Alexandria Lake Area Sanitary District
Chloride Investigation and Minimization Plan (CIMP)
February 2026

Prepared for
Alexandria Lake Area Sanitary District
Alexandria, Minnesota
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Section 1

Introduction

Chloride is commonly used in Minnesota as a component of both road salts and in water softeners to treat "hard" water. Groundwater in Minnesota generally has high levels of calcium and magnesium that is commonly removed through water softening to prevent lime scale buildup in appliances, pipes and water fixtures. Water softeners use sodium chloride (NaCl) in a softening process that replaces calcium and magnesium ions with sodium, while the chloride ions are discharged in wastewater and eventually end up in the environment.

High chloride levels can cause significant impairments to surface water quality. Chloride released into local lakes and streams does not break down, and instead accumulates in the environment, potentially reaching levels that are toxic to aquatic wildlife and plants. Because salt water is more dense than fresh water, it settles at the bottom of lakes potentially preventing the natural mixing of oxygen and nutrients and in effect creating a "dead zone". To address statewide chloride impairments in lakes and waterways, the Minnesota Pollution Control Agency (MPCA) has completed significant studies over the past decade and has recommended chloride source reduction measures based on the determination that there are currently no feasible alternative for treating chloride once it is dissolved into water (December 2018, MPCA Alternatives for addressing chloride in wastewater alternatives and October 2020, Minnesota Statewide Chloride Management Plan).

The MPCA has authority to require discharges to comply with water quality standards using the Clean Water Act and National Pollutant Discharge Elimination System (NPDES) permits and has adopted the United States Environmental Protection Agency's (EPA) recommended water quality criteria for chloride: acute (short-term) exposure is 860 mg/L and chronic (long-term) exposure is 230 mg/L. Variances are used by the MPCA to implement a logical and reasonable pathway to meeting permit requirements. The variance process considers economic factors that allow more flexible timelines and offers the potential for renewal of a variance if the permit goal remains unachievable.

Section 2

Background

Alexandria Lake Area Sanitary District (ALASD) operates the sanitary sewer collection system and Water Reclamation Facility (WRF) to provide wastewater services to the City of Alexandria, and the surrounding townships of Alexandria, Carlos, Hudson, Ida, LaGrand, Lake Mary, and provides contract sanitary services to the City of Nelson, City of Forada, Leaf Valley and Miltona Townships, Carlos State Park and two rest areas. The ALASD service area covers approximately 105 square miles and a population of more than 28,000 people.

Sources of wastewater flow to ALASD's system include residential, industrial and commercial/institutional facilities from area cities and townships located within the ALASD service area. Alexandria Light Power Utilities (ALP) operates the public water supply and has the same service area as the City of Alexandria. The residential and commercial areas outside the City of Alexandria/ALP service area use private well water. Treated wastewater collected from within the ALASD service area is discharged from the WRF to Lake Winona. Approximately one-half the flow and loading to the WRF is from users located within the City of Alexandria (i.e., ALP/public water supply users) while the other half is from users whose water supply is from private wells.

Lake Winona was placed on the 2010 MPCA Clean Water Act [CWA Section 303(d)] list of impaired waters due to excess chloride which impedes the attainment of designated uses for Aquatic Life and Industrial Consumption. Lake Winona is exceeding the 230 milligram per Liter (mg/L) chronic standard intended to protect Class 2B waters for the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. Lake Agnes and Lake Henry were also added to the list of impaired waters in 2014 due to excess chloride.

In November 2020, the Alexandria Lake Area Sanitary District (ALASD) applied for and was granted a variance from the chloride water quality standard in Minnesota Rule 7050, designed to protect the Class 2 beneficial use of the receiving water. The basis of the variance is "controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act (CWA) would result in substantial and widespread economic and social impact". During the term of the variance, the ALASD WRF is required to comply with the highest attainable condition for the pollutant which the variance is granted. To ensure this is met, an alternate effluent limit was developed and became effective as part ALASD's permit requirements. An alternative effluent limit of 839 mg/L (calendar month average) has been consistently achieved in compliance with ALASD's NPDES permit (issued November 2020). The NPDES permit also required specific efforts to reduce chloride including the development and implementation of a Chloride Identification and Minimization Plan.

ALASD submitted a Chloride Investigation and Minimization Plan (CIMP) to the MPCA in May 2021 (Appendix A), as required by NPDES Permit MN 0040738 and has actively pursued chloride reduction as demonstrated in annual progress reports submitted to the MPCA. ALASD's most recent NPDES permit was issued August 22, 2025, and expires July 31, 2030. Under the terms of the recent NPDES permit (Special Requirements Section 5.12.34 – 5.12.53), ALASD is required to update their CIMP and continue actions to reduce chloride discharge to Lake Winona in accordance with the variance requirements. The current alternate effluent limit for total chloride discharge from the ALASD WRF is 805 mg/L (calendar month average). Upon expiration of the variance, ALASD is required to comply with the state-standard final effluent limits of 230 mg/L (monthly average) and

252 mg/L (daily maximum) or apply for a subsequent variance. The ALASD is represented in Figure 1 below.

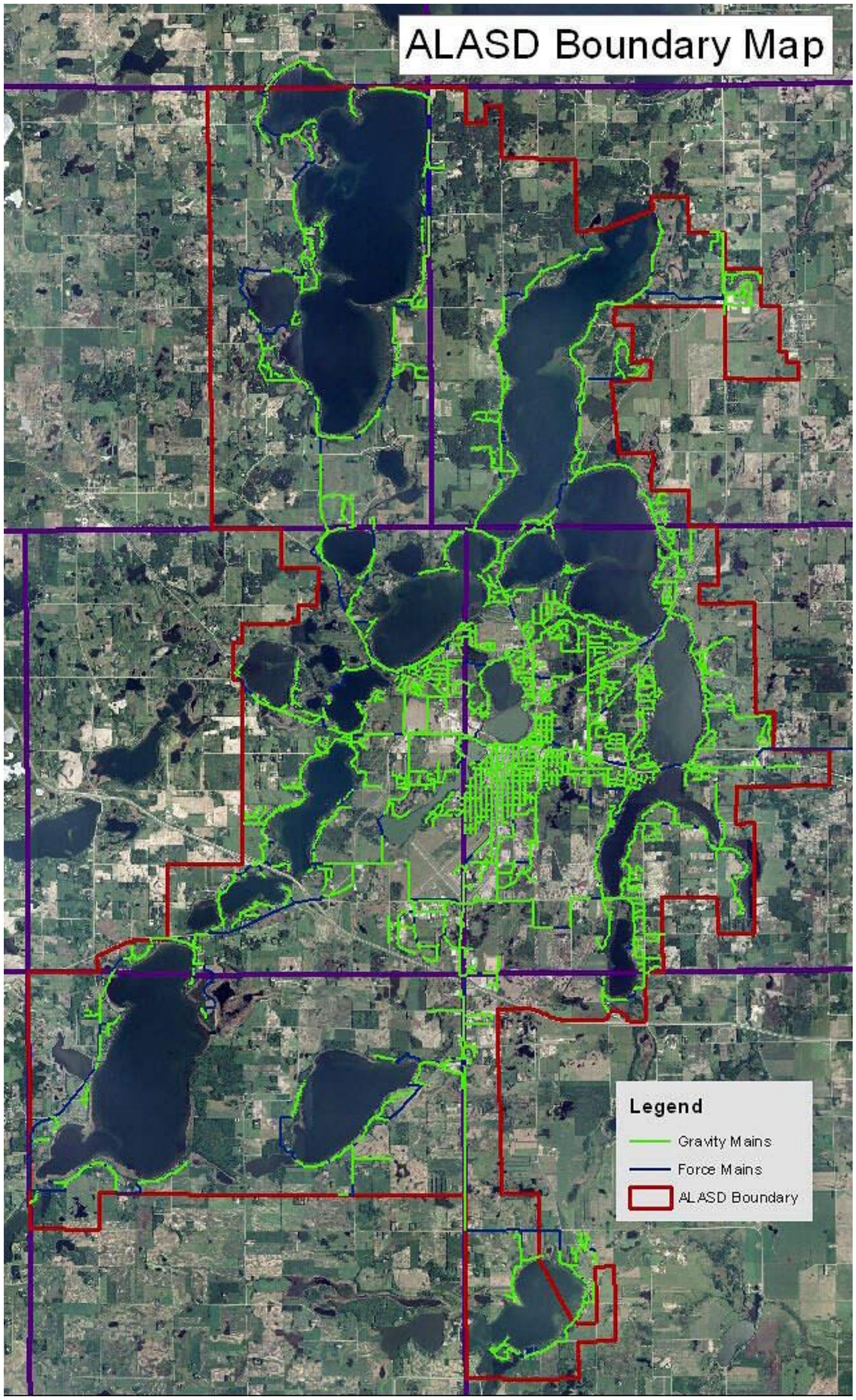

Figure 1. ALASD Boundary Map

Section 3

Data Review

3.1 Influent and Effluent Chloride Levels

Historic influent and effluent chloride concentrations from the WRF are summarized in Table 1. Monthly chloride testing is completed on the influent wastewater stream at the WRF, and bi-monthly testing is completed on the effluent flow. Over the past 5 years, the average influent and effluent chloride concentrations from the WRF are approximately 738 mg/L and 721 mg/L, respectively. While ALASD continues to implement chloride reduction efforts such as those described later in Sections 3 and 4 of this report, the data in Table 1 suggests only minor changes in chloride concentrations. Despite some progress through home softener replacements, the combination of increased residential development, inflow and infiltration (I/I) improvements throughout the collection system, weather variations, and the lack of industrial upgrades are likely reasons for no noticeable trend in chloride concentrations. Severe drought conditions contributed to minimal I/I and therefore less dilution, resulting in higher concentrations reported in 2021 and 2023. Additionally, ALASD capital improvement projects over the past five years have targeted I/I reductions which also result in higher chloride concentrations due to less dilution.

Table 1. ALASD Chloride Influent and Effluent Concentrations and Loads, 2015-2025

Year	Influent Concentration (mg/L)			Effluent Concentration (mg/L)		
	Average	Minimum	Maximum	Average	Minimum	Maximum
2015	740	625	849	717	559	818
2016	830	658	815	713	591	782
2017	690	566	778	659	506	752
2018	740	610	810	697	623	821
2019	690	534	884	615	216	771
2020	720	620	802	719	647	797
2021	757	627	866	739	588	831
2022	691	533	828	679	430	816
2023	782	700	842	747	585	803
2024	739	515	835	716	458	790
2025	720	540	825	725	530	795

3.2 Lake Monitoring

In addition to regular monitoring of the influent and effluent chloride concentrations, ALASD conducts periodic sampling of chloride concentrations in Lake Winona and the Alexandria area chain of lakes. Yearly chloride concentration monitoring at nine lakes around Alexandria is summarized in Table 2 and Figure 1. Winona and Agnes were sampled bi-monthly, and the remaining lakes were sampled monthly.

Table 2. Area Lakes Chloride Concentration Monitoring Data (mg/L), 2020--2025							
Lake Name	Overall Average	2020 Average	2021 Average	2022 Average	2023 Average	2024 Average	2025 Average
South Winona	488	461	575	430	560	463	437
North Winona	472	447	560	398	544	456	424
Agnes	449	389	491	410	487	481	437
Henry	448	384	454	442	463	488	456
Darling	19	19	18	17	19	19	19
Carlos	40	36	37	39	38	42	46
Le Homme Dieu	106	82	99	111	112	123	107
Geneva	23	21	24	22	24	25	22
Victoria	21	20	22	20	26	21	19

The lakes closest to ALASD (South and North Winona, Agnes, and Henry) show slight decreases in average chloride concentrations in 2025. Lakes further downstream in the chain showed minimal impact and are well below the target chloride concentration limits. The chloride concentration monitoring data from the last 5 years is also represented in Figure 2.

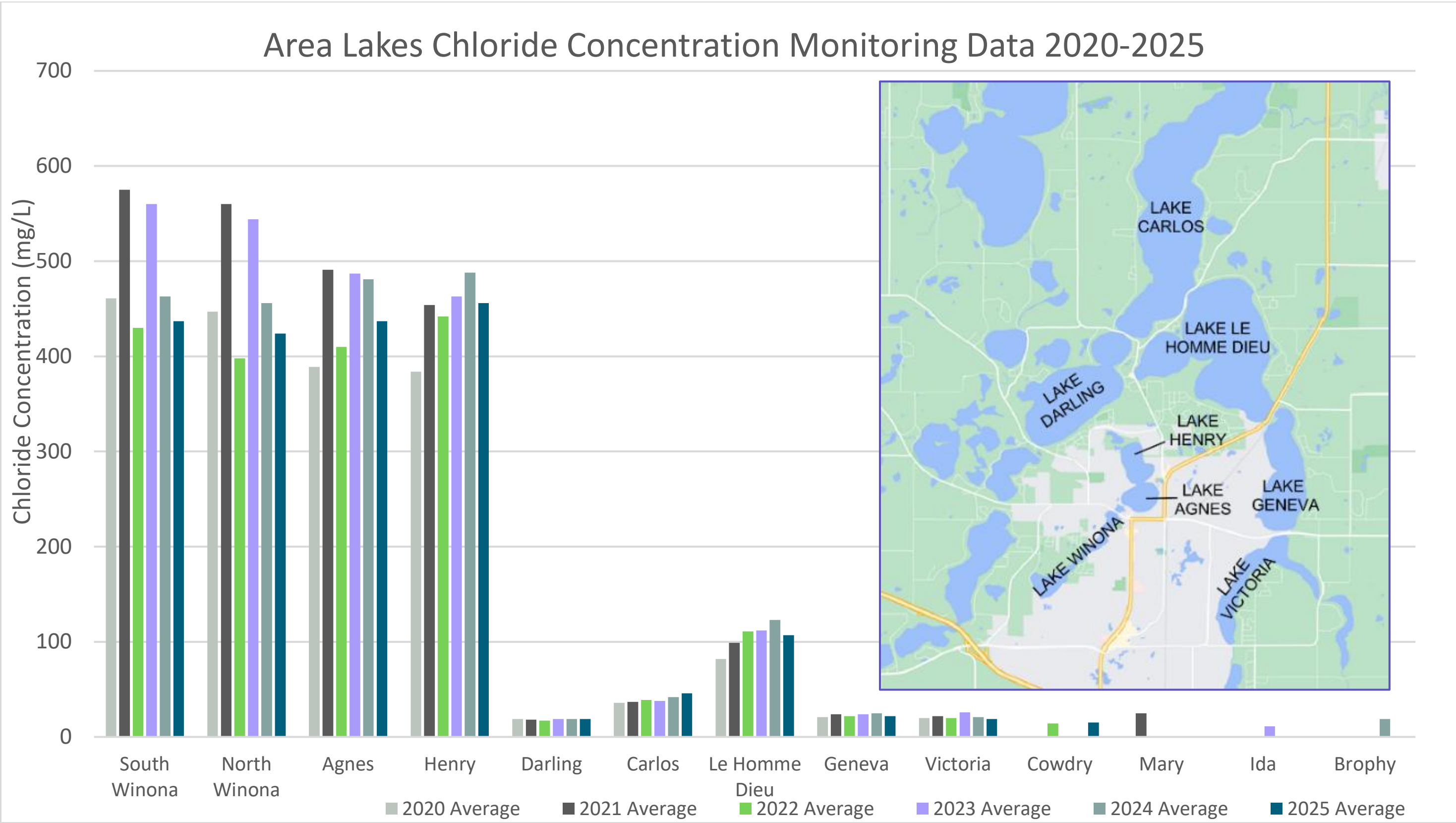

Figure 2. Area lakes chloride concentration monitoring data (mg/L), 2020-2025

3.3 Chloride Source Identification

In the 2021 CIMP, ALASD presented supplemental chloride sampling data from various residential, industrial, and commercial/institutional sources and compared the chloride loading by category as seen in Figure 3. Based on a review of user flows and past data, the breakdown of source contribution has not changed significantly since the original mass balance study in 2021. For more detailed information and background information, please refer to 2021 CIMP.

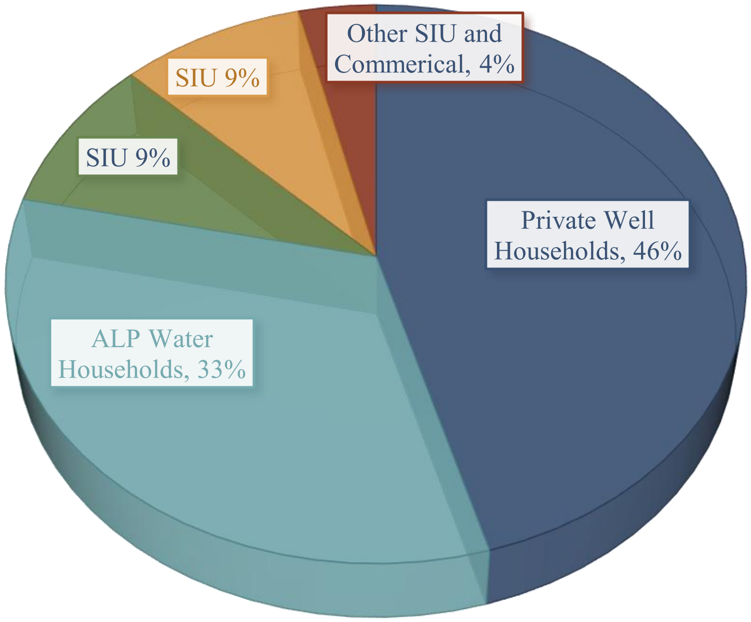

Figure 3. Estimated influent chloride source distribution

The significant industry users' (SIUs) wastewater discharge is approximately 15 percent of the total WRF influent flows and 20 percent of the chloride load to the WRF. The majority of the industrial and commercial is from two SIUs Other SIU's and commercial or institutional facilities account for less than 5 percent of the total chloride load to the WRF.

The chloride mass balance summary provided in Table 3 on the following page was developed in 2021 based on sampling identified points in the collection system such as manholes, lift stations, SIU's, large institutional, and car wash facilities.

Review of 2025 SIU results and ALASD user flows indicate minimal change in the mass balance over the past five years The chloride sampling summary provided below in Table 3 is representative of current chloride loading to the WRF.

Table 3. ALASD Chloride Sampling Summary (Feb. 2021)

Location	Average Chloride Concentration (mg/L)	Typical Flows (mgd)	Estimated Chlorides Load (ppd)
Sunopta Ingredients	1,170	0.163	1,590
Sunopta Aseptic	1,400	0.133	1,557
Alex Extrusion	510	0.001	5
Alex Hospital	530	0.024	108
Douglas Machine - North	310	0.058	150
Douglas Machine	300		
3M	1,010	0.017	150
City of Nelson	610	0.002	10
TWF	820	0.012	80
Carwash North	370	0.010	30
Carwash South	1,350	0.010	120
Residential - All Private Well Water	830	1.16	8,030
Residential- All ALP Water Sources	600	1.16	5,800
WRF Influent	820	2.84	19,420
WRF Effluent	780	N/A	N/A

Section 4

Current Reduction Efforts

4.1 Rebate Programs

ALASD offers rebates for both water softener improvements and brine disposal system installations for private wells. Information regarding the residential water softener rebate program can be easily found at the top of the ALASD main website (https://alasdistrict.org/rebates/). ALASD promotes the rebate program through educational information mailed annually to residential users. Rebate program details are also presented in Appendix B.

As of December 2025, there was an overall total of 1058 water softener replacements/rebates in the ALASD service area. The residential softener rebates reflect the number of softeners upgraded to meet high efficiency standards since 2022.

ALASD also evaluated and developed an industrial chloride reduction rebate program in 2024 and has been working with SIUs to develop chloride reduction plans in conjunction with the rebate program. Funding for this program was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources. Two SIUs have applied for the MPCA chloride reduction grant, and one received a grant award notice in 2025 with expected project completion in early 2026. ALASD continues to meet regularly with SIUs to promote the industrial chloride reduction rebates.

4.2 Ordinance for New Residential Builds

The following ordinance updates were adopted for softener efficiency standards in January 2024. The sewer ordinance can be found on the ALASD website (https://alasdistrict.org/wp-content/uploads/2024/01/2024-sewer-use-ordinance.pdf).

- Section 1.30 – Chloride Reduction Measures:
  - Subd. 1 All new connections to the ALASD system shall be required to install high-efficiency water softeners to reduce chloride discharges caused by brine generated from water softening, effective June 1, 2024.
  - Subd. 2. No time-based softeners will be allowed connection to or allowed to discharge brine to the ALASD system effective January 1, 2030.
  - Subd. 3 Effective January 1, 2030, all softeners connected to or discharging brine to the ALASD System shall meet the following requirements: NSF/ANSI standard 44 with minimum efficiency of 4000 grains/lb. regenerated salt.
  - Subd. 4 Every person owning property with a structure that discharges into the sanitary sewer system shall allow an employee of the ALASD or a designated representative of the ALASD to inspect the buildings to confirm softener system connected to the sewer system are compliant with the requirements of this Section. The ALASD may periodically re-inspect any building or premise to determine compliance with the requirements of this Section.

4.3 Sewer User Education

Educational brochures, fact sheets, ALASD website, and postcards have been updated and distributed to ALASD users yearly regarding high efficiency (HE) softeners, HE softener rebates, and estimated salt usage reduction. These documents provide facts regarding salt reduction efforts, highlighting the fact that HE softeners can reduce chlorides by up to 50 percent and that rebates are available. ALASD has also contributed regularly to local radio shows providing educational information including promoting smart salting, softener replacement/rebate program, and chloride reduction efforts in the area.

In additional to distributing educational brochures, ALASD has delivered educational presentations and facilitated discussions at several venues each year including an Earth Day Educational Booth, Children's Water Festival, STEM Education Expo, Discovery Middel School, and various ALASD Board meetings. More information and documentation on these events are included in the annual progress reports submitted to the MPCA.

4.4 Smart Salting Training

ALASD staff participate in the MPCA Smart Salting Certification Program on a regular basis. The goals of this program are to educate trainees on the harmful impacts of chloride on the environment, improve overall education available to homeowners and businesses about best water softener practices, provide knowledge and resources to assist in water softener evaluation and improvements, and ultimately reduce chloride discharge to Minnesota waters. Several ALASD employees were sent to Smart Salting Training in 2023 and 2024 and the ALASD staff continue to implement practices such as the use of minimal salt on ALASD property. The City of Alexandria has also sent employees to Smart Salting Training. ALASD hosted the MPCA Smart Salting for Softener Optimization training in 2025, where three ALASD employees attended.

The City of Alexandria has also completed Smart Salting Training as part of the ALASD Chloride Citizens Advisory Committee (CAC) presentations, City of Alexandria Public Works estimates 500 tons of deicing salt is applied to roads within City limits each year. Approximately 90 tons of deicing salt is used within the Lake Winona drainage area and 30 tons within the Lake Agnes drainage area.

4.5 Collaboration with Significant Industrial Users

Since 2022, ALASD staff have been meeting with SIU representatives to discuss chloride requirements and reductions needed to reduce chloride discharge to the ALASD sewer system.

In 2024 and 2025, SIU permits were modified to include requirements related to chloride reductions. ALASD continues to collect SIU effluent samples and test for chloride concentrations on a quarterly basis. The permit application can be found on the ALASD website (https://alasdistrict.org/wp-content/uploads/2026/01/2026-Commercial-Sewer-Permit.pdf).

One SIU is currently in the process of implementing a capital upgrade to their water treatment process which will reduce/eliminate salt usage by installing carbon filtration followed by reverse osmosis (RO) system on their incoming water supply. A second SIU is piloting/evaluating water treatment alternatives and budgeting for 2026 capital improvements. A third SIU reviewed three cost scenarios for chloride reduction but has not moved forward with implementation at this time. ALASD will continue to encourage reducing salt usage for all industrial customers. Each SIU received information regarding limits and potential surcharges in 2025.

In addition, ALASD has promoted the Minnesota Technical Assistance Program (MnTAP) resources to SIUs. It is anticipated that 1-2 SIUs will be working with MnTAP in 2026. SIUs also attend and are a member of the ALSAD Chloride Citizen's Advisory Committee.

4.6 Collaboration with Public Water Supply

Meetings with ALP (Alexandria's public water utility) were held to discuss options for centralized softening. ALP commissioned a consultant in 2024 to provide a feasibility level study of the costs to add centralized softening at the water treatment plant (serves the City of Alexandria residents only). ALP is currently focused on capital projects to increase/update water storage capacity and add new wells/treatment to address per- and polyfluoroalkyl substances (PFAS) to meet regulatory requirements which is expected to increase user rates significantly due to capital costs. The current water treatment plant (WTP) useful life and capacity provide approximately 10 to 15 years before an upgrade is required. RO and Lime softening were evaluated for future upgrades and proposed in 10 years based on current rate affordability concerns. ALP continues to participate in ALASD Citizen Advisory Committee meetings and provides updates at CAC meetings.

Section 5

Future Reduction Efforts

5.1 Chloride Reduction Rebates

The rebate program as described in Section 4.1 will continue to be offered to ALASD users. This program will be expanded to include commercial rebates in future years.

ALASD will also continue to provide rebates for brine removal systems (i.e. for private well users that meet design per Douglas County) as well as for salt-less conditioners ALASD continues to research saltless water conditioning technologies Current technologies are not currently recommended as an alternative to private home water softeners, especially those with private wells. Due to the high hardness from both ALP and private wells, these technologies are not likely to meet the needs of the households in the area. In addition, concentrations of other ions from groundwater may impact overall efficacy of the technology and result in significant corrosion issues within the households. However, ALASD will continue to investigate technologies to assess suitability and is in discussion with vendors and other communities that have grant funds for a similar pilot program.

ALASD monitors chloride reduction by tracking softener rebates for replacements on their Asset Management Geographic Information System (GIS). In addition, ALASD evaluates/estimates salt reductions by conducting surveys of users that have updated to new HE water softeners. In conjunction with ALP, information to identify timer-based softener systems within the City of Alexandria/ALP service area is being documented within the ALASD GIS system.

5.2 Non-point Discharges/TMDL Study Underway

MPCA is completing a TMDL study (chlorides) for Lake Winona, Agnes, and Henry Draft report is expected in late-2026.

5.3 Industrial Reductions Underway

Past and current efforts for chloride reductions by SIUs are provided in Section 4 of this report. The industrial rebate program was developed and implemented in 2024/2025. ALASD meets at least annually with all SIUs and actively promotes chloride reduction by providing information on available grants, referrals to MnTAP, and ALASD's chloride reduction rebates. ALASD will also require continued monitoring of SIUs chloride concentrations on a quarterly basis.

As noted in Section 4, one SIU is installing chloride reduction equipment in 2026. The two largest SIUs have hired a consultant to develop chloride reduction alternatives and cost estimates. This effort is underway. Another SIU has evaluated three alternatives but has not moved forward due to cost infeasibility. ALASD continues to actively meet with SIUs to monitor progress on chloride reduction.

ALASD plans to model potential impact to industries if future treatment equipment is required/installed at the WRF to remove chloride. Future treatment costs would be used to model/determine potential surcharge rates for chloride concentrations over 230 mg/l average. Future evaluation of these costs will need to be reviewed with SIUs and ALASD Board of Directors to determine how surcharges may be applied.

5.4 Continued Collaboration with Public Water Supply

ALP operates an iron and manganese filtration WTP with chlorine disinfection and was initially built in 1997. The WTP was upgraded in 2010 and has 4.5 million gallons per day (MGD)capacity while current average flows are 1.8 MGD and peak flows are approximately 3.2 MGD. ALP estimated the WTP has 10 to 15 years of useful life remaining before upgrades are needed for rehabilitation or capacity.

Current capital projects for ALP include installing new wells and adding elevated storage capacity. ALP has acknowledged ALASD's concern regarding chlorides discharged from residential softeners and ALASD's request to consider implementing city-wide softening at the ALP WTP. ALP's consultant reviewed four softening technologies for ALP and lime softening was determined to be the most cost-effective. However, ALP also noted that the current WTP has 10-15 years of remaining life and capacity.

While lime softening would also result in softened finished, industrial users would likely require further on-site industrial water treatment to meet process needs and would still be required to meet the 230 mg/l chloride limit for wastewater discharges. Residential and commercial/institutional users would be required to remove all ion exchange water softeners in order to meet the 230 mg/l limit.

While lime softening at the WTP is desired and recommended by the MPCA to address excess chloride discharges from residential softeners, ALP water supply only services customers within the City of Alexandria. The ALASD service area covers approximately 105 square miles and a population of more than 28,000 people. Approximately one-half of the customers are in the City of Alexandria and the remaining half are outside city limits. Consideration of centralized water softening alternative requires extensive water distribution improvements that result in one of the highest cost alternatives for reducing chloride at ALASD.

5.5 Collaboration with MnTAP

MnTAP offers assessment and intern-led projects to help industrial facilities like SunOpta reduce wastewater chloride and achieve measurable environmental benefits. MnTAP's chloride reduction initiative met with SunOpta and tentatively plans to complete site assessments and participate in the intern program, where interns work on-site to map resource usage, identify chloride streams, and collaborate with facility teams to prioritize and implement cost-effective solutions. This partnership emphasizes source reduction. MnTap also reached out to another SIU in Alexandria; however, the status is still pending on that partnership. ALASD will continue to connect significant industrial users to MnTAP for future opportunities.

5.6 Water Softener Optimization

ALASD is currently researching the development of a Water Softener Optimization Program aimed at reducing chloride discharge into the wastewater system. The program would initially focus on improving the efficiency and settings of existing water softeners within the Alexandria Light and Power (ALP) water supply service area. Many newer softeners can operate at significantly lower salt settings but are often programmed incorrectly at installation, resulting in unnecessary salt use and elevated chloride levels. This initiative would complement ALASD's existing Water Softener Rebate Program by targeting optimization of in-place units, rather than solely incentivizing replacement. By addressing programming, efficiency, and user education, ALASD can achieve measurable chloride reductions in a cost-effective manner.

Core Program Targets:

- ALP Residential customers with automatic ion-exchange softeners.
- Commercial users (laundromats, hospitality, food service).
- Homes with newer demand-initiated regeneration (DIR) softeners set incorrectly.
- In-home or contractor-led inspections.
- Testing of incoming water hardness.
- Verification of softener capacity and salt dosage settings.
- Reprogramming units to match actual water hardness and household size.
- Continued education on efficient salt use.

