



Lower Des Plaines Watershed Chloride Reduction Plan

Prepared by:

Lower Des Plaines Watershed Group

www.ldpwatersheds.org

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Chapter 1 – Introduction

The Lower Des Plaines Watershed Group is focused on improving the water quality and health of the aquatic communities within the Lower Des Plaines River and its tributaries. Winter chlorides, while necessary for public safety, do pose a threat to aquatic life in addition to other impacts to vehicles, infrastructure and vegetation. Levels of chloride in local streams and waterways spikes in the winter, particularly during and after storms and during spring melt. Because chloride does not degrade or breakdown, it lingers along roadways, ditches, stormwater sewers and detention basins continually washing off with rain events into early to mid-summer, when they have the greatest impact to aquatic life.

Efforts are being made across the Midwest to reduce the amount of chloride being applied for winter maintenance while still maintaining expected levels of service and safety. These reductions are being made through better application practices that reduce waste, for example road salt that bounces up onto the right-of-way is not keeping a roadway safe. Practices like pre-wetting salt or anti-icing are becoming the industry standard – the best practices that keep people safe and reduce the amount of chloride reaching waterways. These practices do not sacrifice safety for environmental protection, they achieve both, and generally save time and money in the long-term.

This Chloride Reduction Plan for the Lower Des Plaines Watershed is meant to be a guidance document and support communities making improvements to winter maintenance programs. Particularly for MS4 entities, this plan provides a list of best management practices that will help to reduce the amount of chlorides entering your stormwater system.

Chapter 2 – Chloride Inventory

In addition to winter deicing materials, there are several other sources of chlorides that can contribute to surface and groundwater pollution. These include chlorides used for water softening at both municipal and individual water softening operations, radon reduction at municipal operations, fertilizers and dust suppressants. As a community embarks on a chloride reduction program, determining the magnitude of each source is an important step to allocating resources where they will have the biggest impact. For many urban/suburban communities that utilize Lake Michigan as their drinking water source, winter deicing operations are likely the largest source of chlorides on an annual basis. For those communities and townships, particularly in the southern part of the Lower Des Plaines watershed, that utilize groundwater sources for drinking water and those that also have a larger amount of agricultural lands, these other sources of chlorides may be more prevalent. There are a series of questions in the sections below to assist with determining relative importance of each source.

2.1 Winter Maintenance

The use of chloride-based deicers is a major source of chlorides reaching surface and groundwater. These deicers come in several formulations – sodium chloride, magnesium chloride, calcium chloride to name a few. Sodium chloride is by far the most widely used and least expensive deicing material. In addition to tracking total amounts of all deicers used each year, application rates, # of callouts and weather conditions will also help to track and compare chloride usage each year.

Beyond municipal/township winter maintenance operations, winter deicers used by private contractors can contribute considerable amounts of chlorides to local waterways. Identifying acres of private

parking lots within a community can help to identify a proportional amount of chlorides coming from private sources. Visual surveys of salt storage piles can identify potential issue from uncovered salt piles that may be draining into municipal stormwater systems (MS4s). Understanding how much salt is used by private contractors can help to determine what level of response is needed to encourage or require various BMPs.

2.2 Water Softening

Water softening contributes chlorides to wastewater treatment plants throughout the year. Wastewater Treatment Plants are not designed to remove chlorides as part of the treatment process. If this background level of chlorides continues to increase, it may trigger chloride limits in the NPDES Permit. At the municipal level, how much chloride is used for municipal well water softening operations? Are there opportunities to upgrade to a more efficient water softening system as infrastructure ages out? Do residents know that their municipal water is already softened and that they do not need to operate a water softener at home? How many residents use a water softener? Are chlorides used for radon reduction? Are those chlorides backwashed to the sanitary system? Or are they recaptured? Exploring relevant questions listed above can help a community determine the extent of water softening use and relative impact and what level of resources may need to be allocated.

2.3 Fertilizers & Dust Suppressants

Agricultural sources of chlorides can be found in fertilizers like Potash and in dust suppressants used on gravel roads. These sources runoff croplands and roads or drain through tiles systems and can contribute to background levels of chloride in surface and groundwater. For more rural communities, this may be a source to consider if background chloride levels are high in surface or groundwater systems.

Chapter 3 Winter Maintenance Best Management Practices

The use of winter maintenance BMPs allows communities to maintain the current levels of service while reducing chloride waste. The reductions achieved by each BMP vary based on degree of implementation, training provided to staff, proper tracking of salt usage, the type of equipment used and proper maintenance and calibration of that equipment. BMPs will be listed in a general order of implementation, building upon each other. This is meant to help communities start from where they are and continue to build their programs.

3.1 Snow & Ice Plans

Every organization that operates a winter storm management program should have a written, up-to-date plan that identifies program goals, levels of service, BMPs used, service maps etc. Chapter 4 has been dedicated to the components of a Snow & Ice Plan. This plan should be the backbone of your program, it should be reviewed annually with operations and support staff as well as with Elected Officials and shared, in some form, with the public on your website.

