

# Use of Road Deicer

## **Background**

Road deicing is a necessary part of winter maintenance. Deicing is the process of applying solids or liquids to a road surface to help melt snow/ice that accumulates during a winter event. There are many types of deicers that are used in North America to manage snow/ice. The most popular deicer is sodium chloride more commonly referred to as road salt (see table 1 for a comparison of what other Municipalities are using for chemical deicing). Road salt is an effective substance for deicing but can be detrimental to the environment. To mitigate its harmful effects, City operations has adopted a Salt Management Plan (SMP) which provides valuable information on the effective use for road salt.

In 2005 the City of Greater Sudbury retained BMA Management Consultants to undertake an Internal Audit of winter maintenance activities/practices utilized at the City. The review included but wasn't limited to an analysis of staffing, contracting, yards/deployment centres, fleet management, budget and actual expenditures, work practices, road classifications, service standards, storm tracking and responses as well as performance management. The report provided an overview of existing practices, analyzed opportunities to create efficiencies and improve service delivery, review best practices utilized in Ontario as well as to make recommendations for the delivery of winter control services. One of the key recommendations contained within the BMA report was the need for the City to develop a SMP. In response to this recommendation, the City retained Conestoga-Rovers & Associates to develop its first SMP in September 2005. Since that time, City staff have arranged to have the SMP updated periodically with the latest update completed in 2016 (see Appendix A for a copy of the latest SMP).

The main goal of the SMP was to optimize the use of salt without compromising road safety. As noted in the latest version of the plan "the SMP sets out a policy and procedural framework to ensure the City of Greater Sudbury's (City's) Roads Operations Section (Roads Operations) continuously improves the effective delivery of winter maintenance services and the management of road salt used in winter maintenance operations, as outlined in Environment Canada's Code of Practice for the Environmental Management of Road Salts (April 2004)". The SMP is meant to be a dynamic document that allows staff to evaluate and implement new approaches and technologies in winter maintenance activities in a fiscally responsible manner.

The SMP contains the following key principles:

- Periodic review and analysis of industry practices;
- Implementation and documentation of the SMP;
- Education and training of staff;
- Monitoring and analysis;
- Management review;
- Environmental review; and
- Practices and policy revision.

The principle objective of the SMP is summarized in the following policy statement; "The City of Greater Sudbury will take the actions necessary to provide effective winter maintenance to ensure the safety of road users in keeping with applicable legislation and accepted standards while striving to minimize adverse impacts to the environment. Road Operations will meet these commitments by:

- Adhering to the procedures contained within the SMP;
- Complying with applicable laws and regulations;
- Reviewing and upgrading the SMP periodically and incorporating new technology and development as appropriate;
- Committing to ongoing winter maintenance staff training and education; and
- Monitoring on an annual basis, the present conditions of the winter maintenance program, as well as the effectiveness of the SMP".

On June 30<sup>th</sup>, 2005 BMA Management Consultants made a presentation to Council outlining their findings. Subsequent to their presentation, resolution 2005-284 was approved by Council and reads as follows:

**"THAT** the BMA Internal Audit Winter Maintenance Report be adopted in principle;  
**AND THAT** the report be made public and posted to the City's website;  
**AND THAT** an implementation plan be developed by the General Manager of Infrastructure and Emergency Services."

The most significant developments in our current winter control policy occurred in 2007 when Council resolved to adopt the SMP and implement a number of service changes that were recommended, most notably;

- Increasing the design plow times on class 4 to 6 roadways from 8-12 hours to 24 hours;
- Reduction of one shift on arterial and collector salt routes (class 1 to 3) and the reintroduction of first 8 in 24 (employees are required to report to their first 8 hour shift at any time during the 24 hour period, Monday to Friday) reporting for City Employees which would split into 2 shifts for storm response to provide 24 hour coverage; and
- Changing a number of roads currently treated with salt to roads treated with sand.

Since 2007, staff has initiated many operational changes following the principles of continuous improvement as identified in the SMP, including;

- Staff training;
- Periodic review/revisions to the SMP;
- Use of automatic spreader controllers;
- Calibration of equipment (see table 2 and 3 for City/MTO application rates);
- Installation of onboard brine systems;
- Pre-wetting salt;
- Direct liquid application;

- Pavement and air temperature sensors;
- Value added meteorological services (VAMS, see table 4 for an example) and Road weather information systems (RWIS);
- Use of GPS and AVL technology; and
- Snow removal, disposal and management of snow dumps.