Expected outcome: 20–40 percent salt reduction per unit when improperly programmed.

Section 6

Chloride Treatment Alternatives

6.1 Alternative Analysis Background

Extensive evaluation of potential alternatives to address chloride reduction has been completed by ALASD. This section will summarize and update the chloride reduction alternatives based on past studies and review of current data for ALASD's users. Costs from these previous studies have been updated using the national annual average construction cost index values from the *Engineering News Record (ENR)* to reflect current costs as of February 2026 (Construction Cost Index History - As of February 2026 | Engineering News-Record).

In 2017, ALASD completed a Phosphorus and Chloride Reduction Facility Plan to study treatment alternatives at the WRF to meet long term NPDES permit limits. This analysis was then included/used in the 2021 CIMP which evaluated chloride source reduction alternatives in addition to the chloride treatment alternatives at the WRF.

The 2023 ALASD Water Reclamation Facility Plan estimated costs to address nutrient reductions (both phosphorus and nitrogen), aging infrastructure, and evaluated alternatives/costs if chloride removal is required in the future at the WRF. The 2023 Facility Plan resulted in the implementation of the current improvement project at ALASD to reduce nutrient levels with a project cost of approximately $85 million dollars. The new facility is anticipated to be commissioned and fully operational by 2029; however, does not include improvements for chloride removal. Alternative 5 from the 2023 Facility Plan included the membrane bioreactor (MBR) facility to meet near-term nutrient removal and then added RO in future years for chloride removal after achieving chloride reductions from CIMP source reduction efforts (i.e., 40 percent chloride influent reduction was estimated through the CIMP efforts over a 15-year period).

An additional alternative and estimated cost have been evaluated for chloride removal at the WRF assuming no chloride source reductions to reflect near term costs for meeting chloride limits. Brown and Caldwell modeled and estimated the size/cost to add RO to meet future chloride limits assuming current WRF influent chloride concentrations. It should be noted that this alternative does not align with recommendations from the Minnesota Statewide Chloride Management Plan (CMP) which emphasizes source reduction for chloride through upgrades to centralized water supply treatment, optimizing/upgrading water softeners, and/or industrial reduction programs to reduce chloride use. Minnesota's Statewide CMP indicates treatment technologies for removing chloride at wastewater treatment facilities are considered impractical and prohibitively expensive. This alternative provides an estimated cost to meet chloride limits in the near-term, whereas other scenarios assume a continued variance to allow for long-term source reduction strategy.

6.2 Chloride Reduction Scenarios

Updated chloride reduction scenarios based on past studies and current ALASD user data are listed below. Assumptions and estimates represent a high-level "order of magnitude" comparison.

1. **All Demand Softeners with Limits (HE and Optimization).** Replacement of home softening systems with new, high-efficiency (HE) demand based softening systems at homes throughout all of ALASD's service area. This alternative reduces the overall chloride loads but does not meet future permit limits. However, these source reduction efforts can lower overall costs for future treatment alternatives to meet future limits. The range of predicted ALASD influent chloride concentrations for this alternative is approximately 400 mg/L to 500 mg/L. This alternative would also include implementing ordinances throughout ALASD's service area and may require softener optimization monitoring to maintain reduction levels (i.e., required hardness/softener settings to minimize salt usage).
2. **ALP Softening & Private Well (HE) Demand Softener.** This scenario includes installation of centralized softening at ALP's water treatment plant and may require implementation of an ordinance program to mandate removal of home-based water softener systems within the ALP service area in order to achieve anticipated reductions in chloride. In conjunction with centralized softening at ALP's water treatment plant, rebates/program would be implemented for replacement of softening systems at all private well homes. The range of predicted ALASD influent chloride concentrations for this alternative is approximately 400 mg/L and not sufficient to meet the long-term NPDES chloride permit limit.
3. **ALP Softening Expansion for All Households within ALASD.** Expansion of ALP's water treatment plant and service area to cover all of ALASD dischargers. This assumes a new expanded centralized softening at the current ALP treatment plant and ordinances to mandate removal of home-based water softener systems as discussed above.
4. **ALP Softening and Private Well RO Systems.** In conjunction with centralized softening at ALP's water treatment plant, a program would be implemented for removal of softening systems at all private well homes and installation of "point of entry" RO systems in homes with private wells (i.e., similar to softener rebate program where the private home owner is responsible for installation and operation and maintenance [O&M] of the RO system).
5. **ALP Softening and Partial RO at ALASD WRF.** Centralized softening at ALP's water treatment plant in combination with implementation of partial chloride removal system (RO) at the WRF. Additional treatment at industries to meet pretreatment limits for chloride may be required for SIUs. This assumes removal of all salt-based softening systems in ALP service area, all demand softeners with limits for private well users, and pretreatment limits for SIUs to maintain 40 percent source reduction target which reduces the size/scale needed for additional removal at WRF.
6. **RO at ALASD WRF.** Implementation of chloride removal system (RO) at ALASD WRF without assumed reductions in the influent flow to reflect near-term costs for meeting chloride limits.

Concept-level costs for installation as well as O&M for these alternatives were developed to provide a comparative economic evaluation and are summarized in Table 4.

6.3 Chloride Reduction Alternative Cost Comparison

The most cost-effective scenarios that meet future permit limits are installing softening at ALP WTP plus a partial RO system at the ALASD WRF or installing a larger RO facility at the ALASD WRF to meet future chloride limits. ALP has estimated the existing WTP has approximately 10 to 15 years remaining life/capacity before future treatment upgrades are needed/planned. Alternative 6 does not rely on upgrades at ALP WTP and assumes only end-of-pipe chloride removal. RO treatment also requires brine management systems. RO and the brine management systems have high capital costs and extremely high operating costs due to equipment replacement/maintenance and high electric usage. When assessing future costs and affordability for RO alternatives, the brine management costs must also be considered.

Table 4. Chloride Reduction Alternative Opinion of "Order of Magnitude" Cost Comparison

Number	Alternative Description	Meets Permit Limit	Capital Costs	O&M Costs	20-Year NPV
1	All Demand Softeners w/Limits (i.e. HE)	No	$16,510,000	$1,170,000	$35,580,000
2	ALP Softening & Private Well Demand Softeners (HE)	No	$35,090,000	$1,180,000	$54,320,000
3	ALP Softening for All Households w/in ALASD	Yes	$186,620,000	$1,060,000	$221,010,000
4	ALP Softening & Private Well RO Systems	Yes	$209,910,000	$2,130,000	$244,620,000
5	ALP Softening & Partial RO at ALASD WRF	Yes	$68,110,000*	$7,120,000	$184,142,033
6	RO at ALASD WRF	Yes	$51,610,000*	$8,150,000	$184,427,566

Notes:

- *ALP capital cost upgrades for softening at current WTP were estimated to be $25M (2023) See Appendix C.*
- *Alternative costs are provided in the 2023 ALASD Water Reclamation Facility Plan, 2017 Phosphorus and Chloride Reduction Facility Plan, and 2021 ALASD CIMP 2026 RO capital costs are based on $3.7/gpd capacity and RO concentrate $6.1/gpd capacity 2026 O&M costs based on RO $0.0029 gal treated and RO concentration management $0.038/gallon treated.*
- *Costs from these previous studies have been updated using the national annual average construction cost index values from the ENR to reflect current costs as of February 2026 (Construction Cost Index History - As of February 2026 | Engineering News-Record).*
- *Net Present Value (NPV) is the sum of all projected future cash flows of a project, discounted to today's dollars using a 5% discount rate and assume 3% inflation for O&M costs over a period of 20 years.*
- **ALASD WRF RO alternatives provided above do include filtration improvements that are currently being constructed as part of current ALASD's WRF improvements and include a Membrane Bioreactor (MBR) The current WRF project provides needed filtration to allow for future RO treatment.*

6.4 Rate Impact and Affordability

Median household income for Alexandria is projected to be $61,374 in 2026 (Alexandria, MN - Profile data - Census Reporter). ALASD wastewater residential rates for 2026 equate to $618.60 annually and the estimated residential rates assuming either alternatives 5 or 6 above would equate to $1,661.88 annually (based on ALASD 2025 Cost of Service Rate Study developed by AE2S and the additional chloride treatment costs provided above). Based on 2026 projected costs, the wastewater user cost is 2.7 percent of MHI. Rates are projected to increase by 10 percent per year until 2030 at which time can revert to annual inflationary increases if no further improvements/debt are required. Since the rates do not include full rate escalation due to the current WRF project, this calculation underestimates the affordability which will be closer to 3 percent once full escalation is applied in 2029.

User costs based on projected rates exceed the affordability index. The cost evaluation for chloride treatment indicates that improvements needed to meet future chloride permit limits will be extremely expensive and difficult to implement for both technical and non-technical (social and affordability) reasons.

In alignment with the ALASD CIMP and the Minnesota Statewide CMP findings, ALASD has proceeded implementing chloride reduction measures since 2021 to reduce influent chloride levels being discharged to receiving waters. This benefits the environment as well as moves toward a long-term plan to meet permit limits at the ALASD WRF In the meantime, ALASD continues to evaluate alternatives to meet future chloride limits.

Section 7

Long-term Strategy and Planning

The majority of influent chloride loads to the ALASD WRF is from residential sources. The current loading contributions are approximately 75 percent from residential sources, approximately 20 percent from significant industrial users (SIUs), and the remaining commercial and small industrial sources account for less than 5 percent. Of the portion from residences, private well households appear to contribute a higher percentage of the overall chloride loading to the WRF (46 percent of total) compared to the ALP households (33 percent total) as centralized filtration of ALP's water supply decreases the salt demand for homes within the City of Alexandria.

Removing salt chloride from wastewater after it has been added is not sustainable or feasible as documented in MPCA studies and guidance documents. The MPCA has recommended solutions that reduce the amount of salt added to the water (i.e. source reduction methods) to meet final limits.

ALASD is in a unique situation where one-half of the customers are served by a public water supplier (ALP) and the other half use private wells. In addition, ALASD is a separate government entity from the City of Alexandria and does not have authority to regulate activity within the City or for the municipal water supply entity. ALP is the municipal water supplier for residents of the City and would need to make process changes to their water treatment plant (i.e., upgrade current WTP to add lime softening or reverse osmosis facility) to eliminate the need for home water softener usage. In addition, private well water usage at residences not served by ALP are subject to the local ordinances of the communities, and ALASD does not have authority to regulate these activities. The CIMP efforts require collaboration and long-range planning with the City, ALP, and private well stakeholders to meet requirements.

Given the high hardness of available groundwater supply in the region, alternatives to meet the proposed final chloride limits at the ALASD WRF require significant modifications to the water treatment processes across the entire ALASD service area. Alternatives identified that meet future permit limits require elimination of nearly all in-home water softening. These alternatives also have high capital, operation, and maintenance costs, and do not meet the affordability standards for utility fees (i.e., resulting annual wastewater costs are greater than 2 percent of median household income).

The alternatives that meet the affordability standards do not meet the final chloride effluent limits.

There currently is not an affordable, effective, and feasible solution identified that would meet the future effluent chloride limit. However, implementation of incremental improvements to take advantage of cost-effective opportunities for chloride reductions exist. This includes continuing programs to eliminate older and timer-based softener systems throughout the entire ALASD service area.

ALASD will continue collaboration with ALP for implementation of centralized limit softening within the next 10 to 15 years when the current WTP is approaching end of its useful life. Emerging technologies should be monitored to determine if future innovation and market demand will provide new alternatives to address more cost-effective treatment for home-based systems for the township areas outside of ALP service area.

WTP upgrades are currently scheduled in 10 to 15 years according to ALP; however, this solution alone will not meet the final effluent limit for chloride. If a more affordable home-based "point of entry" water treatment system is available in the future, a combined solution of ALP lime softening and private well treatment would be desirable. If affordable home-based treatment is not available in the future, RO and brine management improvements will also be required at the WRF to meet final discharge limits for chloride.

While funding opportunities, the amount of funding is not nearly enough to provide affordable solutions for chloride reductions. The most significant opportunity is the Point Source Implementation Grant (PSIG) from the State of Minnesota Clean Water Funds which could result in up to $12M grant funding for treatment upgrades.

Key Considerations for Long Range Planning:

- In 2020 ALASD was granted an 8-year variance from the chloride water quality standard – Variance term: 11/15/2020 to 11/14/2028.
- ALASD is required to:
  - Comply with an 805 mg/L interim effluent limit
  - Complete a chloride source investigation and minimization plan
  - ALASD has Identified and developed control strategies for sources of chloride to the wastewater treatment facility
  - ALASD has evaluated the feasibility of water treatment and other alternatives to control chloride sources
- Chloride removal at the ALASD WRF is not currently attainable. ALASD has demonstrated that end-of-pipe treatment would result in substantial and widespread economic and social impacts.
- In alignment with the ALASD CIMP and the Minnesota Statewide CMP findings, ALASD has proceeded implementing chloride reduction measures since 2021 to reduce influent chloride levels being discharged to receiving waters. This benefits the environment as well as moves toward a long-term plan to meet permit limits at the ALASD WRF. In the meantime, ALASD continues to evaluate alternatives to meet future chloride limits.
- Upon expiration of the variance, ALASD is required to meet final chloride water quality-based effluent limits.
- If limits cannot be met by 2028, ALASD may apply for another variance from the chloride standard.

Future steps include the following:

1. Annual reports to be completed in December of each year and submitted to the MPCA.
2. Continue to support and facilitate CAC meetings (2 meetings/year).
3. Continue to support/incentivize chloride source reduction through softener rebate, brine disposal, and softener optimization programs.
4. Evaluate and participate in future chloride TMDL meetings.
5. Evaluate and incentivize implementation/optimization of industrial water treatment systems to reduce chloride discharges from industrial and/or commercial sources.
6. Continue to monitor chloride concentrations in area lakes, ALASD WRF, and SIUs to evaluate if source reduction efforts are achieving measurable reductions.

Section 8

References

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Statewide chloride resources | Minnesota Pollution Control Agency
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https://www.pca.state.mn.us/sites/default/files/wq-wwprm2-18.pdf

Appendix A: 2021 Chloride Investigation and Minimization Plan (CIMP)

Alexandria Lake Area Sanitary District
Chloride Investigation and Minimization Plan

Job no

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Appendix A:

Summary of Statewide Chloride Management Plan and

Streamlined Chloride Variance Action Tree

Appendix B:

Sample Results

Appendix C:

January 19, 2021 Chloride Citizen's Advisory Committee Agenda/Presentation,

April 6, 2021 Chloride Citizen's Advisory Committee Agenda/Presentation

Introduction

Chloride is one of the components of salt, which is used in forms such as sodium chloride (table salt), calcium chloride and magnesium chloride (road salts). Sodium chloride is commonly used in home water softeners and by water treatment plants to treat "hard" water. Minnesota generally has groundwater with high levels of calcium and magnesium that must be removed through softening in order to prevent lime scale buildup in appliances, pipes and water fixtures. The majority of home water softeners use sodium chloride (NaCl) in a softening process than replaces calcium and magnesium ions with sodium, while the chloride ions are discharged in the wastewater and eventually end up in the environment. High chloride levels can cause impairments to surface water quality.

Chloride released into local lakes and streams does not break down, and instead accumulates in the environment, potentially reaching levels that are toxic to aquatic wildlife and plants. Because salt water is more dense than fresh water, it settles at the bottom of lakes potentially preventing the natural mixing of oxygen and nutrients and in effect creating a "dead zone." The Minnesota Pollution Control Agency (MPCA) has authority to require discharges to comply with water quality standards using the Clean Water Act and National Pollutant Discharge Elimination System (NPDES) permits for the protection of aquatic plants, invertebrates, and fish. Variances can be used by the MPCA to implement a logical and reasonable pathway to meeting permit requirements. The variance process considers economic factors that allow more flexible timelines and offers the potential for renewal of a variance if the permit goal remains unachievable. The variance process requires approval by the Environmental Protection Agency (EPA).

Lake Winona was placed on the 2010 MPCA Clean Water Act (CWA Section 303(d)) list of impaired waters due to excess chloride which impedes the attainment of designated uses for Aquatic Life and Industrial Consumption. Lake Winona is exceeding the 230 milligram per Liter (mg/L) chronic standard intended to protect Class 2B waters for the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. Lake Winona is also exceeding the 250 mg/L standard intended to protect Class 3C waters for industrial cooling and material transport without a high degree of treatment being necessary to avoid severe fouling, corrosion, scaling, or other unsatisfactory conditions. A TMDL study has not yet been initiated to address Lake Winona's chloride impairments. Lake Agnes and Lake Henry have also recently been added to the list of impaired waters due to excess chloride. The MPCA is in the process of evaluating revisions to the aquatic life and recreation and industrial consumption chloride standards.

Background

Alexandria Lake Area Sanitary District (ALASD) operates the sanitary sewer collection system and wastewater treatment facility (WWTF) to provide wastewater services to the City of Alexandria, and the surrounding townships of Alexandria, Carols, Hudson, Ida, LaGrand, Lake Mary and provides contract sanitary services to the City of Nelson, City of Forada, Leaf Valley Township, Carlos State Park and two rest areas. The ALASD service area covers approximately 102 square miles and a population of more than 26,000 people.

Major sources of influent flow to ALASD's system include residential, industrial and commercial/institutional facilities from area cities and townships located within the ALASD service area. ALP Utilities (ALP) operates the public water supply and has the same service area as the City of Alexandria. The residential and commercial areas outside the City of Alexandria and ALP service area use private well water. Treated wastewater collected from within the ALASD service area is discharged from the WWTF to Lake Winona.

The ALASD NPDES permit MN 0040738 regulates discharges from the facility. ALASD applied for a variance from the chloride water quality standard in Minnesota Rule 7050, designed to protect the Class 2 beneficial use of the receiving water. A variance is a temporary change in the applicable water quality standards. During the term of the variance the WWTF is required to comply with the highest attainable condition for the pollutant which the variance is granted. To ensure this is met, an alternate effluent limit is developed and becomes effective at permit issuance. In addition, ALASD is required to complete chloride source investigation and minimization plan (CIMP), as well as an evaluation of the feasibility of water treatment or other applicable treatment technologies in an effort to control sources of chloride. The variance is approved for an 8-year term with the effective date of November 15, 2020, and the expiration date of November 15, 2028. Upon expiration of the variance, the Permittee is required to comply with the final effluent limits or if eligible, apply for subsequent variance. The basis of the variance is *'controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act (CWA) would result in substantial and widespread economic and social impact*'. *The MPCA has determined that the ALASD has satisfied the conditions necessary to grant a variance and as a result supports the inclusion of the variance in ALASD's NPDES permit.* The final/future limit is based on the existing state standard of 230 mg/L (monthly average) and 252 mg/L (daily maximum). The alternate effluent limit for total chloride discharge from the ALASD WWTF is 839 mg/L (daily maximum.)

The most recent NPDES permit was issued November15, 2020, and expires October 31, 2025. Under the terms of the NPDES permit (Special Requirements Section 5.14.79 – 5.14.97), ALASD is required to take action to reduce chloride discharge to Lake Winona in accordance with the variance requirements.

Chloride levels monitored in area lakes are shown in Figure 1.

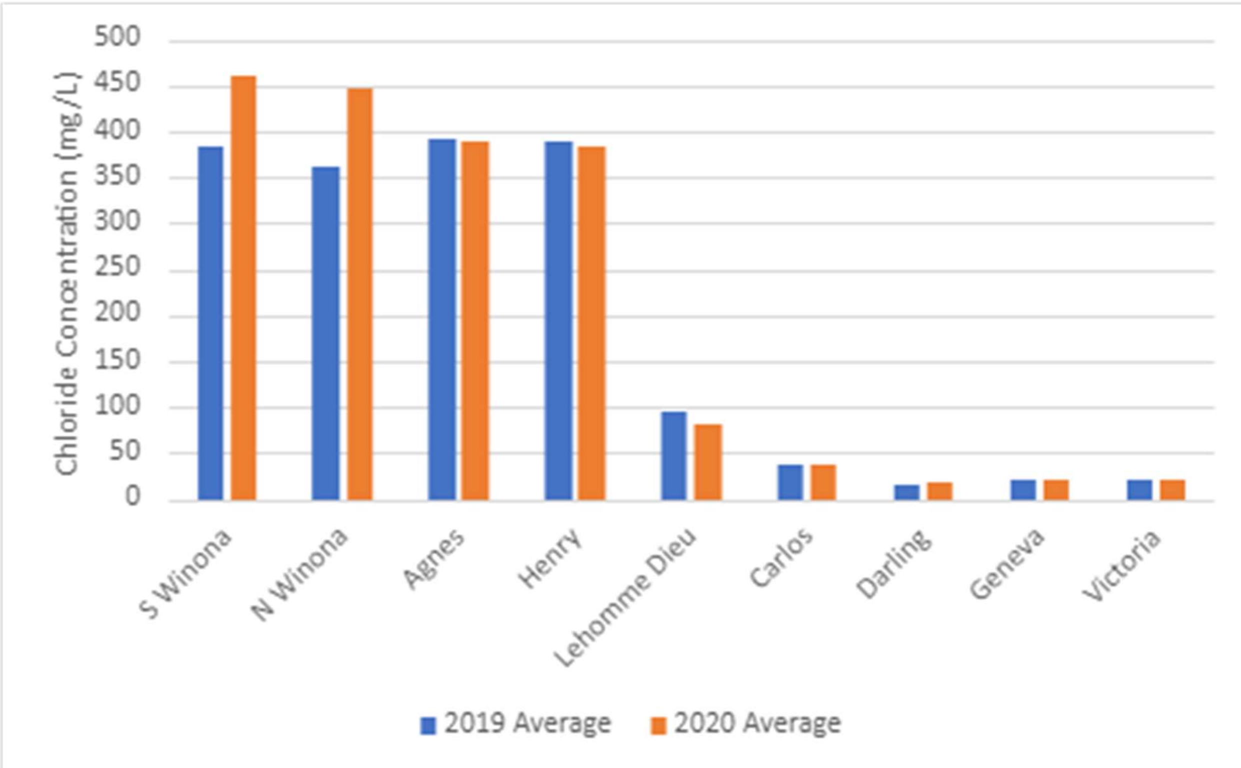


Figure 1. Area Lake Chloride Concentration (mg/L), 2019-2020

The Chloride Investigation and Minimization Plan (CIMP) is required to address the following items:

- Document historic WWTF influent and effluent concentrations – most recent five years of data.
- Identify and quantify the existing and potential sources of chloride loading to the WWTF.
- Provide a summary of chloride source reduction activities implemented and a proposed schedule of reduction activities to be implemented.

This plan addresses the permit requirements for CIMP submittal due 180 days after permit issuance.

Historic Data

Hazen reviewed five (5) years of historic data from the ALASD WWTF to evaluate the influent and effluent chloride concentrations, flows from major commercial and industrial facilities, and other key data. As mentioned previously, ALASD treats flows received from residences (both within and outside of ALP's service area), major commercial sources including the Douglas County Hospital, several car wash facilities, and a number of significant industrial users (SIU's). The locations were selected based on an evaluation of users likely to have higher water usage and/or chloride discharge. The SIU's include two (2) grain processing facilities (Sunopta), a 3M facility, a dairy facility (Nelson Creamery), a metal extrusion facility, and a metal finishing facility. Influent and effluent flows to the WWTF are summarized in Figure and Table 1. Over the past five years, the average influent flows to the WWTF have been approximately 3.0 million gallons per day (mgd), with a maximum daily flow of 6.1 mgd. The facility has seen modest, but inconsistent increases in average daily flows over the past five years. The ALASD WWTF is designed for a wet weather flow of 4.7 mgd.

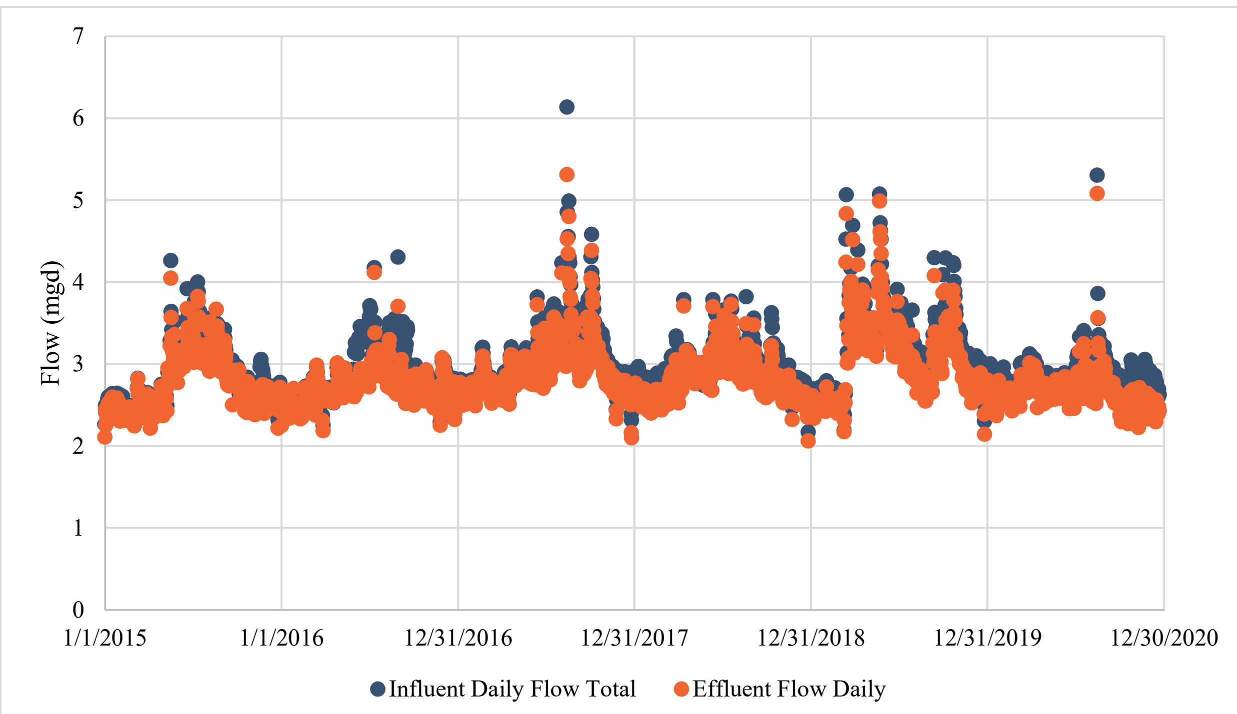


Figure 2. ALASD WWTF Daily Flows, 2015-2020

Table 1. ALASD WWTF Average and Maximum by Year, 2015-2020

Year	Average Daily Flow	Maximum Daily Flow
2015	2.8	4.3
2016	2.9	4.3
2017	3.1	6.1
2018	3.0	3.8
2019	3.2	5.1
2020	2.9	5.3

Flow contributions from major SIUs and commercial facilities are summarized in Figure ,

Table 2, and Table 3. As shown, the overall contribution of flows from SIU's to the WWTF influent typically ranges from approximately 10% - 15% of the total WWTF influent. The most significant dischargers by volume to the WWTF are the two Sunopta facilities, which cumulatively account for nearly 10% of the overall influent flow. Other SIU's and commercial facilities such as the Douglas County Hospital are a significantly lower fraction of the total influent flow, and account for the remaining 5% - 10% that are attributable to SIU's and major commercial facilities.

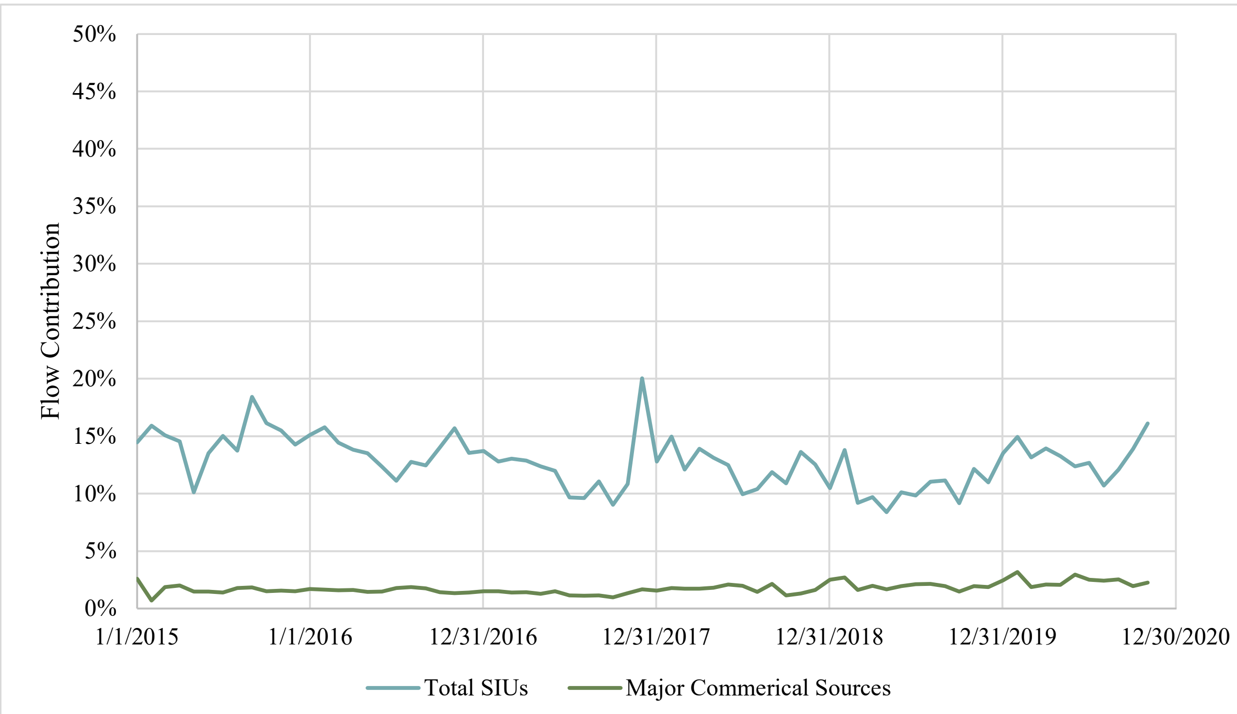


Figure 3. ALASD WWTF - Historic SIU and Commercial Flow Contributions, 2015-2020

Table 2. ALASD WWTF - Daily Average SIU Flow Contributions, 2015-2020

Year	WWTF Flows (mgd)	Sunopta Ingredients - SOI (gpd)	3M (gpd)	Nelson Creamery (gpd)	DMF (gpd)	Sunopta Aseptic - SOA (gpd)	EXT (gpd)	TWF (gpd)
2015	2.8	154,900	16,000	3,300	34,000	127,100	72,100	8,800
2016	2.9	171,800	20,100	2,800	30,500	126,100	32,500	8,100
2017	3.1	132,500	34,700	2,800	63,300	121,000	8,800	8,400
2018	3.0	128,900	16,600	2,900	63,300	134,800	7,500	11,500
2019	3.2	163,400	11,400	2,200	1,300	138,300	6,900	12,500
2020	2.6	145,000	15,200	1,800	53,700	122,200	1,200	10,200

Table 3. ALASD WWTF - Daily Average Commercial Flow Contributions, 2015-2020

Year	WWTF Flows (mgd)	Douglas County Hospital (gpd)	Douglas/Pope Solid Waste Facility (gpd)	Car Washes (gpd)
2015	2.8	31,600	15,100	No Data
2016	2.9	32,200	13,800	No Data
2017	3.1	25,200	15,300	No Data
2018	3.0	31,300	19,100	No Data
2019	3.2	26,900	14,300	22,400
2020	2.6	29,700	12,400	20,700

As required by the NPDES permit ALASD has regularly monitored the WWTF influent and effluent chloride concentrations, along with periodic monitoring of chloride concentrations in Lake Winona and the Alexandria area chain of lakes. Historic influent and effluent chloride concentrations from the WWTF are shown in Figure and Table 4. Over the past five (5) years the average influent and effluent chloride concentrations from the WWTF are approximately 715 mg/L and 685 mg/L, respectively. Minimum daily concentrations observed over the past five (5) years have typically been in the range of 500 – 600 mg/L, from both the influent and effluent. As shown, there have been no constituent trends indicating increases or decreases in chloride concentrations to the WWTF over this time period.

