



Roadway Management Plan

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1. Introduction

On August 2000, Environment Canada concluded a five year scientific assessment on road salt (sodium chloride). Environment Canada report concluded that sufficient concentration of road salt pose risks to plants, animals, water bodies, and groundwater. The Environment Canada report recommended that salt be designated as a toxic under the Canadian Environment Protection Act (CEPA). Although, Environment Canada has stated that if road salts are designated as CEPA toxic, they will not ban road salt but rather have users/municipalities be encouraged to develop a management strategy to reduce used and implement alternatives. An outlined of measures for risk management strategy for road salts was subsequently developed. The strategy culminated in the Syntheses of Best Practices for Road Salt Management which was developed by Transportation Association of Canada (TAC).

The Government of Canada on April 3, 2004 published a Code of Practice for the Environment Management of road salts. The Code of Practice was developed in consultation with a multi-stakeholder working group for road salts. The Code is intended to help municipalities and other road authority by better optimizing the use of road salts while reducing the impacts of salt cause to the environment while preserving road safety.

Road authorities that use more than five hundred tonnes of road salt in a winter season and that have vulnerable areas in their region will have to prepare and implement a salt management plan. The management plan shall cover all activities which may result in release of road salts to the environment, such as salt storage, application of salt on roads, and the disposal of snow containing road salts.

The report from Environment Canada led to ongoing research into the use of salt alternatives. The alternatives to road salt in some cases are more effective or less harmful to the environment. The costs of these alternatives regrettably are too expensive except for limited use in sensitive or high risk areas. However, road salt continues to be the most cost effective deicer across Canada. Many salt management plans require that new technologies be investigated and trials conducted on any promising new development.

Salt management plans are designed to minimize the amount of salt entering the environment by including best salt handling practices and using new technologies to ensure it is the most effective solution for the road system.

2. Objective

The purpose of the Town of Marathon's salt management plan is to set an agenda to ensure a safe, efficient and cost-effective roadway system. Town of Marathon will optimize the use of winter maintenance material containing chlorides on all municipal roads while striving to minimize negative impacts to the environment. Town of Marathon public works staff will strive to provide safe winter road conditions for vehicular and pedestrian traffic as set out in the level of service policies and within the resources established by council.

As part of the salt management design itself will take in to account the best management practices used in today' s industry, most of the influence would be provided by Transportation Association of Canada (TAC) Syntheses of Best Practices - Road Salt Management. Theses practices are to provide effective and measurable techniques for snow and ice control while maintaining the main goal of minimizing road salt entering into the environment. As the salt management plan is influenced by best management practices the plan will always be evolving, as new technologies and ideas develop, the salt management plan will change to incorporate these ideas. The plan will set out guidelines for continually improving our methods for keeping the road safe and lower road salt use. The plan will also provide a benchmark from which we can monitor our progress.

Best management practices have focused on the following three objectives:

1. Salt Storage: The objective is the prevention or control of releases from existing and new sites. In pursuing this objective, the following practices should be considered: coverage of salt piles and blended salt-sand piles, handling practices that avoid uncontrolled releases, drainage management, wash water collection and treatment, training of personnel, and monitoring of the effectiveness of the facility.

Town of Marathon's Position: Our existing salt bin is covered and protected from the elements. We attempt to minimize the volume during the summer months in order to further reduce exposure. Our salt-sand pile is currently uncovered and a capital request in 2010 for a domed shelter was approved. Our proposed solution is to cover in the summer of 2010.

2. Snow Disposal: The objective is the control of releases from existing and new sites. In pursuing this objective, the following practices should be considered: location and construction of the sites to take into account operational and environmental factors, drainage management, training of personnel and monitoring of the effectiveness of the facility.

Town of Marathon's Position: Snow disposal locations (behind the medical clinic, behind the water reservoir, in front of the mill property, trailer park, end of Hemlo Drive) have been selected based on their distance away from our drinking wells, streams and lakes.

