SUBJECT: Road Salt Management Plan (TOE02129a) - (City Wide)

RECOMMENDATION:

(a) That the City of Hamilton’s Salt Management Plan, as presented with Committee of the Whole report TOE02129, be endorsed and approved as part of the City’s comprehensive Integrated Management System; and

(b) That staff be directed and authorized, subject to funding availability under operating and capital budgets, to implement all aspects of the Salt Management Plan; and

(c) That the following subsection previously tabled by City Council on 2002, July 10, be lifted from the table and forwarded to Environment Canada: “That Environment Canada be formally advised of the completion and approval of Hamilton’s comprehensive Salt Management Plan so that Environment Canada is aware of the City’s leadership in this area and has knowledge of the City’s advance compliance with upcoming Canadian Environment Protection Act requirements”.

Peter M. Crockett, P.Eng.
General Manager
Public Works

EXECUTIVE SUMMARY:

The City of Hamilton has demonstrated leadership in the environmental area of road salt management through the development of a Salt Management Plan. The plan, prepared with the help of the consultant Ecoplans Limited, has become a major
component of the City’s Integrated Management System and will be the operating guideline for all salt handling, storage, application and snow disposal methods for the City.

The plan was presented to City Council at the Committee of the Whole meeting of July 2, 2002. At that time the Committee endorsed and approved the Salt Management Plan, subject to the implementation of a communication strategy which was to include community meetings and requested that following the communications undertaking, staff recommend a position on the City Salt Management Plan.

As detailed in this report, staff have undertaken a series of seven public meetings as well as seeking input from the Community Advisory Group of the Integrated Management System. While attendance at the public meetings was limited, those people who did turn out and commented on the plan were almost unanimously in favour.

The City Salt Management Plan is fundamentally a “win-win” concept. The intent is to maintain the existing level of service for winter control while simply reducing wastage of salt. Less waste translates to less environment damage and lower cost to the taxpayer. It is now recommended that the plan be formally and unconditionally approved, which will allow staff to proceed with implementation of all aspects of the program. Based on the conditional approval received last summer, a number of initiatives are already underway or have been presented to Council as part of the 2003 capital budget. These are detailed within this report.

As well, it is appropriate now to advise Environment Canada of the City’s position, in that a proactive response and stance in regard to salt management is a much preferred situation to having the Federal Government dictate rules and regulations.

**BACKGROUND:**

In response to Environment Canada’s determination that excessive use of road salt is harmful to the environment, the City commissioned Ecoplans Limited to prepare a Salt Management Plan. Environment Canada is currently considering designating road salt as a toxic substance under the Canadian Environmental Protection Act (CEPA) and has placed the concept out for public review. Environment Canada’s assessment report released in December 2001 indicated that because of the high releases around handling and storage sites and through run-off and splash from roadways onto soils, streams and rivers, road salt posed a serious threat to the aquatic environment, plants, and animals. It also stated that road salt is not harmful to humans. While it was indicated that the Minister will make a final determination of the status of road salt in the short term, to date no further pronouncement has been made. The City’s Road Salt Management Plan anticipates that the Ministry may dictate regulations to municipalities and takes the alternate approach of a proactive stance.

The full Salt Management Plan was presented to members of Council as Appendix A of Committee of the Whole report TOE02129. A summary report is attached to this document as Appendix A.

When the Salt Management Plan was initially presented to Council in July 2002, Committee of the Whole requested that staff undertake a public consultation process before the Committee would provide the final approval of the plan.
Staff conducted a series of seven public meeting sessions to present the Road Salt Management Plan and at the same time advise the public of winter control standards. The meetings were held in City Hall and at outlying contact and community centres, with one meeting was held during the day at a senior’s centre on Hamilton mountain. In addition, the Salt Management Plan was presented for comment and input to the Community Advisory Group of the Integrated Management System, comprised of a number of knowledgeable environmental experts from across the City.

