

Strategy for municipal chloride reduction and minimization

The goal of this strategy is to help municipalities develop a chloride investigation and minimization plan that results in chloride reductions to the maximum extent possible. It walks through steps to best determine possible sources of chloride, implement chloride reduction options, and evaluate their effectiveness on an annual basis. This strategy was put together with language from the chloride variance permit process in mind; however, it can be used for any chloride reduction effort. It is only a guide. Once an inventory is done, the city is responsible for considering source reduction options with help and guidance by the Minnesota Pollution Control Agency (MPCA).

The steps to develop a plan are:

1. Evaluate chloride at your wastewater treatment plant (WWTP)
2. Create a chloride source inventory
3. Identify options to reduce the chloride at the source
4. Review annually to see what worked and what things need to be changed

1. Evaluate chloride at your wastewater treatment plant

To understand how chloride affects the WWTP, trends and patterns need to be examined using data collected each month. This information can be found at the Wastewater data browser¹ or you can use your own records to look at values over time². Changes in flow, concentration, or load could reveal trends that could be directly related to activities in the collection system and could be opportunities to target reduction activities. Pay attention to:

- Clean-outs or maintenance of equipment
- Weather events
- Seasonal changes in food production or other seasonal users
- Other?

You may also monitor the collection system using a specific conductance meter or total dissolved solids (TDS) meter. This is a cost effective way to narrow down sources of chloride and target reduction activities.

2. Create a chloride source inventory

In order to lower the concentration of the chloride pollutants that reach the WWTP, it is necessary to evaluate the users of the system. This starts with an inventory. The MPCA suggests breaking the users down into the specific source categories listed below. These are only suggestions for beginning an inventory. You may know more about the sources in your community.

¹ <https://www.pca.state.mn.us/data/wastewater-data-browser>. Find your facility in the list or on the map, and choose 'Chloride, Total' under Parameter. Click on the DMR bulk export tab. Download the data to an Excel file.

² Contact MPCA (Brad.Gillingham@state.mn.us) if you have a Pond facility and would like help with this data collection.

Industrial

- Industrial water treatment systems that send their reject water to the WWTP
 - Reverse Osmosis (RO)
 - Ion exchange (water purification)
 - Ultrafiltration systems
- Leachate from landfills
- Food processors (meat, jerky or cheese production)
- Rendering plants
- Breweries
- Ethanol
- Biofuels
- Drink bottlers
- Metal finishing or metal painting (including powder coat painting).
- Car/truck washes (for both salt coming off vehicles, but also type of water conditioning, i.e. ion-exchange water softeners)

Institutional

- Hospital
- Nursing home
- Assisted living facility
- School

Municipal

- City-owned buildings that have ion-exchange water softeners
- Water treatment plant
- Inflow and infiltration

Commercial

- Hotels
- Restaurants
- Office buildings

Residential

- Type of softeners found in homes

Once this is complete, one idea is to rank these sources as “high, medium or low” priority for targeting reductions. You may want to focus on larger sources first, or potentially those that have more clear or immediate reduction options. Another option would be to look at the amount of water sent by different sources and start by analyzing large users.

3. Reduce chloride

Once you have created your Chloride Source Inventory, you will be able to work on your options to reduce chloride being discharged to the WWTP. As part of this strategy, you will develop a more detailed understanding of each source’s chloride contribution to the WWTP and establish chloride reduction goals by identifying cost-effective options that will reduce chloride loadings. The following section provides some chloride source analysis

and reduction ideas to get you started. You are not limited to these examples and are encouraged to find other analysis/reduction activities that are specific to your situation.

If your facility has a variance, or you expect to need one, all of these criteria must be considered. Therefore, although the language below says “may”, if your facility has a variance or expects to need one, you must consider each of these suggested alternatives. This includes **when** these activities will occur and **how much** of a reduction is anticipated. This will meet the requirements in the section of your permit titled “**Total Chloride Water Quality Based Effluent Limit Variance Schedule of Compliance**”, specifically the requirement that asks for the development of a Plan 180 days after permit issuance.

Industrial

- You may have industrial users and/or significant industrial users (SIU). More information about the differences between these two can be found at <https://www.pca.state.mn.us/water/wastewater-pretreatment>. You may ask industries to monitor for chloride or establish a local limit for chloride and report it.
- In addition, an onsite walk through and interview of the local businesses can prove beneficial. These types of walk-throughs are required for SIUs.
- Educate the members and businesses of the community about the need to reduce chloride pollution.

Institutional

- Investigate the type, age and condition of softeners in these institutions. Work with the institution to determine the timeline in which to optimize or install new softeners.

