Environment Canada Environnement Canada

Canadian Environmental Protection Act, 1999
Loi canadienne sur la protection de l'environnement (1999)

Implementation Guide

for the

code of practice

for the environmental management of

road salts

September 2004

Aussi disponible en français sous le titre *Guide de mise en oeuvre – Code de pratique pour la gestion environnementale des sels de voirie*.

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FOREWORD

Join the growing number of Canadian road authorities that have developed a salt management plan and now use best management practices!
Find out how they:

- Improved winter maintenance of roads
- Improved road safety
- Increased protection of the environment
- Reduced potential liability arising from damages by road salts
- Reduced costs due to corrosion
- Reduced use and costs of deicing materials
- Increased protection of their water supplies

This Implementation Guide provides guidance on the implementation of recommendations contained in Environment Canada's *Code of Practice for the Environmental Management of Road Salts*. For more specific information about the preparation and content of your salt management plan, you may also wish to refer to documents prepared by the Transportation Association of Canada (TAC) and other relevant associations.

The appendices to the Guide provide useful information and resources to assist organizations with the development of their salt management plan.

PREFACE

Road salts enter the Canadian environment through their storage and use, and through the disposal of snow cleared from roadways. Environment Canada assessed inorganic chloride salts and concluded that road salts in high concentrations are harmful to the environment. Environment Canada recognizes that use of road salts is an important component of strategies to ensure roadway safety during winter months. As a result, risk management of road salts is done through a Code of Practice that recommends the preparation of a salt management plan and the implementation of best management practices developed by specialists in the field.

Background Information

1 - Environmental impacts of road salts

Environment Canada assessed inorganic chloride salts, with or without ferrocyanide salts, i.e. sodium chloride, calcium chloride, potassium chloride and magnesium chloride. It is estimated that approximately 4.75 million tonnes of sodium chloride were used as road salts in the winter of 1997-1998 and that 110 000 tonnes of calcium chloride are used on roadways in a typical year. Very small amounts of other salts are used.[1] Road salts enter the Canadian environment through their storage, use, and through the disposal of snow cleared from roadways.

The scientific assessment concluded that road salts that contain inorganic chloride salts, with or without ferrocyanide salts, enter the environment in a quantity or concentration or under conditions that are harmful to the environment. Concerns include impacts on the aquatic environment and fish but also poisoning of birds and large mammals as well as damage to vegetation and valuable crops.

2 - Management of road salts

The *Code of Practice for the Environmental Management of Road Salts* is the result of an extensive consultation process. It aims at achieving environmental protection while keeping winter roads safe. This voluntary instrument takes into account ongoing efforts from road authorities to address various sources of contamination.

The Code recommends best management practices concerning activities involving road salts, application, salt storage and disposal of snow cleared from the roadways,

[1] Source: Summary of the 'Priority Substances List Assessment Report - Road Salts.'

which are important sources of contamination. Environment Canada also actively participates in other initiatives with potential to further protect the environment through enhanced winter road maintenance, such as Road Weather Information Systems (RWIS). This technology allows a more efficient use of road salts resulting in improved road safety and less salt being released to the environment. Meteorological Services from Environment Canada will provide precise local weather information to the national RWIS network supported and funded by Transport Canada.

Purpose of this Guide

In response to comments received during multistakeholder consultations, this implementation guide has been prepared to supplement the Code of Practice. The purpose of this Implementation Guide is to provide guidance to organizations in implementing the Code's recommendations. The Guide is divided into sections :

- Application of the Code and preparation of a salt management plan
- Questions and Answers
- Examples of success in salt management
- Guidance documents for preparation of a salt management plan
- Annual report form
- Additional resources

Inquiries and comments pertaining to this Implementation Guide should be directed to:

Chemicals Control Branch
Environment Canada
Place Vincent Massey
351, St-Joseph Blvd, 12th Floor
Gatineau QC K1A 0H3
819-953-2477
roadsalts@ec.gc.ca

A - APPLICATION OF THE CODE OF PRACTICE AND TIMELINES

Application
The Code of Practice ('Code') applies to:

- organizations that have identified one or more vulnerable areas[1] in their territory that could be potentially impacted by road salts; and
- organizations that use, or are responsible for the use of, a quantity of 500 tonnes or more of road salts per year (based on a rolling average over the last 5 years) on public roads in Canada.

Organizations such as the following may be subject to the Code:

- Municipalities;
- A company that holds a concession or lease to manage a public road, unless the public entity from which the company holds that concession or lease has developed a salt management plan that the company agrees to implement;
- Provincial Ministries of Transportation; and
- The federal house (e.g. federal departments, boards, agencies, Crown corporations and persons on federal land or on aboriginal land that are responsible for the maintenance of public roads).

An organization that does not meet the above criteria should still consider implementing best management practices, such as those developed by the Transportation Association of Canada (TAC)[2], that are relevant to its local conditions in order to protect the environment from the negative impacts of road salts.

Timelines
The following table describes the Code's milestones:

Date	Event and description
April 3, 2004	Publication of final Code in Canada Gazette, Part I.
April 2004 - April 2005	Organization prepares a salt management plan (SMP).
October 31, 2004	Due date for the organization to send a Letter of intent to prepare a SMP to Environment Canada.
April 2005 - April 2006	Organization starts implementing its SMP
June 30, 2005	Due date for first report to Environment Canada. A report is due June 30 of every year thereafter.
April 2009	Organizations will be invited to cooperate with Environment Canada to prepare a report on the progress achieved.

[1] See appendix 1-C for guidance on the identification of vulnerable areas.
[2] *Syntheses of Best Management Practices – Road Salts*, developed by the Transportation Association of Canada (TAC). See references in Appendix 2.