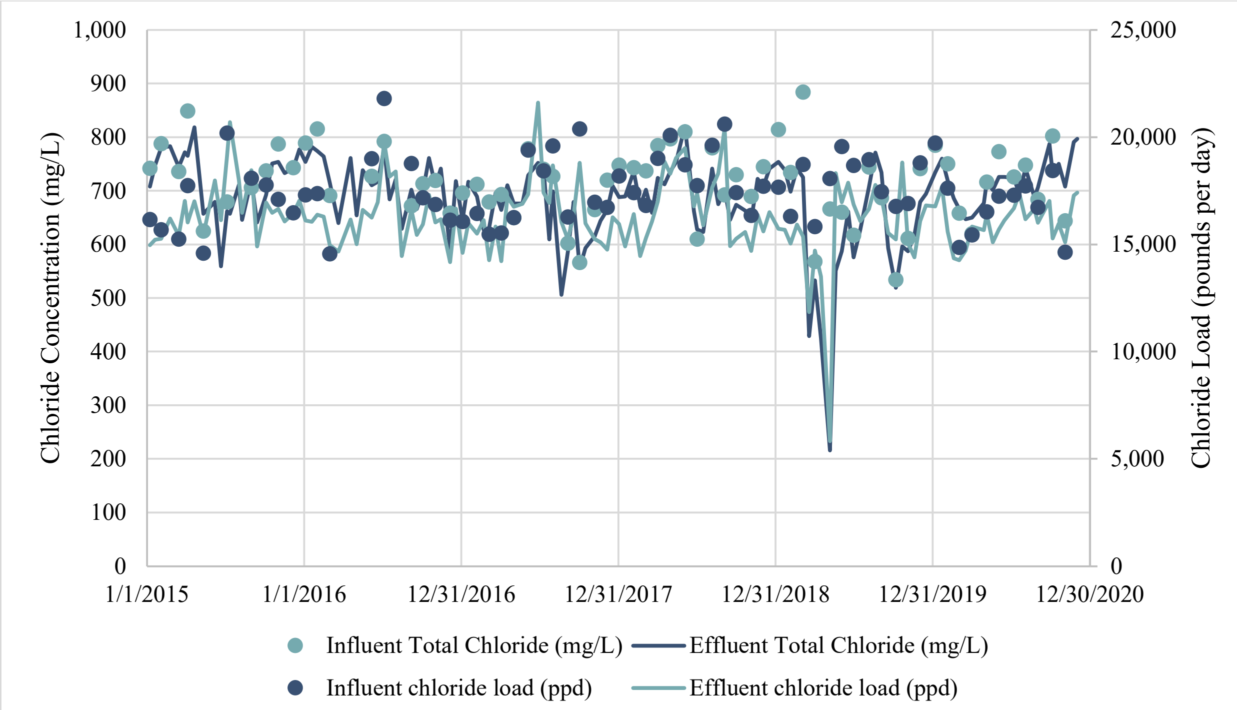


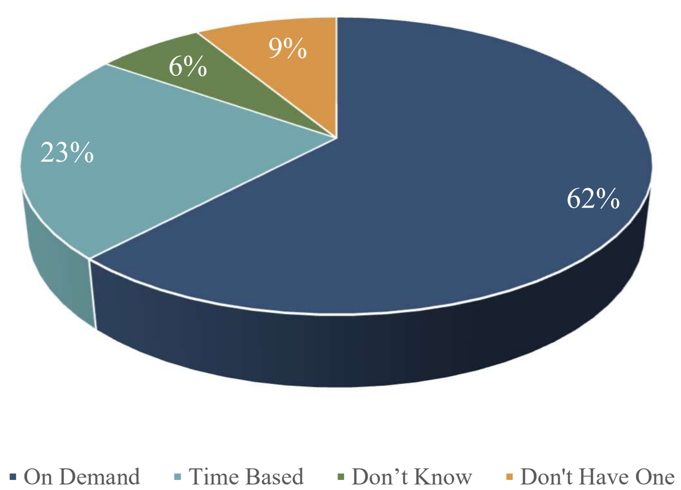
Figure 4. ALASD Historic Chloride Influent and Effluent Concentrations and Loads, 2015-2020

Table 4. ALASD Historic Chloride Influent and Effluent Concentrations and Loads, 2015-2020

Year	Average Influent Concentration (mg/L)	Minimum Influent Concentration (mg/L)	Maximum Influent Concentration (mg/L)	Average Influent Load (ppd)	Average Effluent Concentration (mg/L)	Maximum Effluent Concentration (mg/L)	Minimum Effluent Concentration (mg/L)
2015	740	625	849	16,900	720	818	559
2016	730	658	815	17,660	710	782	591
2017	690	566	778	17,290	660	752	506
2018	740	610	810	18,305	700	821	623
2019	690	534	884	17,810	615	771	216
2020	720	620	802	16,930	720	797	647

ALASD Customer Home Softener Survey

ALASD surveyed customers in spring 2021 to better understand customer softener systems. Approximately 16% of customers provided responses. Results of the survey are provided below and were used in the mass balance calculations to determine number of time-based versus on-demand softeners. Approximately 10% of customers responded to the survey and of those submitted the average age was 8 years old for demand softeners was 12 years old for time-based softeners. According to softener installation professionals, older time-based systems may not likely no-longer efficient resulting in significantly higher salt usage.



The percentages were also compared with data from local water softener companies which confirmed that roughly two-thirds of salt delivery customers had demand softeners compared to one-third time-based softeners in their service area around Alexandria.

Supplemental Sampling

In order to better inform the chloride mass balance developed for this plan and to understand the contributions of various chloride sources within the ALASD service area, ALASD collected supplemental sample from identified points within the collection system. These points were identified to collect specific data on chloride concentrations and contributions from residential, industrial, and commercial sources. Samples were collected by ALASD staff at the following locations:

- Several manholes and a lift station composed primarily of residential houses with ALP service
- One (1) manhole composed primarily of residential houses with private well water
- All SIU's
- Douglas County Hospital
- Car wash facilities

All samples were collected via a 24-hour composite sample. The sample results exhibited significant variability, as expected based on potential fluctuations in the softener regeneration patterns within a service area or facility. The sampling results are summarized in Table 5. There are several notable observations from this supplemental sampling data:

- The initial sampling from a residential neighborhood with ALP source water indicated unexpectedly low chloride concentrations (Ridgewood Dr neighborhood). Follow-up sampling was conducted at several additional locations to confirm the initial sample results. The sampling had a high degree of variability due to difficulties with sample collection at localized residential manholes and potential variation in softener recharge schedules in a small residential area. Omitting outlier values, the average concentration of all the samples collected is approximately 600 mg/L. Since the ALP treatment plant removes iron and manganese the expected chloride loading from softening systems is lower and this concentration makes sense in comparison to the samples collected from private well households.

- Sampling from a residential neighborhood with private well water (Lake Mary) indicated chloride concentrations in line with typical average values to the WWTF (700 – 950 mg/L).

- A number of the industrial and commercial facilities within the ALASD service area had chloride concentrations in line with typical average values to the WWTF (500 – 1,000 mg/L). This includes the majority of the SIU facilities and Douglas County Hospital.

- Both Sunopta facilities had high chloride concentrations in the samples. Most notable, Sunopta Aseptic concentrations exceeded 1,300 mg/L in nearly all samples collected. Sunopta Ingredients also had concentrations exceeding 1,000 mg/L in most samples collected. 3M had significant variability in samples with one sample in line with typical WWTF influent concentrations (500 – 1,000 mg/L) and one sample exceeding 1,000 mg/L.

- Similarly, samples collected from the car wash facilities had significant variability in concentrations, with three samples indicating lower than typical influent concentrations at the WWTF and one sample with a concentration of 1,900 mg/L.

- The combination of sampling data and flow contributions indicate that residential sources are the largest contributor of chlorides to the ALASD WWTF. Overall, this accounts for an estimated 75% - 80% of the influent chlorides to the facility. Industrial contributions are approximately 22%. A comparison of the overall contribution from each source is shown in Figure 2.

- A comparison of the historic flows and WWTF influent chloride loading with the sampling data collected in 2021 is shown in
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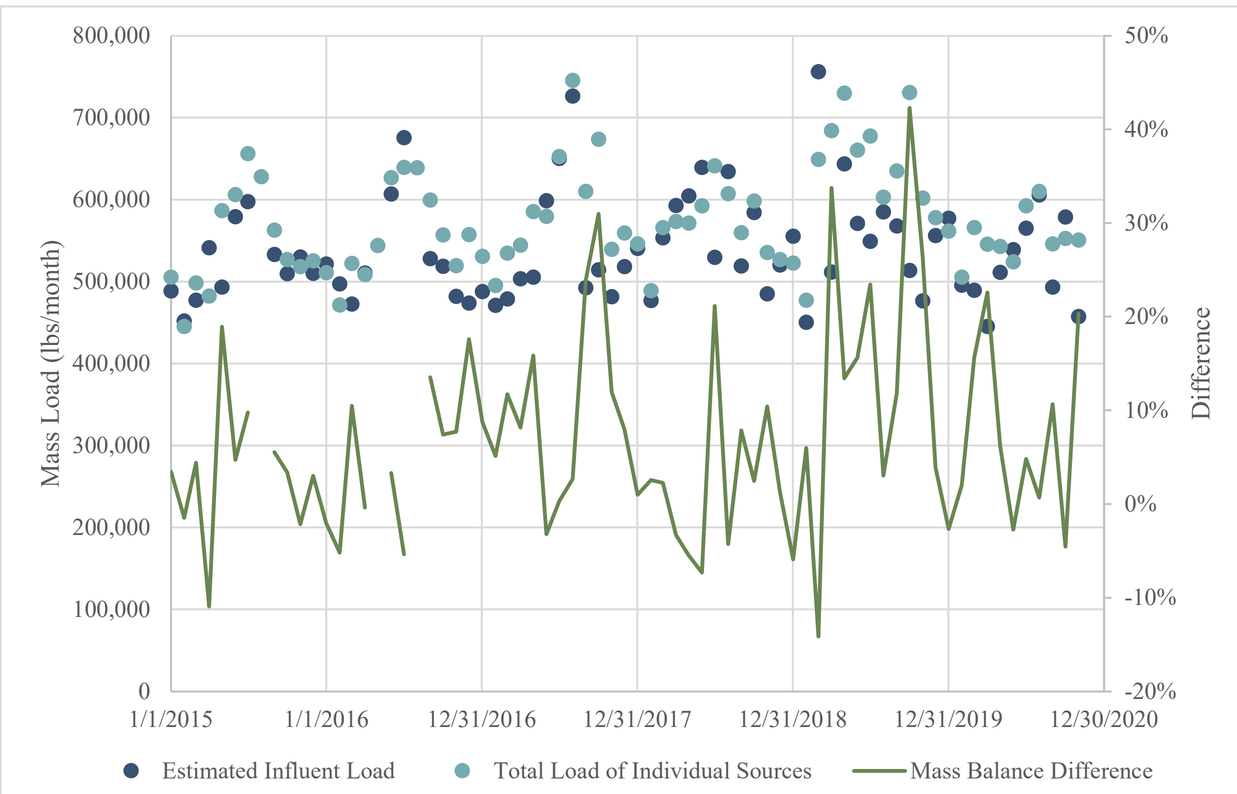


- **Figure 3**. In general, the sampling data concentrations appear to overestimate WWTF influent chloride loading by approximately 5% to 10% on average, with significant month to month variability. However, accuracy within 10% of overall WWTF influent loading is expected to be useful for a planning level evaluation. Therefore, the sampling concentrations are expected to be representative of the general magnitude and contribution from each set of sources.

Table 5. ALASD Supplemental Chloride Source Sampling Summary (February 2021)

Location	Average Chloride Concentration (mg/L	Maximum Chloride Concentration (mg/L)	Minimum Chloride Concentration (mg/L)	Typical Flows[1] (mgd)	Estimated Chlorides Load[2] (ppd)
Sunopta Ingredients	1,170	1,370	707	0.163	1,590
Sunopta Aseptic	1,400	1,580	1,110	0.133	1,557
Alex Extrusion	510	850	172	0.001	5
Alex Hospital	530	623	428	0.024	108
Douglas Machine - North	310	578	47.6	0.058	150
Douglas Machine - South	300	361	234		
3M	1,010	1,200	826	0.017	150
Nelson	610	946	266	0.002	10
TWF	820	835	801	0.012	80
Carwash North (Holiday)	370	510	220	0.010	30
Carwash South	1,350	1,900	796	0.010	120
Lake Mary - Private Well Water	830	953	697	1.16	8,030
Ridgewood Drive - ALP Water	250	264	243	N/A	N/A
Lakeside Drive Lift Station - ALP Water	1,130	1,130	1,130	N/A	N/A
Lakeside Drive Manhole - ALP Water	350	408	286	N/A	N/A
S Le Homme Dieu Dr - ALP Water	3,510	9,150	161	N/A	N/A
All ALP Water Sources[3]	600	1,210	1,130	1.16	5,800
WWTF Influent	820	866	777	2.84	19,420
WWTF Effluent	780	784	784	N/A	N/A

Notes:

1. Based on December 2020 average daily flows.
2. Loads estimated based on averages of all samples collected.
3. Omitting high outlier values.

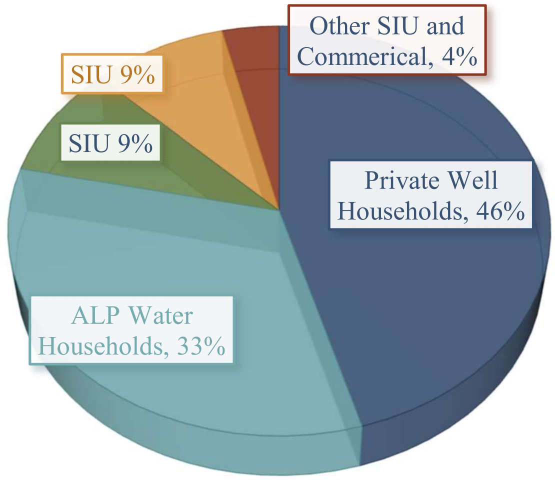


Figure 2. Estimated Influent Chloride Source Distribution, Based on 2021 Sampling

(Note: **Institutional category** is combined with the Commercial category and is not broken down. Based on review of individual significant water users and sampling data, Institutional flows are not a significant contributor.)

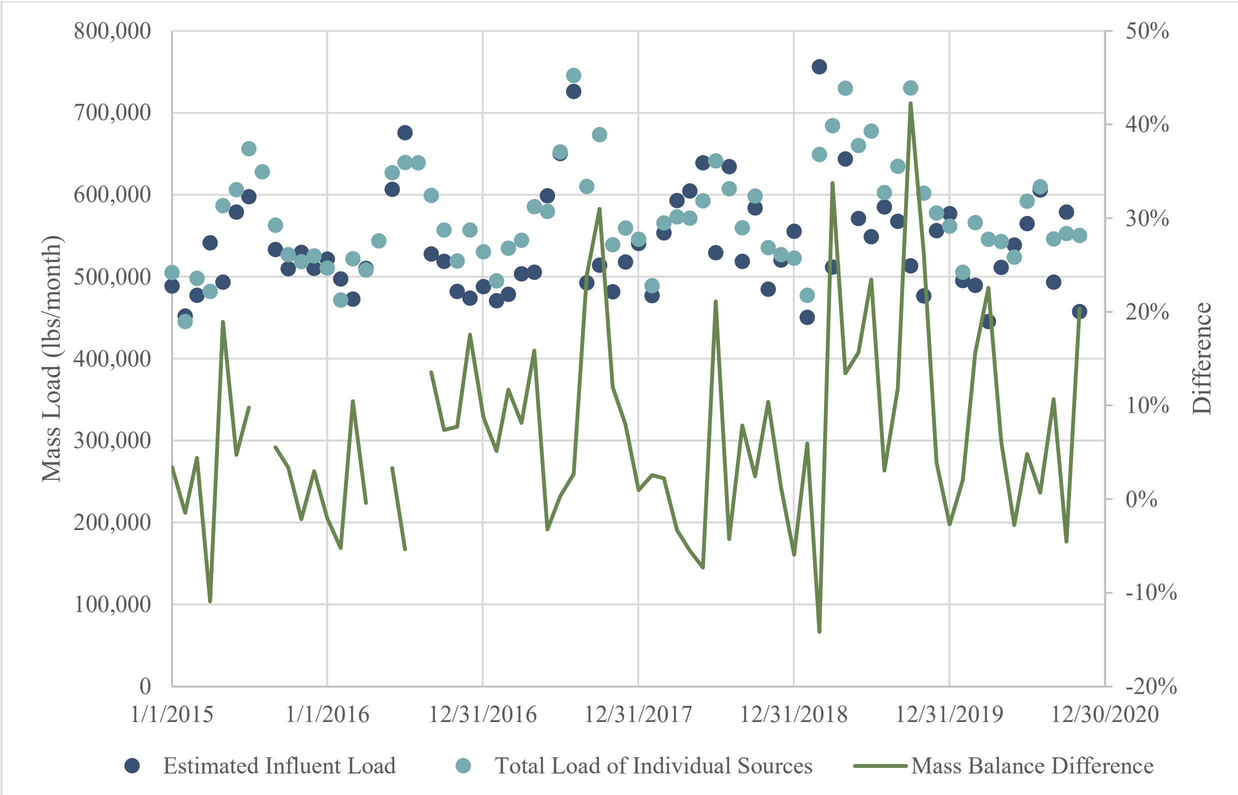


Figure 3. Comparison of Historic WWTF Influent Loading with Calculated Loads from 2021 Sampling Data

Chloride Mass Balance Model

A previous chloride mass balance model was developed as part of the ALASD Chloride Management Plan submitted to the MPCA in 2014. However, the mass balance estimates were largely based on theoretical values with limited field sampling data collected from residential, commercial, or industrial discharges. Hazen developed an update to this model based on the latest five (5) years of ALASD data and the sampling data collected from residential, commercial (including institutional), and industrial customers.

Several key assumptions related to residential water softener usage were incorporated in development of the mass balance model. These assumptions were adjusted to calibrate the model to match the historic WWTF influent data. These key assumptions include the following:

- There are a total of 10,500 households discharging to ALASD. Of this, approximately 5,245 are ALP customers. The remaining approximately 5,255 utilize private well water.
- Based on input from local water softening suppliers and servicers, it is estimated that approximately 2/3 are demand based systems and 1/3 are timer-based systems. This assumption was also confirmed in a survey conducted by ALASD in February to March 2021.
- Background hardness for both ALP and private well water is approximately 25 grains per gallon, based on the latest sampling data. Similarly, background chloride concentrations for ALP and private well waters are approximately 63 mg/L and 15 mg/L, respectively, based on the latest sampling data. However, there is significant variability in the data from private wells.
- Individual customer water softening is a common practice in the ALASD service area due to water supply hardness. The most common types of water softeners use an ion exchange process to remove magnesium and calcium that cause water hardness and to remove iron and manganese from the water supply. The softeners work by pumping water through a resin matrix. This matrix traps the magnesium and calcium ions that cause hard water and other naturally occurring ions by exchanging them with sodium or potassium ions. Over time, however, the efficiency of the matrix decreases as the sodium or potassium is exhausted. To regenerate the treatment capability of the softener, the device is backwashed with a concentrated sodium or potassium chloride solution. The frequency of regeneration cycles and volume of backwash created depends on the hardness of the water, the amount of water used in the building, and the size of the water softener. Used properly, softeners regenerate one to three times per week and produce between 40 and 150 gallons of brine per week. If the water softener is set up incorrectly the amount of brine can be much higher. Water softeners are set to regenerate based on either flow measurements or by a timed interval. Flow regulated softeners generally produce less backwash brine than timer regulated systems.
- The typical household softener systems include the following:
  - 1 cubic foot (cf) capacity with 24,000 grain capacity.
  - Approximate salt usage during regeneration of 7 lbs/cf.

- Timer based systems initiate regeneration cycle every 2 to 3 days. Resulting chloride discharge is approximately 50 – 60 lbs/month.
- Demand based systems on average initiate regeneration cycle when approximately 90% of resin bed capacity is consumed. The resulting regeneration frequency is approximately 2 – 3 days, with approximate chloride discharges of 30 – 40 lbs/month.

A comparison of the model predicted ALASD influent chloride mass to the 2015 – 2020 historic influent loading is shown in Figure 4. The model matches the ALASD historic influent data well to within approximately 10% and is a valuable planning tool for evaluation of scenarios for reduction of chlorides at ALASD.

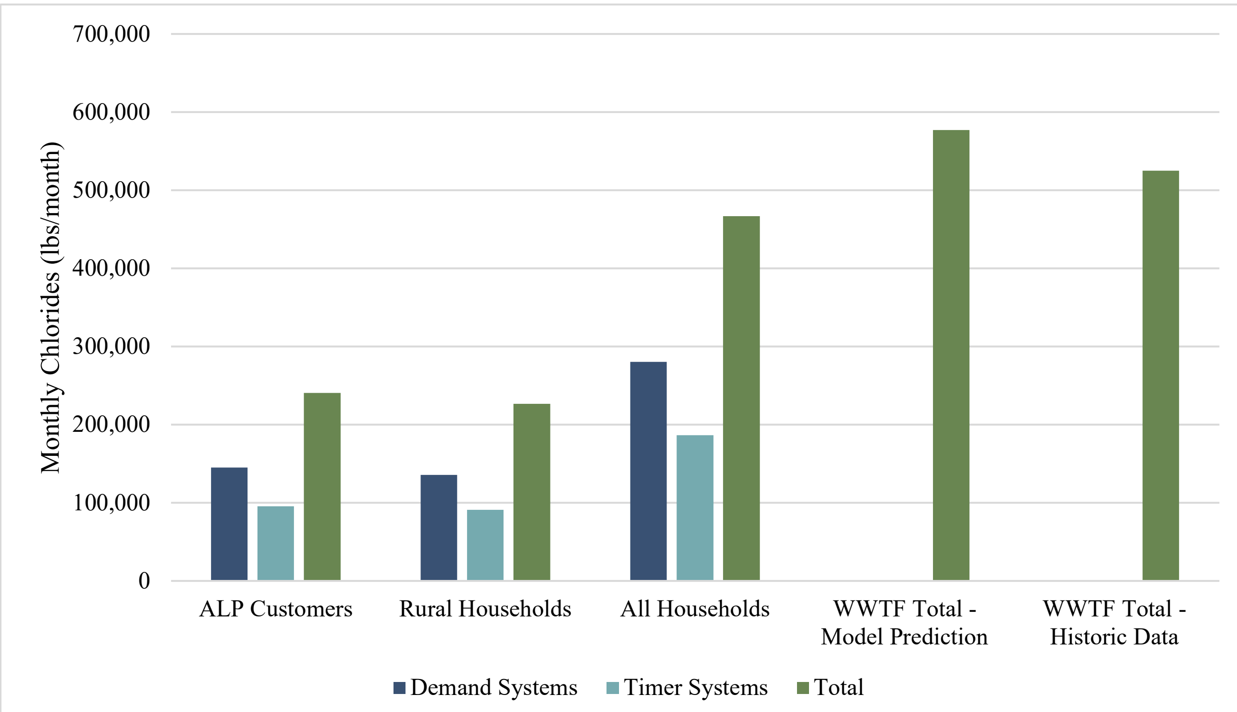


Figure 4. ALASD Predicted Influent Chloride Mass Compared to 2015 – 2020 Historic Data

Long Prairie River Watershed Restoration and Protection Strategies (WRAPS)

As required in the ALASD NPDES permit, the following section summarizes findings from the Long Prairie River WRAPS related to chloride levels in the ALASD receiving waters which are part of the Long Prairie River Watershed:

- Lake Winona, Lake Agnes and Lake Henry chloride levels are above the state standard and are considered impaired due to high chloride levels.
- Strategies for chloride reduction should include education campaign on smart salting techniques and education on road salt usage to LGUs.
- Wastewater actions should follow the statewide chloride management plan.
- Alternatives to water softeners should be explored within the ALASD area. Research should include feasible alternatives to traditional water softeners including the provision of soft water by the municipal supplier or prohibiting the use of individual water softeners in the ALASD.

ALASD Chloride Reduction and Management Strategies

In addition to the 2014 Chloride Management Plan, ALASD completed a 2017 study of combined improvements that could be implemented at ALASD to address both phosphorus and chloride reduction to meet long-term NPDES permit limits. These evaluations have indicated that improvements needed at ALASD to meet the long-term chloride requirements will be extremely expensive and difficult to implement for both technical and non-technical (social and affordability) reasons.

ALASD has also undertaken an extensive public outreach and education campaign since 2010. These efforts have included the following:

- Newspaper interviews, radio shows, and public education efforts throughout 2018 through 2020.
- Inclusion of educational materials on the ALASD website.
- Billing inserts with educational materials on chloride issues distributed to customers to promote awareness.
- A customer survey on water softener usage and practices in 2020.
- Civic organization outreach in 2020 and 2021 (i.e., Sertoma and Rotary clubs).

ALASD revived the Chloride Citizen's Advisory Committee in 2021 to continue to address chloride minimization strategies with the guidance of the recent Draft Statewide Chloride Management Plan and the streamlined chloride variance action tree. The Committee meets quarterly and includes representatives from stakeholder groups to discuss chloride issues and work towards developing an attainment Plan for chloride reduction.

This minimization plan used the mass balance model developed in 2021 to provide a conceptual level evaluation of alternatives to reduce chloride discharges from ALASD. This includes strategies to be implemented at residential households, at ALP, at ALASD, and at industrial and commercial dischargers. Highlights of possible scenarios considered include the following:

1. Replacement of older, timer based softening systems with new, demand based softening systems at homes throughout all of ALASD's service area.
2. Development and implementation of ordinances throughout ALASD's service area that reduce the level of hardness reduction that can be provided by home softening systems. This would likely be done in conjunction with a program to replace older, timer based softening systems at homes throughout all of ALASD's service area. However, it is anticipated that this program would be extremely difficult to implement, monitor, and ensure compliance over a long-term timeframe. This alternative was included to evaluated whether any alternative to optimize in-home water softening systems could be utilized to meet the future effluent limit.
3. Installation of centralized softening at ALP's water treatment plant. This scenario would also require implementation of an ordinance program to ban and mandate removal of home-based water softener systems within the ALP service area in order to achieve anticipated reductions

in chloride. In addition, it is anticipated home compliance checks would be required to maintain the efficacy of this scenario.

4. In conjunction with alternative 3 for centralized softening at ALP's water treatment plant, a program for replacement of older, timer based softening systems at private well homes throughout all of ALASD's service area.
5. In conjunction with alternative 3 for centralized softening at ALP's water treatment plant, a program for replacement of all salt based softening systems at private well homes throughout all of ALASD's service area with saltless RO units.
6. Expansion of ALP's water treatment plant and service area to cover all of ALASD dischargers. This would be implemented alongside new centralized softening at the ALP treatment plant and ordinances to ban and mandate removal of home-based water softener systems as noted in the above scenario.
7. Source specific reduction strategies at major industrial and commercial dischargers. The specific reduction strategies are 'to be determined' through continued evaluation and meetings with individual industrial and commercial facilities/customers. This would be combined with a for replacement of older, timer based softening systems at homes throughout all of ALASD's service area.

A summary of the estimated chloride impacts at ALASD resulting from these alternatives are shown in Figure 5 and Figure 6. As shown, the most significant impacts on chloride loading to ALASD are from programs that significantly eliminate water softener usage across the service area. Only the alternatives that include complete or near complete removal of all water softeners are predicted to meet the ALASD long-term NPDES discharge permit limit.

The alternatives that involve water softener optimization programs, through either demand system replacement incentivization or ordinance-based programs are predicted to have a more modest impact. The extent of chloride reduction associated with these alternatives range from approximately 15% - 45% overall chloride reduction, but none are sufficient to approach to meet the long-term NPDES discharge permit limit. The range of predicted ALASD influent chloride concentrations associated with these water softener optimization programs are approximately 400 mg/L to 600 mg/L.