3. Salt Application: The objective is the reduction of the negative impacts of road salts by delivering the right amount of road salts in the right place at the right time. In pursuing this objective, consideration should be given to using the most recent advancements in the application of winter maintenance anti-icing and de-icing materials, winter maintenance equipment, and road weather information and other decision support systems. As well, the training of personnel and the monitoring of the effectiveness of road salt application techniques should be considered.

Town of Marathon's Position: In 2008 we purchased a new sander which now tracks our salt and sand salt application.

Regardless of whether salt is label toxic, the recent groundwater study done by Harden Environmental in 2002 (updated in June, 2009) reported that the town's groundwater is vulnerable to any contaminations, road salt being one of them. With implementing a salt management plan it would exhibit the ongoing protection of Marathon's valuable groundwater and meets the Federal Government incentive of reducing road salt that enters into the environment.

While the goal in mind is to minimize effects of road salt on the environment through an effective winter maintenance program, the most important issue in the salt management plan is still not to compromise the safety of a road user.

3. Policy Statement

The Town of Marathon will provide efficient and effective winter maintenance to ensure the safety of users of the municipal road network in keeping with applicable provincial legislation and accepted standards while striving to minimize adverse impacts to the environment. These commitments will be met by:

- adhering to the procedure contained within the salt management plan
- reviewing and upgrading the salt management plan on an annual basis to incorporate new technologies and new developments
- committing to ongoing winter maintenance, staff training and education
- monitoring on an annual basis, the present conditions of the winter maintenance program, as well as the effectiveness of the salt management plan

4. Current Winter Maintenance Program

4.01 The System Maintained

The major activities related to winter maintenance are (please refer to Appendix A and B):

- street plowing
- parking lot plowing
- sidewalk plowing
- snow storage
- snow removal
- salt spreading
- salt/sand spreading

The Town of Marathon is responsible for the maintenance in winter of approximately 86 lane kms of roadway.

4.02 Level of Service Policy

The level of service policy for the Town of Marathon currently meets or exceeds the Minimum Maintenance Standards specified in the Ontario Regulation 239/02 (please refer to Appendix C for details), Municipal Act, 2001, for snow accumulation and icy roads.

The code of practice for the environmental management of road salts, under the Canadian Environmental Protection Act, 1999 recommends that the salt management plan follows the Transportation Association of Canada syntheses of best practices for road salt management.

4.03 Winter Patrol

To meet and exceed the minimum maintenance standards, the Town of Marathon carries out winter patrol in two different ways:

1. Every day during the winter season a town employee performs a 4 am morning road patrol and then attends to snow removal activities as required. If a call-out of additional staff is required, the call-out is made to employees by means of a callout list.
2. Monitoring of road conditions is provided 24 hours per day/7 days per week with the assistance of the Ontario Provincial Police (OPP). During regular town office hours road conditions are monitored by the Works and Operation Department of the Town. Nevertheless, when adverse conditions appear that pose public safety, the OPP notify the Works and Operations manager at the town office during regular business hours. After hours the on-call manager is notified. It is the manager's responsibility and judgment to assemble staff for winter maintenance. During the weekends the on-call personnel patrol the main streets within town, giving special attention to main access egress roads (i.e. Peninsula Road).

4.04 Winter Material

1. Sand

The Town of Marathon currently uses 100% sand application only at the airport. Possible future use of 100% sand for town application will be addressed in future version of the Salt Management Plan.

2. Road Sand/Salt

Sand is purchased locally from and delivered to the Works and Operations yard or hauled from our stockpile located approximately halfway between Highway 17 and the Town of Marathon on Peninsula road. Each year before the snow arrives we stockpile approximately 50 % of our sand/salt needs in the public works yard

(approximately 700 tonnes). The Town of Marathon winter maintenance uses primarily a salt and sand mix. An approximate ratio of 15 % salt and 85 % sand is spread on the roads.