Despite the fact that the meetings were held in November and December, at a time when people would be interested in winter conditions, turn out at the public meetings was generally light with the exception of one meeting which was held on the subject of the budget as well as salt management and winter control. The comments that were received at the public meetings were generally quite favourable.

The Community Advisory Group suggested that the Salt Management Plan is a “good first step”. They would like to see in future an additional movement away from the use of salt entirely, either to sand, additional plowing or complete absence of treatment. However, there was no contradiction or concern with the measures that are contained within the Salt Management Plan.

As part of the delivery of winter control services for this and upcoming winters, a number of initiatives supporting the Salt Management Plan have been either been undertaken or are planned. Following are a description of some of the items which have already been implemented:

**Training.** Staff, both City and contractor, were provided with education and training on the proper application of salt, prior to the start of winter control. A major goal of this training was to provide operators with an understanding of the how to achieve adequate snow control with the minimum application of salt.

**Pre-wetting.** Pre-wetting is the application of a liquid deicing chemical to the rock salt just before it is placed on the roadway. This allows the salt to stick to the roadway and begin to react with the snow or ice more quickly. By sticking to the roadway less salt is migrates to the curb or ditches. By reacting more quickly, less salt is required, thus becoming more effective and efficient from an environmental perspective. Ten new snow removal vehicles were purchased by the City of Hamilton prior to the start of winter operations for 2002/2003. All vehicles were equipped with on-board pre-wetting. All trucks supplied by the City of Hamilton’s contractor for the next three years were required to have pre-wetting equipment on board. In addition, a capital budget item was presented to Council for retro-fitting 10 existing vehicles with automated controls and pre-wet tanks, and this initiative was paired with a $24,000 annual reduction in salt usage.

**Weather Service.** The City subscribes to a specialized weather service, specific to winter control operations, in order to react as appropriately as possible to on-coming storms.

**ARWIS.** ARWIS stands for Advanced Road Weather Information System. A study has been completed on the number, type, and siting of ARWIS stations. ARWIS stations are most useful in that they can provide very specific on-site information not only of air temperature and weather conditions but more importantly of road temperature, moisture and salinity conditions. This allows the better decision-making and means that salt is applied in a more knowledgeable fashion. The
implementation of a single ARWIS station within Hamilton will allow access to a whole network of ARWIS stations presently in use by the Ministry of Transportation and ETR/407. The installation of one or more ARWIS stations is planned for 2003 and was included in the 2003 budget.

Anti-icing. Anti-icing is the application of liquid brine directly to the roadway in advance of an on-coming storm. The intention is to prevent a bond between the snow/ice and the roadway surface. Anti-icing has the side effect of being more efficient in terms of the overall use of salt for the situation required. Anti-icing has a limited application, in that it must be applied to a dry road in advance of a storm, at weather conditions not too far below zero. However within that window, it can be very effective. The City has at its disposal four anti-icing trucks and these were dispatched on a number of occasions this winter, to apply anti-icing on escarpment crossings, Linc ramps, and on many bridge decks throughout the City.

Added Salt Storage Buildings. One of the primary precepts of the Salt Management Plan is to minimize the loss of salt into the environment around storage and loading areas. In order to minimize the use of salt, the City has standardized on the use of 100% salt for major roadways and a salt/sand mix for minor and residential roadways. This has the drawback of requiring duplicate storage facilities for two separate types of materials. At present some of the salt/sand mix is being stored outside which allows for the migration of the material into the environment, as well as making the material much more difficult to manage. In the 2003 capital budget, provision has been made for the erection of two buildings at operations yards where there are large quantities of salt/sand mix stored outdoors.

Hard Surfacing. Significant amounts of salt can migrate into the environment when loading of sander units takes place on a granular or unpaved surface. Provision has been made in the 2003 capital budget for additional hard surfacing at some of the Public Works yards in order to ensure that all material can be loaded on a hard surface. This will ensure that material which is spilled can be easily captured and reclaimed. As well, some of the funding in this capital item will be used to add sewer interceptors, to catch the oils and other materials from the trucks, which otherwise would flow into the City’s sewer system as a result of regular washing and cleaning of the vehicles.