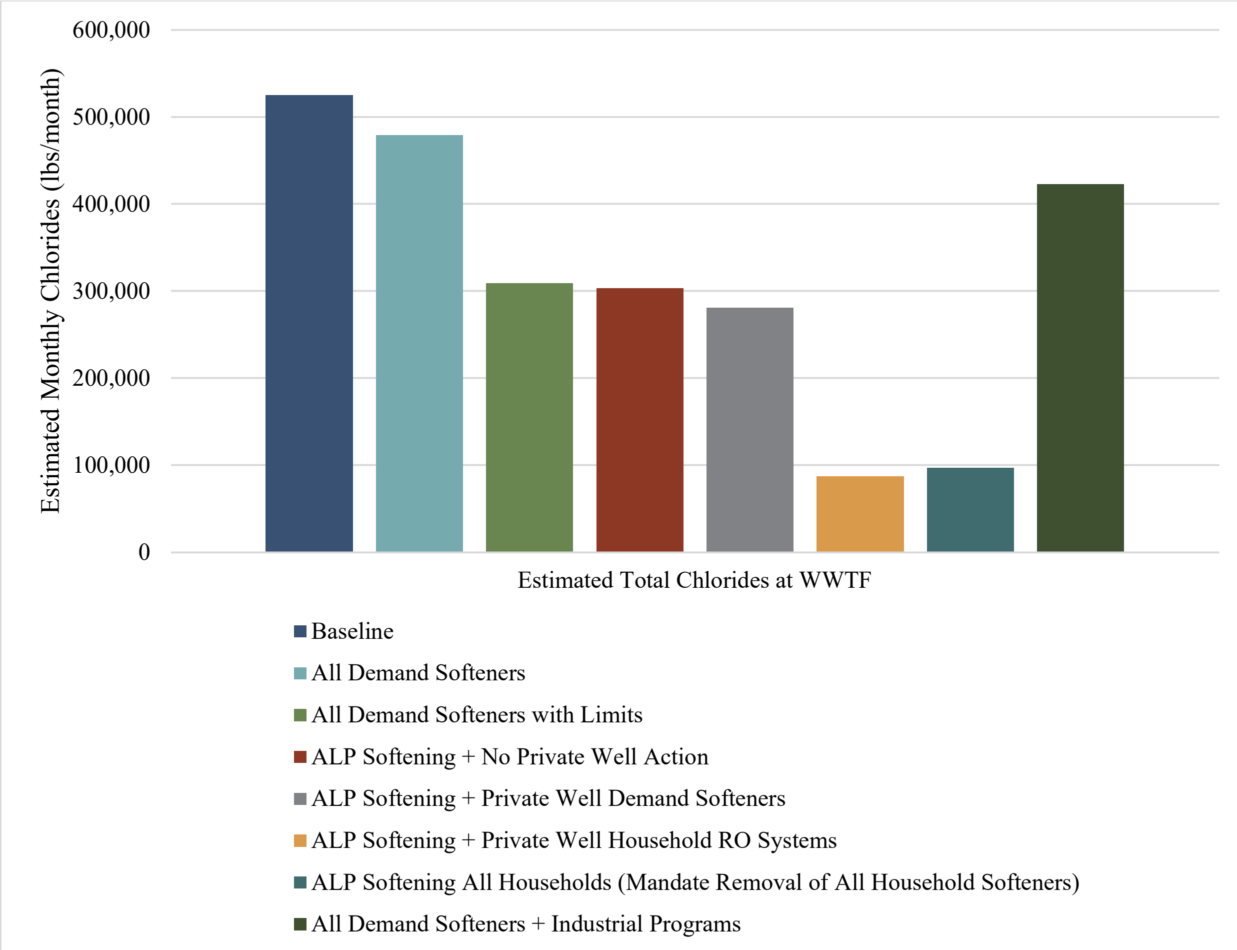


Figure 5. ALASD Estimated Influent Chlorides from Reduction Strategies

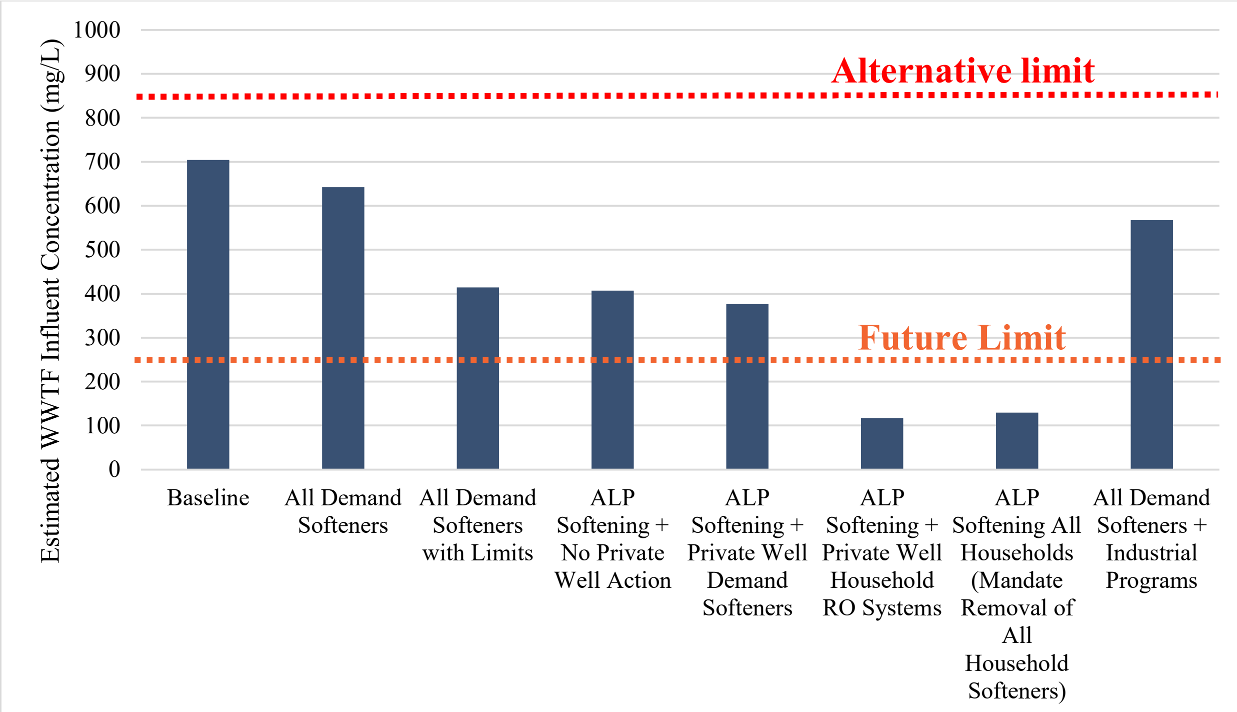


Figure 6. ALASD Estimated Influent Chloride Concentrations from Reduction Strategies

For each alternative, Hazen also developed high level, conceptual installation and operation and maintenance (O&M) cost impacts to ALASD and the surrounding community. These costs provide an overall indication of installation feasibility and economic efficiency of each alternative. The costs are summarized in Table 6. In addition to the alternatives described previously, prior reports developed for ALASD have evaluated "end of pipe" treatment systems at the WWTF to remove chlorides from facility effluent prior to discharge. This treatment approach would require installation of an RO membrane systems and an evaporator to handle concentrate from the membranes. These costs for this alternative have been inflated to 2021 dollars and are also included with the alternatives presented here.

Key assumptions that were used in the development of the cost estimates include the following and are stated in 2021 dollars:

- For the 30-year life cycle cost estimates inflation and discount/interest rates were 3% and 5%, respectively.
- Timer based water softeners were estimated to have an annual operating cost of $120.
- Demand based water softeners were estimated to have an annual operating cost of $95. New equipment installation costs were estimated at $1,350 per household, and estimated equipment service life is 15 years.
- Household RO systems were estimated to have an annual operating cost of $250. New equipment installation costs were estimated at $10,000 per household, and estimated equipment service life is 15 years.

- Centralized ALP softening was estimated to have an installation cost of approximately $11.3 million in 2017. This cost was escalated to 2021 dollars for inflation. O&M costs for ALP softening were assumed to be $750/mg.
- Expansion of ALP service to all of ALASD's customers has a significant installation cost. This includes approximately $10 million to expand the capacity of the ALP water treatment plant, $15 million for installation of softening, and approximately $125 million for installation of 180 miles of new water piping at approximately $140/lf installed. O&M costs for ALP softening were assumed to be $750/mg.
- Installation of an "end of pipe" treatment system at the WWTF combined with centralized ALP softening was estimated to have an installation cost of approximately $70 million and annual O&M cost of approximately $4.5 million in 2017. These costs were escalated for inflation to 2021 dollars.

As shown, the most cost-efficient strategies for chlorides reduction are those that utilize installation of saltless water conditioner systems in place of household water softeners. The next most cost efficient are those that include centralized softening at ALP in combination with softener replacement in private well households. The remaining alternatives either have relatively low impact (a timer softener system replacement program) or extremely high installation costs (ALP softening and service area expansion).

Table 6. Chloride Reduction Alternatives based on 2021 dollars
Opinion of "Order of Magnitude" Cost Summary

Alternative	Installation Costs	30-Year NPV	Annualized Costs
Baseline	0	$38,420,000	$2,500,000
All Demand Softeners	$14,175,000	$45,600,000	$2,970,000
All Demand Softeners with Limits	$14,175,000	$45,600,000	$2,970,000
ALP Softening & No Private Well Action	$12,800,000	$44,000,000	$2,870,000
ALP Softening & Private Well Demand Softener	$19,900,000	$46,600,000	$3,030,000
ALP Softening for All Households w/in ALASD	$150,000,000	$170,000,000	$11,030,000
ALP Softening & private well RO systems	$170,000,000	$250,000,000	$16,030,000
ALP Softening & MF/RO at ALASD WWTF	$78,000,000	$195,700,000	$12,730,000

Saltless water conditioning systems were also researched and evaluated, but not included as an alternative to private home water softeners in any scenario. Due to the high hardness from both ALP and private wells, these technologies are not likely to meet the needs of the households in the area. It is expected that uptake may be low, with a high degree of replacement and reinstallation of conventional water softeners likely. In addition, concentrations of other ions from the groundwater may impact overall efficacy of the technology and result in significant corrosion issues within the households. However, ALASD could consider a pilot program to evaluate the technology in a limited number of households to assess suitability for wider roll-out.

Conclusions and Next Steps

Based on the historic data from ALASD and the additional sampling conducted in 2021, the majority of influent chlorides to the ALASD WWTF is from residential sources. The current loading contributions are approximately 75% to 80% from residential sources, 15% to 20% from two industrial facilities, and the remaining commercial and industrial sources accounting for less than 5%. Of the portion from residences, private well households appear to contribute a higher percentage of the overall chloride loading to the WWTF (46% of total) compared to the ALP households (33% total).

In order to meet proposed final limits, residents in the ALASD service area must reduce the amount of salt added to their water supply. Removing salt chloride from wastewater after it has been added is not feasible according to the MPCA studies and guidance documents. Solutions must therefore reduce the amount of salt added to the water used for residential purposes in order to meet final limits.

ALASD is in a unique situation where one-half of the customers are served by a public water supplier (ALP) and the other half use private wells. In addition, ALASD is a separate government entity from the City of Alexandria and does not have authority to regulate activity within the City or for the municipal water supply entity. ALP Utilities is the municipal water supplier for residents of the City and would need to make process changes to their water treatment plant (i.e., upgrade current WTP to add lime softening or reverse osmosis facility) to eliminate the need for home water softener usage. In addition, private well water usage at residences not served by ALP are subject to the local ordinances of the communities, and ALASD does not have authority to regulate these activities. The CIMP efforts require collaboration and long-range planning with the City, ALP Utilities, and private well stakeholders to meet requirements.

Given the high hardness of available groundwater supply in the region, alternatives to meet the proposed final chloride limits at the ALASD WWTF require significant modifications to the water treatment processes across the entire ALASD service area. Alternatives identified that meet future permit limit require elimination of nearly all in-home water softening. These alternatives have high capital, operation, and maintenance costs, and do not meet the affordability standards for utility fees (i.e., resulting wastewater costs are > 2% of median household income).

A number of other scenarios were evaluated to optimize in-home water softener performance, upgrade the ALP water treatment plant without a service area expansion, and target industrial sources. Several of these alternatives would meet the affordability standards. However, none of these alternatives would meet the final chloride effluent limits.

There currently is not an affordable, effective, and feasible solution identified that would meet the future effluent chloride limit. However, implementation of incremental improvements to take advantage of cost-effective opportunities for chloride reductions exist. This may include promotion programs to accelerate the elimination of older, timer-based softener systems throughout the entire ALASD service area and collaboration with ALP Utilities during future water treatment plant upgrades to enable implementation of centralized limit softening.

In addition, emerging technologies should be further researched to determine if future innovation and market demand will provide new alternatives to address more cost-effective treatment of home-based systems for the township areas outside of ALP service area.

WTP upgrades are currently scheduled in 10 to 15 years according to ALP which could include lime softening upgrades, however this solution alone will not meet the final effluent limit for chloride. If a more affordable home-based "point of entry" water treatment system is available in the future, a combined solution of ALP lime softening and private well treatment would be desirable.

Funding opportunities exist to create more affordable solutions for chloride reductions. The most significant opportunity is the Point Source Implementation Grant (PSIG) from the State of Minnesota Clean Water Funds which could result in up to $7M grant funding for water treatment plant upgrades. We have initiated discussions with the MPCA to discuss the ability for PSIG eligibility while still maintaining the variance status (i.e., our current understanding is eligibility for the PSIG would require eliminating ALASD's variance status). The PSIG funding would be for upgrading ALP's municipal WTP to a lime softening plant. However, this is only "part" of the solution. Out of the 10,000 customers of ALASD, about ½ are in the city. The other half use private wells and the ALASD will still need a variance until a more feasible solution is found to deal with these remaining chloride sources.

Phase 1 Steps (to be completed in 2021) for the CIMP include the following:

Annual report to be completed in December and submitted to the MPCA.

Continue Chloride CAC meetings on quarterly basis.

Stakeholder meetings to held in 2021 with select industrial and commercial customers to investigate potential chloride reduction available to users with high chloride discharges. Follow up discussions may be required. Recommendations to be included in 2021 Annual Report.

Continued chloride education events for residential customers will be planned and implemented in 2021.

Meeting with ALP to be scheduled in 2021 after ALP feasibility study results for future water treatment plant alternatives/costs are available.

Funding opportunities to be reviewed including:

- Chloride Reduction Grant for chloride reduction from business or industrial water softening systems.
- Small Business Environmental Assistance for zero-interest loans to businesses to upgrade equipment to reduce salt use.
- Clean Water Partnership loans for zero-interest loans for LGU to implement practices that reduce non-point source chloride reduction.
- Point source implementation grant (PSIG) for water plant treatment upgrades related.

- Investigate other funding opportunities.

ALASD to engage ALP and the City of Alexandria to discuss Integrated Planning to determine how to streamline regulatory issues related to chlorides.

Future steps (beyond 2021) for the CIMP include the following:

Annual reports to be completed in December of each year and submitted to the MPCA.

Continue Chloride CAC meetings on quarterly basis.

Evaluate alternatives to industrial water treatment systems to reduce chloride discharges from industrial and/or commercial sources with high chloride levels.

Per the ALASD NPDES permit, within three years this CIMP, research nonpoint source discharges of chloride such as road salt application and the use of de-icing products on ALASD property. Review MPCA's Smart Salting Assessment tool (www.wintermaintenancetool.com) with LGUs. This web-based tool will help winter maintenance organizations assess operations, identify opportunities to reduce salt using proven best management practices (BMPs), and track progress. Along with this tool are Smart Salting training opportunities.

Per ALASD NPDES permit, work with and provide funding for one City of Alexandria staff member to attend at least one smart salting trainings and submit documentation of completion to the MPCA. The preferred City staff to attend should be a staff member who is considered a decision-maker in road maintenance. This will satisfy the requirement that Permittees with a variance will implement cost-effective and reasonable BMPs for nonpoint source control (Minn. R. 7050.0190 subp 1(B)).

Identify the appropriate quantifiable sampling and reporting methods necessary to determine if the chloride source reduction activities are resulting in a reduction, or if changes are needed.

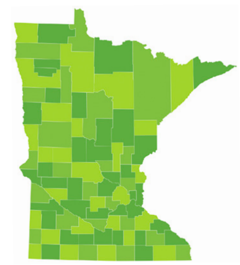
Continue to update schedule of CIMP actions per the Streamlined Chloride Action Tree.

Appendix A: Summary of Statewide Chloride Management Plan and Streamlined Chloride Variance Action Tree

Summary

Statewide Chloride Management Plan

Effectively managing salt use to protect Minnesota's lakes and streams



Reducing chloride at the source is needed throughout the state of Minnesota, not only to restore already impacted waters but also to protect all water resources. There are multiple sources to consider, a variety of options to reduce chloride, and a large geographical area to address. A main purpose of this plan is to provide guidance, resources, and information to individuals and organizations to assist in making the important decisions of the what, how and when for managing chloride.

The Statewide Chloride Management Plan (CMP) outlines a comprehensive strategy to reduce salt (chloride) use from a variety of sources to protect our lakes, rivers, and other water resources. The Statewide CMP incorporates water quality conditions, sources of chloride, salt reduction strategies, protection strategies, and monitoring recommendations as well as measurement and tracking of results.

The plan was developed by the Minnesota Pollution Control Agency (MPCA) in partnership with municipalities, counties, watershed districts and other state experts. As part of this effort, the MPCA and partners collaborated to monitor, evaluate, and better understand the level of chloride in lakes, streams, wetlands, and groundwater.

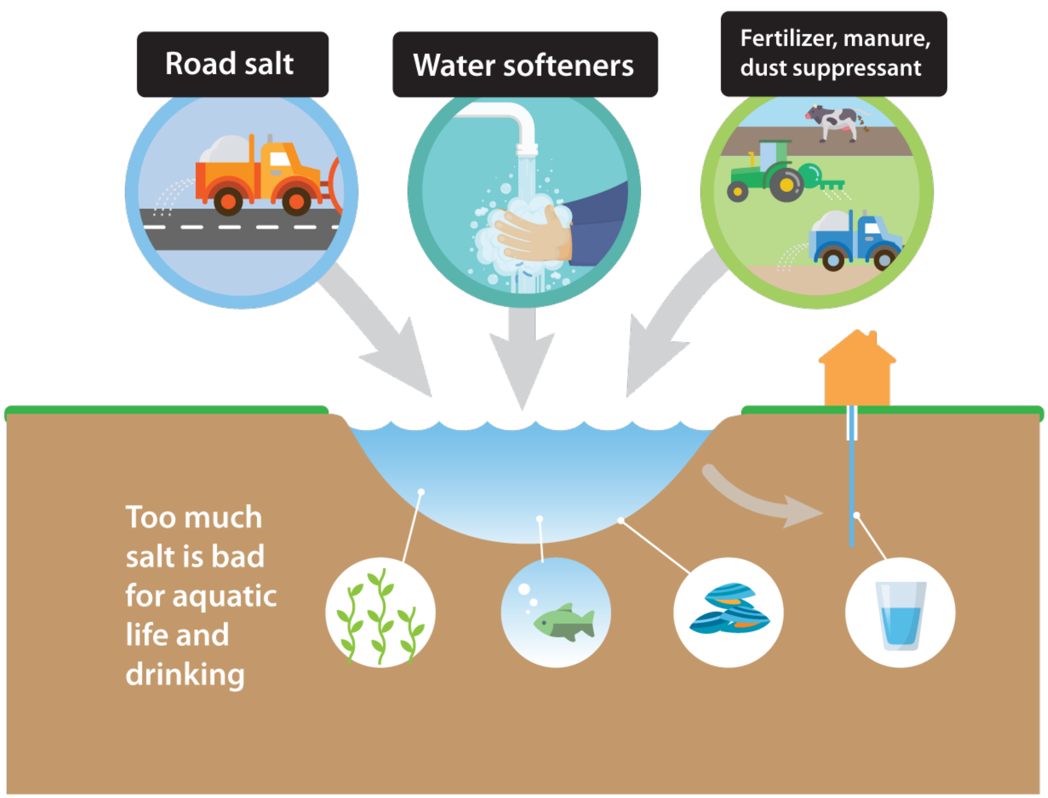
However, water quality is not the only factor driving the need to reduce chloride entering the state's water resources. Improved practices not only reduce chloride impacts on water quality, but they can also lead to long-term cost-savings as a result of purchasing less salt and reduced impacts on vegetation and corrosion of infrastructure and vehicles.

Sources of chloride

Chloride enters lakes, streams, wetlands, and groundwater from a variety of sources, including:

- salt applied to roads, parking lots, trails, and sidewalks for winter maintenance
- water softener brine discharge to municipal wastewater treatment plants (WWTPs)
- water softener discharge to a septic system
- agricultural fertilizer
- industrial discharge
- land application of manure
- land application of WWTP sludge
- dust suppressant

From a statewide perspective, road salt use, fertilizers, and WWTPs make up the predominant sources of chloride.



The relative significance of each source of chloride is dependent on the watershed. For highly developed urban areas, winter maintenance activities are typically the primary source.

In rural areas, residential and commercial water softening represent the largest point sources of chloride to the environment. In a 2019 report, University of Minnesota researchers estimated that roughly 65% of all chloride passing through WWTPs, or

136,000 tons of chloride annually, comes from residential or commercial water softening processes. In other rural areas, dust suppressants, fertilizers, and animal manure can also be a significant source of chloride.

Trends in surface and groundwater

Minnesota has found elevated chloride concentrations throughout the state. Recent reports have identified 221 river miles, 55 acres of wetlands, and 1,400 acres of lake surface area in Minnesota that are impaired by chloride. But only a fraction of all waterbodies have been assessed for chloride. Minnesota lists 50 waterbodies as impaired by chloride, 41 of which have approved Total Maximum Daily Load (TMDL) studies.

In the Twin Cities metro area, chloride concentrations have been increasing in the Minnesota River, St. Croix River, and Mississippi River since 1985, with the highest observed concentrations typically occurring downstream of urban influence. There is additional evidence of increasing concentrations in 59 waterbodies throughout the state within the last 10 years.

In 2016, the MPCA finalized the Twin Cities Metropolitan Area (TCMA) Chloride Management Plan (CMP) and the TCMA Chloride TMDL, which is a predecessor to this Statewide Chloride Management Plan (Statewide CMP). The TCMA CMP focused largely on the impacts of winter maintenance activities in the 7-County metropolitan area.

The Statewide CMP presented here focuses not only on winter maintenance activities and water softening, but includes information and guidance on other chloride applications that take place year-round, such as dust-suppressants and fertilizers that include chloride.

The trend of increasing chloride concentrations in lakes, wetlands, streams, and groundwater is expected to continue but through this plan we hope to slow down the rate of impairment. With today's technology, treating waters already contaminated by chloride is impractical and cost-prohibitive.

The problem with salt

Chloride persists in the environment: Once chloride is in water, the only way to remove it is reverse osmosis, which is not economically feasible. This means that chloride will continue to accumulate in the environment over time. A University of Minnesota study found that about 78% of salt applied for winter maintenance in the Twin Cities metro area is either transported to groundwater or remains in the local lakes, streams, wetlands, groundwater, and soil.

Harmful animals and aquatic life: Low levels of chloride can be found naturally in lakes and streams, and chloride is essential for aquatic life to carry out a range of biological functions. But high concentrations of chloride can kill fish, invertebrates, and even some plant species. Chloride can also harm pets and wildlife if they consume deicing materials by eating them directly, licking their paws, or by drinking snow melt and runoff.

The MPCA has adopted the United States Environmental Protection Agency's recommended water quality criteria for chloride:

- acute (short-term) exposure is 860 mg/L
- chronic (long-term) exposure is 230 mg/L

At levels exceeding the water quality standard of 230 mg/L, chloride is toxic to aquatic life.

Contaminating groundwater and drinking water: About 75% of Minnesotans rely on groundwater for their drinking water supply. Groundwater monitoring data collected by the MPCA from 2013-2017 found that 16% of monitoring wells tested in shallow sand and gravel aquifers in the Twin Cities metro area exceeded the state chronic standard for surface waters of 230 mg/L for chloride. Deicing salt application, in particular, is resulting in high chloride concentrations in groundwater. Groundwater also contributes flow to lakes, wetlands, and streams, and can release elevated concentrations of a number of pollutants into surface waterbodies.

Drinking water infrastructure is also susceptible to increased concentrations of chloride. Lead and copper pipes become more corrosive as chloride levels reach a certain threshold, which can cause human health concerns and reduce the lifetime of infrastructure.

Damage to infrastructure and vehicles: Water quality isn't the only concern related to high levels of chloride in the environment. Chloride can damage road and bridges, increasing maintenance and repair costs. It can also damage vehicles due to corrosion to parts such as brake linings, frames, bumpers. Estimates of damage to infrastructure, automobiles, vegetation, human health, and the environment due to road salt range from $803 to $3,341 per ton of road salt used.

Key challenges in reducing salt use

Reducing chloride use comes with a number of challenges: meeting the public's winter travel expectations, providing potable water suitable for public preferences and appliance operations, and economic losses in agricultural and industrial settings.

Currently, there are no environmentally safe and cost-effective alternatives that are effective at melting ice on paved surfaces, and few options to eliminate chloride use in water softening and agriculture. Therefore, the continued use of salt as the predominant deicing agent for public safety and its use in water softening and agricultural settings is expected.

Road salt: A key challenge in reducing road salt use is balancing the need for safety with the public's growing expectation for clear, dry roads, parking lots, trails, and sidewalks throughout the mix, severity, and duration of Minnesota winters. The Minnesota Department of Transportation (MnDOT) and many cities, counties, and others have made notable progress in improving winter maintenance while reducing salt use.

The impact of climate change on salt use is uncertain. Shorter snowfall and freezing seasons may result in reduced salt use. Yet, more frequent snow events, more extreme events, and potentially more frequent ice storms may result in greater needs for deicing roads, particularly in the more populated parts of the state.

Water softening: We need to educate the public on the balance between ***necessity*** and ***preference*** with water softening practices. Certain commercial or residential appliances require or operate more effectively with softened water, however, the specific degree of softening can often be calibrated to individual preferences. Additionally, some municipalities offer softening prior to distribution, and many older in-home softening units are less efficient than newer models. These various factors often lead to more chloride use than is necessary to meet specific needs and tastes.

Other sources: Similar cost-benefit challenges exist for all sources, including the balance between agricultural fertilizer applications and downstream chloride transport, and the balance between industrial process efficiency and chloride discharge.

Despite these challenges, reduced use of salt is likely to result in direct cost-savings to winter maintenance organizations and private applicators. Improved efficiency and adjusted water softening practices can also have economic benefits on a residential and municipal scale.

How can this plan help me reduce my chloride use?

This plan provides guidance, resources, and information to individuals and organizations to help them make the important decisions of what, how, and when for managing chloride.

Performance-based approach for reducing chloride

The over-arching implementation strategy identified in this report is a performance-based approach to reducing chloride. This approach allows stakeholders and regulators flexibility in the type of BMPs and the timing of implementation. It also allows individuals and organizations an opportunity to develop specific chloride management strategies that are practical for their individual situations.

Chloride Management Plan
Purpose – Scope – Audience

Purpose

- Highlight the impacts of chloride on statewide water quality
- Develop an appreciation of the competing demands of level of service and reduced salt usage
- Set performance-based goals for restoration and protection
- Inform and guide implementation of improved winter maintenance practices and policy needs
- Educate on demonstrating the benefits of efficient residential and commercial water softening
- Demonstrate the success and economic benefits of improved practices

Scope

- Status and trends of chloride levels in lakes, wetlands, streams, and groundwater
- Sources of chloride
- Restoration and protection goals
- Implementation and strategies to reduce chloride impacts
- Educational and training resources
- Continued monitoring, tracking, and adaptive management

Audience

- Local working groups (local governments, watershed management groups, soil and water conservation districts)
- Winter maintenance groups (MnDOT, local governments, private applicators, commercial property owners, residents)
- Elected officials and policy makers
- Permit holders
- State agencies (MPCA, MnDOT, DNR, BWSR, etc.)

The performance-based approach doesn't focus on specific numbers to meet, but rather on making progress through the use of BMPs. Progress is measured in terms of the progress made and BMPs implemented.

Prioritization and critical areas: Where do I start?

Road salt and water softening are two large statewide sources of chloride in the environment, and many of the current reduction strategies focus on these two sources. This plan also identifies critical watersheds and locations around the state based on road density and potential demand for water softening, where chloride loadings are to be expected high and therefore implementation efforts to reduce chloride should be focused. For the protection of surface and ground waters, implementation is encouraged statewide.

Organizations interested in reducing the amount of chloride entering our water resources should begin with an effort to fully understand the problem:

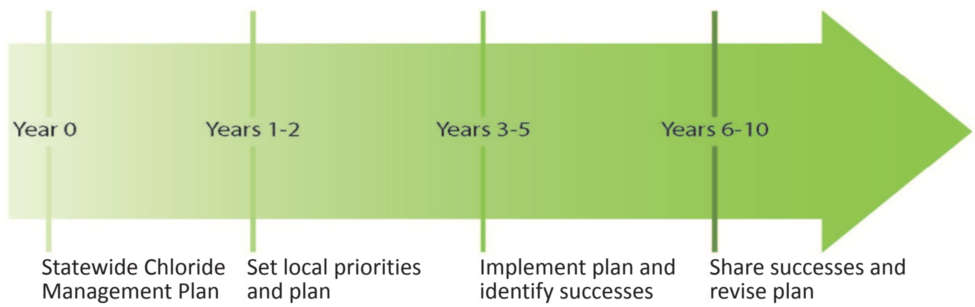
- Know what the primary sources of chloride are in your community.
- Determine your organization's role in contributing, preventing, or slowing the growing trend of increased chloride in surface and groundwater.
- Understand local water resources and conditions, both surface water and groundwater. Addressing these considerations can help determine priorities and critical areas.

Implementation strategies

The statewide CMP provides the overall framework for the implementation strategies that are necessary to protect and restore our water resources. **Section 5.4** of this plan provides the implementation activities for specific audiences and all sources of chloride.

