

“Salty Discharge” Monitoring At NPDES/SDS Permitted Facilities

Background

Wastewater from some process streams contains high concentrations of chlorides, sulfates, salinity, and dissolved minerals. For simplicity, they are often referred to as “salty discharges”. 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.); food processing using density-based (saline) sorting; and, beverage, ethanol, biofuels, meat jerky or cheese production, and animal rendering industries.

The Minnesota Pollution Control Agency (MPCA) currently has limited information about concentrations of these parameters in discharges for most National Pollutant Discharge Elimination System (NPDES) permitted facilities. Available data indicates concentrations of some minerals in reject waste streams, even those that are discharged to a Publicly Owned Treatment Work (POTW), may be high enough to result in exceedances of water quality standards in the receiving water. A few POTWS have even had whole effluent toxicity test results that seem to indicate excessive salt concentrations. To address this, the MPCA began in 2009 to add monitoring for “salty” parameters to NPDES permits as they come up for reissuance or as new permits are issued.

If monitoring data for any facility indicate a reasonable potential to cause or contribute exceedance of a water quality standard for any of the parameters, the Permittee will be required to submit an application for a permit modification. A compliance schedule may then be added to the permit to ensure progress towards meeting the standards. The compliance schedule will contain a requirement for the facility to either demonstrate compliance with the standard as soon as possible or submit a variance request with the application for permit reissuance. A variance would remove the limit for the specific parameter that the facility is requesting the variance for. The variance of a parameter is temporary; the variance is revisited at least when the facility NPDES/State Disposal System (SDS) permit expires. It is expected during the permit cycle that the Permittee will take steps toward compliance with the water quality standard/effluent limit. Variance approvals involve a long process and are difficult to obtain.

Monitoring Parameters

Industrial and Municipal facilities with continuous, periodic/seasonal, or intermittent waste flows where the receiving water stream flow to effluent design flow dilution ratio is less than 5:1 under low flow conditions (Average Dry Weather Design Flow [domestic] or Maximum Daily Design Flow [industrial]) will be required to monitor the effluent for the parameters listed in Table 1.

In addition, 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 POTWs 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. Stabilization ponds with a controlled discharge (where the discharge is for short durations during permitted, pre-defined periods in spring and fall) will be required to monitor effluent if influent salty waste streams are present.

Table 1. Monitoring Parameters

(More items may have to be monitored if the receiving water is classified for use as a source of drinking water.)

Analyte (January – December MoMax)	Units	WQ Standard/Justification
Chloride	mg/L	Class 2 and 3
Ca and Mg Hardness as CaCO ₃	mg/L	Class 3
Specific Conductance	umhos/cm	Class 4A
Total Dissolved Salts (a.k.a:solids)	mg/L	Class 4A
Sulfates as SO ₄	mg/L	Class 4A,4B
Bicarbonates (HCO ₃)	mg/L	Class 4A
Sodium	mg/L	Class 4A
*Calcium	mg/L	Class 4A
*Magnesium	mg/L	Class 4A
*Potassium	mg/L	Class 4A
Whole Effluent Toxicity (WET)**		Use U.S. EPA Method 821-R-02-013 for chronic WET testing for fathead minnows and Ceriodaphnia dubia, if the receiving water is a Class 2 (fisheries waters) or 821-R-02-012 for acute WET testing fathead minnows Ceriodaphnia dubia and Daphnia magna, if the discharge does not impact a Cass 2 water

*Analytes necessary to calculate Sodium as percent total cations. The sodium water quality standard is 60 percent of total cations.

**WET testing will be applied to Permittees on a case-by-case basis.

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 NPDES/SDS permits as they are reissued. 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	Monitoring Frequency	Sample Type	*Duration
Class A	1 x month	24 hour flow composite	2 years minimum
Class B	1 x month	24 hour flow composite	2 years minimum
Class C	1 x quarter	24 hour flow composite	2 years minimum
Ponds (controlled discharge)	2 x week (during discharge)	Grab	NA

*Permittees may request reduced monitoring after two years of data collection if the data does not indicate a reasonable potential to exceed a water quality standard; or after a minimum of 10 samples for Permittees with stabilization ponds with controlled discharges.

Water Treatment Plants: For plants which have a higher risk of impacting surface waters, such as those using zeolite, reverse osmosis, or potassium permanganate treatment, monitoring shall be once per month. For plants which are considered to be of lower risk, such as those that use lime, monitoring shall be quarterly.

Industrial Facilities: Monitoring frequencies will be determined on an individual basis and generally consistent with domestic wastewater facilities. The determination will be made based on the industrial facility process(es), the ratio of the various waste streams to the whole, the receiving waterbody, and whether the parameters of concern are known to be present or suspected to be present. The typical monitoring frequency for the salty discharge parameters for industrial facilities, such as ethanol facilities, is once per month.

Treatment Technologies

If a receiving water is listed for not meeting water quality standards due to high salts, additional treatment of the wastewater discharges to that water may be necessary. Some locations, such as those located in the southwestern part of the state, may also have drinking water sources that are naturally hard and high in salts.

These locations may require additional treatment of either the wastewater flow, community drinking water supply, or both, in order to address high salts.

Treatment of hard drinking water may include lime softening or an advanced filtration process. Softening of the water supply at the point of use, such as with individual residential units, often involves an ion exchange process utilizing salt crystals. These processes can further increase the overall salt concentration in the wastewater flow.

Softening of the total water supply with a non-salt process may eliminate the need for individual point of use ion exchange softeners. Advanced filtration usually involves the use of a membrane filter, such as reverse osmosis, to remove the salts.

Some cities are investigating pollution prevention alternatives to try to reduce the amount of salts used to treat the water supply. These programs generally focus on calibration and optimized operation of individual water softening units to a flow based rather than time based regeneration cycle to reduce the total amount of salts added to the water supply. There is no conclusive evidence that a pollution prevention program of this type will have a significant reduction in salt concentrations. A program of this type may have some benefits, but will most likely to be part of a broader salt reduction program that includes some treatment of both the drinking water and wastewater flows.

Additional treatment will provide a higher quality drinking water supply, but also produce a waste that has an even higher salt concentration that still needs to be addressed. It may be discharged to a wastewater treatment facility, but that may cause problems there as well. Wastewater treatment methods for mineral salts are essentially the same as for drinking water supplies and usually include reducing the volume of the waste stream to a manageable quantity.

If a program to reduce a salty discharge is necessary, it will likely require a combination of methods. From pollution prevention, pretreatment of industrial wastes and other high concentration sources, to treatment of the entire wastewater and drinking water flow stream. Each situation will probably have a unique combination of methods tailored to the specific conditions that contribute to the salty discharge.

Additional Considerations

Note that not all permitting situations will fit neatly into this guidance. If you have questions regarding the new NPDES/SDS Permit monitoring requirements, please contact the Permit or Compliance staff for your facility.