B - 5 STEPS TO A SALT MANAGEMENT PLAN

The Code recommends that organizations meeting the specified criteria prepare a salt management plan (SMP). The organization will identify in this plan actions to be taken to implement best management practices, in particular in the areas of salt storage, general use on roads and snow disposal. The Code is flexible, thus allowing organizations to customize their plans to suit their individual needs and budgets.

STEP 1: Commitment from your organization

Organizations subject to the Code of Practice should advise Environment Canada of their intent to prepare a salt management plan by submitting a Letter of Intent within 6 months after the publication of the Code, i.e. by October 31, 2004. A letter from organizations that have already developed a SMP would also be appreciated. If any of the criteria is not currently met but should be met in the future, then the organization should submit a Letter of Intent to prepare a SMP within six months of meeting the criterion.

Letters of intent are very important for Environment Canada as this will give an early indication of the willingness of road authorities to implement the Code.

Components of the Letter of Intent:

- Commitment from the senior management of the organization to develop, implement and update a salt management plan;
- Commitment to report information about the implementation of the salt management plan to Environment Canada; and
- Name, title and signature of the senior manager.

The letter is to be sent to:
Minister of the Environment
c/o Director, Chemicals Control Branch
Environment Canada
351, St Joseph Blvd
PVM 12th floor
Gatineau QC K1A 0H3

Fax: 819-994-0007 e-mail: roadsalt@ec.gc.ca

Refer to the sample letter of intent in **Appendix 1-A** to this Guide**.**

STEP 2: Assessing your organization's current situation

In order to prepare a salt management plan, you should:

1. Identify your organization's activities or operations involving road salts;
2. Assess your organization's current practices against recommended best management practices developed by the Transportation Association of Canada (TAC). The practices are described in their *Syntheses of Best Practices* as a reference to assist organizations to improve their salt management practices. Topics covered by the Syntheses include:
   - **1.0** Salt Management Plans
   - **2.0** Training
   - **3.0** Road and Bridge Design
   - **4.0** Drainage and Stormwater Management
   - **5.0** Pavements and Salt Management
   - **6.0** Vegetation management
   - **7.0** Design and Operation of Road Maintenance Yards
   - **8.0** Snow Storage and Disposal
   - **9.0** Winter Maintenance Equipment and Technologies

   These documents are available on the TAC website (refer to **Appendix 2** for the website address).

   Specifically, the Code recommends to assess:
   - Presence of areas vulnerable to road salts (refer to **Appendix 1-C** for guidance for the identification of such areas)
   - Salt storage, including storage of mixtures of abrasives
   - Snow disposal
   - Salt application on roadways

Best management practices have also being developed for other activities, such as dust suppression and salt use on parking lots and private roads. Please communicate with your regional Environment Canada office for more information.

STEP 3: Preparing your salt management plan

Once your organization has identified activities and practices involving road salts and assessed them against best management practices, you should start the preparation of your SMP.

You may refer to the template, in **Appendix 1-B**, in order to prepare a SMP that contains the items described in section 9 of the Code.

Typically, an SMP would include the following sections:

1. Organization general information
2. Salt management policy

3. Organization's winter maintenance policy
4. Operational practices and strategies: this part inventories current practices and sets objectives to achieve best management practices.
5. Appendices

The items may vary, depending upon the specifics of your organization.

STEP 4: Implementing your salt management plan

As for the assessment and preparation stages, TAC's Syntheses documents are a valuable source of information and guidance for the implementation of your salt management plan. In the case of training for example, the TAC's Synthesis *2.0 – Training* provides guidance on objectives, content and methodology to train various staff involved with road salts. TAC also developed a learning guide, the *Get SMART About Salt - Learning Guide* (see reference in **Appendix 2-2**).

In addition, associations or consultants can assist your organization with the implementation of your salt management plan, in whole or in part. The Ontario Good Roads Association (OGRA) is another organization very involved with the development of training packages and has provided assistance to various municipalities with the training of their winter maintenance personnel. Also, Environment Canada's regional office can direct you to helpful resources and events being held in your region.

Your SMP could be a staged process, depending upon your organization's characteristics. Some tasks may be conducted in the short term, for example reviewing your application rates, whereas others may be longer term actions, like purchasing upgraded trucks when your current fleet is being renewed. Possible actions can be categorized into:

Immediate Actions

For example: calibration, reviewing application rates, individual record keeping per operator, reviewing levels of service and training.

Short Term Actions

For example: equipment replacement, installing infrared units, retrofitting one truck with liquid spreading capability, training.

Long Term Actions

For example: new equipment, new storage sites, installing Road Weather Information System (RWIS), Global Positioning System (GPS), monitoring program.

Refer to the TAC Syntheses for information about recommended practices and types of equipment.

STEP 5: Reporting to Environment Canada on your salt management plan

You should report the information described in Annex C of the Code using the form provided by Environment Canada (refer to **Appendix 1-D** of this Guide). On-line reporting will also be available through the Road Salts Website. The objective of the report is to inform Environment Canada about your SMP, its implementation stage, and your use of road salts. Submission of an SMP to Environment Canada is not required. Environment Canada will **not** review or endorse any salt management plan. The data reported will be used to assess the trend in salt use and management practices by organizations over time.

Also note that the Code of Practice does not require your organization to implement an **environmental monitoring** program. However, please advise Environment Canada about any monitoring program that already exists in your organization or region, or about your intent to set up such a monitoring program. Important environmental data could be gathered through such programs and used to assess progress achieved over time.

The first report is due **June 30, 2005**. Organizations should report every June 30th thereafter on an annual basis to Environment Canada. The purpose of reporting is to assess the effectiveness of the Code in minimizing the environmental impacts of road salts.

It is important for your organization to retain records about all items pertaining to winter maintenance and to your SMP. These documents could be useful for the assessment of the Code and its efficiency to achieve the desired environmental outcome. Such information should be made available to the Minister of the Environment upon request.

C – FREQUENTLY ASKED QUESTIONS

1- Application

Does the Code apply to our municipal roadways that are maintained by a private contractor?