With the approval of this report, staff will be charged with a wide range of responsibilities for minimizing salt wastage, which will also result in reduced overall operating costs for winter control.

At this time, it is also appropriate to formally notify the Federal Government of the existence of the City’s Salt Management Plan, to provide proof to them of the City’s proactive stance with regard to this environment issue.

**ANALYSIS OF ALTERNATIVES:**

The alternative is not to proceed to implement the plan. This would result in continuing damage to the environment and would be contrary to the City’s core values. It would also result in increased financial cost in terms of salt usage.
FINANCIAL/STAFFING/LEGAL IMPLICATIONS:

The Salt Management Plan can be implemented with existing staff through training and cultural change.

Building and yard improvements will need to be considered in conjunction with Facility Management’s Yard Rationalization Study and funded through the capital budgeting program.

Fleet improvements can be addressed through tender specifications on new and replacement vehicles and minor modifications can be funded through the current budget.

The overall program will require funding from both operating and capital budgets. The program can be phased in over a number of years based on the availability of funding. Ideally, the program would be implemented within three years, but financial constraints suggest a 5 to 7 year timeframe is more realistic. The total cost of capital improvements is estimated at $3,150,000. The total current budget implication is about $40,000 annually, which should be offset by reduced salt usage.

Staff will prepare an annual financial plan for the program to be revised in consideration of changes in systems, technology, and field experience. The program will be reviewed on an annual basis in accordance with the stated obligations in the Salt Management Plan.

POLICIES AFFECTING PROPOSAL:

The Salt Management Plan is a major component of the City’s Integrated Management System and was developed in accordance with the level of service policies provided for in the City’s Winter Control Policy.

Initiatives from Environment Canada, although not yet fully developed or implemented, indicate that improved salt management practices may be regulated in the near future.

CONSULTATION WITH RELEVANT DEPARTMENTS/AGENCIES:

The implications and importance of the Salt Management Plan have been previously reviewed with Facilities Management staff, Fleet Management staff, and those responsible for the co-ordination of the Integrated Management System. The Salt Management Plan is consistent with the national salt management initiatives being developed in response to Environment Canada’s on-going review of salt use and is consistent with the Transportation Association of Canada’s Salt Management Guide.

CITY STRATEGIC COMMITMENT:

The City’s Vision calls for a “…safe, healthy, sustainable community...”. One of our core values is “Sustainability: to contribute to a balanced community, economy and environment; to minimize the footprint of our activities and to do no harm”. One of our six Goals is to have “A Healthy, Safe and Green City” which includes as specific actions: “Cleaning Up the Harbour”, “Investing in Safe Water for Today and Tomorrow” and “Leading the Way in Environmental Studies and Management”.
The proposed Salt Management Plan is a progressive, proactive response to the City's Vision, Values and Goals.

As per the above goals, reducing salt usage will mean less damage to flora and fauna in the City. It will also mean less salt entering the harbour.

As well, reduced road salt usage will mean less salt in the ground water. Health Canada has stated that road salt does not have any direct human health impacts. However, it is also acknowledged that for those people whose water source is from shallow aquifers, increased sodium intake may be experienced when roadway runoff is permitted to enter the water table. This increased exposure to sodium may pose an additional health risk to those who are on sodium-reduced diets.

The Salt Management Plan is also consistent with the Corporate Environmental Policy (E = MC4). Our commitment is to strive for excellence in environmental management. We intend to comply with all legal and environmental regulations and will try to exceed them through voluntary actions. We will try for continual improvement in our environmental performance. Once implemented, the proposed plan will achieve these goals.

