BEST MANAGEMENT PRACTICES FOR CHLORIDE MANAGEMENT

APPENDIX CI

BEST MANAGEMENT PRACTICES FOR SALT AND DEICER STORAGE AND ONSITE MANAGEMENT

Improper storage and management of deicing material can lead to contamination of surface water and groundwater. Salt-based materials can dissolve in precipitation and stormwater and run off into surface water or infiltrate through the ground into ground water. Storing deicing materials responsibly and following good housekeeping practices during the delivery, storage, loading, and management of deicing materials can reduce the amount of chlorides that needlessly enter the environment. Several best management practices are recommended for storage and onsite management of deicers.[1]

The following best management practices address locating storage facilities for deicing materials:

- Storage facilities should be located in areas that are not environmentally sensitive. Areas where there are wells, reservoirs, or stratified-drift aquifers should be avoided.

- Storage facilities should be located on flat sites away from surface waterbodies and wetlands.

- Site drainage should be designed to direct clean stormwater away from the operations and storage areas in order to keep the stockpiles as dry as possible.

- Drainage that is contaminated with salt should be directed to a sewage treatment plant (subject to municipal approval), collected for use in pre-wetting activities, or sent for proper disposal.

The following best management practices address the design of deicer material storage structures:

- Ideally, deicing material storage facilities should be completely enclosed, with storage and working areas on impervious surfaces such as asphalt or coated concrete.

[1] *Transportation Association of Canada,* Syntheses of Best Practices: Road Salt Management, *2003; Transportation Association of Canada,* Salt SMART Learning Guide, *2005; Salt Institute,* The Salt Storage Handbook: A Practical Guide for Storing and Handling Deicing Salt, *2006; New Hampshire Department of Environmental Services,* Environmental Fact Sheet: Storage and Management of Deicing Materials, *WD-DWGB-22-30, 2019*.

- Overhead cover should be installed to protect material from exposure to snow and rain and to minimize runoff and inventory loss. Because it is very difficult to keep storage piles completely covered with tarpaulins, fixed roofs are preferable to tarpaulins.

- Structures should have stormwater drainage controls to prevent runoff and snow melt from contacting or running through material storage and loading areas. Areas should be sloped away to prevent stormwater from entering the loading areas or structures. Building floors and storage pads should be sloped to prevent ponding and allow any water to drain away from the storage piles.

- Salt and salt-sand mixtures should be stored on pads of impermeable asphalt or concrete.

- Concrete pads and walls should be treated to prevent concrete deterioration.

The following best management practices address on-site management, delivery, handling, and loading of deicers:

- Solid deicers should be handled as little as possible to avoid breakdown of particles and loss of material. Spillage should be minimized.

- Deicers spilled in storage and loading areas should be collected and returned to the storage pile.

- All deicer materials temporarily out in the open should be covered to prevent deicer material from being washed or blown from the pile.

- Solid bagged materials should be stored securely, indoors if possible. Bags should be protected from rain and snow. All open bags should be resealed. Once empty the bags should be disposed of properly.

- Frozen or clumped blocks of deicer should either be set aside to be dried and crushed or added to brine tanks.

- Liquid storage tanks should be protected from freezing. Know the freezing point of liquid deicers to determine whether they can be stored outdoors.

- Liquid storage tanks should be double-walled or have secondary containment.

- Liquid storage tanks should be designed so that a plumbing failure will not result in release of contents.

- Liquid storage tanks should be protected from impact from vehicles moving about the yard. They should be located such that spilled material can be contained and retrieved in the event of a tank or piping failure.

- Spreaders should not be overloaded such that material spills off the vehicle.

- Spreaders should only be washed at locations where wash water is properly managed.

BEST MANAGEMENT PRACTICES FOR APPLICATION OF DEICERS TO ROADS

Snow and ice control activities on roadways reduce the likelihood of accidents and protect drivers and passengers using these facilities, but runoff originating on or flowing over these surfaces can carry deicers into surface waters or groundwater. It is recommended that following snow and ice control best management practices be used to keep roadways safe and reduce environmental impacts:[2]

- A clear level of service as to the condition that a roadway will be maintained should be established, based on traffic volume or regulation. This level of service should be communicated to staff and the public.[3]

- Staff should be trained in proper spreading procedures, record-keeping, and the environmental impacts of deicing activities. Such training should include seasonal and contracted employees.

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[2] *Salt Institute,* The Snowfighter's Handbook: A Practical Guide for Snow and Ice Control, *1999; Transportation Canada,* Salt SMART Learning Guide, *2005; Minnesota Department of Transportation,* Minnesota Snow and Ice Control: Field Handbook for Snowplow Operators, *Manual No. 2005-01, 2005; W. Nixon and R.M. DeVries,* Manual of Best Management Practices for Road Salt in Winter Maintenance, *Clear Roads, 2015.*

[3] *An example of level of service for highway under the jurisdiction of the State of Wisconsin can be seen at wisconsindot.gov/Documents/doing-bus/local-gov/hwy-mnt/winter-maintenance/snowplowbrochuer2014mapside.pdf.*

- Spreading equipment should be calibrated prior to and regularly during the winter deicing season. Equipment should be recalibrated if there is a change in the deicing material used.

- Spreaders should be equipped with instrumentation to monitor current conditions and deicer usage.

- Spreading rates should be based on the best available information, including current road conditions, precipitation type and rate, pavement temperature, level of service, deicing cycle time, and weather forecast.[4] Spreading equipment should be able to apply deicers at specified rates and should be capable of calibration.