Yes, if the combined total salt usage by your direct operations and those of your contractor(s) exceed 500 tonnes or if you can identify vulnerable areas in your territory, whoever may be maintaining those roadways, the Code applies to your municipality. You should also ensure that contractors implement the best management practices identified in your salt management plan that are relevant to their work.

Does the Code apply to salt we use for activities such as parking lot deicing or dust suppression?

No, but other guidelines apply. While the Code targets primarily practices for winter maintenance of public roads, it might make sense for an organization preparing a SMP to also include the use of road salts on parking lots and sidewalks, or as dust suppressants in the summer. Best management practices and recommendations for salt use on parking lots and private roads and as dust suppressants were also developed. Contact Environment Canada for more information about these documents.

Is a university that uses road salts on the streets and parking lots on the campus subject to the Code?

No, but other guidelines apply. Salt use on streets and around buildings located on the campus of a university would be an institutional use. The Code of Practice does not cover this type of use. However, the university should adopt the best practices developed for parking lots. Contact Environment Canada for more information on the guidance document available.

In the case of shared responsibility of a roadway (for example, where a road belonging to a municipality is maintained by the county), who should include this road in their salt management plan?

In such a case, the municipal and county authorities should agree on whose plan should cover this road. The Code of Practice is flexible therefore allowing organizations to address the issue in the way that is most convenient and efficient for them.

2- Preparing a salt management plan (SMP)

Where can my organization find help with preparing our SMP?

Some provincial authorities and municipalities that have already prepared a SMP have also helped neighbouring municipalities with designing their plans. Your regional Environment Canada office could provide you with information about road authorities or professional associations in your area which may assist your organization with the preparation of your SMP. Also, Environment Canada's Road Salts Website links to sites of other organizations that specialize in this field, such as the Transportation Association of Canada (TAC). TAC's *Syntheses of Best Practices* are good reference documents for technical issues (refer to the list in the **Appendix 2** of this Guide).

How can my organization identify vulnerable areas?

Annex B to the Code provides guidance to consider when identifying areas of a receiving environment that may be particularly sensitive to road salts. Other ways to identify a vulnerable area include, but are not limited to, consultations with:

- environmental non-governmental organizations dedicated to the protection of natural sites, watersheds, etc,
- local associations, such as a soil and crop association,
- organizations responsible for conservation.

Also, refer to the document *Considerations for Identifying a Vulnerable Area* in **Appendix 1- C** of this Guide, for a list of points to consider when assessing an area's vulnerability.

What should I consider when dealing with vulnerable areas?

For example, when you are assessing your salt storage, you should consider the drainage of salt contaminated water to groundwater and to nearby wetland habitat. For snow disposal, high concentrations of salt in meltwater is harmful to the aquatic environment. In respect to road design, special attention to ditch design in vulnerable areas is necessary to reduce significant releases into the environment.

3- Reporting

What information does my organization have to report?

Environment Canada has developed a form for reporting the information specified in Annex C of the Code of Practice (refer to **Appendix 1**-**D**). The forms can also be completed or downloaded from the Road Salts Website at http://www.ec.gc.ca/nopp/roadsalt. Information to be reported pertains to the organization's winter maintenance practices such as:

- Length of roads serviced;
- Winter severity: a qualitative rating based upon criteria such as temperature, snow fall, freezing rain and storm events;

- Materials used: quantities and types;
- Material storage:
  - Percentage of sites that are covered
  - Percentage of sites equipped with run-off treatment systems
  - Objectives;
- Winter maintenance equipment: percentage of fleet equipped with various equipment and objective for the future;
- Snow disposal: report existing guidelines or plans your organization has for disposing of snow that contains salts;
- Training: percentage of personnel trained and objective for the future;
- Areas vulnerable to road salts; and
- Environmental monitoring.

When are the reports due?

The first report is due June 30th, 2005 for winter 2004-2005 activities. Subsequent reports are due every year thereafter on June 30th.

Can organizations report quantities of materials used over their fiscal year instead of over the winter season?

The Code is flexible to accommodate organizations. However, data pertaining to the organization should be consistently reported through the years, allowing for an accurate analysis of trends in road salt use. If a fiscal year reporting period is preferred, organizations are encouraged to discuss this approach with Environment Canada, prior to completing the annual report.

How will Environment Canada evaluate salt management plans?

Environment Canada will **not** evaluate salt management plans and will **not** endorse any plan. The purpose of reporting is to help Environment Canada follow progress in the environmental management of road salts. The Code is flexible and provides leeway for organizations to identify the best way for them to protect the environment through the efficient implementation of an appropriate SMP.

Will reporting to Environment Canada be a burden to organizations?

Annual reporting to Environment Canada pertains only to the implementation of the salt management plan. Data required is the same data used by organizations to monitor their winter operations efficiency. SMPs will improve management and record-keeping and generate all the information required to complete the report to Environment Canada.

4- Monitoring

Do organizations have to start a monitoring program?

No. The Code of Practice does not require organizations to start a monitoring program. However, if your organization already monitors chloride levels, you may report the results in order for Environment Canada to better follow the trends in your locality.

Which types of data from existing monitoring programs will Environment Canada use to assess environmental impacts of road salts?

Data from programs that monitor either direct chloride releases to the environment or effects of exposure to chloride could be relevant. Examples are:

- Chloride levels in municipal wastewater systems
- Monitoring of salt usage from private highways
- Data from crop monitoring
- Health of roadside trees or nurseries that are exposed to salt spray or, that are receiving underground water contaminated with salty plume
- Data from academia research / monitoring

D - EXAMPLES OF SUCCESS IN SALT MANAGEMENT

The following case studies explore the costs and benefits of introducing best management practices and are just a few examples of road maintenance organizations who have taken the lead in responsible road salt management. You may consult the full case studies on Environment Canada's Road Salts Website, **www.ec.gc.ca/nopp/roadsalt/cStudies/en/index.cfm** or request a copy from one of our regional offices.