Attached: Appendix A
City of Hamilton

SALT MANAGEMENT PLAN

SUMMARY

E = M C^d
Environment Management Commitment
Compliance
Continual Improvement
Consultation
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>2</td>
</tr>
<tr>
<td>OVERVIEW</td>
<td>2</td>
</tr>
<tr>
<td>PURPOSE OF THE SALT MANAGEMENT PLAN</td>
<td>2</td>
</tr>
<tr>
<td>FORMAT OF THE SALT MANAGEMENT PLAN</td>
<td>3</td>
</tr>
<tr>
<td>RESPONSIBILITIES</td>
<td>4</td>
</tr>
<tr>
<td>THE CITY OF HAMILTON MISSION AND GOALS</td>
<td>4</td>
</tr>
<tr>
<td>CORPORATE ENVIRONMENTAL POLICY</td>
<td>5</td>
</tr>
<tr>
<td>THE CITY OF HAMILTON’S ROAD MAINTENANCE POLICIES</td>
<td>6</td>
</tr>
<tr>
<td>SALT MANAGEMENT POLICY</td>
<td>7</td>
</tr>
<tr>
<td>APPLICATION</td>
<td>6</td>
</tr>
<tr>
<td>IMPLEMENTATION</td>
<td>6</td>
</tr>
<tr>
<td>WINTER MAINTENANCE STANDARDS</td>
<td>7</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>7</td>
</tr>
<tr>
<td>WINTER OPERATIONS – LEVEL OF SERVICE STANDARDS</td>
<td>7</td>
</tr>
<tr>
<td>WINTER OPERATIONS – SALT AND ABRASIVE APPLICATION RATES</td>
<td>7</td>
</tr>
<tr>
<td>OPERATIONAL PRACTICES AND STRATEGIES</td>
<td>9</td>
</tr>
<tr>
<td>OVERVIEW</td>
<td>9</td>
</tr>
<tr>
<td>KEY GOALS</td>
<td>9</td>
</tr>
<tr>
<td>CLOSING</td>
<td>13</td>
</tr>
</tbody>
</table>

**NOTICE:**

The City of Hamilton’s Salt Management Plan is modeled on a Salt Management Plan Template developed by Ecoplans Limited and has been prepared for the sole use of the City of Hamilton. It may not be used by anyone else without the prior written approval of Ecoplans Limited.
INTRODUCTION

Overview

The City of Hamilton has about 3000 centerline kilometres of roads within the framework of a classification system, which provide for the safe, efficient and affordable means of surface transportation for road users. People rely on our roadway network throughout the year for transport to the workplace, to recreation and leisure facilities, for the transport of goods and services, and for emergency and security services.

Snow and ice conditions on the road system have a dramatic impact on public safety, roadway capacity, travel time and economic costs. User safety remains the most important priority within winter maintenance operations, practices and strategies contained in this Salt Management Plan.

Although there is ongoing research into the use of alternatives to road salt in winter maintenance, salt continues to be the most cost-effective de-icer across Canada. However, because of the adverse effects that salt has on the environment, the Salt Management Plan strives to minimize the amount of salt entering the environment by including best salt handling practices, and using new technologies to ensure its most effective use over the road system. The city will continue to search out and use viable and cost-effective new technologies and chemicals to reduce the environmental impacts of winter maintenance activities.

In 2001, Environment Canada released an assessment report stating that road salts are entering the environment in large amounts and are posing a risk to plants, animals, birds, fish, lake and stream ecosystems and groundwater. Based on the assessment, Environment Canada is considering declaring road salt to be “toxic” under the Canadian Environment Protection Act (CEPA). The “toxic” designation only means that it is harmful to the environment if used in excessive amounts. Environment Canada has stated that they will not ban road salts, but rather will encourage users to develop their own salt management strategy. It must be noted that Health Canada stated that road salts are not harmful to humans.

Given the environmental concerns regarding road salt, the City of Hamilton is showing leadership within Canada by developing its Salt Management Plan in accordance with a Framework for Salt Management Plans prepared by TAC. This Salt Management Plan ensures that roads are properly maintained in a safe condition while addresses growing concerns about the effect road salt is having on our natural environment. This plan is consistent with ISO 14001 and will become part of the City’s Corporate Integrated Management System.