Local priorities should be set with a plan in place within 1-2 years after this Statewide CMP is published. Local priorities will vary by various stakeholder groups and audiences.

General performance-based timeline for chloride management



By years 3-5, an implementation plan should be set and successes and progress should begin to be monitored.

Years 6-10 should be spent sharing successes and revising any necessary components of the localized plan.

Find your section of the plan

This plan was developed to be used by many different audiences and organizations. Every organization will have different priorities based on their local watershed conditions, the role of their organization in the watershed or state, and their organization's specific needs or goals.

Because the Statewide CMP is meant to be used as a reference document to help you or your organization reduce chloride use, **Section 5** of the plan may be the most useful sections for you to revisit as you develop and implement chloride reduction strategies. This section and subsections lay out implementation strategies for how each person or organization can reduce chloride based on the types of activities with which they are involved. Example strategies and timelines are also provided as templates.

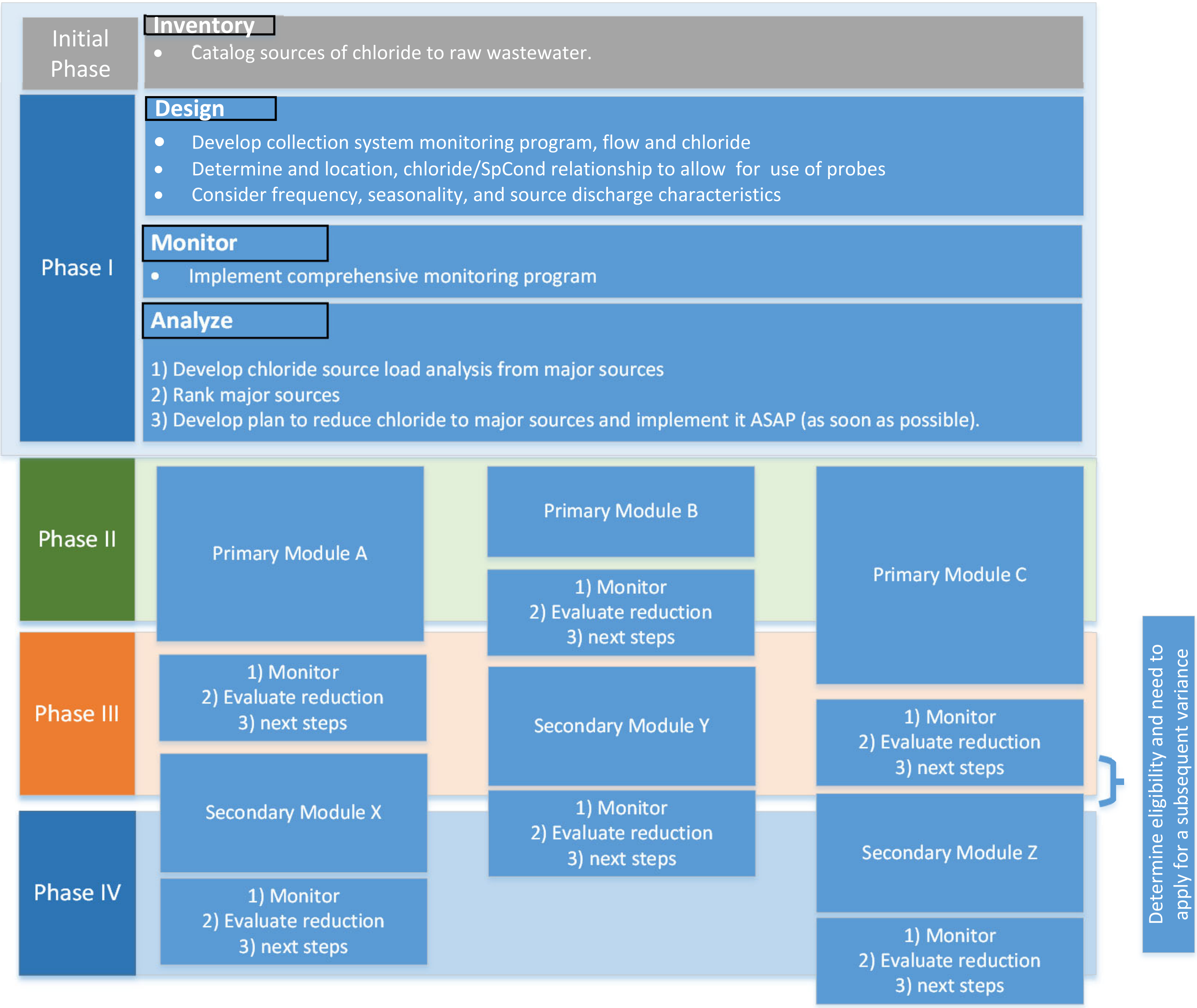
Full report To view the full draft report on public notice, please visit the MPCA Public Notice Webpage or https://www.pca.state.mn.us/water/draft-statewide-chloride-management-plan

Contact person Eric Alms,Minnesota Pollution Control Agency
eric.alms@state.mn.us
651-757-2589

MINNESOTA POLLUTION CONTROL AGENCY

CLEAN WATER LAND & LEGACY AMENDMENT

Streamlined Chloride Variance Action Tree



The following action tree is designed to be a guide for development and implementation of activities to reduce chloride as a part of schedules of compliance activities within chloride variances in municipal wastewater permits. Specific features of the community, including the types of sources and any work to investigate and reduce chloride prior to application for and receipt of a chloride variance will impact both the activities and the time it takes to complete them. For many communities that have not done substantial investigation into chloride, 15 years is a reasonable time frame. MPCA has documented that residential water softeners are the main source of chloride for many communities and will take time to address, hence this sequenced approach. In some municipalities, activities can be done sooner and others later. However, they must all be done “as soon as possible”.

The initial Phase will primarily focus on development of an inventory of chloride sources. Phase I will then dive deeper into a load assessment, the goal of which is to determine the major sources of chloride. It is in this Phase that the sequence of actions that will lead to the greatest reduction in the quickest way. Order or priority of activities in the next Phase will be driven by the largest pollutant load sources. The following modules are provided as examples of concepts that could be added into schedules of compliance activities. Until the discharge meets the chloride WQBEL, a city is expected to continue to progress through the activities in each module and from one source category to the next, assessing chloride reduction opportunities and implementing those that are feasible.

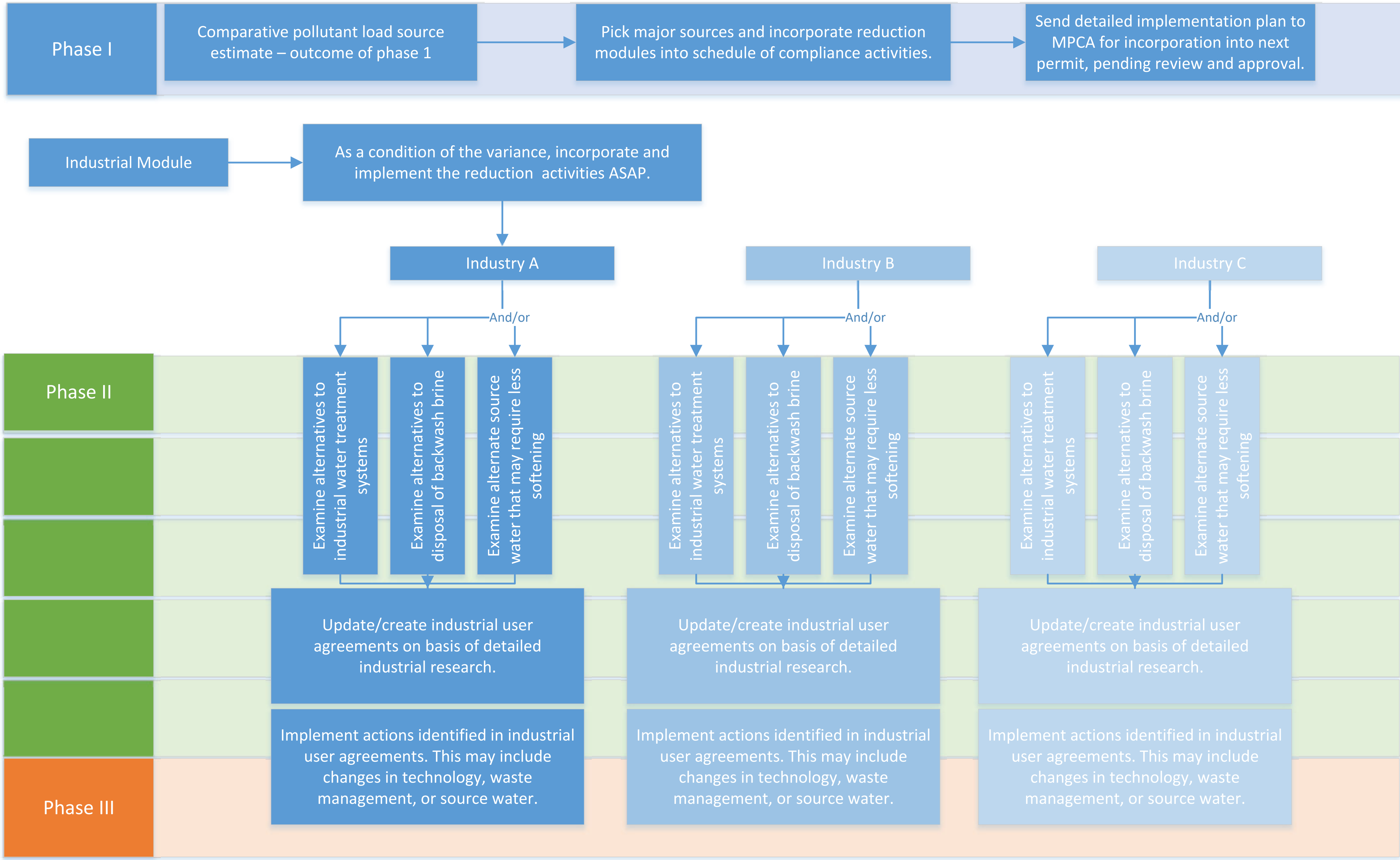
Given limited staff and resources at most municipalities, it is not expected that all of these modules can be completed at once. Rather, it is likely that modules will be implemented both in parallel and in sequence with a monitoring step in-between to evaluate progress towards meeting the final water quality based effluent limit (WQBEL). Activities will be continual through the variance, with sources being addressed to the extent feasible with flexibility given based on time.

As the first stage of most reduction modules are completed, monitoring will determine the amount of load reduction achieved. Once the first round of major sources are addressed, secondary activities identified in each module must be initiated to attain further reductions. In the last year prior to the end of the variance, the permittee will need to determine whether there is a need and if the facility is eligible to receive a subsequent variance. If a subsequent variance is needed, action modules will be maintained and reflected in the subsequent variance.

Timelines will differ based on community. However, initial phase will be done within 180 days as required in the permit. Phase I will move along as sources are investigated further (including monitoring, seasonality, and other factors) after the aforementioned 180 days (years 2-5). Plans will be updated annually based on the permit requirements. Phase II and III will measure the reduction results and move on to other activities as time and resources allow. This timeline will encompass years 2 or 5 through years 15, but Plans will continue to be updated annually. The goal is to gather data that will show what actions have led to reductions and to target future activities. The Permittee shall use the data to summarize effectiveness, re-evaluate next year's schedule, and modify the Plan as needed. If the monitoring does not indicate progress, identify the barriers, take action to overcome those barriers, and take supplemental action to ensure future progress. Again, all this will be updated annually as required by the permit.

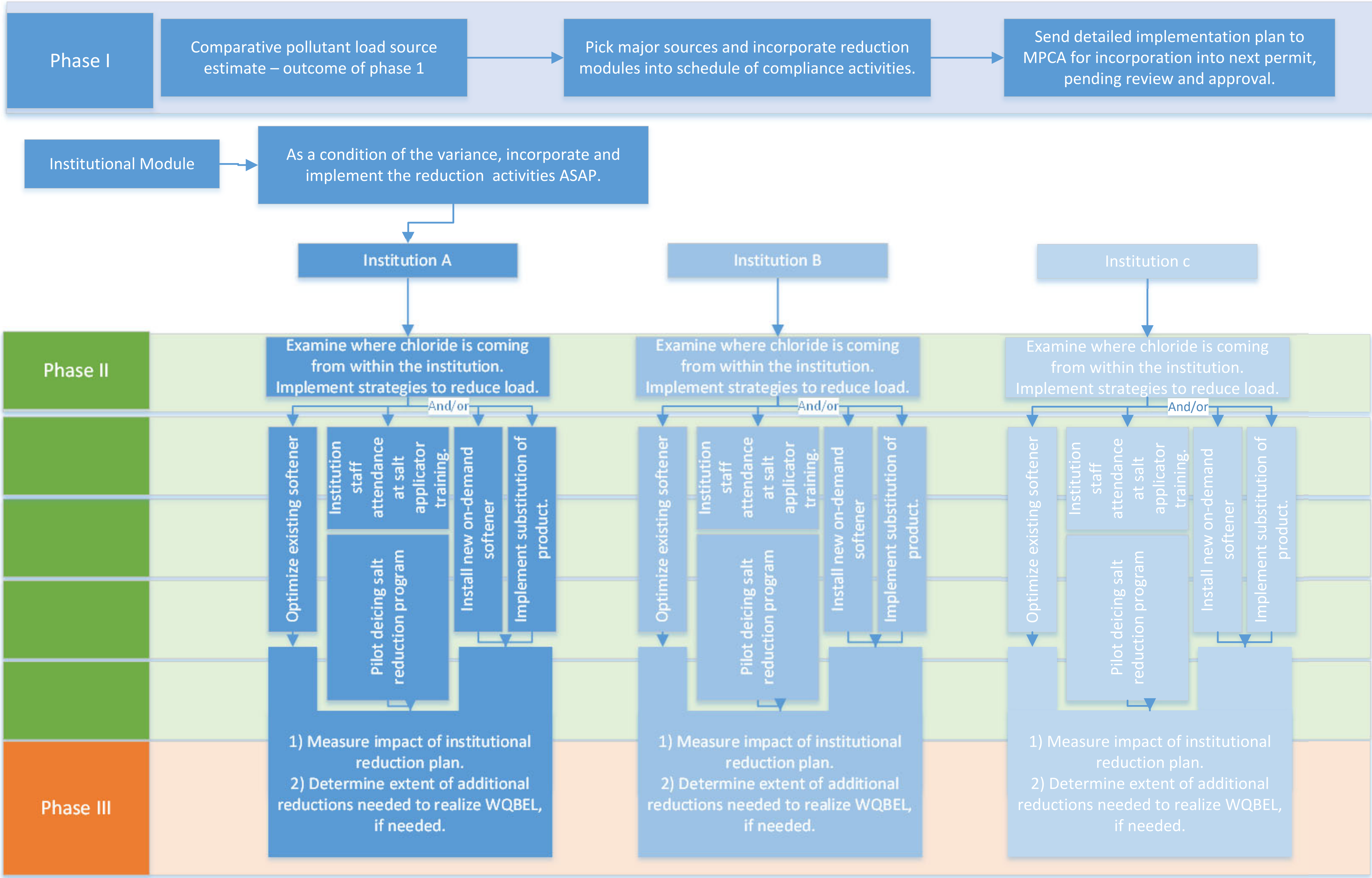
Industrial source schedule of compliance activities module

Note: Industries may include the following: leachate from landfills, food processors (meat, jerky or cheese production), rendering, breweries, ethanol, biofuels, drink bottlers, metal finishing, or metal painting (including powder coat painting).



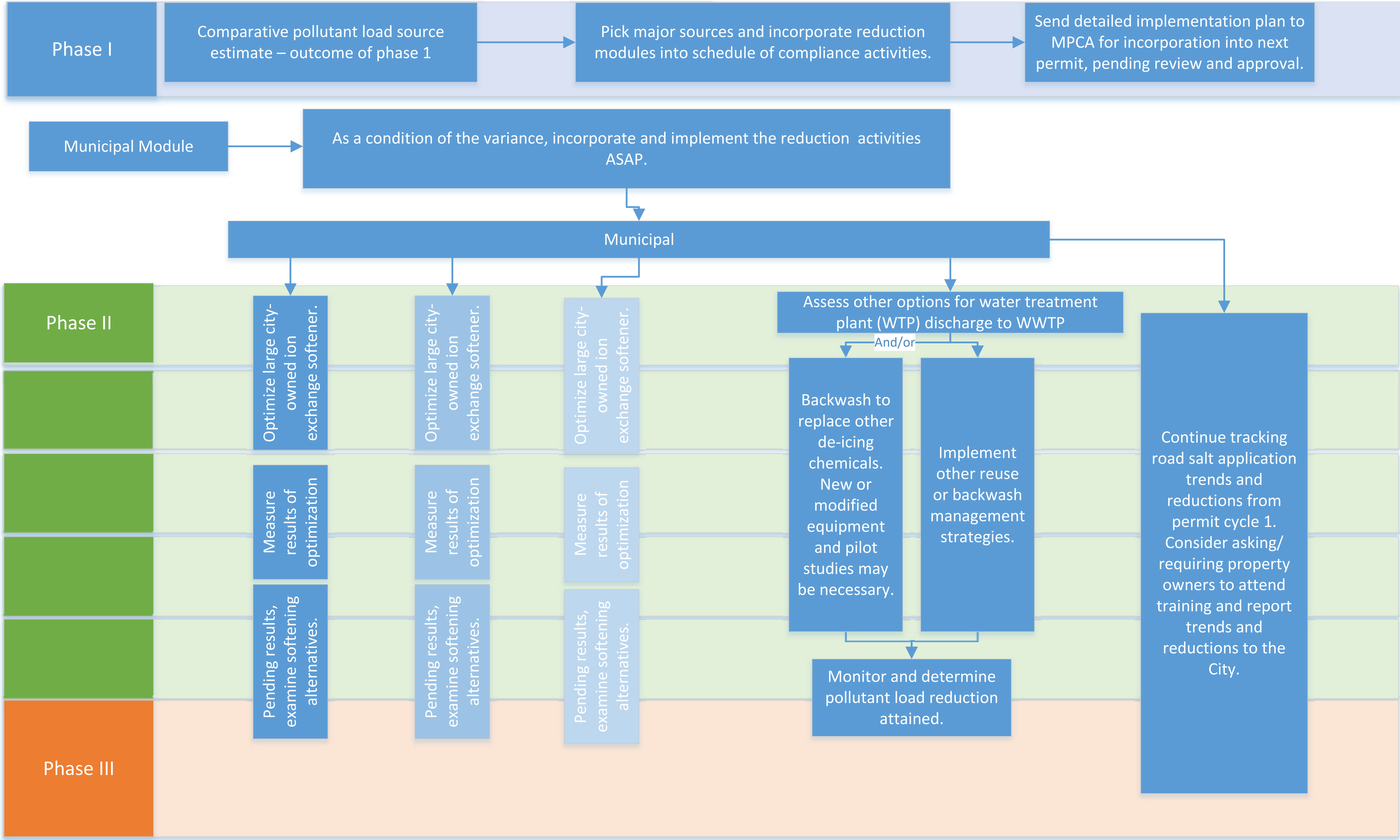
Institutional source schedule of compliance activities module

Institutional sources often include larger ion exchange water softeners from entities like schools or hospitals.



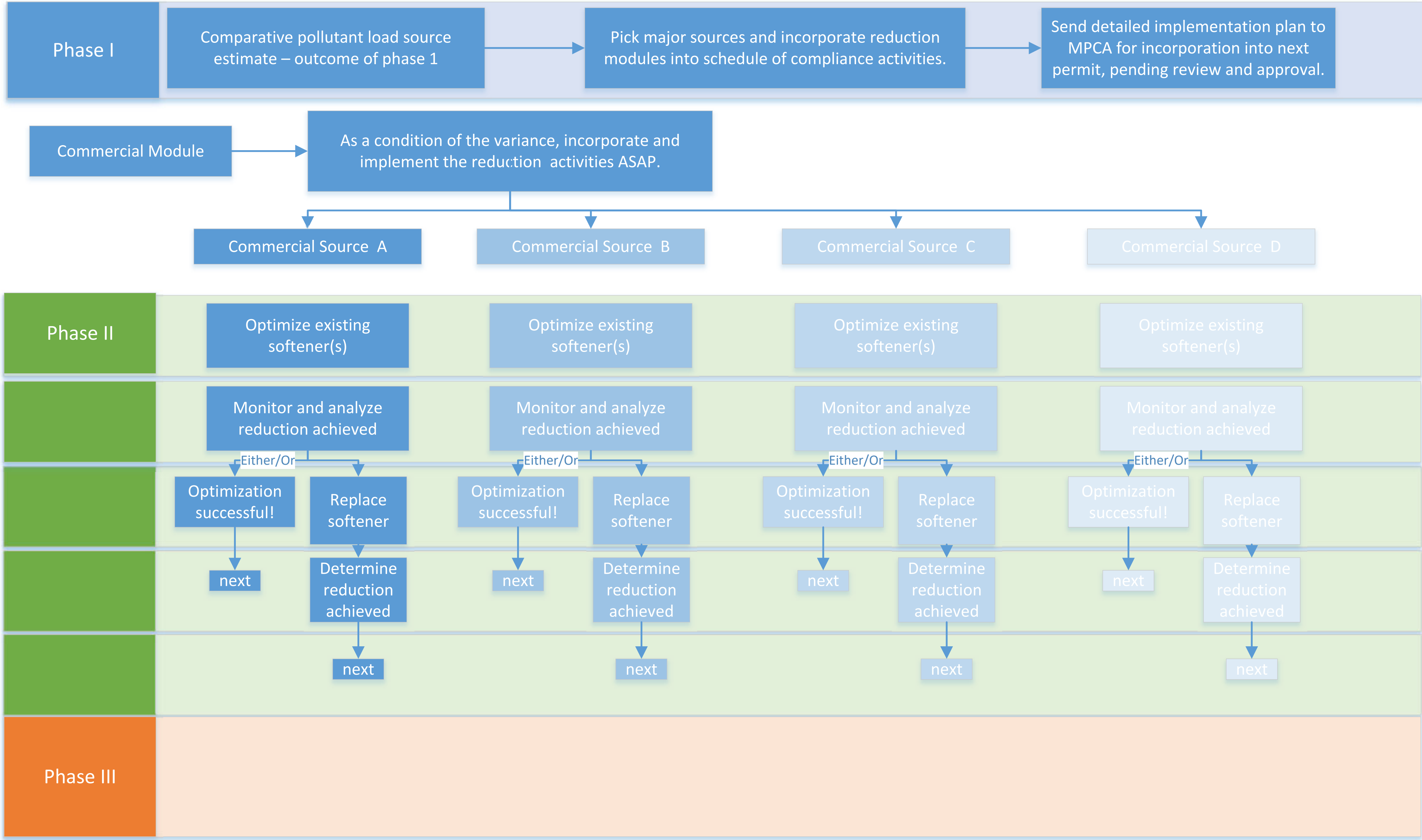
Municipal source schedule of compliance activities module

Note: "municipal sources" refers to contributions from large, city-owned softeners. Chloride contributions would occur if the city operated an ion exchange system, which may be rare. Other centralized softening methods (RO, Lime) should not produce chloride, but backwash may be high in other salts. Finally, chloride may be an issue if inflow and infiltration results in contributions from application of road salt.



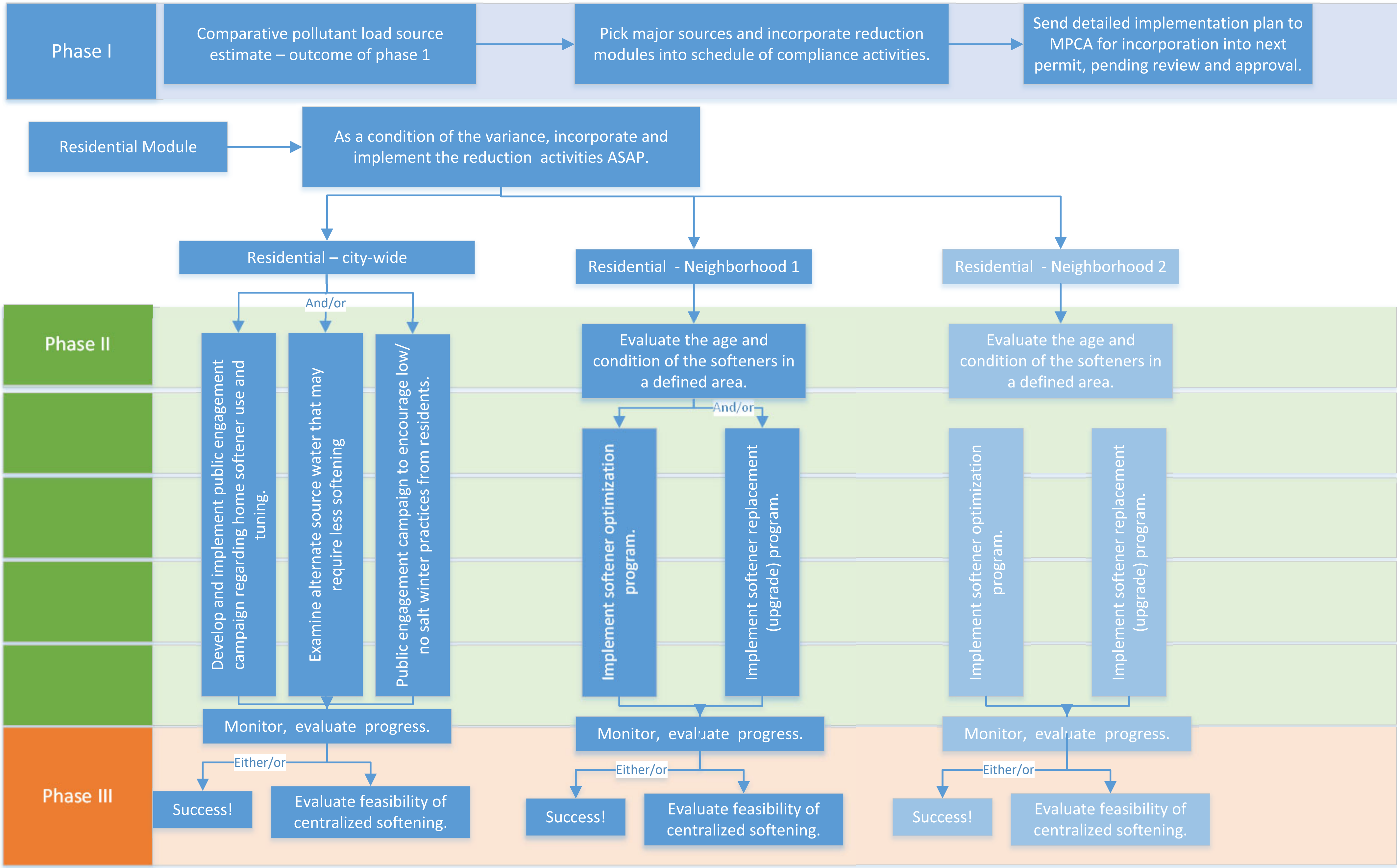
Commercial source schedule of compliance activities module

Commercial entities include hotels, restaurants, and office buildings. Reduction activities are largely based on water softener optimization or replacement. Staff and resource limitations may require actions taken in sequence rather than parallel. If this is the case, it is recommended that the work order be prioritized



Residential source schedule of compliance activities module

Residential softening is likely to be the primary source of chloride loading to the WWTP. Actions are likely to be implemented on multiple scales, both at individual neighborhoods and city-wide. Some actions may not be implemented in parallel, but rather, in sequence due to limitations on staff and resources.



Appendix B: Sample Results

MVTL

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MEMBER
ACIL

Report Date: 2 Apr 2021
Lab Number: 21-A12257
Work Order #: 12-7053
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 25 Mar 2021 8:45
Date Received: 26 Mar 2021 9:15

Temp at Receipt: 1.2C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: LAKESIDE DR LS 47

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1130 ~	mg/L	3.0	SM 4500 Cl E	1 Apr 21 9:53	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 19 Mar 2021
Lab Number: 21-A10251
Work Order #: 12-6522
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 11 Mar 2021 9:00
Date Received: 16 Mar 2021 9:15

Temp at Receipt: -0.6C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: S LE HOMME DIEU DRIVE

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1210 ~	mg/L	3.0	SM 4500 Cl E	18 Mar 21 8:47	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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MEMBER
ACIL

Report Date: 12 Mar 2021
Lab Number: 21-A9085
Work Order #: 12-6185
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 5 Mar 2021 8:30
Date Received: 9 Mar 2021 8:50

Temp at Receipt: 0.2C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA ASEPTIC

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1580 ~	mg/L	3.0	SM 4500 Cl E	11 Mar 21 10:55	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
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CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 12 Mar 2021
Lab Number: 21-A9086
Work Order #: 12-6185
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 5 Mar 2021 8:15
Date Received: 9 Mar 2021 8:50

Temp at Receipt: 0.2C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA INGRED.

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1230 ~	mg/L	3.0	SM 4500 Cl E	11 Mar 21 10:55	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:

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CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER ACIL

Report Date: 12 Mar 2021
Lab Number: 21-A8693
Work Order #: 12-6103
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 3 Mar 2021 8:40
Date Received: 5 Mar 2021 9:05

Temp at Receipt: 0.6C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Sample Description: SUNOPTA ASEPTIC

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1560 ~	mg/L	3.0	SM 4500 Cl E	11 Mar 21 10:36	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
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! = Due to sample quantity   + = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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MEMBER ACIL

Report Date: 12 Mar 2021
Lab Number: 21-A8694
Work Order #: 12-6103
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 3 Mar 2021 8:15
Date Received: 5 Mar 2021 9:05

Temp at Receipt: 0.6C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Sample Description: SUNOPTA INGRED.

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1140 ~	mg/L	3.0	SM 4500 Cl E	11 Mar 21 10:36	SS

~ Sample diluted due to result above calibration of linear range.

Approved by: Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:

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CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Report Date: 12 Mar 2021
Lab Number: 21-A8695
Work Order #: 12-6103
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 4 Mar 2021 8:00
Date Received: 5 Mar 2021 9:05

Sample Description: SUNOPTA ASEPTIC

Temp at Receipt: 0.6C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1220 ~	mg/L	3.0	SM 4500 Cl E	11 Mar 21 10:36	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER ACIL

Report Date: 12 Mar 2021
Lab Number: 21-A8696
Work Order #: 12-6103
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 4 Mar 2021 8:15
Date Received: 5 Mar 2021 9:05

Temp at Receipt: 0.6C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Sample Description: SUNOPTA INGRED.