Implementation of Anti-Icing and Pre-Wetting Techniques at the Cypress Bowl Ski Area

The Cypress Bowl ski area reduced its winter maintenance costs by 34% between March 2000 and March 2001 through the introduction of anti-icing and pre-wetting techniques. As a result of these changes, the maintenance crew reduced their annual salt and sand use, and the new practices resulted in an estimated 73% reduction in chlorides released to the environment.

Remediation vs. Salt Storage Construction at Heffley Creek: A Cost Comparison

Following the contamination of groundwater used as a municipal water supply from a salt storage site in Heffley Creek, the Province of British Columbia incurred costs of more than $2 million to remedy the situation. These costs included more than $600,000 in claims from local residents for property damage and nearly $600,000 for the replacement of the drinking water sources. Now the province is taking steps to ensure that no new incidents occur. In the last five years, the province has replaced over 30 salt storage sites with new facilities that include salt sheds with underlying salt traps to catch and contain salt-laden run-off.

Accident Reduction on the 401/416 Ramp using Fixed Automated Spray Technology (FAST)

A number of weather-related accidents occurred during the first winter following the construction of the Highway 401/416 interchange ramp near Prescott, Ontario. The Ministry of Transportation of Ontario (MTO) had been investigating different methods of improving highway safety during winter storms and saw an opportunity to significantly reduce the potential for icing on the ramp. In the fall of 2000, MTO installed Fixed Automated Spray Technology (FAST) along with an Advanced Road Weather Information System (ARWIS), which work together to apply an anti-icing chemical in advance of an icing condition. Since the installation of these systems, no winter-related accidents have occurred at this location.

City of Toronto – Salt Use Reductions through Employee Training

Each year, nearly 200 trucks and more than 140,000 metric tonnes of sodium chloride (road salt) are required to maintain the 5,300 km of roads in the City of Toronto during the winter months. With the growing concern over excessive salt use, the City realised it needed to find a balance between maintaining safe, passable roads and managing road salt use and costs.

In 2001, the City developed a salt management plan (SMP) and implemented a salt management training program. As a result of its efforts, the City decreased its mean salt use by almost 37,000 tonnes over two winter periods.

Salt Reductions through a New Approach to Winter Maintenance Practices - Otterburn Park, Québec

In the early 1990's, the Otterburn Park Town Council became concerned with the amount of salt being used on its roads. To address this concern, the Town began a program to reduce salt use. In the period from 1995 to 2000, Otterburn Park was successful in reducing its total salt use by 73% through improved training, better plowing practices and the use of pre-wetted salt.

Winter Maintenance Innovations Reduce Accidents and Costs - City of Kamloops

In 1995, the City of Kamloops launched the Winter Road Research (WRR) project with an emphasis on testing the effectiveness of liquid anti-icing. The Insurance Corporation of British Columbia became interested in the project in 1996, and provided funds to help continue and expand the trials. As a result of the trials, during the three-year period from 1997 to 2000, the City of Kamloops experienced a 7% decrease in snow and ice-related accidents. The City also reduced its snow and ice control costs, the amount of sand used and, consequently, its spring-cleanup costs.

Utilizing Technological Advances in the Management of Road Salt Usage in Nova Scotia

The Nova Scotia Department of Transportation & Public Works (NSTPW) installed its first five Road Weather Information Systems (RWIS) in 1995. The network has since expanded to 19 stations due to a major initiative between December 2000 and January 2004. In this initiative, wherever the Department installs a new RWIS station, the local highway engineer commits to initiating a pre-wetting program in that area, brine-making equipment is purchased and salt trucks are retrofitted to enable pre-wetting. This growth in RWIS and pre-wetting is allowing the Department to take a proactive approach to snow and ice control and has led to a reduction in salt usage.

Engineered Snow Disposal Facilities – City of Ottawa

The City of Ottawa maintains over 5,300 km of roads spread over an area of 2,760 km^2. Each winter, the City disposes of, on average, over 1,500,000 m^3 of snow. Such an extensive snow disposal program presents logistical, fiscal and environmental challenges. The City has effectively managed these challenges through a snow disposal program that will phase out unacceptable disposal sites, upgrade existing sites and establish new engineered sites.

APPENDIX 1 - FORMS AND TEMPLATES

A - Letter of Intent

Organizations subject to the Code of Practice should advise Environment Canada of their intent to prepare a salt management plan by submitting a Letter of Intent within six months after the publication of the Code, i.e. by October 2004.
It would be appreciated if organizations that already have a plan advise Environment Canada in writing as well. Environment Canada will use the number of letters received to evaluate the adoption rate of the Code and to assess which promotion activities are necessary to encourage further implementation of the Code's recommendations.

Components of the Letter of Intent:

- Commitment from senior management of the organization to develop, implement, and continuously update its salt management plan.
- Commitment to report information about the implementation of the salt management plan to Environment Canada; and
- Name, title and signature of the senior manager.

The Letter of Intent is to be sent to:

Minister of the Environment
c/o Director, Chemicals Control Branch
Environment Canada
351, St Joseph Blvd
PVM 12th floor
Gatineau QC K1A 0H3

Fax: 819-994-0007
e-mail: roadsalts@ec.gc.ca

EXAMPLE OF LETTER OF INTENT

[*Date*]

Minister of the Environment
C/O Director, Chemicals Control Branch
Environment Canada
Place Vincent Massey
351 St. Joseph Blvd., 12th Floor
Gatineau QC K1A 0H3

NOTIFICATION OF INTENT TO PREPARE A SALT MANAGEMENT PLAN

This letter confirms the intention of [*organization's name*] to prepare a salt management plan in accordance with the *Code of Practice for the Environmental Management of Road Salts*, published April 3, 2004.