Purpose Of The Salt Management Plan

Hamilton’s Salt Management Plan provides a comprehensive framework for ensuring that the City improves the management of road salt used in its winter maintenance operations on an ongoing basis. This document is a summary of the information contained in the full plan and report.
The plan will be modified as new technologies and procedures become available. However, at all times, modifications to winter maintenance activities will be aimed at providing roadway safety and user mobility consistent with the weather conditions experienced during the snow and ice control season. The Salt Management Plan is a living document that allows the City of Hamilton to phase in new approaches and technologies in a way that is responsive to fiscal demands and the needs to ensure that roadway safety is not compromised.

Format of the Salt Management Plan

The full, comprehensive Plan has the following chapters.

*Chapter 1.0* of the Plan provides an introductory context for the Plan.

*Chapter 2.0* of the Plan documents the Policy Directions approved by the Council.

*Chapter 3.0* of the Plan presents the Winter Maintenance Policies that are relevant to salt management. It focuses on Level of Service, material application rates, snow disposal policies and sidewalk clearing policies.

*Chapter 4.0* of the Plan presents the summaries of Operational Practices and Strategies for Snow and Ice Control as they relate to effective road salt management. The chapter is presented as a series of sub-sections that can be modified as new policies, procedures and practices are introduced and refined. Effective road salt management involves many elements of the City’s winter maintenance operations. The subsections in Chapter 4.0 set out our goals for:

- Improving our fleet so that proper salt application is achieved;
- The use of liquids in pre-wetting and anti-icing operations;
- The management of vehicle washwater;
- The storage and handling of ice control chemicals and sand;
- The tools for predicting winter road conditions and determining the appropriate snow and ice control response;
- Our winter road patrols;
- The removal and disposal of snow;
- Snow and ice control training;
- Record keeping and reporting; and
- Monitoring of our operations.

*Chapter 5.0* of the Plan presents the approach to monitoring the implementation of the plan and to maintaining and updating the plan.

Responsibilities

Effective road salt management is the responsibility of everyone in the City connected to winter road maintenance. Effective salt management involves the acquisition and proper use of modern snow and ice control equipment along with appropriate training. Cooperation at all levels of the City will ensure that the adverse effects of excessive road salt use are reduced while maintaining safe roads.
THE CITY OF HAMILTON MISSION AND GOALS

The City’s Mission

The mission of Council and staff is to work together to create and implement strategies necessary to turn the vision into reality.

Applicable City Goals

Our strategic plan shows how we want to build a city that works. We want Hamilton to be:

2. A Great City in Which to Live

To ensure that Hamilton remains a great city, Council commits to providing quality services that residents can rely on and to support the community’s quality of life.

(f) VISION 2020 – A Sustainable City

Council is committed to VISION 2020 and will partner with ACTION 2020 in the implementation of its strategies.

3. A Healthy, Safe and Green City

To ensure the quality of life of Hamilton residents, Council commits to work with our government partners to improve our natural environment, the safety of our community, and the health of our residents.

(b) Cleaning Up the Harbour

Council will work with government, the private sector, and the community to work to clean up the Harbour.

(f) Leading the Way in Environmental Studies & Management

Council will work with government, academia, the community and private sector to study issues related to our natural environment, provide valuable advice and put forward action plans.

5. A City That Spends Wisely and Invests Strategically

To get the best value for taxpayer dollars, and to ensure that we have the financial resources available to invest in our economic development and other community priorities, Council commits to increase the efficiency of our city government.

(b) Best Practices – Best Value

Council will pursue best practices to lower the cost of government and ensure best value in service delivery. It is recognized that best value is not just a calculation of dollars: it also includes accountability, service quality, accessibility and other community priorities which must be taken into account as per Council policy.
CORPORATE ENVIRONMENTAL POLICY

The City of Hamilton’s goal is to become a leader in municipal environmental performance in the delivery of our municipal services. The City of Hamilton will sustain and protect its human community and natural environment through:

**COMMITMENT:** The City of Hamilton will strive for excellence in its management of the environment by applying pollution prevention principles and addressing environmental implications in its decisions, activities and expenditures.