3. Road Salt

The tracking of road salt in past years has been from the amount purchased each winter season; however with our new sander we are now able to track the amount applied:

Winter Season	Road Salt (tonnes)	Increase / Reduction (%)
2009 - 2010 Season (Applied)	118.32	-74.34%
2009 - 2010 Season (Purchased)	127.82	-75.04%
2008 - 2009 Season (Applied)	461.18	
2008 - 2009 Season (Purchased)	512.18	-27.53%
2007 - 2008 Season (Purchased)	706.7	29.03%
2006 - 2007 Season (Purchased)	547.71	13.14%
2005 - 2006 Season (Purchased)	484.1	-26.85%
2004 - 2005 Season (Purchased)	661.83	0.11%
2003 - 2004 Season (Purchased)	661.1	-0.37%
2002 - 2003 Season (Purchased)	663.56	-3.07%
2001 - 2002 Season (Purchased)	684.55	17.19%
2000 - 2001 Season (Purchased)	584.16	-22.63%
1999 - 2000 Season (Purchased)	755.03	

Note: chart is updated as of April, 2010

The road salt application schedule is shown in Appendix D.

4.05 Yard Facilities

The municipality has one patrol yard from which it operates its winter maintenance program which is the works and operation yard located at 2 Penn Lake Road.

1. Equipment and Technologies

The Town of Marathon current fleet used for snow maintenance consists of:

- 1990 John Deere 644 Loader (Town)
- 1994 Champion Road Grader (Town)
- 1997 John Deere 544 Loader with attachments (blade and blower) (Airport)
- 1998 International Sander (Airport)
- 1998 Trackless Machine with snow blower attachment (Town)

- 2010 Trackless Machine with plow and dump body attachment (Town)
- 2000 Champion Road Grader (Town)
- 2003 ½ ton truck with sandbox (Airport)
- 2006 John Deere 444 Loader (Town)
- 2008 International Sander (Town)

Recommendation is to purchase a new trackless machine to augment our sidewalk plowing efforts. This initiative was approved in 2010.

2. Sand and Salt Storage

Since 1986, the Town of Marathon has been storing road salt at the Public Works yard in a small garage with a concrete floor. The salt is mixed with sand and stored outside uncovered.

The need of a new material storage facility is a high priority for the salt management plan. A construction of a new storage facility should include the suggestion of TAC-best synthesis practices. The construction of a new storage facility will help minimize the amount of salt that is being put into the environment and also provide a safer environment for the town's employees.

3. Wastewater

Presently the Town of Marathon does not have any specialized wash bays, therefore most of the wastewater from vehicle & equipment washing, including any salt-laden runoff from any uncovered material pile outside affected by weather is being soaked up by the soil before reaching the nearest storm sewer basin.

The problem with chlorides found in wastewater, that chlorides are not treated to any significant extent by conventional methods of wastewater treatment plants and thus directing wash water to the sanitary sewer only relocates the problem. Nevertheless with reduction of salt usage it should mean less salt being washed from vehicles. Other ways to minimize salt waste:

- Any outside pile of material containing chloride (salt) should be covered from the elements and be stored on top of impermeable material (ex. concrete pad or asphalt pad)
- Development of good house keeping skill at the Works and Operation yard
- Washing of equipment should be directed through an oil/grit separator prior to discharge to a sanitary sewer connection
- The placement of drainage at a tactical location at the works and operation site should also be investigated

4.06 Snow Removal and Disposal

Currently, municipal staff removes and hauls snow to the nearest available town owner properties when the resultant accumulation of piled snow impede traffic within the business districts or residential areas of Marathon. Some snow dumping locations include the gravel pit - near the booster station (Penn Lake Heights-subdivision), behind the Marathon library, etc. Also, the restriction of snow dumping within 100 metres of municipal wells is in practice as recommended by Harden Environmental.