Senior management will ensure that a salt management plan is developed, implemented and updated.

Furthermore, the organization commits to reporting information about the implementation of its salt management plan as prescribed in the Code in order to allow Environment Canada to follow-up on road salts use and management in Canada.

Future inquiries pertaining to the organization's salt management should be addressed to:

Name
Title
Address
Telephone/fax/e-mail

Sincerely,

Name
Title of senior manager

B –Salt Management Plan Template

This document presents the main sections of a typical salt management plan. This is an example and should not prevent an organization to include additional information and considerations in their plan if deemed appropriate. This document is divided into three parts:

- General information, including salt management policy and winter maintenance policies.
- A matrix to assess operational practices and strategies for three areas of concerns: general salt use, salt storage and snow disposal.
- Additional information.

Additional guidance on the identification of vulnerable areas is available in **Appendix 1-C** *Considerations for Identifying a Vulnerable Area.*

Salt Management Plan for
(Name of your municipality)

1.0 General information

Name:	
Address:	
Population:	
Technical Contact:	
Tel.:	
Fax:	
E-mail:	
Date plan was prepared:	
Date plan will be fully implemented:	
Projected evaluation dates:	

1.1 Overview

(Write a small summary and purpose of the document)

1.2 Organization of the plan

(Describe how the document is organized)

2.0 Salt Management Policy

(Example)
It is the organization's policy to take the actions necessary to manage road salts in a manner that protects the environment without compromising road safety.
To meet these objectives the organization will:

- Manage road salts in accordance with the *Code of Practice for the Environmental Management of Road Salts*.
- Keep employees and the public informed about the environmental practices related to road salts.
- Adopt internal standards to meet or exceed local requirements.
- Comply with applicable laws and regulations.
- Conduct regular management reviews and make improvements wherever feasible.

The organization/council accepts the responsibility for this environmental program and for its effectiveness and improvement.

Signature of senior official :_____ Date: _____

Print name and title: _____Council resolution number_____

3.0 Organization's Winter Maintenance Policies

Identify policies, shared responsibilities and standards related to:

3.1 General salt use
3.2 Salt and sand / salt storage
3.3 Snow disposal
3.4 Local legislation impacting winter maintenance policies
(Example: local guidelines, municipal bylaws, provincial maintenance standards)

4.0 Operational Practices and Strategies

This section describes baseline practices and objectives.
Using the tables below, set up separate sections for general salt use, salt and sand/salt storage and snow disposal. Establish where salt is entering the environment through existing practices and set objectives for improvement. Document and format using the following table as a guide.

(Reference: The Transportation Association of Canada, *Syntheses of Best Practices Road Salt Management*)

Headings / Subsections	4.1 General salt Use	4.2 Salt Storage	4.3 Snow Disposal
What are the significant environmental considerations where salt enters the environment during general use / salt storage / snow disposal	*Section 4.1.1* Examples: • Ground / surface waters, vehicle spray on vegetation and runoff • Vulnerable areas close by *	*Section 4.2.1* Examples: • Location(s) of the facility • Salt and sand / salt storage • Site drainage • Site operation and maintenance procedures • Vulnerable areas close by*	*Section 4.3.1* Examples: • Site location(s) • Storage • Site drainage • Site operation and maintenance • Vulnerable area*
Identify existing practices	*Section 4.1.2* Examples: • Level of service • Equipment • Fleet upgrading • Equipment maintenance and calibration • Pre-treatment, Pre-wetting, anti-icing, RWIS, AVL/GPS	*Section 4.2.2* • Are piles covered and on an impermeable surface? • Loading practices and truck washing • Liquid preparation and storage • General housekeeping procedures • Site drainage	*Section 4.3.2* • Location, design and construction • Operation and maintenance • Site drainage / meltwater management
Set overall objectives for improvement relating to environmental considerations and existing practices above	*Section 4.1.3* Example: • The right material, right amount, in the right place at the right time	*Section 4.2.3* Example: should contain several objectives related to improvements in: • Salt / sand storage • Loading practices • Truck washing • Site drainage • Storage repairs	*Section 4.3.3* Should contain several objectives related to improvements in snow disposal such as: protection of water quality and management of drainage and melt water etc.

* Refer to appendix 1-C for guidance on the identification of vulnerable areas.

Headings / Subsections	4.1 General salt Use	4.2 Salt Storage	4.3 Snow Disposal
Set overall objectives for improvement relating to environmental considerations and existing practices above. (CONTINUED)	For example: **Immediate Actions** • Calibration, reviewing application rates, individual record keeping per operator, reviewing level of service and training **Short Term Actions** • Equipment replacement, installing infrared units, retrofitting one truck with liquid spreader, training. **Long Term Actions** • New equipment, new storage sites, installing RWIS, GPS, monitoring program.	• Storage tanks for liquids with containment in case of leaks • Other improvements	
What are the timelines and objectives for achieving the objectives	*Section 4.1.4* The timelines and objectives reflect local budget considerations and salt management priorities. They should be broken down yearly: year 1, year 2, …5 etc.	*Section 4.2.4* Same as 4.1.4	*Section 4.3.4* Same as 4.1.4
Implement a training program and schedule to meet your objectives	*Section 4.1.5* Example of training required: • Road Salts and the Environment • Material use • Pre-wetting and anti-icing • Plowing • Spreaders • Weather, pavement temperatures and RWIS • Salt Science	*Section 4.2.5* Example of training required: • Understand that all salt and sand/salt blends should be covered and on impermeable surfaces to minimize salt loss • Liquids storage and handling • Understand how salt handling activities affect the environment	*Section 4.3.5* Example of training required: • Understand how snow handling activities affect the environment • Managing snow disposal
Who are the persons involved and their responsibilities under this plan	*Section 4.1.6* Example of responsible person: • Maintenance Manager • Supervisor of Operations • Operators	*Section 4.2.6* Same as 4.1.6	*Section 4.3.6* Same as 4.1.6
Develop a procedure to monitor and measure progress as per Annex C of the Code	*Section 4.1.7* Example: Include the information you are required to report for general salt use in your procedure:	*Section 4.2.7* Example: Include the information you are required to report for salt storage in your procedure: • Quantity of salt covered	*Section 4.3.7* Example: Sites with runoff collection and/or treatment systems(s)