3.2 Before Season BMPs – Getting Ready for Winter

3.2.1 Training

One of the most important things that an organization can do is to provide annual training to all staff involved in winter maintenance. This includes not only the plow drivers and other hands on staff, but also the mechanics, facility maintenance crew, managers & supervisors, and those that interact with the public like elected officials and those staff that answer the phone. The training should be tailored to the audience, and can be done in-house or achieved through outside workshops, webinars or other trainings. Annual trainings are offered through the Salt Smart Collaborative each fall, information can be found at www.saltsmar.org

Training should also occur whenever a new practice is introduced or a new piece of equipment is purchased so that staff know how to properly implement the technique or calibrate and use the new equipment. New equipment or techniques may require some practice runs to work the kinks out. Building in time in for practice and evaluation will set you up for success. Most equipment suppliers will provide training for new equipment and assistance with calibration.

3.2.2 Recordkeeping

Prior to the winter season, a recordkeeping system should be put in place so that all necessary information needed to document salt usage and evaluate your program during and after the season is collected and recorded as you go. Important information to include: types and amounts of deicers used, equipment calibration, and trainings provided, as well as call-out logs that should include weather conditions, pavement temperature, plowing & snow clearing activities, and anti-icing or deicers used – what rates were used and how much by route.

3.2.3 Storage

Proper storage of all winter maintenance materials is a requirement of the ILR-40 MS4 Stormwater permit under the Good Housekeeping control measure. Storing solid materials in a permanent structure like a salt dome is required within two years of issuance of an MS4 permit. Keeping deicing materials covered saves resources and keeps



chlorides out of stormwater runoff. Liquid deicers like brine or other mixes should be stored in well labeled tanks that are properly sited to protect from vehicle impact and within a containment basin in case of rupture.

BENEFITS OF BMPS

Improved Level of Service: A well developed, implemented, and communicated plan provides consistent services to the public.

Improved Safety: Choosing the right materials at the right application rates using the right equipment based on current and forecasted weather conditions minimizes dangerous road conditions.

Protects Water Quality: Using winter maintenance BMPs reduces road salt waste and the amount of chlorides reaching local streams.

Saves Money & Resources: Using the right treatment at the right time and application rate will save money and materials. These practices will also extend the life of equipment, vehicles and concrete and reduce replacement costs for adjacent vegetation and landscaping.

These practices are not compromising safety to protect our natural and built environments, they are some of the best practices we can implement to provide the best service to our public.

3.2.4 Choosing the Right Materials and Rates

Anti-icing or de-icing materials and application rates chosen should be based on pavement temperature, preceding, current and predicted storm conditions and whether temperatures are rising or falling. An application rate table should be developed to vary application rates based on pavement temperature and weather conditions. Rates used and resulting pavement conditions should be tracked to allow for evaluation and tweaking of rates as program develops.

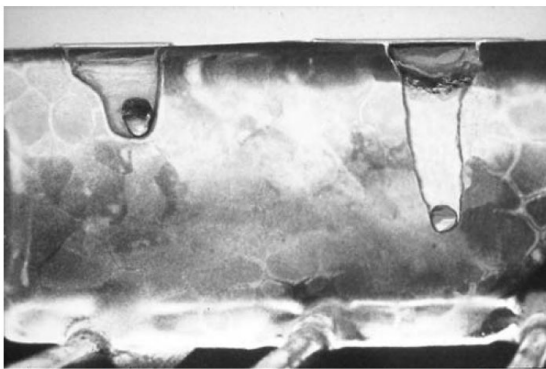
3.2.5 Pavement Temperature & Weather Services

Pavement temperature and current & forecasted weather conditions are the basis for many of the decisions that are made prior to and during a call-out or storm event. Hand-held pavement temperature sensors are an inexpensive way to start collecting this important information. Ideally, pavement temperature sensors should be installed on enough trucks in your fleet to provide an accurate accounting of temperature differences across your service area. Many communities already subscribe to a weather service to meet the needs of public safety and operations. To assist other community organizations make more informed decisions on how they deal with winter operations, consider sharing this information with them. For example, sharing information on expected road conditions and storm forecasts can help your school district make better decisions on whether or not to close the school. Not having buses on the road while municipal crews are out trying to clear roads during a storm can provide for safer conditions for all involved.

3.3 Liquids

Brine used for prewetting salt or anti-icing is a 23.6% mixture of rock salt and water. Brine can be bought in bulk or made in-house. For pre-wetting salt, brine can be applied on the pile or off the back of the truck, either in the auger or at the spinner. Brine can be mixed with a carbohydrate like beet juice to enhance stickiness and decrease ice crystal formation or mixed with other deicing products like calcium chloride to increase effectiveness at lower temperatures.

Pre-wetting salt kick-starts the melting process, otherwise dry salt has to first draw moisture from dry winter air before it can start melting ice. Pre-wetting salt also reduces bounce and scatter, keeping salt on the roadway where it is needed. This practice can reduce salt by as much as 20-30%.