**COMPLIANCE:** The City of Hamilton will manage its operations to comply with all legal, environmental and other requirements that the City has committed to. When Council or Administration deems it is in the best interest of the Community, the City of Hamilton will exceed those requirements through voluntary policy commitments in the management of the City’s operations and services.

**CONTINUOUS IMPROVEMENT:** The City of Hamilton will set objectives and targets to improve its environmental performance and review with environmental management system to ensure continuing suitability, adequacy and effectiveness.

**CONSULTATION:** The City of Hamilton will consult with the community on significant environmental issues and priority setting. The City will report to the community on the progress of the resulting environmental management programs on at least an annual basis.

$$E = M \cdot C^4$$

- **Environment**
- **Management**
- **Commitment**
- **Compliance**
- **Continual Improvement**
- **Consultation**
THE CITY OF HAMILTON’S ROAD MAINTENANCE POLICIES

Salt Management Policy

Within the City of Hamilton’s overall policy context, the following is the City of Hamilton’s policy on the use and management of road salt.

- To comply with all applicable federal and provincial legislation regarding the storage and use of snow and ice control products.
- To use road salt in an environmentally responsible manner, and minimize the negative environmental effects of handling, storage and application of salt on the environment.
- In providing the stated Level of Service, the City of Hamilton will conserve the use of salt by utilizing the most cost-effective technologies and practices.

Application

This policy applies to all employees involved in Winter Maintenance Operations.

Implementation

This Salt Management Plan is activity based and follows an Environmental Management System framework consistent with the City’s Environmental Management Policy. It includes the following elements:

- Periodic review and analysis of industry practices
- Implementation and document of the plan
- Education and training of staff
- Monitoring and analysis of operations
- Management review and revisions
- Environmental review
- Policy and practices revision
WINTER MAINTENANCE STANDARDS

Introduction

The major activities related to winter maintenance are:

- salt and sand storage;
- salt spreading;
- sand spreading;
- snow plowing; and
- snow removal and disposal.

Winter Operations – Level of Service Standards

Winter control Level of Service Standards are designed to meet the needs of the community from the perspective of driver safety and the provision of emergency service. These LOS standards are driven by both the technical requirements of winter operations and the need to address the socio-economic concerns of a large urban municipality. The standards are laid out in the City’s Winter Control Policy, as approved by Council.

Winter Operations – Salt and Abrasive Application Rates

The following application rates are target rates to be used in conjunction with the City’s Winter Control Policy.

Tables 1 and 2 present the Application Rates for salt and for abrasives (salt/sand mix).

The City has recently introduced the use of liquids for pre-wetting salt and anti-icing on a limited basis. The City is committed to adding on-board pre-wetting capabilities on its entire fleet. Pre-wet application rates are in the range of 5 – 8%. Anti-icing application rates are under review. As the City gains experience with anti-icing, these rates will be defined.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Dry Salt</th>
<th>Pre-wetted Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>95 kg/2lane km</td>
<td>75 kg/2 lane km</td>
</tr>
<tr>
<td>Normal</td>
<td>130 kg/2lane km</td>
<td>105 kg/2 lane km</td>
</tr>
<tr>
<td>Heavy</td>
<td>170 kg/2lane km</td>
<td>130 kg/2 lane km</td>
</tr>
<tr>
<td>Extra-heavy (Escarpment Crossings)</td>
<td>320 kg/2lane km</td>
<td>250 kg/2 lane km</td>
</tr>
</tbody>
</table>

The on duty supervisor has the flexibility to adjust the application rates to accommodate specific conditions. For example, application rates are reduced for black ice and frost conditions and increased on mountain accesses.