Headings / Subsections	4.1 General salt Use	4.2 Salt Storage	4.3 Snow Disposal
Develop a procedure to monitor and measure progress as per Annex C of the Code (CONTINUED)	• Fleet equipped for direct liquid application • Materials used: quantity and concentration • Fleet equipped with electronic spreader controllers • Fleet equipped with pre-wetting • Number of Road Weather Information System (RWIS) installations • Winter Severity • Progress on staff training	• Quantity of abrasives covered • Sites with run/off and or treatment systems etc. • Site inspections	
Ensure documentation exists which describes the elements of this management plan	*Section 4.1.8* The level of detail of documentation should be adequate to describe the main elements and interactions of the management plan and for measuring and monitoring performance against the environmental objectives	*Section 4.2.8* Same as Section 4.1.8	*Section 4.3.8* Same as Section 4.1.8
Develop a procedure for a regular management review with corrective action and continual improvement	*Section 4.1.9* Management must ensure that a regular documented review of the management plan takes place and that corrective actions are taken where necessary.	*Section 4.2.9* Same as Section 4.1.9	*Section 4.3.9* Same as Section 4.1.9

5.0 Appendix

- Programs and Procedures
- Forms

Finally, effective implementation of a salt management plan requires the close involvement of employees, ongoing evaluation and the sharing of results within the organization. This will enhance employee "ownership" of and commitment to salt management and can lead to new ideas and suggestions for refinements and improvements.
For additional information on road salts management please refer to:

- Environment Canada's road salts web site: http://www.ec.gc.ca/nopp/roadsalt
- Transportation Association of Canada (TAC) http://www.tac-atc.ca

C – Considerations for Identifying a Vulnerable Area

The following information is provided for guidance only, as considerations for the identification of vulnerable areas depend upon the specific geographical or ecological area. It is based upon:

- information provided in the Code's Annex B: G*uidance for Identifying Areas that are Vulnerable to Road Salts* and
- *Identification of Salt Vulnerable Areas*, a study by the Regional Municipality of Niagara in cooperation with Environment Canada.

Two factors to consider in the assessment of area vulnerability are the area characteristics and the risk exposure.

The use of Geographic Information System (GIS) can be a useful tool for mapping various characteristics of your territory (for example: soil type, land use, road network, etc.). Combining the various maps helps to locate potential salt sensitive areas and to plan appropriate road maintenance practices.

Annex A of the Code of Practice also provides information on *Environmental Impact Indicators for Road Salts*.

1 - Area Vulnerability Considerations

Area characteristics	Consequence
Drainage into lakes, ponds with low-dilution and long residence times.	Chloride concentration in water possibly harmful to fish or fish habitat.
Drainage into watercourses in the vicinity of a dense network of highways.	Chloride concentration in water possibly harmful to fish or fish habitat.
Provincially significant wetlands adjacent to roadways.	Chloride concentration in water possibly harmful to fish or fish habitat, wetlands vegetation.
Drainage into small, moderately deep lake.	Change in the characteristics of the micro-ecosystem by interfering with oxygenation, preventing normal vertical mixing of the water (meromictic conditions).
Salt-sensitive native or agricultural vegetation.	Possible harmful soil concentrations of sodium and/or chloride or aerial spray of sodium and chloride, causing: • Reduction in flowering and fruiting • Severe foliar, shoot and root injury • Reduction in growth • Reduction in germination and seedling establishment.

1 - Area Vulnerability Considerations (continued)

Area characteristics	Consequence
Fish habitat Bird and waterfowl habitat	Harm to integrity of a life cycle: • Spawning grounds • Nursery • Rearing • Food supply • Migration areas.
Wildlife species habitat	Damage to critical habitat of wildlife species listed on the List of Wildlife Species at Risk and protected under the *Species At Risk Act* (*SARA*).
Drainage into sources of drinking water (surface or groundwater, including wells).	Water may not be drinkable.
Drainage into groundwater recharge zones with exposed or shallow watertable with medium to high permeability soil, such as medium to coarse sand and gravel.	Threat of serious or irreversible environmental damage (groundwater, drinking water, or fish or fish habitat).
Land use, such as agricultural crops, wetland type.	Groundwater vulnerability (damage to crops or wetlands).
Geological topography such as thin soil cover over a limestone bedrock with karst topography.	Increased vulnerability to infiltration reaching groundwater sources.

2 - Risk Exposure Considerations

Item	Issue	Consequence
Proximity of waterways	Improper salt storage causing significant runoffs with high chloride concentration.	Possible damage to fish and fish habitat.
Category of roads passing through	Factors: • Class of service • Average traffic volume (AADT) • Percentage of trucks • Number of lanes	Higher loads to the surrounding environment.
Winter severity	Frequency of roadway salting.	Quantity of salt entering the environment.

D – Annual Report Form

Road Salts
Annual Report Form

Reporting information for the period of September 1st to May 31st.
Year: 20_____

Purpose:

The purpose of this form is to provide information required in Annex C of the Code of Practice for the Environmental Management of Road Salts. It will be used to help monitor and measure progress in road salt management, the implementation of best management practices with respect to road salt, and the concentration of road salt in the environment. Information reported will be used in conjunction with additional data (winter severity weather data, environmental monitoring data, cases studies, water quality monitoring programs, and road safety data) to determine the extent and success of implementation of the Code of Practice.