Faster melting action is the main benefit of pre-wetting salt. After 20 minutes the difference is significant. This photo shows two salt particles penetrating ice. The one on the right was pre-wetted.

Anti-icing is a proactive practice of applying brine to roadway and other surfaces ahead of winter storms to prevent ice from bonding to the surface. This allows the ice and snow to be more easily and fully removed by plows. In light snow events, anti-icing can melt off snow without the need for plowing. Anti-icing liquids can be applied several days ahead of a storm during normal work hours, as long as rain is not predicted.

If not already implemented, liquids should be incorporated into future planning.

3.4 Equipment Calibration

The purpose of calibration is to know how much material is being dispensed at each setting and that the equipment is functioning the way it should. All pieces of equipment used for anti-icing or deicing should be calibrated prior to each season and after any repairs. Calibration records should be maintained for each piece of equipment. Equipment suppliers will generally provide assistance or training for calibration.

3.5 After the Storm & Season

After storms and at the end of the season there are a number of Good Housekeeping activities geared towards reducing chloride pollution that should be a part of your facility plan. Cleaning up spilled or excess salt, particularly around loading areas, should be done regularly throughout the season and especially before rain is predicted. For larger areas consider using a backpack leaf blower or power sweeper to gather salt together. When washing equipment or vehicles after storms, be sure that wash water is not directed into stormwater collection system. Having a truck washing bay that collects wash water for treatment or reuse in brine system is ideal. If this is not an option, check with neighboring communities to see if they have a truck washing bay and if they would be willing to allow others to use it.

After the storm season is over, look for ways to clean up leftover salt around the community. Street sweeping should be used to remove excess salt from roadsides before it gets washed down the storm drains during spring rains. Consider offering a drop-off or pick-up program to collect leftover salt from small businesses in your community. This can be a great way to get salt piles cleaned up out of parking lots that drain into your storm sewer system.

3.5 Documentation & Evaluation

There are many reasons to document winter deicing activities, ranging from reducing liability to justifying equipment purchases to evaluating and improving snow and ice programs. As with any data collection system, the data that comes out is only as good as the information that is put in. Consider how you will use the information to make sure you are collecting what is needed to make necessary decisions.

Your documentation program should collect storm event information including pre-event, during and post event weather conditions, type(s) and amount of precipitation, and pavement temperatures; as well as information about snow and ice clearing activities like whether or not anti-icing was applied and when, time snow clearing activities began, material and application rates used and resulting road conditions, and total amounts of both liquid and solid materials used. Equipment issues like blade changes or other needed repairs should also be tracked. Storm event tracking can then be compiled to provide a summary of results for the season. Examples of documentation forms can be found at www.saltsmart.org/public-road-agencies

Post storm event evaluation with staff can be a useful way to identify problem areas, track how application rates are working and where tweaks can be made to reduce excess salt use. Post season evaluations are useful to track how overall changes in your program are working, identify equipment needs to improve program results and recognize staff for their efforts.

Chapter 4 Snow & Ice Plans

Snow & Ice Plan, Winter Maintenance Plan, Winter Storm Management Plan, whichever title is used the document should reflect your current operations and decision-making process. These plans should be reviewed annually and updated as needed to reflect program or equipment changes. Snow & Ice Plans are also an important communication tool that can be used with both Elected Official and residents – We Have A Plan! Below is a sample outline of information that should be included in a snow and ice plan. Particular order or grouping of information is provided as an example, a plan should be developed in such a way that makes sense for your organization.

4.1 Sample Plan Components

Purpose & Mission of Winter Management Program – Level of Service

Staffing – Who makes decisions, who are the primary staff, how are other department staff used, etc.

Preparation – Snow Season Preparations

- Route Maps – Roads, Parking Lots, Sidewalks & Trails
- Equipment List
- Equipment Calibration
- Staff Training
- Pre-Season Route Inspection Process
 - Road conditions
 - Railroad Crossing
 - Mailbox inspections
- Outreach for Residents

Snow-fighting Operations

- Internal Communication Protocol
- Call-Out Procedures
- Call-Out Staffing
- Plowing Procedures
- Salting Procedures
- Cul-de-Sac Procedures
- Anti-Icing Procedures
 - Routes
 - Tracking

Supporting & Historical Information

Chapter 5 Education & Outreach

The Lower Des Plaines Watershed Group is a part of the Salt Smart Collaborative and works to develop and share education and outreach materials related to winter storm management activities. Materials are presented in different formats and made accessible on the web at

<https://ldpwatersheds.org/outreach/salt-smart/> New materials are added each season and input is

welcome for specific topics or issues faced in your community. Using these materials also helps to meet MS4 Public Outreach requirements.

It is important to communicate with residents and commuters about winter storm management activities. The social media, blog articles, posters and videos can be used as is or can be customized to meet your needs. Helping your residents understand the practices that are implemented, the order in which different parts of the community are cleared, and how they can help is the goal of this part of the program. Below are some examples of existing materials that are available on the web.