Municipal

- For ion-exchange softeners in city-owned buildings, consider controlling the source by optimizing, updating and/or replacing the softeners.
- For sources of inflow and infiltration, evaluate correction and repair.
- If the municipal source is the water treatment plant (WTP), document the type of treatment (RO, filtration, etc.) whether there is a problem with arsenic or radium, and flow. Then consider other options for the discharge, focusing on re-use of treatment plant effluent.
- You can also evaluate alternative water treatment technologies, including those that provide centralized softening. Specifically, MPCA designed the variance criteria to include municipal consideration of centralized softening if it is feasible (meaning it does not cause substantial and widespread social and economic harm). Your city can utilize the chloride variance eligibility tool developed by the MPCA³. Under the variance process, you must re-evaluate the conditions under which the variance is granted. This includes evaluating the feasibility of central softening and removal of in-home ion-exchange water softeners. If you are operating under a variance, the permit will require the city to take a close look at this every five years.

Commercial

- Educate commercial entities on the availability of products and processes that do not contain or discharge chloride. Work with the commercial entity to determine a timeline in which to optimize or install a new softener.

Residential

- Initiate a public education program that focuses on sources in homes. Educate residents on their water hardness, and what is considered a reasonable level of hardness to maintain appliances.

³<https://www.pca.state.mn.us/water/water-permit-holders-and-chloride>. Consider using the ‘eligibility tool for streamlined chloride variance approach’ (wq-wwprm2-17) to consider cost impacts.

- Investigate the type, age and condition of residential softeners. One option is to collaborate with the local water softener retailer(s). You may want to use a ‘sewershed’ approach; an area of the city that utilizes one main pipe to bring wastewater to the WWTP).
- Consider optimization and/or updates to residential softeners.
- Create an ordinance that will require flow-based or high-efficiency water softeners.
- Evaluate regional or centralized water softening. As stated above, if operating under a variance, your city must re-evaluate the conditions under which the variance is granted every five years. A big part of this variance is that centralized water softening and removal of home softeners is the most cost-effective approach to reducing chloride at the WWTP; however, in many cases, it still causes substantial economic hardship. Keep an eye out for all opportunities. For example, if a drinking water plant needs updating or a city is looking at regionalizing city services, it may become cost effective. The city needs to be ready if/when this happens.
- MPCA wants the Permittee to consider any and all options to address residential sources and execute the ones that makes the most sense for the city based on resources (time, cost, available staff, etc.).

4. Review annually

You should annually review your chloride reduction activities. This annual review or progress report should describe what activities you implemented and the environmental impacts.

If your facility has a variance, all of the below questions must be considered to meet the requirements of “**Total Chloride Water Quality Based Effluent Limit Variance Schedule of Compliance**”, specifically the requirement that asks for annual progress reports. Look at both what occurred in the last 12 months, and change the plan to address what will occur in the next 12 months, including continuation of activities.

Program/Activity review

The programmatic review should look at whether you have been able to (or are on track to) effectively implement the programs and activities that you planned. The annual review should answer the following questions:

- What was in your plan for the year that you are reviewing and/or reporting on?
- What did you do, and how well did it work? Were you able to make progress on or accomplish the specific activities laid out in your plan? If so, what was completed or how much progress did you make?
 - Include any relevant metrics or measurements, such as percent reduction in pounds of salt applied, or number of softener tune-ups.
- What factors influenced the success (or lack of success) for any given program or activity? If there were barriers to the implementation of a specific activity, how do you plan to address those?
- Are there any significant changes in your area, particularly in terms of new sources?
 - **For industrial sources**, are there any new industries? What kind of onsite training and/or permitting needs to be done?
 - **For commercial sources**, are there any new businesses? What kind of onsite education can be done?
 - **For residential sources**, have there been any new developments that need to be looked at and provided with education?
- What is the plan for next year? Do you need to adjust that plan to account for any barriers described above? Do you need to adjust the plan to include any new sources?
 - If your facility has a variance, also consider the long-term outlook for completing the activities in your investigation and minimization plan. In particular, how has what you have learned and implemented so far impact the 5-year, 10-year and 15-year outlook for your overall plan?

Environmental impact

The review should also, to the extent feasible, evaluate or estimate the environmental impact from the actions taken. Collect all chloride monitoring information from the last year, and correlate any reductions with actions taken. This could include any additional monitoring using TDS or Specific Conductivity meters.

MPCA is in the early stages of developing a tool to estimate the load reductions that specific activities may have on a municipal WWTP. Currently, a Smart Salting Assessment tool (SSAt) is available for cities to evaluate road-salt application practices. Specifically, it outlines how safety can be maintained and salt can be saved by changing practices. The plan is for the tool to implement GIS capabilities to help cities focus on specific sources. This document and the webpage will be updated when this tool is available.