There is currently no practical or economical way of removing chlorides, including those found in snow. Therefore protection of the town's groundwater is very important; one recommendation offered by Harden Environmental is to review snow dumping from all capture zones and remove from 2 years time of travel (TOT) zone if possible. Please refer to Appendix E for further details on the ground water flow patterns.

4.07 Communications

All winter maintenance vehicles are equipped with two way radios for communications, and municipal staff are responsible for reporting changing winter weather and/or road conditions.

Communication is maintained 24 hours/7 days a week, during regular business hours the Town of Marathon offices serves as the main hub for in/outgoing calls from staff, emergency services and the general public. After hours, the on-call manager is responsible for all communication.

External communication with the general public ranges from media press releases by radio, community television, and newspaper by the Town of Marathon regarding winter maintenance services and issues.

Another way of communicating with the general public can be by posting information on the town's web site regarding winter maintenance services and salt management practices to response in individual inquires.

4.08 Training

Currently the Town of Marathon winter maintenance staff, handle winter situations on a day to day basis, relying on past experience.

All staff involved in winter maintenance (operators, patrollers, and supervisors) need their current training updated with the newest techniques and technologies used in today's winter operation. Training programs such as Transportation Association of Canada salt smart train-the-trainer program or Ontario Good Road Association winter maintenance training programs. These programs can be cost effective by sharing the cost of one instructor with neighbouring towns.

Training should be specific, learning goals should include the following:

- Salt management plan
- Principles of ice formation
- Science of freeze point depressants
- Road salt usage
- Brine production and use
- Ploughing techniques
- Environmental Protection
- Maintenance Yards
- Spreader controls and calibrations
- Drift control
- Weather forecasts and decision-making
- Pavement temperatures
- Record keeping
- Snow removal equipment
- Snow disposal
- 5-R's Salt Management: right material, right amount, right time, right place, right person

Any current training that can be provided would be worthwhile, ensuring that personnel are competent to carry out their duties and are aware of the environment impacts of road salts.

4.09 Weather Monitoring

The Town of Marathon supplements road patrol information to determine an effective winter storm response and allocation of resources with observations and past experience from municipal staff. In addition, winter maintenance employees monitor websites such as Environment Canada's and The Weather Network for weather forecasting.

4.10 Record Keeping

The municipality retains records for the purchase of salt and sand for use in winter maintenance. Currently, records are also kept for application rates, plow or spreader routes, etc.

The development of a record keeping/assessment system to maintain an annual log that contains total quantities of sand and salt usage along with weather data reports from environment Canada. Shift reports shall comprise of the following:

- areas maintained
- material used (sand and/or salt)
- quantities of material used
- specified operator
- shift hours
- pavement and air temperature (when applicable)

5. Salt Management Goals

One of the primary goals of the salt management plan is still to provide safe transportation while striving to reduce the amount of salt being used to protect the environment. To identify sensitive areas affected by salt and find less harmful alternatives to further reduce their harm.

The following summarizes the goals of essential practices and strategies contained in the Salt Management Plan.

5.01 LOS (Level of Service) Policy

- Review the LOS policy if any improvements can be made compare to other similar road authorities and the minimum maintenance standard when required.
- Train and inform staff, management and the public on the intentions and expectations in service delivery.
- Monitor and report on compliance with LOS policy annually.

5.02 Training (Ongoing)

- Update the winter maintenance employees with the latest training for winter maintenance activities.
- Training should incorporate salt management principles in accordance with TAC's Salt Management Synthesis of Best Practices for Training.
- Training should be provided in the fall of each year to all staff involved in winter maintenance operations.
- On going training and improved technologies will be investigated and implemented to ensure an effective management of road salt.

5.03 Salt/Sand Storage (To Be Completed)

- It is vital that construction of a new salt/sand storage facility be completed. A construction of a new storage facility should include the suggestion of TAC's Salt Management Synthesis of Best Practices for Design of Road Maintenance Yard.