- Spreader routes should be optimized to eliminate leftover salt and driving without spreading.

- The appropriate deicing compound should be used for the pavement temperature.

- Solid deicers should be prewetted to reduce the amount of deicer that leaves the roadway during application.

- Spreaders should be covered to prevent loss of deicer in wind and precipitation.

- Records should be kept of deicer usage by each truck and route. Actual usage should be compared to the prescribed spreading rates to identify over-use and inefficiencies.

- Under specified conditions, anti-icing materials should be applied to prevent ice formation on pavement and to prevent ice and snow from bonding to the pavement. The conditions under which anti-icing materials should be applied include all of the following:

    - Snow or frost is predicted to occur within the next three days.

    - Rain is not predicted to occur prior to the snow.

[4] *An example of variable application rates based on highway level of service, pavement temperature, and road conditions can be seen in Wisconsin Department of Transportation,* Highway Maintenance Manual, Chapter 06, Section 12, Subject 25, "Application Rates De-Icing, *November 2008.*

- Pavement temperatures are 15°F or greater.

- The dewpoint temperature is at least 3°F below the air temperature.

- The relative humidity level is 70 percent or less.

- The pavement is dry.

- Winds are less than 15 miles per hour when loose snow is present.

- When it has been confirmed that sufficient anti-icing material residue is no longer present on the pavement.

BEST MANAGEMENT PRACTICES FOR SNOW AND ICE CONTROL ON PARKING LOTS AND SIDEWALKS

Snow and ice control activities on parking lots and sidewalks protect the drivers and pedestrians using these facilities, but runoff originating on or flowing over these surfaces can carry deicers into surface waters or groundwater. It is recommended that following snow and ice control best management practices be used to keep parking lots and sidewalks safe and reduce environmental impacts:[5]

- Develop a maintenance policy or plan that guides winter operations. Conduct training sessions for supervisors, staff, and customers on the policy and best management practices.

- Do site assessments in parking lots and near building entrances to document drainage problems such as roofs that drip onto steps and downspouts that drain to sidewalks. Fix these during the summer.

- Inspect storm drains in the fall and remove obstructions such as leaves, sticks, and trash to prepare for the spring melt.

[5] *Minnesota Pollution Control Agency,* Winter Parking Lot and Sidewalk Maintenance Manual, *Third Revision, June 2015.*

- Calibrate each piece of deicing equipment in the fall of the year. If the equipment has different settings, calibrate it for each setting.

- Equipment should be designed or modified to be able to deliver granular products at very low rates.

- For sidewalks, use drop spreaders instead of rotary spreaders. If using a rotary spreader, install shields to restrict the spread pattern, reduce the application rate, and protect vegetation.

- Look for opportunities to close extra building entrances during winter. High maintenance, non-essential entrances are good candidates.

- Use a pavement temperature sensor to measure pavement temperature and apply deicers at appropriate rates for the temperature.

- Always remove snow prior to applying deicers. Focus on aggressive mechanical removal of snow. The less snow present, the less deicer that will be required for a safer walking surface.

- Know the composition of the deicing product and its practical melting temperature range. Use it only at temperatures at which it will be effective and use the minimum amount needed for deicing.

- It may be possible to use a lower rate of deicer application in high traffic areas of parking lots as traffic tends to mix deicers into snow, helping snow and ice to melt.

- Handicap parking spots are often over-salted and over-sanded. They should get the same amount of deicers as other areas.

- Store snow piles in areas where solids can be recovered after the snow melts. Locate these areas down-slope from salt and sand storage to prevent snow melt from flowing through salt and sand storage areas.

- Avoid pushing snow into lakes, ponds, wetlands, rivers, streams, or other natural areas.

BEST MANAGEMENT PRACTICES FOR WATER SOFTENING

Discharge of brine used to recharge water softeners releases chloride to the environment. While sanitary sewerage systems receive most of the brine from water softener recharge in the Oak Creek watershed, some is discharged into the remaining onsite sewage treatment systems that are present in the watershed. It is recommended that the following best management practices be used by water treatment professionals to reduce chloride contributions to wastewater:[6]

- Evaluate existing softening units during service calls. Verify that hardness settings are in line with actual tested hardness on site. Review the historical softened water use and family size and use those data to make any necessary adjustments to softener settings to use salt as efficiently as possible.

- Provide the consumer with educational material regarding the benefits of upgrading to a more efficient softening system.

- For residential softening, follow the Wisconsin plumbing code's alternative sizing criteria for residential installations.

- For residential softening, use a typical rate of 40 gallons of water consumed per person per day and the actual number of household residents or use the actual flow rates based on the history obtained from an existing softener.

- Use a minimum softening efficiency for new softening equipment of 4,000 grains of hardness per pound of salt.

- Use a maximum regeneration water usage of 2.5 gallons of water per 1,000 grains of hardness provided.

- Size a regeneration frequency of no less than three days at 4,000 grains of hardness per pound of salt.

[6] *K. Lake, R. Erickson, and A.F. Cantor,* The Reduction of Influent Chloride to Wastewater Treatment Plants by the Optimization of Residential Water Softeners, *Report to the Madison Metropolitan Sewerage District, November 2015.*

- Replacement of existing or installation of new water softening systems should be consistent with the requirement in Section SPS 382.40(8)(j) of the *Wisconsin Administrative Code,* which states that "ion exchange water softeners used primarily for water hardness reduction that, during regeneration, discharge a brine solution shall be of a demand initiated regeneration type equipped with a water meter or sensor unless a wastewater treatment plant downstream of the water softener specifically documents the reduction of chlorides."

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