In 2015, the City adopted the Source Water Protection Plan which was subsequently signed by the Ministry of Environment and Climate Change (MOECC). Since completion, City staff has implemented and/or is working on the following items;

- Improved monitoring of road salting activities;
- Improve signage in the Source Water Protection areas; and
- Reviewed salt/sand storage and handling at the various CGS depot operations.

In 2017, CGS commissioned a Risk Management Plan (RMP) for the Frobisher Facility and a Salt Optimization Plan (SOP). Copies of each of these plans can be found in Appendix B and C respectively, of this report. The RMP for the Frobisher Facility suggested that there were two measures available to the CGS to manage the significant threat of road salt storage within the Ramsey Lake intake protection zone. They include;

- "Maintain Site operations and implement Best Management Practices (BMPs) with monitoring to evaluate the effectiveness of BMPs;
- Maintain Site operations and implement Best Management Practices (BMPs) with monitoring to evaluate the effectiveness of BMPs. Relocate the winter maintenance material storage to a new site, located outside of any area where road salt storage and handling is deemed a significant threat, preferably within an area of low salt vulnerability as identified in the CGS Salt Optimization Plan."

The RMP for the Frobisher Facility concluded "that considering the additional costs associated with relocating the depot, in association with the benefits provided by the low-lying down gradient swamp which provides salt attenuation and a buffer from salt travel, redeveloping the existing Site using BMPs (i.e., build a dome for the pickled sand, install a monitoring network) would be the most economical and practical option."

The SOP on the other hand has been commissioned to assess the potential risk/vulnerability to environmental receptors with the application of road salt with the CGS road network. To establish the plan, our Consultant compiled data contained from the following data sources;

- Source water protection (SWP);
- Wellhead protection areas (WHPAs);
- Intake protection zones (IPZs);
- Highly vulnerable aquifers
- Significant/sensitive groundwater recharge areas;
- Lake trout and fish spawning areas; and
- Wetlands, and provincially tracked species sensitive to salt application.

By combining and weighing each environmental receptor/vulnerable area cumulatively, areas and roadways within the CGS can be rated as low to high receptor risk related to salt exposure. Based on the identification of the salt vulnerable areas and their intersection with roadways, recommendations are provided to minimize the impact of salt onto these environmental receptors and provide direction to the CGS Road Operations staff and SWP Group (Working Group) to maintain a safe road network while protecting the environment. CGS has developed this SOP in an effort to remain proactive with its SMP initiatives and as a requirement of the MOECC.

The SMP considers best practices for road salting as developed by the Transportation Association of Canada's (TAC) Salt Management Guide. Within the guide TAC has studied alternative products and supports the use of road salt. Other products studied by TAC include (see appendix D for details);

- Calcium Chloride
- Potassium Chloride
- Magnesium Chloride
- Calcium Magnesium Acetate
- Potassium Acetate
- Sodium Acetate
- Urea
- Glycols
- Methanol
- Sodium Formate
- Organic Compounds (sugar by-products)

Alternatives to road salt are generally prohibitively expensive, not appropriate for use on public roadways, unproven in a large scale operation and in many instances an alternative form of salt.

Another recommendation contained within the SMP suggests City staff should participate in a user group of Municipal operators to identify trends in the industry and compare practices of other Municipalities to ensure that practices utilized by the City closely mimic practices used by other Municipalities. Up until recently, the City maintained active membership in the Ontario Road Salt Management Group (ORSMG) which was sponsored by the Ontario Good Roads Association (OGRA). Unfortunately the ORSMG disbanded last summer but was quickly replaced by another group whose mandate will include bringing together various Municipalities/agencies from across Ontario to continue the discussion on winter maintenance and other road activities. The second meeting of the new group is scheduled for this month and City staff will be participating.

Finally, CGS is currently undertaking a study of a number of watersheds across the City. The main purpose of the study is to establish an implementation plan for storm water best management practices. Based on the principles of the SMP, Roads Operations staff will need to consider the recommendations of the sub-watershed plan when performing winter maintenance activities.

### **Conclusion**

As noted earlier in this report, the CGS has adopted a SMP which sets out a policy and procedural framework to ensure the City of Greater Sudbury's (City's) Roads Operations Section (Roads Operations) continuously improves the effective delivery of winter maintenance services and the management of road salt used in winter maintenance operations. The priority areas for continuous improvement identified in the most recent version of the SMP (2016) and RMP for the Frobisher Facility recommends that the CGS take steps to improve salt storage and handling at its existing sites. Over the coming months, staff will be presenting alternatives and recommendations to Council to address Infrastructure facility needs which includes the construction of new sand/salt handling facilities.