You may submit the report:

1- on-line at: www.ec.gc.ca/nopp/roadsalt
2- via mail:

Minister of the Environment
c/o Director, Chemicals Control Branch
Environment Canada
Place Vincent Massey
351 St. Joseph Blvd., 12th Floor
Gatineau QC K1A 0H3

3- via fax: 1-(888)-391-3695
4- via e-mail: roadsalt@ec.gc.ca

Assistance in filling out the report may also be obtained at the mailing and e-mail address listed above.

Due date: June 30th, 2005 and every following year.

Annual Report Form

Year: 20_____

1. Background Information

Organization
Name:
Street Address:
Mailing Address (if different from street address):
Population (municipality only):
Technical Contact (name and title):
Phone Number (including area code):
Fax (if available):
E-mail (if available):

Salt Management Plan

Does your organization have a salt management plan: ☐ Yes ☐ No

Date salt management plan was approved by Council:_____

Most recent date salt management plan was revised (if applicable): _____

Additional information:

Road Length Serviced

Total length of road on which salt is applied in your jurisdiction, reported in two-lane equivalent: _____ two-lane-kilometres.

Describe any additional information on your total length of road on which your organization applies salt (i.e. sidewalk length):

Winter Severity

Rate the severity of the winter compared with "normal" conditions for your area, according to your perspective (check one):

Below Average ☐ Average ☐ Above Average ☐

Municipal Organizations Only: Total number of events averaged over all districts within the organization's jurisdiction requiring salt application for winter road maintenance for the period from September 1st to May 31st: _____

Note: Information on the snowfall, number of days with freezing rain and average temperature may be collected by Environment Canada from the Meteorological Services of Canada to further assess the severity of the winter in various geographical areas across Canada.

Additional information:

2. Materials Used

Provide the total quantity and concentration of road salts found in all materials used (including abrasives) for winter road maintenance, for the period of September 1st to May 31.

Quantity and Concentration			
Material	**Solids**	**Liquids**	
	Tonnes	**Litres**	**Concentration (average % wt)**
NaCl			
$CaCl_2$			
$MgCl_2$	N/A		
Other chloride materials (e.g.sand/salt mix ratio and range)			

Describe any non-chloride materials used (e.g. corn residue, CMA, etc.) for winter road maintenance:

3. Material Storage

Does your organization have a "good housekeeping"[2] policy: ☐ Yes ☐ No

[2] « good housekeeping » means 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.

Provide the organization's long term objectives, as indicated in your salt management plan, for implementing best management practices related to material storage, as well as the state of implementation as of May 31.

Practice	Current	Long term objective
Quantity of salt covered by a permanent roof	%	%
Quantity of salt stored on an impermeable surface	%	%
Quantity of abrasives covered	%	%
Sites with run-off collection and/or management system(s)	%	%
Other (specify):	%	%

Add any additional practices and related objectives identified in the organization's salt management plan, as required.

4. Winter Road Maintenance Equipment and Road Salt Application Practices

Provide the organization's long term objective, as indicated in your salt management plan, for implementing best management practices related to winter road maintenance equipment and application practices, as well as the state of implementation as of May 31.

Practice	Current	Long term objective
Fleet equipped with* - electronic spreader controllers	%	%
- pre-wetting equipment	%	%
- direct liquid application	%	%
- infrared thermometers * a piece of equipment could be listed more than once	%	%
Number of Road Weather Information System (RWIS) installations (owned)		
Other (i.e. sidewalk equipment with de-icing capability)		
Other (specify):		

Add any additional practices and related objectives identified in the organization's salt management plan, as required.

Does the organization regularly calibrate its equipment: ☐ Yes ☐ No

Number of times the organization calibrates its equipment last year: _____

Describe any additional practices related to the calibration of your organization's equipment.

5. Snow Disposal

Does your organization have snow disposal guideline: ☐ Yes ☐ No

Provide your organization's objective, as indicated in the salt management plan, for implementing best management practices related to snow disposal, as well as the state of implementation as of May 31. Add any additional practices and related objectives identified in the organization's salt management plan, as required.

Practice	Current	Long term objective
Sites with runoff collection and/or management system(s)	%	%
Methods of disposal (i.e. snow melters)		
Other (specify):		
Other (specify):		

6. Winter Road Maintenance Training

Does your organization have a winter road maintenance training program or utilize an outside training program (e.g. TAC, OGRA) :

☐ Yes Specify: _____ ☐ No

Provide your organization's objective, as indicated in the salt management plan for percentage of winter road maintenance personnel trained with regard to salt management:

Provide the total number of winter road maintenance personnel trained as of May 31 :

_____

Provide the percentage of winter road maintenance personnel trained in the last year:

_____%

7. Areas Vulnerable to Road Salts

Has your organization completed an inventory of areas vulnerable[3] to road salt :

☐ Yes ☐ No

Has your organization identified/designated areas vulnerable to road salts:

☐ Yes How many? _____ ☐ No

Describe any additional salt management practices taken in identified vulnerable areas:

8. Environmental Monitoring

Does your organization have an environmental monitoring program :

☐ Yes ☐ No

Describe any environmental monitoring done related to road salts (i.e. water analysis, impact on vegetation or soil testing).

[3] See Annex B of the Code of Practice for more information.

9. Comments

Provide any additional comments:

_____ _____
(print name) (date)

_____
(signature)

Environment Canada thanks you for submitting your annual report.
Your collaboration is appreciated.

APPENDIX 2 - ADDITIONAL RESOURCES

1 - Environment Canada Offices and Website

Additional information about the Code of Practice and the issue of road salts can be obtained through Environment Canada Offices, listed below, as well as Environment Canada's Road Salts Website: www.ec.gc.ca/nopp/roadsalt/en/index.cfm

Environment Canada Office for:	Phone Number
Newfoundland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick	902-426-9590
Quebec	514-283-4670
Ontario	416-739-5872
Alberta, Manitoba, Saskatchewan, Northwest Territories and Nunavut	780-951-8600
British Columbia	604-666-9862
Yukon	867-667-3402

2 - Resources from other organizations

The table below lists documents and information pertaining to best management practices for road salts which can be found from other organizations and municipalities.