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1340 ~	mg/L	3.0	SM 4500 Cl E	11 Mar 21 10:36	SS

~ Sample diluted due to result above calibration of linear range.

Approved by: Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Report Date: 12 Mar 2021
Lab Number: 21-A9084
Work Order #: 12-6184
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 8 Mar 2021 7:40
Date Received: 9 Mar 2021 8:50

Project Name: INF CHLORIDE QTR 1 2021
Sample Description: INF CHLORIDE QTR 1 2021

Temp at Receipt: 0.2C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	777 ~	mg/L	3.0	SM 4500 Cl E	11 Mar 21 10:55	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
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Report Date: 5 Mar 2021
Lab Number: 21-A8071
Work Order #: 12-5917
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 2 Mar 2021 8:55
Date Received: 3 Mar 2021 9:05

Temp at Receipt: -1.0C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: LAKESIDE DR

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	286 @	mg/L	3.0	SM 4500 Cl E	4 Mar 21 10:31	SS

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
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The reporting limit was elevated for any analyte requiring a dilution as coded below:
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! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 5 Mar 2021
Lab Number: 21-A8072
Work Order #: 12-5917
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 2 Mar 2021 8:25
Date Received: 3 Mar 2021 9:05

Temp at Receipt: -1.0C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SOUTH LE HOMME DIEU DR

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	9150 ~	mg/L	3.0	SM 4500 Cl E	4 Mar 21 10:31	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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! = Due to sample quantity
= Due to concentration of other analytes
+ = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

MVTL

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MEMBER
ACIL

Report Date: 5 Mar 2021
Lab Number: 21-A7779
Work Order #: 12-5826
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 26 Feb 2021 10:55
Date Received: 2 Mar 2021 9:20

Temp at Receipt: 0.6C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA ASEPTIC

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1540 ~	mg/L	3.0	SM 4500 Cl E	4 Mar 21 9:38	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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MEMBER
ACIL

Report Date: 5 Mar 2021
Lab Number: 21-A7780
Work Order #: 12-5826
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 26 Feb 2021 10:40
Date Received: 2 Mar 2021 9:20

Temp at Receipt: 0.6C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA INGRED.

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1230 ~	mg/L	3.0	SM 4500 Cl E	4 Mar 21 9:38	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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1201 Lincoln Highway ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
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MEMBER ACIL

Report Date: 5 Mar 2021
Lab Number: 21-A7514
Work Order #: 12-5754
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 24 Feb 2021 8:50
Date Received: 26 Feb 2021 9:00

Temp at Receipt: -1.0C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA ASEPTIC

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1770 ~	mg/L	3.0	SM 4500 Cl E	4 Mar 21 9:02	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix   # = Due to concentration of other analytes
! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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1201 Lincoln Highway ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
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MEMBER
ACIL

Report Date: 5 Mar 2021
Lab Number: 21-A7515
Work Order #: 12-5754
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 24 Feb 2021 8:30
Date Received: 26 Feb 2021 9:00

Temp at Receipt: -1.0C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA INGRED.

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1330 ~	mg/L	3.0	SM 4500 Cl E	4 Mar 21 9:02	SS

~ Sample diluted due to result above calibration of linear range.

Approved by: [signature] [signature]
Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
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! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
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Report Date: 5 Mar 2021
Lab Number: 21-A7518
Work Order #: 12-5755
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 25 Feb 2021 8:40
Date Received: 26 Feb 2021 9:00

Temp at Receipt: -1.0C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA ASEPTIC

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1110 ~	mg/L	3.0	SM 4500 Cl E	4 Mar 21 9:20	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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Report Date: 5 Mar 2021
Lab Number: 21-A7519
Work Order #: 12-5755
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 25 Feb 2021 8:20
Date Received: 26 Feb 2021 9:00

Temp at Receipt: -1.0C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA INGRED.

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	982 ~	mg/L	3.0	SM 4500 Cl E	4 Mar 21 9:20	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
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! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER ACIL

Report Date: 26 Feb 2021
Lab Number: 21-A7102
Work Order #: 12-5647
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 23 Feb 2021 8:50
Date Received: 24 Feb 2021 9:25

Temp at Receipt: -0.1C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: LAKESIDE DRIVE

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	408 ~	mg/L	3.0	SM 4500 Cl E	25 Feb 21 8:46	SS

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix   # = Due to concentration of other analytes
! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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1201 Lincoln Highway ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
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MEMBER
ACIL

Report Date: 26 Feb 2021
Lab Number: 21-A7103
Work Order #: 12-5647
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 23 Feb 2021 8:20
Date Received: 24 Feb 2021 9:25

Temp at Receipt: -0.1C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: S LE HOMME DIEU DRIVE

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	161 @	mg/L	3.0	SM 4500 Cl E	25 Feb 21 8:46	SS

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
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Report Date: 12 Feb 2021
Lab Number: 21-A5515
Work Order #: 12-5255
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 9 Feb 2021 9:15
Date Received: 10 Feb 2021 10:45

Temp at Receipt: -0.2C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: NELSON

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	266 @	mg/L	3.0	SM 4500 Cl E	11 Feb 21 10:26	AKF

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Report Date: 12 Feb 2021
Lab Number: 21-A5516
Work Order #: 12-5255
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 9 Feb 2021 8:50
Date Received: 10 Feb 2021 10:45

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SOUTH CAR WASH

Temp at Receipt: -0.2C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	19000 ~	mg/L	3.0	SM 4500 Cl E	11 Feb 21 10:26	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by: [signature] [signature]

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
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Report Date: 12 Feb 2021
Lab Number: 21-A5517
Work Order #: 12-5255
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 9 Feb 2021 8:20
Date Received: 10 Feb 2021 10:45

Temp at Receipt: -0.2C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: DOUGLAS MACHINE NORTH

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	578 ~	mg/L	3.0	SM 4500 Cl E	11 Feb 21 10:26	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 12 Feb 2021
Lab Number: 21-A5142
Work Order #: 12-5173
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 3 Feb 2021 8:25
Date Received: 5 Feb 2021 8:45

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: TWF

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	801 ~	mg/L	3.0	SM 4500 Cl E	11 Feb 21 9:29	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix   # = Due to concentration of other analytes
! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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MEMBER ACIL

Report Date: 12 Feb 2021
Lab Number: 21-A5143
Work Order #: 12-5173
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 3 Feb 2021 9:15
Date Received: 5 Feb 2021 8:45

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: RIDGEWOOD DRIVE

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	243 @	mg/L	3.0	SM 4500 Cl E	11 Feb 21 9:29	AKF

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 12 Feb 2021
Lab Number: 21-A5144
Work Order #: 12-5173
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 3 Feb 2021 9:00
Date Received: 5 Feb 2021 8:45

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: ALEX EXTRUSION

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	172 @	mg/L	3.0	SM 4500 Cl E	11 Feb 21 9:29	AKF

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:

@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER ACIL

Report Date: 12 Feb 2021
Lab Number: 21-A5145
Work Order #: 12-5173
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 4 Feb 2021 8:40
Date Received: 5 Feb 2021 8:45

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: HOSPITAL

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	428 ~	mg/L	3.0	SM 4500 Cl E	11 Feb 21 9:29	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by: Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix   # = Due to concentration of other analytes
! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 12 Feb 2021
Lab Number: 21-A5146
Work Order #: 12-5173
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 4 Feb 2021 8:20
Date Received: 5 Feb 2021 8:45

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: LAKE MARY

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	953 ~	mg/L	3.0	SM 4500 Cl E	11 Feb 21 9:29	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 12 Feb 2021
Lab Number: 21-A5147
Work Order #: 12-5173
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 4 Feb 2021 9:10
Date Received: 5 Feb 2021 8:45

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA INGRED

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1370 ~	mg/L	3.0	SM 4500 Cl E	11 Feb 21 9:48	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by: Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 12 Feb 2021
Lab Number: 21-A5274
Work Order #: 12-5199
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 5 Feb 2021 8:25
Date Received: 9 Feb 2021 9:25

Temp at Receipt: -1.2C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: NELSON

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	946 ~	mg/L	3.0	SM 4500 Cl E	11 Feb 21 10:07	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER ACIL

Report Date: 12 Feb 2021
Lab Number: 21-A5275
Work Order #: 12-5199
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 5 Feb 2021 9:10
Date Received: 9 Feb 2021 9:25

Temp at Receipt: -1.2C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: NORTH HOLIDAY CAR WASH

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	510 ~	mg/L	3.0	SM 4500 Cl E	11 Feb 21 10:07	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by: Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix   # = Due to concentration of other analytes
! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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MEMBER ACIL

Report Date: 12 Feb 2021
Lab Number: 21-A5276
Work Order #: 12-5199
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 5 Feb 2021 9:25
Date Received: 9 Feb 2021 9:25

Temp at Receipt: -1.2C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: 3M

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1200 ~	mg/L	3.0	SM 4500 Cl E	11 Feb 21 10:07	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by: [signature] [signature]

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix # = Due to concentration of other analytes
! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

MINNESOTA VALLEY TESTING LABORATORIES, INC.

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MEMBER
ACIL

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Report Date: 8 Feb 2021
Lab Number: 21-A4423
Work Order #: 12-5018
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 2 Feb 2021 7:45
Date Received: 3 Feb 2021 9:20

Sample Description: EFF CHLORIDE QTR 1 2021

Temp at Receipt: -0.7C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	784 ~	mg/L	3.0	SM 4500 Cl E	4 Feb 21 10:00	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:

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CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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Report Date: 8 Feb 2021
Lab Number: 21-A4424
Work Order #: 12-5018
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 2 Feb 2021 7:50
Date Received: 3 Feb 2021 9:20

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Sample Description: INF CHLORIDE QTR 1 2021

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	866 ~	mg/L	3.0	SM 4500 Cl E	4 Feb 21 10:00	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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MEMBER ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4425
Work Order #: 12-5018
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 2 Feb 2021 8:45
Date Received: 3 Feb 2021 9:20

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Sample Description: 3M

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	826 ~	mg/L	3.0	SM 4500 Cl E	4 Feb 21 10:00	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

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! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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MEMBER ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4426
Work Order #: 12-5018
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 2 Feb 2021 9:30
Date Received: 3 Feb 2021 9:20

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Sample Description: CARWASH NORTH HOLIDAY

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	220 @	mg/L	3.0	SM 4500 Cl E	4 Feb 21 10:19	AKF

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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MEMBER ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4427
Work Order #: 12-5018
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 2 Feb 2021 8:30
Date Received: 3 Feb 2021 9:20

Temp at Receipt: -0.7C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Sample Description: CARWASH SOUTH

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	796 ~	mg/L	3.0	SM 4500 Cl E	4 Feb 21 10:19	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by: Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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\# = Due to concentration of other analytes
! = Due to sample quantity
\+ = Due to internal standard response

CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4209
Work Order #: 12-4942
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 29 Jan 2021 8:15
Date Received: 2 Feb 2021 9:15

Temp at Receipt: 0.4C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: SUNOPTA ASEPTIC

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	1470 ~	mg/L	3.0	SM 4500 Cl E	4 Feb 21 9:03	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

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The reporting limit was elevated for any analyte requiring a dilution as coded below:
@ = Due to sample matrix   # = Due to concentration of other analytes
! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Report Date: 8 Feb 2021
Lab Number: 21-A4210
Work Order #: 12-4942
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 29 Jan 2021 8:50
Date Received: 2 Feb 2021 9:15

Project Name: CHLORIDE SAMPLING 2021
Sample Description: RIDGEWOOD DRIVE

Temp at Receipt: 0.4C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	264 @	mg/L	3.0	SM 4500 Cl E	4 Feb 21 9:03	AKF

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

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Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
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! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4211
Work Order #: 12-4942
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 29 Jan 2021 9:22
Date Received: 2 Feb 2021 9:15

Temp at Receipt: 0.4C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: HOSPITAL

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	623 ~	mg/L	3.0	SM 4500 Cl E	4 Feb 21 9:22	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
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! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4212
Work Order #: 12-4942
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 1 Feb 2021 9:05
Date Received: 2 Feb 2021 9:15

Temp at Receipt: 0.4C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: DOUGLAS MACHINE NORTH

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	47.6	mg/L	3.0	SM 4500 Cl E	4 Feb 21 9:22	AKF

Approved by: R. Dan O'Connell   [signature]

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

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Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
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! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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MEMBER ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4213
Work Order #: 12-4942
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 1 Feb 2021 8:55
Date Received: 2 Feb 2021 9:15

Temp at Receipt: 0.4C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: DOUGLAS MACHINE SOUTH

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	234	mg/L	3.0	SM 4500 Cl E	4 Feb 21 9:22	AKF

Approved by:

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

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! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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www.mvtl.com

MEMBER ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4214
Work Order #: 12-4942
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 1 Feb 2021 8:35
Date Received: 2 Feb 2021 9:15

Temp at Receipt: 0.4C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING 2021
Sample Description: LAKE MARY

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	697 ~	mg/L	3.0	SM 4500 Cl E	4 Feb 21 9:22	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell David Smahel
Chemistry Laboratory Managers New Ulm, MN

RL = Reporting Limit
Analyses performed under our Minnesota Department of Health Accreditation conform to the current TNI standards.
The reporting limit was elevated for any analyte requiring a dilution as coded below:
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! = Due to sample quantity + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125 ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4062
Work Order #: 12-4901
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 27 Jan 2021 9:00
Date Received: 29 Jan 2021 9:35

Temp at Receipt: 0.8C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING
Sample Description: SUNOPTA INGRED.

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	707 ~	mg/L	3.0	SM 4500 Cl E	4 Feb 21 8:25	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

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CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

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MEMBER
ACIL

Report Date: 8 Feb 2021
Lab Number: 21-A4063
Work Order #: 12-4901
Account #: 001012
Sample Matrix: WASTEWATER
Date Sampled: 28 Jan 2021 9:40
Date Received: 29 Jan 2021 9:35

Temp at Receipt: 0.8C

SCOT SPRANGER
ALASD
2201 NEVADA ST
ALEXANDRIA MN 56308

Project Name: CHLORIDE SAMPLING
Sample Description: ALEX EXTRUSION

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Chloride	850 ~	mg/L	3.0	SM 4500 Cl E	4 Feb 21 8:25	AKF

~ Sample diluted due to result above calibration of linear range.

Approved by:

Dan O'Connell   David Smahel
Chemistry Laboratory Managers New Ulm, MN

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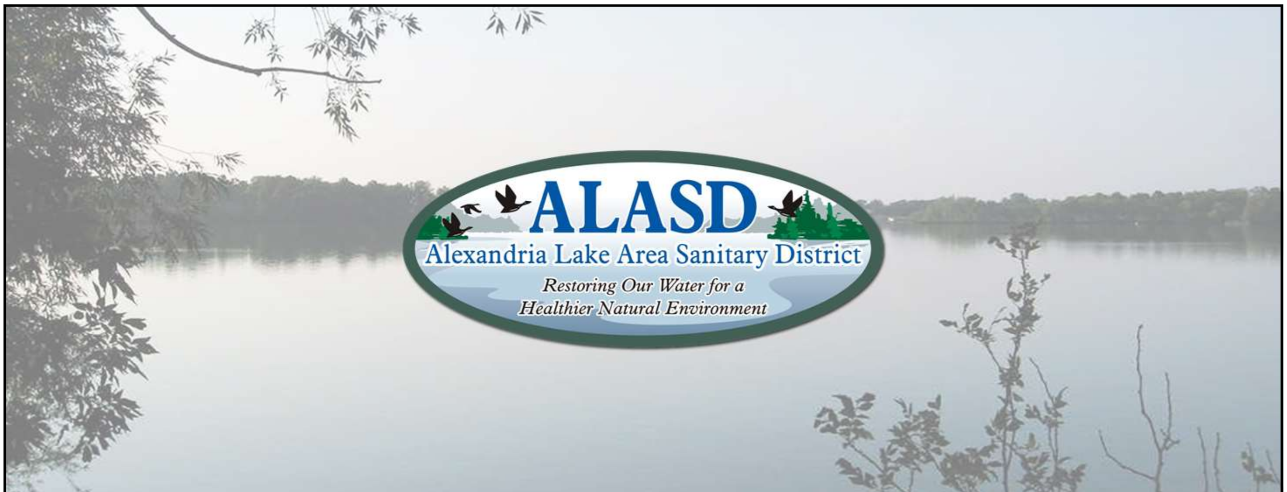
! = Due to sample quantity   + = Due to internal standard response
CERTIFICATION: MN LAB # 027-015-125   ND WW/DW # R-040

Appendix C:

January 19, 2021 Chloride Citizen's Advisory Committee Agenda/Presentation

April 6, 2021 Chloride Citizen's Advisory Committee Agenda/Presentation



Chloride Citizen's Advisory Committee

January 19, 2021

Hazen

1

ALASD Chloride CAC Agenda

January 19, 2021 @ 10 AM

1) **Introduction (Chair/Executive Director/Committee Members)**
2) Consultant Introduction and Background
3) Advisory Committee Role/Protocols
4) Background and History
5) MPCA Chloride Rules
6) ALASD NPDES permit
7) Chloride Scope and Tasks Schedule for 2021
8) Open Discussion
9) Schedule Future Quarterly Meetings

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Introduction

- The ALASD Chloride Citizen's Advisory Committee includes representatives from stakeholder groups to discuss chloride issues and work towards developing an attainment Plan for chloride reduction.
- Reducing chloride at the source is needed in the ALASD service area to protect water resources.
- Chloride is not generated at ALASD's WWTF.
- Wastewater discharge from residential, commercial, institutional, and industrial sources contain varying levels of chloride from industrial or institutional uses or from water softener brine discharge.
- There are also other sources of chloride entering our lakes and rivers from road salt, land application of industrial byproducts, fertilizer, or dust suppressants on gravel roads.
- **The goal of this attainment plan is to reduce the level of chloride in the wastewater discharged to ALASD which will in turn benefit the water quality in area lakes.**

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WHERE DID THE ADVISORY COMMITTEE GO?

- A previous Chloride Citizen's Advisory Committee was created in 2014 by ALASD for providing input on initial efforts to identify and understand the chloride reduction needs in wastewater discharged to ALASD.
- Developed a Chloride Mass Balance in 2014. Lake Winona chloride level avg: 422 mg/L.
- The committee activity was halted until the statewide regulatory guidelines for chlorides were finalized and ALASD's National Pollution Discharge Elimination System (NPDES) permit conditions were finalized. ALASD's NPDES revised permit was issued on November 15, 2020.
- The NPDES permit includes 8-year Chloride Variance. Most permittee variance terms for chloride will be 15 years.
- MPCA Permit Limit: 230 mg/L avg. month, 252 mg/L Max day. WWTF Avg. Effluent: 652 mg/L (last 2 years)

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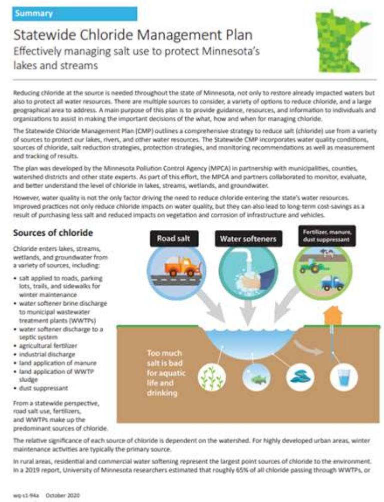
DRAFT Statewide Plan completed 2019-2020

Chloride Management Plan
Purpose – Scope – Audience

Purpose
- Highlight the impacts of chloride on statewide water quality
- Develop an appreciation of the competing demands of level of service and reduced salt usage
- Set performance-based goals for restoration and protection
- Inform and guide implementation of improved winter maintenance practices and policy needs
- Educate on demonstrating the benefits of efficient residential and commercial water softening
- Demonstrate the success and economic benefits of improved practices

Scope
- Status and trends of chloride levels in lakes, wetlands, streams, and groundwater
- Sources of chloride
- Restoration and protection goals
- Implementation and strategies to reduce chloride impacts
- Educational and training resources
- Continued monitoring, tracking, and adaptive management

Audience
- Local working groups (local governments, watershed management groups, soil and water conservation districts)
- Winter maintenance groups (MnDOT, local governments, private applicators, commercial property owners, residents)
- Elected officials and policy makers
- Permit holders
- State agencies (MPCA, MnDOT, DNR, BWSR, etc.)



Summary

Statewide Chloride Management Plan
Effectively managing salt use to protect Minnesota's lakes and streams

Reducing chloride at the source is needed throughout the state of Minnesota, not only to restore already impacted waters but also to protect all water resources. There are multiple sources to consider, a variety of options to reduce chloride, and a large geographical area to address. A main purpose of this plan is to provide guidance, resources, and information to individuals and organizations to assist in making the important decisions of the what, how and when for managing chloride.

The Statewide Chloride Management Plan (CMP) outlines a comprehensive strategy to reduce salt (chloride) use from a variety of sources to protect our lakes, rivers, and other water resources. The Statewide CMP incorporates water quality conditions, sources of chloride, salt reduction strategies, protection strategies, and monitoring recommendations as well as measurement and tracking of results.

The plan was developed by the Minnesota Pollution Control Agency (MPCA) in partnership with municipalities, counties, watershed districts and other state experts. As part of this effort, the MPCA and partners collaborated to monitor, evaluate, and better understand the level of chloride in lakes, streams, wetlands, and groundwater.

However, water quality is not the only factor driving the need to reduce chloride entering the state's water resources. Improved practices not only reduce chloride impacts on water quality, but they can also lead to long-term cost-savings as a result of purchasing less salt and reduced impacts on vegetation and corrosion of infrastructure and vehicles.

Sources of chloride

Chloride enters lakes, streams, wetlands, and groundwater from a variety of sources, including:
- salt applied to roads, parking lots, trails, and sidewalks for winter maintenance
- water softener brine discharge to municipal wastewater treatment plants (WWTPs)
- water softener discharge to a septic system
- agricultural fertilizer
- industrial discharge
- land application of manure
- land application of WWTP sludge
- dust suppressant

From a statewide perspective, road salt use, fertilizers, and WWTPs make up the predominant sources of chloride.

The relative significance of each source of chloride is dependent on the watershed. For highly developed urban areas, winter maintenance activities are typically the primary source.

In rural areas, residential and commercial water softening represent the largest point sources of chloride to the environment. In a 2019 report, University of Minnesota researchers estimated that roughly 65% of all chloride passing through WWTPs, or

wq-s1-94a October 2020

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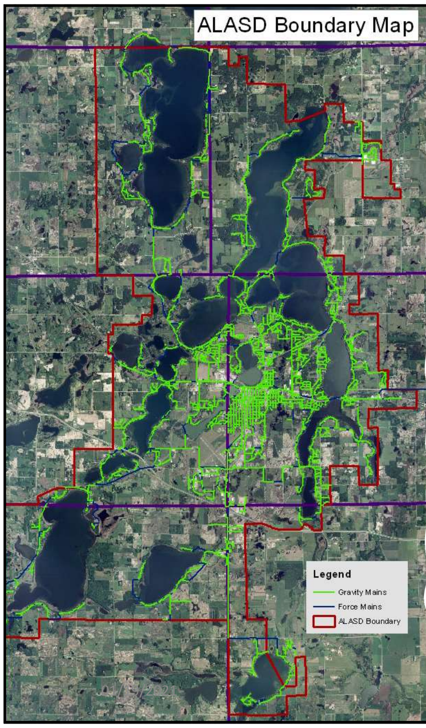
ALASD-Who?

- **Area:** 102 Square Miles
- **Population:** >26,000
- **Customer Accounts:** 10,350
- **Sanitary Sewer (Gravity):** 227 Miles
- **Sanitary Sewer (Forcemain):** 56 miles
- **Lift Stations:** 171
- **Residential Grinders:** 121
- **Manholes:** 4,570
- **Plant Design Flow:** 4.75 (MGD)-current avg 3.1 MGD
- **Lake Quality Testing:** Performed on each of the following lakes in June, July, August and September: Lake Henry, Winona, Agnes, Victoria, Geneva, Carlos, Darling, Cowdry, Brophy, Latoka, Andrew, Mary and Ida.

01/19/2021 6

6



ALASD provides collection system and treatment services to:

- City of Alexandria
- Alexandria Township
- Carlos Township
- Hudson Township
- Ida Township
- LaGrand Township
- Lake Mary Township

- ALASD provides contract service to:
  - City of Nelson
  - City of Forada
  - Leaf Valley Township
  - Carlos State Park
  - Two state rest areas located along I-94

7

7

ALASD Chloride Citizen Advisory Committee

01/19/2021

- **Gene Rose**, Douglas Co. Lake Association representative
- **Bill Luckmeyer**, Douglas Co. Lake Association representative
- **Ted Cash**, ALP General Manager
- **Brian Dahl**, ALP Water Superintendent
- **Marty Schultz**, City of Alexandria City Administrator
- **Dane Bosl**, City of Alexandria Public Works Director
- **Dave Rush**, Douglas County Land and Resource Director
- **Steven Senden/Ryan White** (Culligan), water quality business representative
- **Bucky Scholls** (Traut Wells), water quality business representative
- **Dave Stuessy**, residential customer outside ALP service territory (w/private well)
- **Bill Krivanek**, residential customer outside ALP service territory (w/private well) & ALASR Board Member
- **Joe Gerardt**, SunOpta Plant Manager, ALASD Significant Industrial User
- **Tom Hedstrom**, 3M Environmental Engineer, ALASD Significant Industrial User
- **Brian Bye**, Widseth
- **Roger Thalman**, ALASD Board Chairman

- **ALASD Staff:** Supervisor **Scott Spranger**, Asst. Supervisor **Troy Drews**, Executive Director **Scott Gilbertson**
- **Facilitator/Consultant:** **Tracy Ekola**, Hazen and Sawyer

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ALASD Chloride CAC Agenda

January 19, 2021 @ 10 AM

1) Introduction (Chair/Executive Director/Committee Members)
2) **Consultant Introduction and Background**
3) Advisory Committee Role/Protocols
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6) ALASD NPDES permit
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Tracy Ekola, PE

University of Minnesota, Civil Engineering
Strategic Leadership & Organizational Design, Stanford Graduate School of Business

Environmental/Wastewater Consultant 1992-1997, 2003 – Present
Public Sector/Utility Experience 1997-2003

Career Focus
- Wastewater facility planning and design
- Residuals and biosolids management
- Utility management and strategic planning
- Permitting and regulatory studies, strategy and collaboration

MPCA Committee Appointments
- Upper Mississippi Basin Planning Committee (2000–2004)
- Wild Rice Standards Study Task Force (2012-2014)

Water Environmental Federation
- House of Delegates 2015/2017/2018
- WEF Budget Committee Chair 2016/2017
- Community of Practice Director 2020-2023
- Committee Leadership Council 2020-2023

Central States Water Environmental Association
- Section Chair 2013/14, Vice Chair 2012/13, Government Relations Chair 2014/15, Membership Committee Chair 2010/12
- Innovative Conference Chair, Conference on the Environment Chair
  Government Affairs Washington DC Fly-in delegate - multiple years

MESERB - Minnesota Environmental Science and Economic Review Board Executive Committee Member 2010–present

Hazen

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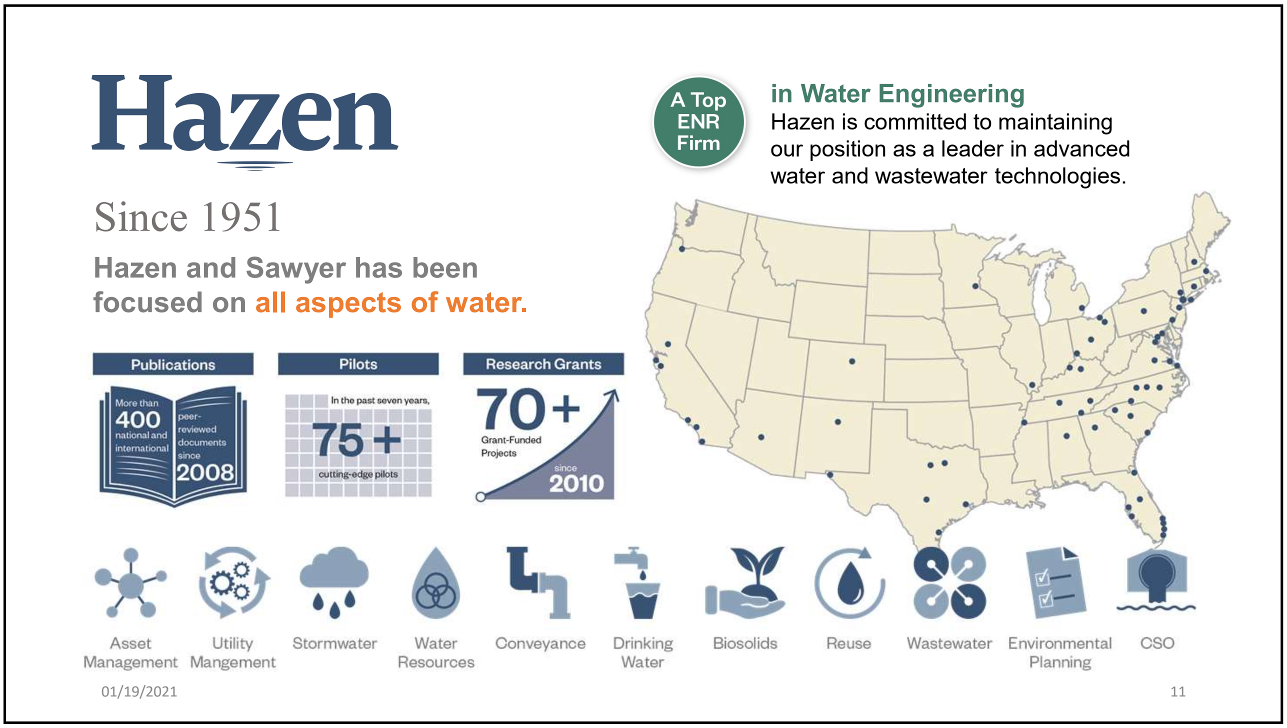

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Purpose and Role
Chloride Citizen's Advisory Committee (CAC)

- The primary role of the Chloride CAC is to provide input and information to the ALASD Board to support the District's efforts to minimize chloride discharge to the sewer system.