5.04 Record Keeping (To Be Completed)

- Establish a standardized record keeping system.
- Records of sand & salt material delivery and end of season material left over will be tracked for year-end audit of bulk material use.
- Development of reporting and summarize storm or "event" responses (including a definition of an event) by equipment.
- Training for record keeping be provided annually.

5.05 Emergency Response Program

- When salt (winter material) inventory reach a low level, the emergency response is in place to acquire the extra material. In the event that primary supplier fails to perform or if the purchase quantities exceed the contract limit, or if winter material runs out and the primary supplier can not supply material at an appropriate delivery time we will seek alternative sources from other suppliers.

5.06 Sand/Salt Mix Ratio (To Be Completed)

- Lowering the salt and sand mix ratio to approximately 5% to 10% by volume where possible.
- Environment Canada expects to be able to have a standard of 5% by 2010.

5.07 Spreader Calibration

- A development of a calibration procedure.
- Standardized spreader rates for salt and sand / salt will have been developed, the rates are as follows;
 - Salt settings have a range between 170 and 100 kg/km (170,150,130 and 100). The pre wetting has been set at 40 L per T.
 - Sand / Salt settings have a range between 600 and 300 kg/km (600,570,500,400,350,300 and 250). The pre wetting has been set with a range of 10 to 5 L per T.
- All spreader(s) will be properly calibrated after monthly readings are taken.

5.08 Good Housekeeping Practices

- Develop and implement a good housekeeping policy.
- Include a contamination section in the good housekeeping policy.
- Provide annual training on good housekeeping practices.

5.09 IRT's (Infrared Thermometer) (To Be Completed)

- At least one patrol/supervisor truck should have a truck mounted IRT installed.
- Provide annual training on the use of the IRT.
- Develop and implement a record-keeping program for the data supplied by the IRT, for future analysis purpose.

5.10 Electronic Spreader Controls

- 100 % of equipment used to spread material shall have the groundspeed regulated by electronic controllers with print out or download capability.
- Develop and implement a record-keeping program for the data supplied by the electronic controller, for future analysis purpose.

5.11 Environment Vulnerable Areas (To Be Completed)

- A development of a study of identifying any environmentally sensitive areas that need to be addressed **in** future versions of the salt management plan.
- Cooperate with other agencies (MNR, MOE) to identify salt vulnerable areas.
- Develop solutions and strategies for protecting vulnerable areas.

5.12 Alternatives to Salt (To Be Completed)

- Investigate the feasibility of a salt alternative.
- Investigate the merits of a pre-wetting and/or anti-icing program.
- Assess and review results of other towns, jurisdictions, etc. experiences on the alternatives to salt.
- Develop pilot projects for environmentally sensitive areas, and introduce and assess the various alternatives to salt.
- Investigate the cost-effectiveness of these alternatives compared to salt.

5.13 Salt Management Plan Review Program

- Tracking the performance of the required objectives and goals identified in the winter maintenance control program and the salt management plan will be ongoing to ensure roads are properly maintained and safe for the public while being committed to the reduction of road salt.
- Ensure the most recent technologies are studied, reviewed, tested and adopted when it's appropriate and financially feasible.
- Participate in conference and forums geared to the development of road salt best management practices.

6. Conclusion

The salt management plan is a continuous improvement document and be incremental and ongoing. Monitoring and reviewing the Town of Marathon's technology needs and salt management strategies will be required to achieve continued safety for road users and the protection of the environment.

Some items describe in the salt management plan should be establish as soon as possible:

- Establish a standard record keeping system for winter material use every winter season.
- A new winter material storage facility.
- Training for winter personnel staff.
- Attempt to reduce the winter mix of salt use, from 15% to 12% in the season 2009 / 2010.

Other recommendations in the salt management can be addressed in future version of the Salt Management Plan.