RESOURCE	ORGANIZATION
• *Syntheses of Best Practices - Road Salt Management*: **1.0** Salt Management Plans **2.0** Training **3.0** Road and Bridge Design **4.0** Drainage and Stormwater Management **5.0** Pavements and Salt Management **6.0** Vegetation management **7.0** Design and Operation of Road Maintenance Yards **8.0** Snow Storage and Disposal **9.0** Winter Maintenance Equipment and Technologies • *Get SMART about salt - Learning Guide*: 1. Transportation impact to economy 2. Science of road salt and ice and Application strategies 3. Equipment and Technologies 4. Road salt and the environment 5. Material storage and handling and Snow disposal sites 6.Monitoring and record keeping	Transportation Association of Canada www.tac-atc.ca

RESOURCE	ORGANIZATION
• Training sessions for operators and supervisors • RWIS maps for Ontario • Adaptation of AASHTO's (American Association of State Highway and Transportation Officials) winter maintenance training to the Canadian context.	Ontario Good Roads Association (OGRA) www.ogra.org
Salt Management at Highway MaintenanceYards CD (October 2003) intended for highway maintenance contractors, superintendents, foremen and operators.	Joint Environment Committee [Alberta Transportation, Alberta Environment and Alberta Infrastructure]
• Snowfighters Training Program • Snowfighters Handbook • Salt Storage Handbook	Salt Institute www.saltinstitute.org/snowfighting www.saltinstitute.org/34.html#wi
Winter maintenance training through provincial chapters	Canadian Public Works Association www.cpwa.net
• Questions and Answers about Road Salts • Road Salt Management and Chloride Reduction Study Report	Region of Waterloo, Ontario www.region.waterloo.on.ca/web/region.nsf
• Liquid Anti-Icing • Roads winter maintenance	Region of Peel, Ontario www.region.peel.on.ca/pw/roads/winter-maintenance/index.htm

3- Other examples of road salts management

The following extracts are reprinted, with the permission of the Federation of Canadian Municipalities (FCM), from its 2002 and 2003 *Municipal Governments and Sustainable Communities: A BEST PRACTICES GUIDE FCM-CH2M HILL Sustainable Community Awards*. The Awards are also supported by FCM's Green Municipal Funds, by Environment Canada through funding for Partners for Climate Protection, and by Transport Canada.

CITY OF TORONTO, ONTARIO
Population: 2,481,494
Salt Management Plan

Icy roads can have a dramatic impact on public safety, so managing winter conditions on the City of Toronto's 5,100-kilometre road network required a broad management strategy. The city's Salt management plan is based on best practices and sets out a framework to continuously improve road salt management. The plan includes a Good Housekeeping Code of Practice that improves salt management practices at storage facilities and, by 2003, all new maintenance facilities must be designed following the principles set out by the Transportation Association of Canada. Because the plan is activity-based, it allows the city to phase in new approaches and technologies to ensure that public safety is not compromised.
Contact: Gary Welsh, Director, Transportation Services, District 4, (416) 396-7842

TOWN OF CALEDON, ONTARIO
Population: 50,595
Reduction in Road Chlorides
The Town of Caledon has reduced the amount of chlorides it uses to manage dust and ice on the town's roads by implementing four specific practices. About 600 kilometres of the town's roads are gravel, so one such practice was to convert many of these rural roads to hard surface. The town expects that overall chloride use on these converted roads will be cut in half. Caledon also implemented a spring stabilization practice to deep grade gravel roads. This produces more uniform road characteristics and maximizes road strength, allowing the town to apply liquid calcium chloride more easily and efficiently. By the end of 2002, the town had reduced its overall chloride use by 67 per cent, with annual operating savings in the order of $1 million.
Contact: Hans Muntz, Director of Infrastructure, (905) 584-2272

CITY OF BRAMPTON, ONTARIO
Population: 351,646
Responsible Use of Salt in Snow and Ice Control
The escalating use of salt on the City of Brampton's roads was increasing costs and environmental degradation. The city purchased new spreaders that pre-wet the salt before it is applied to roads, reducing salt usage by 30 per cent. When snowfall or icy conditions are expected, primary roadways are pre-salted to prevent snow and ice from sticking to the road surface. Salt is placed along the centre of the roadway and allowed to spread to the curb by means of normal traffic flow, forming a brine that melts the ice. New salt storage shelters were also built to prevent runoff from improper storage, and the city plans to phase out conventional snow removal equipment and replace it with leading-edge salt spreaders.
Contact: Deborah Tracogna, Senior Manager, Corporate Communications, (905) 874-2143

4 - Glossary

TERM	DEFINITION
Anti-icing	The application of a de-icer to a roadway, often before a frost or snowfall, in order to prevent melted snow and ice from forming a bond with the road surface.
Best Management Practices (BMP)	Set of recommended procedures to achieve the proposed objective or objectives.
De-icing	To prevent a bond from occurring between the snow and the road surface or to destroy a bond that has already formed.
Electronic spreader controls	These controls minimize salt wastage by ensuring that the appropriate spreader rate is achieved. Modern ground speed spreader controls regulate the amount of salt dispersed based on the vehicle's speed, while maintaining a consistent and accurate application of materials.
Pre-wetting	The addition of a liquid to solid de-icers or abrasives before application, in order to quicken melting and to improve material adherence to the road surface.
Road Weather Information System (RWIS)	A network of roadway sensors connected together to provide real-time, accurate and site specific pavement surface conditions and weather data. RWIS allow maintenance crews to make informed decisions on road maintenance actions based on current weather conditions.