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CAC Meeting Management

- ALASD Board Chair will act as chair for CAC meetings.
- Consultant and ALASD Exec Director will help facilitate discussions.
- If chair is available, ALASD staff or Board member will chair CAC meetings.
- Staff will work with the Consultant to prepare agendas and materials for the committee meetings.
- Committee members are encouraged to suggest agenda items.
- CAC meetings are open to the public.
- Information brought to and shared at committee meetings is considered public.

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Suggested Decision Making Procedures

In general, an informal consensus-based approach will be used for decision making. If a consensus cannot be reached on a matter, the committee may consider options as how to address the item. The chair or facilitator may decide to refer to Roberts Rules of Order when deemed appropriate to helping the committee make decisions.

The following options may also be used to help move forward with a decision/action.

Decide. Make a decision on the matter at that given meeting.	**Table.** Move the item or matter to the next meeting so that staff/consultant can do further research.	**Work group.** Create a workgroup and bring it back to the committee for further discussion.	**Outside the Scope.** Determine that the item or matter is outside the scope of the CAC.

A simple majority vote of members attending the meeting would decide the option and approach taken.

Ultimately, the ALASD Board is required to approve all plans, policy, recommendations, and other recommendations addressing significant issues related to ALASD actions that have the effect of binding the District.

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Chloride Water Quality Standard

Purpose is to protect aquatic life

Too much salt can be toxic to:

- Fish
- Mussels
- Mayflies and other aquatic organisms in the food chain

Standard:

- chronic 4-day average: 230 mg/L
- acute1-day average: 860 mg/L
- Chloride standard applied **at low flow ($7Q_{10}$) per state rule**

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MPCA's Chloride WQS

- MPCA is required to determine if WWTPs have **reasonable potential (RP)** to cause or contribute to the cause of violations of the chloride standard
- If discharge has RP MPCA must put a limit in the permit or issue variance
- MPCA anticipates that **roughly 100 cities** need permit limits for chloride based on current data

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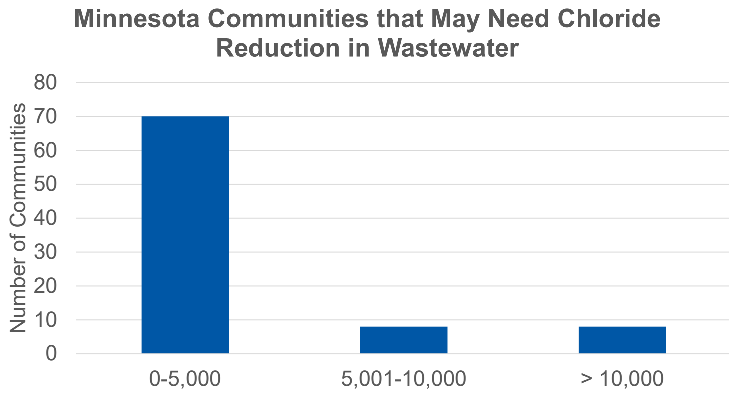

Figure 2. Number of Minnesota municipalities with reasonable potential for exceeding the chloride standard in wastewater. (Credit MPCA)

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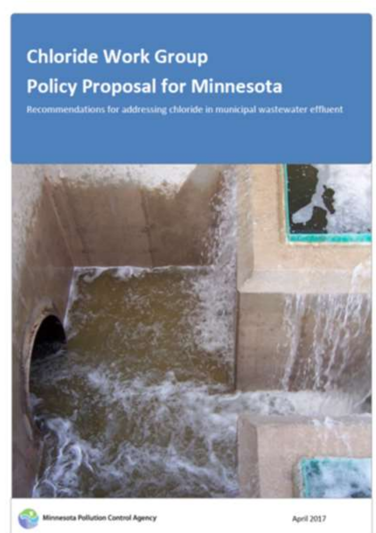
MPCA's Chloride Permitting Strategy

- No limits: if no RP or discharge w/n attainable margin
- Limits with **variances**
- Limits with **extended schedule of compliance (SOC)**



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What is a Variance?

A **time-limited** designated use & criterion for:

- A specific pollutant (e.g., chloride)
- A specific source or waterbody
- That reflects **highest attainable condition (HAC)** for a specific time period

Legal Basis for Variance

Sec. 101 of the Clean Water Act (CWA)

- Objective of CWA is to "**restore & maintain**" the nations waters
- National goal to protect aquatic life, wildlife and recreational uses "**wherever attainable**"
- Discharger must demonstrate **attainment of WQS is not feasible** for one of 1 or more of 6 defined reasons (40 C.F.R sec. 131.14)
- State statute and regulations

Chloride Variance Eligibility

- Applicant must demonstrate that:
- Alternative treatment / control options have been considered and are not feasible to meet WQS
  - MPCA alternative analysis does this
- **Factor 6**: attainment of WQS not feasible because compliance cost would cause "**substantial & widespread economic and social impact**"
  - Complicated economic analysis focused on impact of pollutant control costs
  - Based on U.S. EPA *Interim Economic Guidance for Water Quality Standards Workbook*

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Eligibility Analysis

Substantial financial impacts due to the cost of compliance

- Annual pollution control costs exceed 2% of median household income
- Financial health evaluation
  - ✓Bond rating, tax revenue, tax collection rate
  - ✓Debt as % market value of taxable property
  - ✓Unemployment rate & MHI

Widespread adverse impacts to community

- Impacts to poverty rate, unemployment & MHI
- Tax revenues, demand for social services

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No Feasible Solution at WWTP

- MPCA has determined reverse osmosis (RO) treatment at WWTP is infeasible
- MPCA determined only **potentially** feasible options are:
  - Installation of high efficiency water softeners
  - Centralized lime softening at WTP and remove softeners
    - **Cost prohibitive - many cities likely eligible for variance**
  - Centralized RO softening and remove softeners
    - **Cost prohibitive and salty brine problem - many cities likely eligible for variance**

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Application Process

- MPCA preliminary screening tool
  - Early engagement with MPCA, EPA & consultants
- Submit application prior to permit renewal
- MPCA preliminary approval, public notice, comment & hearing
- EPA review approval
- Final issuance

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Variance Requirements

- Variance terms may be up to 15 years. ALASD's variance is 8 years and can be re-evaluated.
- Alternate limits established based on previous maximum concentration (re-evaluated every 5 years).
- Chloride Investigation & Minimization Plan (CIMP) due 180 days after issuance.
- Must reduce non-point sources w/in control within 3 years.
  - Also include MPCA safe salting training

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CIMP Requirements

- Evaluate chloride sources and loading
- Create chloride source inventory
- Identify options to reduce chloride at source
- Implement reduction strategies
- Significant monitoring and reporting responsibility
- Review annually

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CIMP: Implementation Challenges

Industrial source reductions
- May pose problems for local industry

Residential source reductions
- ALASD and City may lack authority to regulate home softeners

Institutional and Commercial source reductions

Municipal source reductions
- City owned softeners
- I&I issues related to road salt

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Variance Re-evaluation

- 1 year prior to expiration determine if CIMP will lead to compliance
- If not, submit request to re-evaluate variance 180 days prior to permit expiration
- HAC and alternate limit will be re-evaluated (more restrictive)
- Must re-evaluate feasibility of central softening
- Comply with final limits or re-apply for variance with more restrictive limit and revised CIMP to lead to compliance

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ALASD Variance Summary

- 8-year variance term
- Alternate limit (HAC) of 839 mg/L, daily max
- Required to meet final limits at end of variance term(s)
- Chloride Action Tree & CIMP incorporated into permit

The right solution is case specific and should be based on careful evaluation of options and development plans.

Variance Strategy Summary

- Variances will reduce chloride in cost-effective manner
- Provides best value approach: delay capital costs while developing most cost-effective long term plan
- In many cases, likely the best/only option

- Major impacts for cities/utilities
  - Short-term admin burden & impacts on economic growth
  - Major long-term potential infrastructure costs
- Massive state funding needed to assist cities achieve final compliance
- Long-term planning needed for local utility improvements and funding

ALASD Chloride CAC Agenda

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MINNESOTA POLLUTION CONTROL AGENCY

National Pollutant Discharge Elimination System/State Disposal System

MN0040738

Permittee:	Alexandria Lake Area Sanitary District
Facility name:	Alexandria Lakes Area Sanitary District Wastewater Treatment Facility
Receiving water:	Lake Winona - Class 2B, 3C, 4A, 4B, 5, 6 water
City:	Alexandria **County:** Douglas
Issuance date:	November 15, 2020
Expiration date:	October 31, 2025

The state of Minnesota, on behalf of its citizens through the Minnesota Pollution Control Agency (MPCA), authorizes the Permittee to operate a disposal system at the facility named above and to discharge from this facility to the receiving water named above, in accordance with the requirements of this permit.

The goal of this permit is to reduce pollutant levels in point source discharges and protect water quality in accordance with the U.S. Clean Water Act, Minnesota statutes and rules, and federal laws and regulations.

Although this permit is effective on the issuance date identified above, the limits and monitoring requirements are not effective until December 01, 2020. This permit expires at midnight on the expiration date identified above.

Signature: Paul C. Scheirer

This document has been electronically signed.

for the Minnesota Pollution Control Agency

Paul C. Scheirer
Supervisor
Northeast/Northwest Regional Unit
Municipal Division

- Special Requirements 5.14.79 **Total Chloride Water Quality Based Effluent Limit** Variance General Requirements. [Minn. R. 7001] 5.14.80 The Alexandria Lake Area Sanitary District Wastewater Treatment Facility (Facility) (MN0040738) has applied for a variance from the chloride water quality standard in Minnesota Rule 7050, designed to protect the Class 2 beneficial use of the receiving water.

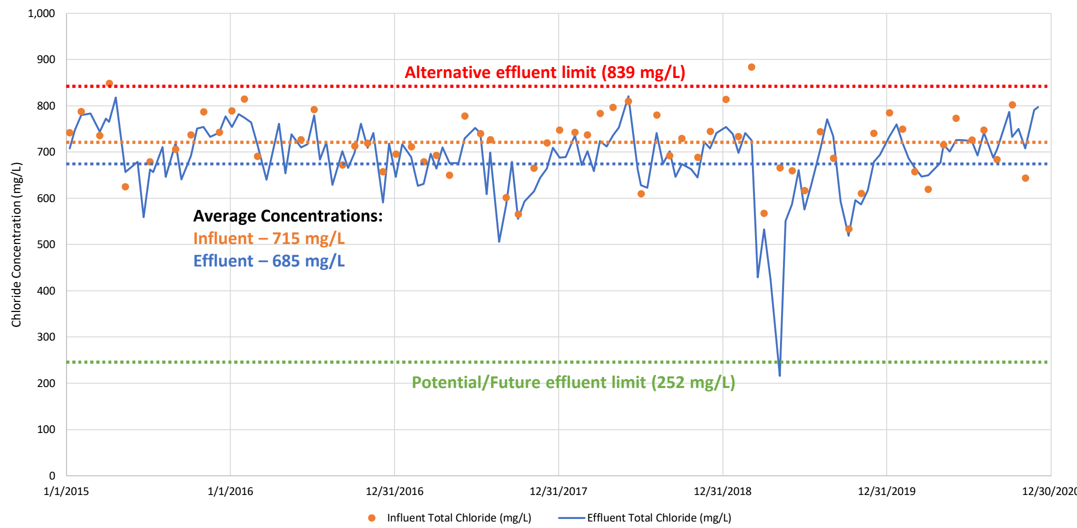
- **A variance is a temporary change in the applicable water quality standards**. During the term of the variance the Facility is required to comply with the highest attainable condition (HAC) for the pollutant which the variance is granted (40 CFR 131.14(b)(ii)(A)(3)). To ensure this is met, an alternate effluent limit is developed and becomes effective at permit issuance as outlined in requirement

- In addition, the Permittee is required to complete **chloride source investigation and minimization**, as well as an evaluation of the feasibility of water treatment (which must include the evaluation of lime softening) or other applicable treatment technologies in an effort to control sources of chloride.

- As applied for by the Permittee, the basis of the variance is 'controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act (CWA) would result in substantial and widespread economic and social impact' (Minn. R. 7050.0191, subp.4(6)).

- The MPCA has determined that the Permittee has satisfied the conditions necessary to grant a variance and as a result supports the inclusion of the variance in the permit. [Minn. R. 7001]

Chloride testing at WWTF



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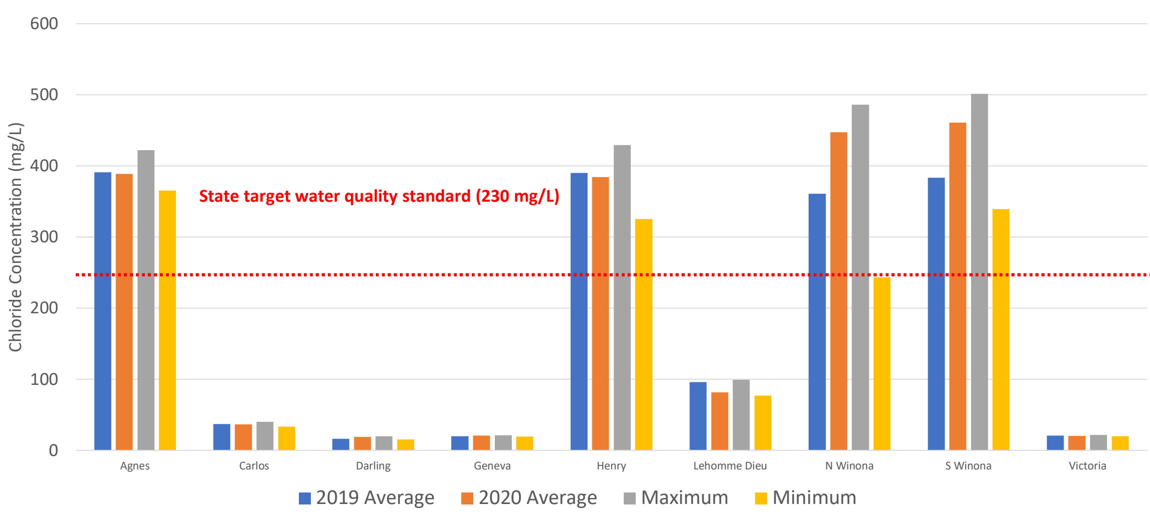
Chloride testing in area lakes



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2021 Schedule for Chloride Activities

Chloride Sources Inventory to be completed by **March 1, 2021**

Chloride Investigation and Minimization Plan due by **April 30, 2021**

Public Education during 2021

Quarterly Meetings with Citizen's Advisory Committee

Annual Chloride Report for 2021

Chloride Identification & Minimization Plan (CIMP)

TASK 1 – Chloride Sources Inventory

- Data Collection and Review – Hazen will submit an initial prioritized list of required data and information; ALSAD will provide information needed to complete this task including existing reports and mass balance from previous plan.
- Develop a detailed inventory of chloride sources to determine major sources of chloride over the past five years.
- The chloride mass balance will be prepared with chloride influent and effluent concentrations using the most recent five years of monitoring data to identify trends.
- Develop monitoring plan for major chloride sources/industries.

TASK 2 – Chloride Investigation & Minimization Plan

- Prepare Chloride Investigation and Minimization Plan and submit to MPCA within 180 days of the effective date of NPDES permit.
- Plan will include an updated chloride source inventory, a summary of chloride source reduction activities implemented and proposed schedule of chloride source reduction activities to be completed to identify and evaluate chloride reduction, elimination, and prevention activities.
- Identify and quantify existing and potential sources of chloride concentrations for the following categories: Industrial, Institutional, Municipal, Commercial, Residential.
- Recommend a control strategy for each major source of a chloride identified.

Open Discussion

- Agenda topics for upcoming meetings
- Key items to be considered in 2021
- Public education
- Survey residential users
- Questions

Schedule for Quarterly Meetings

- January 19
- Late April
- September
- November

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Thank you for your time and participation!

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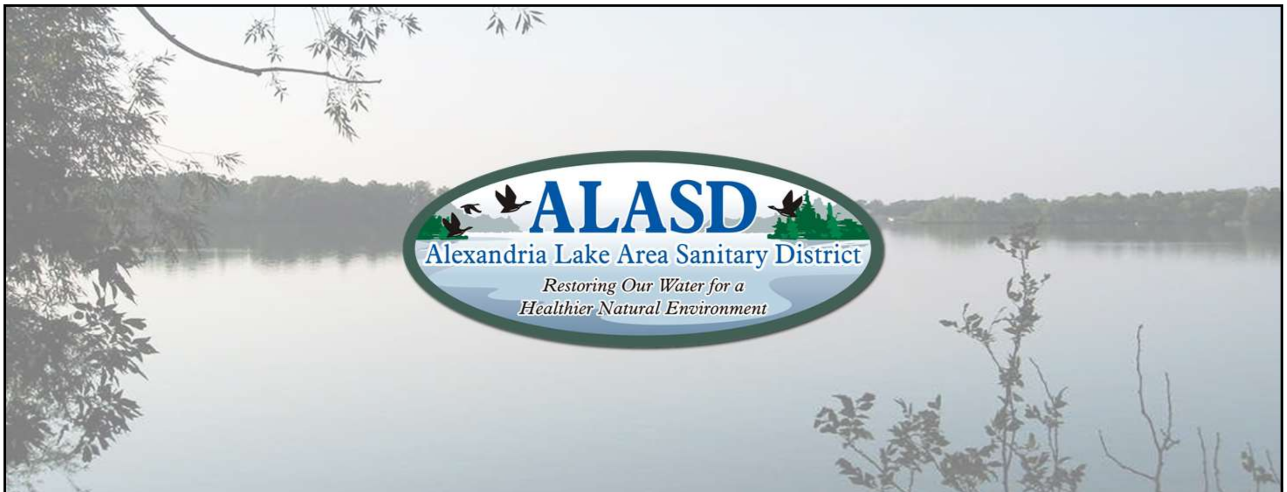

Chloride Citizen's Advisory Committee

April 6, 2021

1

Introduction

- The ALASD Chloride Citizen's Advisory Committee includes representatives from stakeholder groups to discuss chloride issues and work towards developing an attainment Plan for chloride reduction.
- Reducing chloride at the source is needed in the ALASD service area to protect water resources.
- Chloride is not generated at ALASD's WWTF.
- Wastewater discharge from residential, commercial, institutional, and industrial sources contain varying levels of chloride from industrial or institutional uses or from water softener brine discharge.
- There are also other sources of chloride entering our lakes and rivers from road salt, land application of industrial byproducts, fertilizer, or dust suppressants on gravel roads.
- **The goal of this attainment plan is to reduce the level of chloride in the wastewater discharged to ALASD which will in turn benefit the water quality in area lakes.**

2

ALASD Chloride CAC Agenda

April 6, 2021 @ 10 AM

1) Introduction and Review of Agenda - Chair
2) Self-Introduction of Attendees
3) Review of Advisory Committee Role
4) Softeners and Saltless Conditioners - Ryan
5) Ion Exchange and Membrane Systems - Gene
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3

ALASD Chloride Citizen Advisory Committee

- **Gene Rose**, Douglas Co. Lake Association representative
- **Bill Luckemeyer**, Douglas Co. Lake Association representative
- **Ted Cash**, ALP General Manager
- **Brian Dahl**, ALP Water Superintendent
- **Marty Schultz**, City of Alexandria City Administrator
- **Dane Bosl**, City of Alexandria Public Works Director
- **Dave Rush**, Douglas County Land and Resource Director
- **Ryan White** (Culligan), water quality business representative
- **Bucky Scholls** (Traut Wells), water quality business representative
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- **ALASD Staff:** Supervisor **Troy Drews**, Executive Director **Scott Gilbertson**
- **Facilitator/Consultant: Tracy Ekola**

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Chloride CAC Purpose and Role

- The primary role of the Chloride CAC is to provide input and information to the ALASD Board to support the District's efforts to minimize chloride discharge to the sewer system.

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Softeners and Saltless Conditioners

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Ion Exchange and Membrane Systems

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Alternative Technologies To Ion Exchange Water Softeners That Produce A Chloride Waste Stream

- Objective: To provide an overview using company and published literature selected to provide an introduction to various technologies.
- Comprehensive Review: Peter Fox, Mara Wiest, Timothy M. Thomure, Wontae Lee, Evaluation of Alternates to Domestc Ion Exchange Water Softeners, published by WateReuse Research Foundation, Alexandria , VA (2014); Reference: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/research/ion_exchange_water_softeners.pdf
- References are provided on slides to acknowledge sources and to find further information.

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Template Assisted Crystallization (TAC)

Reference for TAC slides:

1. https://www.watts.com/our-story/brands/oneflow/template-assisted-crystallization-technology
2. https://filtersmart.com/blogs/article/template-and-nucleation-assisted-crystallization

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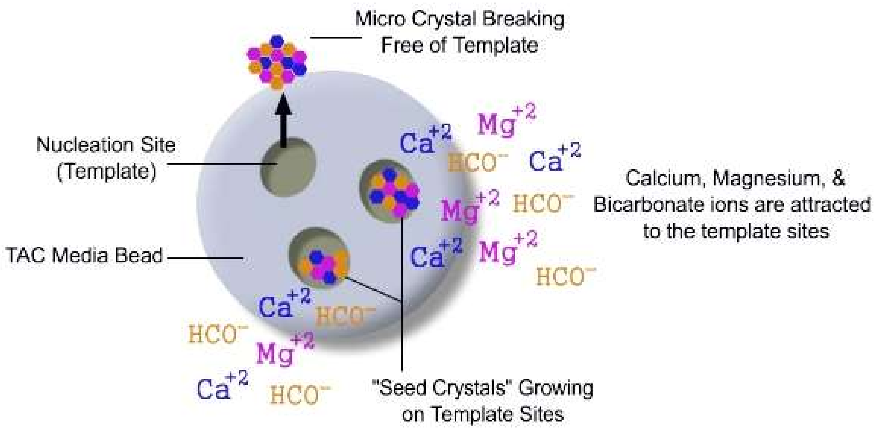
How does filtersmart TAC work?



https://filtersmart.com/blogs/article/template-and-nucleation-assisted-crystallization

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Summary of Process

- TAC media granules provide nucleation sites.
- Dissolved calcium, magnesium and bicarbonate combine into microscopic crystals on sites.
- Once formed, the crystals detach from the media in a fluidized bed
- Crystals flow freely through the system unable to form hard scale on internal plumbing surfaces.

Reference: https://www.watts.com/our-story/brands/oneflow/template-assisted-crystallization-technology

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Why Use OneFlow® TAC

- "Hard" water contains a high mineral content (primarily calcium and magnesium that naturally occur in groundwater).
- Over time, "hard" water can cause scale to build up in pipes and plumbing, increasing your energy costs and shortening the life of your appliances.

Reference: https://www.watts.com/our-story/brands/oneflow/template-assisted-crystallization-technology

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Why Use TAC (continued)

- No salt or additional chemicals required
- No electricity
- No backwashing required and zero discharge
- Consistent scale control performance
- Compact and simple installation
- Safe for pipes and appliances
- Minimal maintenance
- Energy-saving
- Conserved water quality

Reference: https://www.watts.com/our-story/brands/oneflow/template-assisted-crystallization-technology

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Other Technologies For Ion Removal

- Capacitive, electrical and magnetic processes for scale reduction are reviewed on the next slide. References:
  - Fox, et al., reference on the first slide
  - A pdf webinar by Timothy M. Thomure & Peter Fox: https://watereuse.org/wp-content/uploads/2015/12/Webinar-WateReuse-08-06.pdf

- Reverse Osmosis: https://www.waterfiltermag.com/best-reverse-osmosis-system-reviews/

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Alternate Technologies for Scale Reduction

Technology	Max Power Required	Backwash Required	Cost	Salt Addition Required
Capacitive Deionization	220W	Yes	High	No
Electrically Induced Precipitation	100W	Yes	High	No
Template Assisted Crystallization	None	No	Moderate	No
Magnetic Water Treatment	8W	No	Low	No
Ion Exchange	13.5W	Yes	Moderate	Yes

https://watereuse.org/wp-content/uploads/2015/12/Webinar-WateReuse-08-06.pdf

Note: Magnetic water treatment has been proposed for home systems but it along with the capacitive and electrical process are not prominent technologies for home use.

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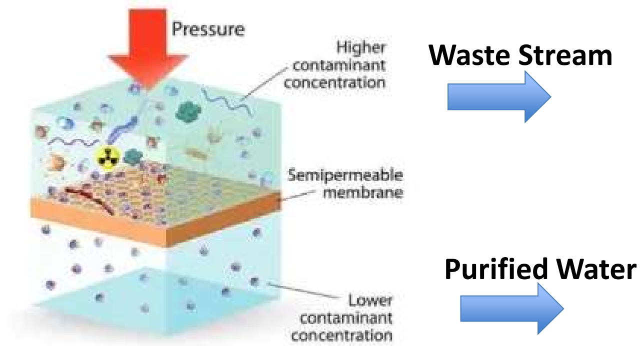
Home Reverse Osmosis Systems



RO systems are able to remove particles as small as ions, molecules, and even some species of bacteria

https://www.waterfiltermag.com/best-reverse-osmosis-system-reviews/

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Factors to Consider for RO Systems

- **Storage**: A limited space would not be suitable for a reverse osmosis system.
- **Water Pressure:** These devices do not function properly if the pressure is below 40PSI.
- **Water Usage:** They consume vast amounts of water that carries the contaminants to the drain (the waste stream).
- **Demineralization:** RO also removes some of the healthy elements from the water.
- **Replacement Filters:** Regular maintenance work of the multi-staged filtering process.
- **NOTE: Complete home RO systems can be costly.**

Reference: https://www.waterfiltermag.com/best-reverse-osmosis-system-reviews/

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Cost Examples for Home Deionizing Systems

Filtersmart examples:

https://filtersmart.com/blogs/article/water-softener-system-price-and-cost

- Water softeners generally cost from $300 to $4000
  - Magnetic = $300 to $600
  - Mid range TAC = $687 plus $200 installation cost
  - Salt-based ion exchange = $400 to $1000 plus installation cost from $400 to $1000
- Operating cost of salt-based system is greater than TAC system

Reverse osmosis exampes:

https://reverseosmosis.com/collections/whole-house-reverse-osmosis-systems/products/light-whole-house-water-system

- Axeon whole house system (including pump, tank, etc.) costs: for $1000 gpd = $5500; for 500 gpd = $4650.
- Does not include installation

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Summary

- There are deionization technologies that do not produce a chloride waste stream
- Each has its own advantages and disadvantages that are not always obvious in company literature
  - TAC can leave a cloudy residue on glassware
  - TAC can be used with septic systems.
- An incentive may be needed to encourage home owners to change from the ion exchange process

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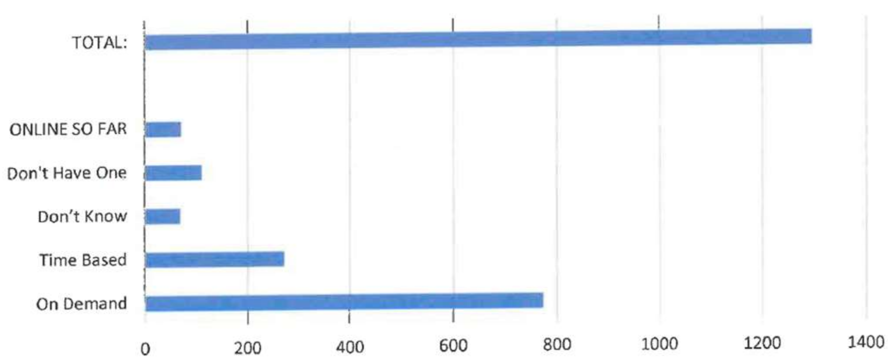
ALASD Softener Survey – Bill Stuffer and Website



On Demand Average Age: 8 years
Time Based Average Age: 12 years

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Chloride Identification & Minimization Plan (CIMP)

TASK 1 – Chloride Sources Inventory

- Data Collection and Review – Select locations for sampling of residential, commercial, institutions and industrial facilities. Inventory of chloride sources to determine major sources of chloride over the past five years.
- Complete chloride mass balance based on representative sampling data.

TASK 2 – Chloride Investigation & Minimization Plan

- Prepare Chloride Investigation and Minimization Plan and submit to MPCA within 180 days of the effective date of NPDES permit.
- Recommend a control strategy for each major source of a chloride identified.

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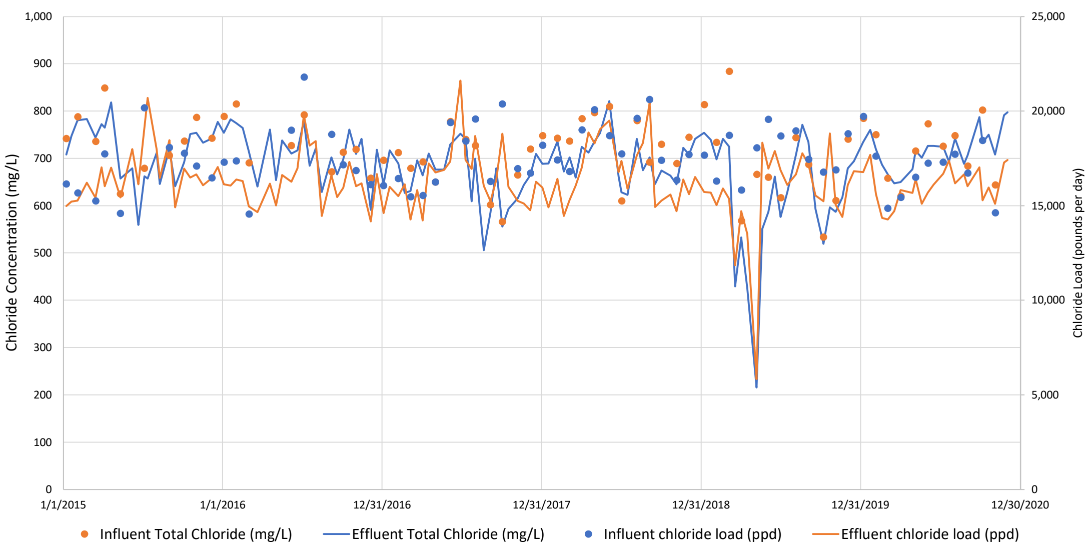
ALASD Chloride Influent & Effluent, 2015-2020



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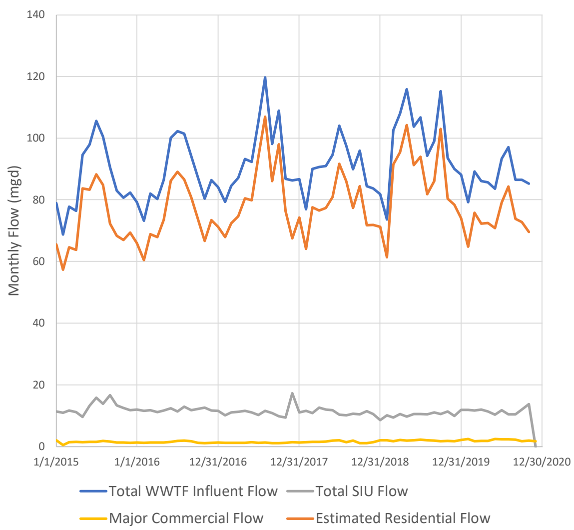
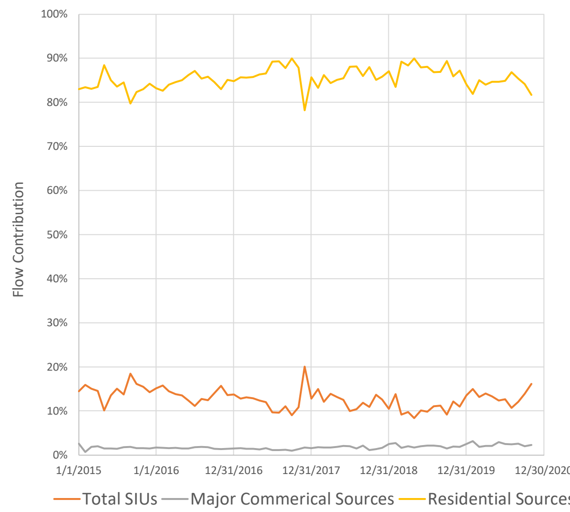
ALASD – Historical Flow





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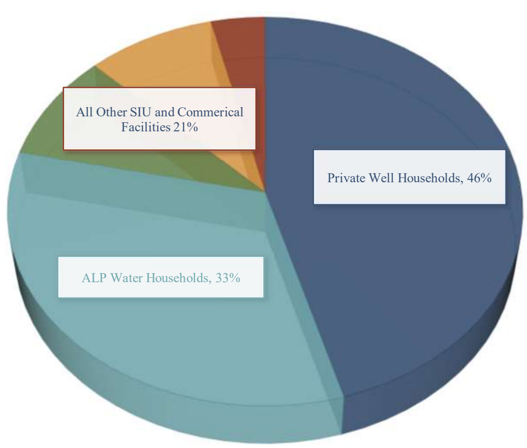
ALASD – Chloride Sources



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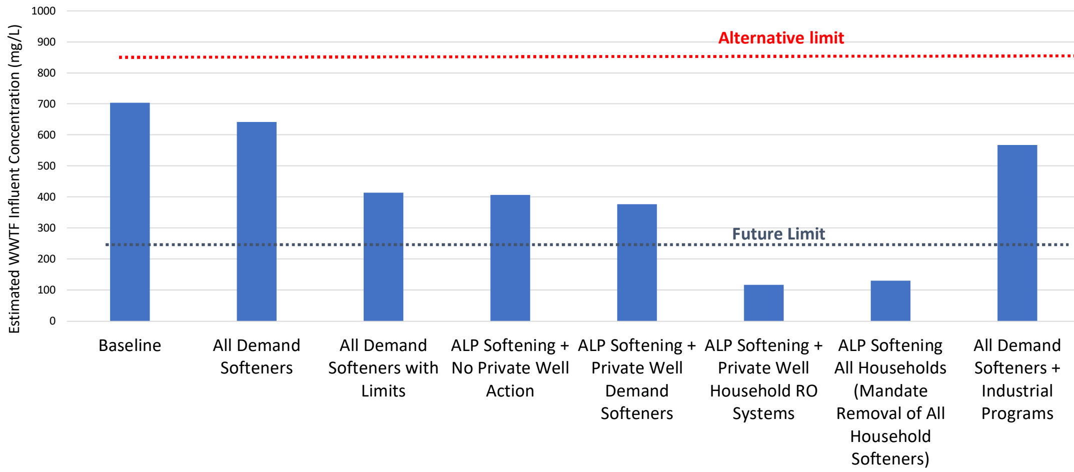
ALASD Estimated Influent Chloride Concentrations from Reduction Strategies



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ALASD Chlorides Reduction Alternatives Estimated Cost

Alternative	Capital Costs	Annual cost (Capital + O&M)
Baseline	0	$2,500,000
All Demand Softeners	$14,175,000	$2,970,000
All Demand Softeners with Limits	$14,175,000	$2,970,000
ALP Softening & No Private Well Action	$12,800,000	$2,870,000
ALP Softening & Private Well Demand Softeners	$19,900,000	$3,030,000
ALP Softening - All Households	$150,000,000	$11,030,000
ALP Softening & private well RO treatment	$170,000,000	$12,610,000

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2021 Schedule for Chloride Activities

Chloride Sources Inventory to be completed by **March 1, 2021**

Chloride Investigation and Minimization Plan due by **April 30, 2021**

Public Education during 2021

Quarterly Meetings with Citizen's Advisory Committee

Annual Chloride Report for 2021 due in December

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ALASD Chloride CAC Agenda

April 6, 2021 @ 10 AM

1) Introduction and Review of Agenda - Chair
2) Self-Introduction of Attendees
3) Review of Advisory Committee Role/Protocols
4) Softeners and Saltless Conditioners - Ryan
5) Ion Exchange and Membrane Systems - Gene
6) ALASD Softener Survey results - Scott
7) Review draft CIMP and solicit feedback - Tracy
8) Chloride Scope and Tasks Schedule for 2021
9) Open Discussion
10) Schedule Future Quarterly Meetings

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Open Discussion

- Agenda topics for upcoming meetings
- Stormwater System – Dane
- WTP Overview – Bryan
- Public education in Summer months

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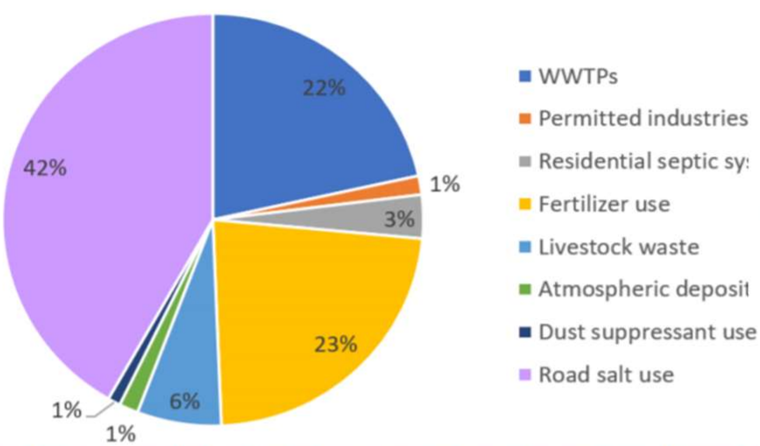

Figure 4: Fraction of annual chloride contributions from major point and nonpoint sources for State of Minnesota (Overbo et al. 2019)
**Please note that Road salt use is actually all de-icing salt applied to roads, parking lots, sidewalks, and trails.*

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Schedule for Quarterly Meetings

- January 19th
- April 6th
- Early September ?
- Late November ?

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Thank you for your time and participation!

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- The remaining slides are from previous presentation and just left in for back up if needed for discussion.

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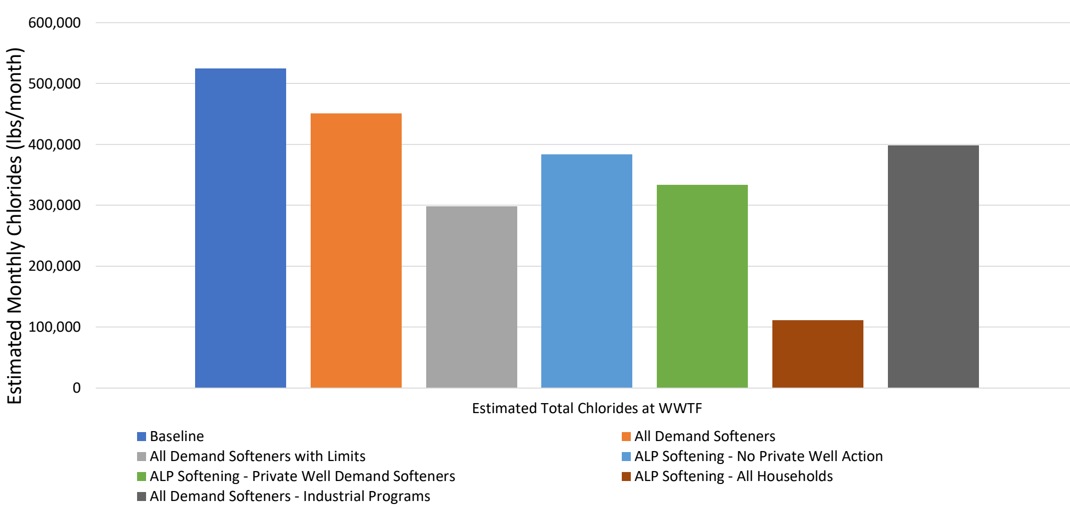
ALASD Estimated Influent Chloride Concentration



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Suggested Decision Making Procedures

In general, an informal consensus-based approach will be used for decision making. If a consensus cannot be reached on a matter, the committee may consider options as how to address the item. The chair or facilitator may decide to refer to Roberts Rules of Order when deemed appropriate to helping the committee make decisions.

The following options may also be used to help move forward with a decision/action.

- **Decide.** Make a decision on the matter at that given meeting.
- **Table.** Move the item or matter to the next meeting so that staff/consultant can do further research.
- **Work group.** Create a workgroup and bring it back to the committee for further discussion.
- **Outside the Scope.** Determine that the item or matter is outside the scope of the CAC.

A simple majority vote of members attending the meeting would decide the option and approach taken.

Ultimately, the ALASD Board is required to approve all plans, policy, recommendations, and other recommendations addressing significant issues related to ALASD actions that have the effect of binding the District.

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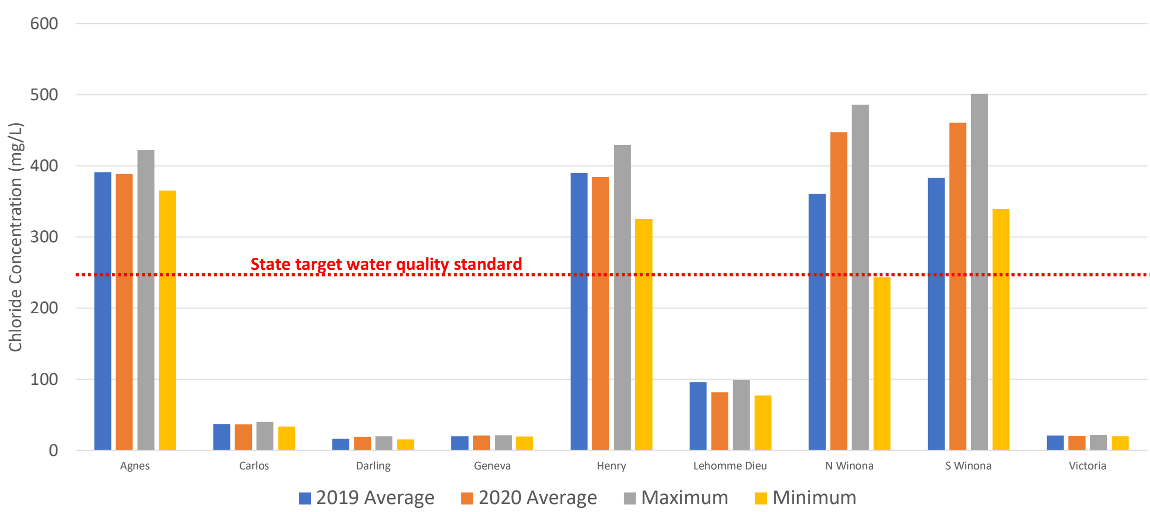
Chloride testing in area lakes



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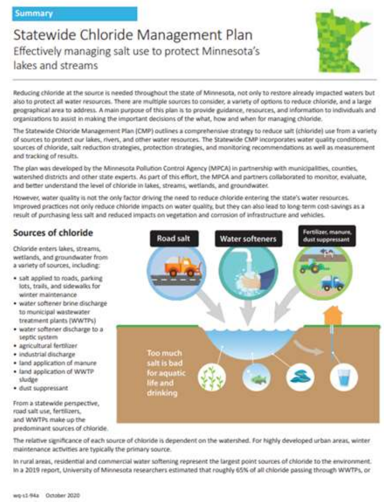
DRAFT Statewide Plan completed 2019-2020



Summary

Statewide Chloride Management Plan

Effectively managing salt use to protect Minnesota's lakes and streams

Reducing chloride at the source is needed throughout the state of Minnesota, not only to restore already impacted waters but also to protect all water resources. There are multiple sources to consider, a variety of options to reduce chloride, and a large geographical area to address. A main purpose of this plan is to provide guidance, resources, and information to individuals and organizations to assist in making the important decisions of the what, how and when for managing chloride.

The Statewide Chloride Management Plan (CMP) outlines a comprehensive strategy to reduce salt (chloride) use from a variety of sources to protect our lakes, rivers, and other water resources. The Statewide CMP incorporates water quality conditions, sources of chloride, salt reduction strategies, protection strategies, and monitoring recommendations as well as measurement and tracking of results.

The plan was developed by the Minnesota Pollution Control Agency (MPCA) in partnership with municipalities, counties, watershed districts and other state experts. As part of this effort, the MPCA and partners collaborated to monitor, evaluate, and better understand the level of chloride in lakes, streams, wetlands, and groundwater.

However, water quality is not the only factor driving the need to reduce chloride entering the state's water resources. Improved practices not only reduce chloride impacts on water quality, but they can also lead to long-term cost-savings as a result of purchasing less salt and reduced impacts on vegetation and corrosion of infrastructure and vehicles.

Sources of chloride

Chloride enters lakes, streams, wetlands, and groundwater from a variety of sources, including:

- salt applied to roads, parking lots, trails, and sidewalks for winter maintenance
- water softener brine discharge to municipal wastewater treatment plants (WWTPs)
- water softener discharge to a septic system
- agricultural fertilizer
- industrial discharge
- land application of manure
- land application of WWTP sludge
- dust suppressant

Road salt | Water softeners | Fertilizer, manure, dust suppressant

Too much salt is bad for aquatic life and drinking

From a statewide perspective, road salt use, fertilizers, and WWTPs make up the predominant sources of chloride.

The relative significance of each source of chloride is dependent on the watershed. For highly developed urban areas, winter maintenance activities are typically the primary source.

In rural areas, residential and commercial water softening represent the largest point sources of chloride to the environment. In a 2019 report, University of Minnesota researchers estimated that roughly 65% of all chloride passing through WWTPs, or

wq-s1-94a October 2020

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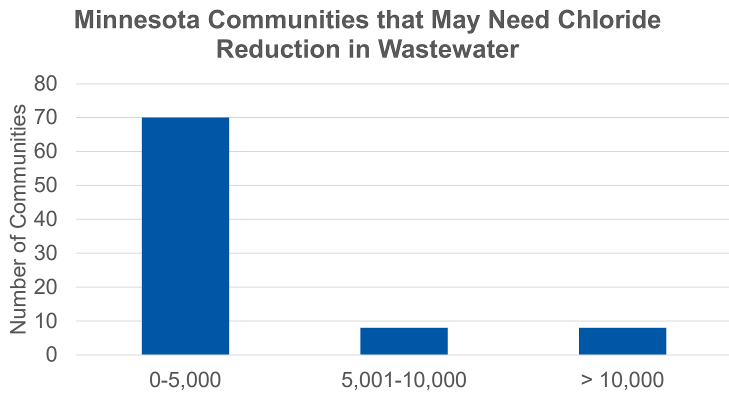

Figure 2. Number of Minnesota municipalities with reasonable potential for exceeding the chloride standard in wastewater. (Credit MPCA)

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Chloride Variance Eligibility

- Applicant must demonstrate that:
- Alternative treatment / control options have been considered and are not feasible to meet WQS
  - MPCA alternative analysis does this
- **Factor 6**: attainment of WQS not feasible because compliance cost would cause "**substantial & widespread economic and social impact**"
  - Complicated economic analysis focused on impact of pollutant control costs
  - Based on U.S. EPA *Interim Economic Guidance for Water Quality Standards Workbook*

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Eligibility Analysis

Substantial financial impacts due to the cost of compliance

- Annual pollution control costs exceed 2% of median household income
- Financial health evaluation
  - ✓Bond rating, tax revenue, tax collection rate
  - ✓Debt as % market value of taxable property
  - ✓Unemployment rate & MHI

Widespread adverse impacts to community

- Impacts to poverty rate, unemployment & MHI
- Tax revenues, demand for social services

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No Feasible Solution at WWTP

- MPCA has determined reverse osmosis (RO) treatment at WWTP is infeasible
- MPCA determined only **potentially** feasible options are:
  - Installation of high efficiency water softeners
  - Centralized lime softening at WTP and remove softeners
    - **Cost prohibitive - many cities likely eligible for variance**
  - Centralized RO softening and remove softeners
    - **Cost prohibitive and salty brine problem - many cities likely eligible for variance**

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CIMP Requirements

- Evaluate chloride sources and loading
- Create chloride source inventory
- Identify options to reduce chloride at source
- Implement reduction strategies
- Significant monitoring and reporting responsibility
- Review annually

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CIMP: Implementation Challenges

Industrial source reductions
- May pose problems for local industry

Residential source reductions
- ALASD and City may lack authority to regulate home softeners

Institutional and Commercial source reductions

Municipal source reductions
- City owned softeners
- I&I issues related to road salt

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ALASD Variance Summary

- 8-year variance term
- Alternate limit (HAC) of 839 mg/L, daily max
- Required to meet final limits at end of variance term(s)
- Chloride Action Tree & CIMP incorporated into permit

The right solution is case specific and should be based on careful evaluation of options and development plans.

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MINNESOTA POLLUTION CONTROL AGENCY

National Pollutant Discharge Elimination System/State Disposal System

MN0040738

Permittee:	Alexandria Lake Area Sanitary District
Facility name:	Alexandria Lakes Area Sanitary District Wastewater Treatment Facility
Receiving water:	Lake Winona - Class 2B, 3C, 4A, 4B, 5, 6 water
City:	Alexandria **County:** Douglas
Issuance date:	November 15, 2020
Expiration date:	October 31, 2025

The state of Minnesota, on behalf of its citizens through the Minnesota Pollution Control Agency (MPCA), authorizes the Permittee to operate a disposal system at the facility named above and to discharge from this facility to the receiving water named above, in accordance with the requirements of this permit.

The goal of this permit is to reduce pollutant levels in point source discharges and protect water quality in accordance with the U.S. Clean Water Act, Minnesota statutes and rules, and federal laws and regulations.

Although this permit is effective on the issuance date identified above, the limits and monitoring requirements are not effective until December 01, 2020. This permit expires at midnight on the expiration date identified above.

Signature: Paul C. Scheirer

This document has been electronically signed.

for the Minnesota Pollution Control Agency

Paul C. Scheirer
Supervisor
Northeast/Northwest Regional Unit
Municipal Division

- Special Requirements 5.14.79 **Total Chloride Water Quality Based Effluent Limit** Variance General Requirements. [Minn. R. 7001] 5.14.80 The Alexandria Lake Area Sanitary District Wastewater Treatment Facility (Facility) (MN0040738) has applied for a variance from the chloride water quality standard in Minnesota Rule 7050, designed to protect the Class 2 beneficial use of the receiving water.

- **A variance is a temporary change in the applicable water quality standards**. During the term of the variance the Facility is required to comply with the highest attainable condition (HAC) for the pollutant which the variance is granted (40 CFR 131.14(b)(ii)(A)(3)). To ensure this is met, an alternate effluent limit is developed and becomes effective at permit issuance as outlined in requirement

- In addition, the Permittee is required to complete **chloride source investigation and minimization**, as well as an evaluation of the feasibility of water treatment (which must include the evaluation of lime softening) or other applicable treatment technologies in an effort to control sources of chloride.

- As applied for by the Permittee, the basis of the variance is 'controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act (CWA) would result in substantial and widespread economic and social impact' (Minn. R. 7050.0191, subp.4(6)).

- The MPCA has determined that the Permittee has satisfied the conditions necessary to grant a variance and as a result supports the inclusion of the variance in the permit. [Minn. R. 7001]

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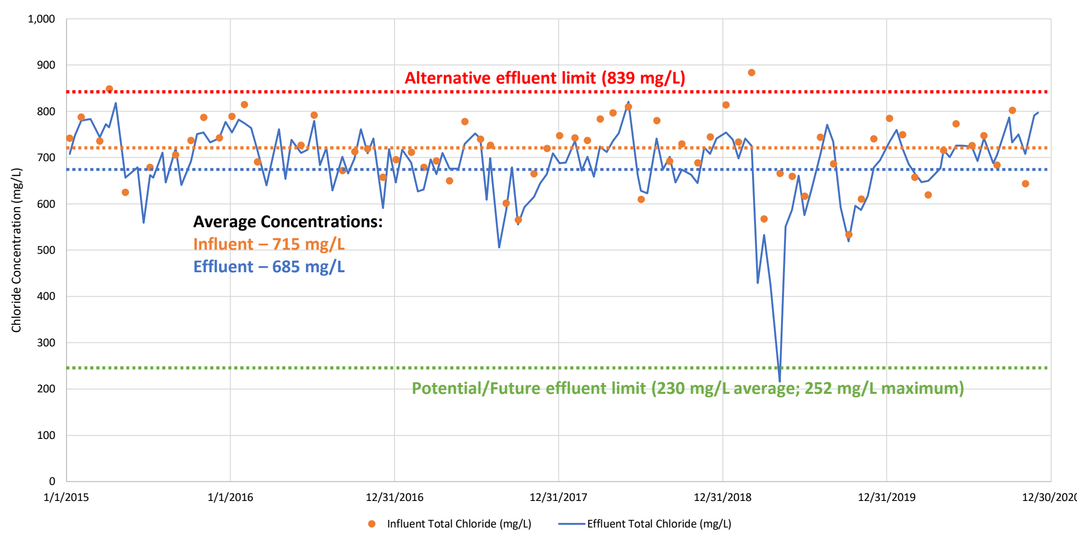
Chloride testing at WWTF



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Appendix B: Chloride Reduction Rebate Program

Chloride Reduction Rebate Program

ALASD is required to investigate chloride sources and make reductions in the amount of chloride discharged to the sewer system. **Most of the salt being discharged** to Lake Winona is from water softeners used in homes. ALASD is offering rebates to homeowners who significantly reduce or eliminate salt discharges to the sewer system. Questions can be emailed to info@alasdistrict.org or call ALASD at 320.762.1135.

The following rebates will be offered to ALASD users:

$500 Rebate for replacement of softener to **ALASD approved high efficiency (HE)** demand softener.
Minimum HE Softener requirements: NSF/ANSI standard 44 with minimum efficiency of 4000 grains/lb. regenerated salt.

Up to $2000 Rebate to remove softener permanently and install salt-less conditioner***** (see note below regarding system performance expectations). Rebate requires signed agreement and permanent removal of softener to eliminate brine discharge to sewer and allow future inspection by ALASD.

Up to $2000 Rebate for private well user outside of City of Alexandria to install a brine disposal system. Rebate requires signed agreement to permanently eliminate brine discharge to sewer and allow future inspection by ALASD to determine continued compliance. Installation must be completed by certified system installer. Minimum requirements for brine disposal systems are forthcoming and will be provided on the ALASD website.

Future Rebate Programs will be considered for Commercial/Industrial Users.

***** NOTE: Salt-less conditions may have lesser performance when compared to softened water. Water with greater than 1 ppm iron and hardness greater than 20 grains may not be suitable. Fully discuss system performance expectations with your installer/plumber before proceeding with this option.

ALASD Rebate program details and requirements are subject to change based on program evaluation.

Rebates are subject to ALASD budget limitations and availability. When budgeted funds are depleted, notification will be provided on www.alasdistrict.org and rebates will no longer be available.

Funding for this project was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).

ALASD Chloride Reduction Rebate Application
All information must be provided to be eligible:

*Must be postmarked within **90 days** of purchase/install date*

Applicant Name: ____________________________________

Mailing Address: ____________________________________

City: _______________________________________State: ______ Zip: _____________

Phone: _____________________ E-mail: _________________________

System Installation Address or check box if same as above ☐

Installation Address: _________________________City:_________________ State: MN Zip: ________

Utility Bill Account # _______________________

Property Type: Owner Occupied ____Rental____ What year is existing(old) Softener_______________

Is existing (old) softener: time based or on demand (circle one)?

Type of Product Purchased and Installed: ____

Date of Purchase: __/__/_____ Make: ________________________ Model: _______________________

Date of Installation: _______________ Installed by:____

Brine Disposal System: If you are installing a Brine Disposal System (not a water softener) please use the Brine Disposal System Application.

Please attach original or copy of **purchase receipt indicating type/model of system installed and photograph of the installation. Attachment shall also include information indicating compliance NSF/ANSI standard 44 and minimum efficiency of 4000 grains/lb.**

Customer Agreement: My signature indicates that the information provided is true, I have read and understood the rebate program guidelines, and that I comply with the rebate program requirements. In addition, I agree I will not disconnect or modify this installation unless the modification is replacement with same or more efficient system (i.e. efficient system refers to reduction/elimination of chloride discharge to the sewer). Furthermore, I will allow a representative of ALASD to inspect the installation in my home when requested to ensure compliance.

Signature: ____ Date: _____________
Rebates will be denied for the following reasons: missing receipts, no proof of payment, inadequate proof of installation, not compliant with ALASD requirements/inspection.

Upon compliance with program requirements and submissions, a rebate will be distributed if funding is available. **THE ALASD REBATE PROGRAM WILL CONTINUE ONLY WHILE BUDGETED FUNDS ARE AVAILABLE. When budgeted funds are depleted, notification will be provided on www.alasdistrict.org.** You may also call ALASD to check on status of rebate funding at 320-762-1135.

Send questions to info@alasdistrict.org

Applications to:
Chloride Reduction Rebate
Alexandria Lake Area Sanitary District
2201 Nevada ST SW
Alexandria MN 56308

Funding for this project was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).

Salt Management Fact Sheet

Lake Winona is listed as impaired by the Minnesota Pollution Control Agency (MPCA) due to excess phosphorus as well as chloride. Both negatively impact aquatic life. ALASD has been successful in reducing the total phosphorus loading to Lake Winona and the chain of lakes over the past 40 years and continues to reduce the total phosphorus concentrations entering area lakes. However, in addition to phosphorus, **we are now faced with finding a solution to reduce chloride (salt) loading as well.**

There are multiple chloride sources including road salt that can enter our area lakes**. However, most of the salt being discharged to Lake Winona is from water softeners used in homes.**

6,000,000 pounds or 3000 tons of salt is discharged annually to the ALASD sewer system and ends up in area lakes.

Home Water Softener Background

Area groundwater has high levels of calcium and magnesium that are commonly treated/removed through "*softening*" to prevent lime scale buildup in appliances, pipes, and water fixtures. Home water softeners use sodium chloride (NaCl) in a softening process that replaces calcium and magnesium ions with sodium, while the chloride ions (i.e. salt) are discharged as brine/backwash to the sewer system and eventually end up at the wastewater treatment facility (WWTF) and are discharged into Lake Winona and eventually to the chain of lakes.

MPCA requires salt reductions to meet future chloride limits:

The MPCA recommends installing centralized softening technology at municipal water treatment plants thereby removing the need for home softeners. **ALP Utilities is evaluating centralized softening for the City of Alexandria residents.** However, this alone will not attain the target effluent chloride discharge concentrations at the WWTF since **over half of ALASD customers use private well water with home softeners.** Costs associated with providing centralized water supply and distribution system to the township areas is not economically feasible based on affordability standards according to the Minnesota Public Facilities Authority. In addition, treatment for chloride at the end of the WWTF is not economically feasible.

You can help reduce the amount of the salt discharge:

- Installing a high-efficiency water softener. Ensure settings are correct for your source water!
- Removing your softener and installing a salt-less water conditioner/treatment system.
- Installing a subsurface soil disposal system for your softener backwash/brine discharge.

ALASD implemented a pilot program in 2022 for homeowners to reduce or eliminate salt discharge to the sewer. ALASD is now continuing this program into future years with support from the ENRTF. For more information, please visit our website: www.alasdistrict.org

Funding for this project was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).

Appendix C: WTP Upgrade Cost Estimate

ALP WTP LIME Softening Addition *Revision: 1/1/2023*
AE2S Project #P00896-2016-001
Opinion of Probable Total Construction Cost
Preliminary Design Phase

Preliminary Opinion of Probable Total Construction Cost		
00/01 0000 Contracting and General Requirements		$1,457,035
03 0000 Building		$5,400,000
09 0000 Finishes		$458,500
22 0000 Plumbing		$439,662
23 0000 Heating, Ventilation, and Air Conditioning		$510,811
25 0000 Integrated Automation		$150,000
26 0000 Electrical		$1,200,000
31 0000 Earthwork		$746,000
40 0000 Process Integration		$1,547,406
41 0000 Material Processing and Handling Equipment		$993,300
46 0000 Water and Wastewater Equipment		$3,124,650
Subtotal Construction Cost		**$16,027,380**
Contingencies	30%	$4,808,214
Engineering/Legal/Administrative	20%	$4,167,119
Subtotal Legal/Administrative/Contingencies		**$8,975,333**
Preliminary Opinion of Probable Total Project Costs		**$25,002,712**