---

1 Anti-icing is a proactive snow and ice control strategy whereby straight brine is sprayed directly on the road in advance of a storm. The term can also refer to early application of chemical in any form early in a storm to prevent the formation of the snow/road bond.
Table 2 – Target Abrasive Application Rates

<table>
<thead>
<tr>
<th>Setting</th>
<th>Dry</th>
<th>Pre-wetted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>300 kg/2lane km</td>
<td>240 kg/2lane km</td>
</tr>
<tr>
<td>Normal</td>
<td>500 kg/2lane km</td>
<td>400 kg/2lane km</td>
</tr>
<tr>
<td>Heavy</td>
<td>750 kg/2lane km</td>
<td>600 kg/2lane km</td>
</tr>
</tbody>
</table>

The on duty supervisor has the flexibility to adjust the settings to accommodate specific conditions as directed by.

Because of the variety of conditions that can be encountered, within this framework, Supervisors are allowed full control regarding frequency and timing of applications.
OPERATIONAL PRACTICES AND STRATEGIES

Overview

Chapter 4.0 of the Salt Management Plan analyzes each of the key operational practices and strategies related to the effective management of road salt during winter maintenance activities.

Each subsection has a summary that presents a discussion of the objectives, environmental considerations, current situation, plan goals, responsibilities, performance measures and references.

The Goals recognize that the Salt Management Plan is comprehensive and will take time to implement.

Key Goals

The following table summarizes the City’s Salt Management Goals.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>SUMMARY OF SALT MANAGEMENT GOALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level Of Service</td>
<td>• Maintain a consistent and updated Level of Service Policy for roads and sidewalks.</td>
</tr>
<tr>
<td>Fleet Allocation/Optimization</td>
<td>• Complete the route optimization study for priority 1 roads.</td>
</tr>
<tr>
<td></td>
<td>• Implement the accepted recommendations from the Route Optimization Study and revise this plan accordingly.</td>
</tr>
<tr>
<td></td>
<td>• Evaluate the merit of the priority 1 effort for use on other roads.</td>
</tr>
<tr>
<td>Electronic Spreader Controls</td>
<td>• By 2008 all spreading equipment shall have groundspeed regulated electronic controllers with printout capability. These will be acquired at a rate of approximately 10 per year.</td>
</tr>
<tr>
<td></td>
<td>• All contracted spreaders will be required to have electronic controls in the 2002-2003 winter season.</td>
</tr>
<tr>
<td></td>
<td>• Develop and implement a record-keeping system that uses the data supplied by electronic controllers.</td>
</tr>
<tr>
<td></td>
<td>• Verify calibration using the salt distribution printout.</td>
</tr>
<tr>
<td>Pre-Wetting And Anti-Icing Equipment</td>
<td>• Assess and review the results of the pre-wetting and anti-icing experience to-date (in-house and other jurisdictions).</td>
</tr>
<tr>
<td></td>
<td>• Develop an anti-icing and pre-wetting guideline that addresses preferred application rates and expected performance on the road.</td>
</tr>
<tr>
<td></td>
<td>• Introduce pre-wetting on all priority 1 and 2 roads over the next 3 years, with all units having pre-wetting capabilities by 2006.</td>
</tr>
<tr>
<td></td>
<td>• Identify areas that have an anti-icing priority and integrate this into the equipment plan.</td>
</tr>
<tr>
<td></td>
<td>• Consider requirement for pre-wetting on all contracted units by the fall of 2002.</td>
</tr>
</tbody>
</table>
## SUMMARY OF SALT MANAGEMENT GOALS

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>Activitiy Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide training in liquid use and handling by November of the year in which liquid use is implemented.</td>
<td>Provide training in liquid use and handling by November of the year in which liquid use is implemented.</td>
</tr>
<tr>
<td>Continue with at least one contracted anti-icing operation in 2002.</td>
<td>Continue with at least one contracted anti-icing operation in 2002.</td>
</tr>
<tr>
<td>Outfit at least one City anti-icing unit in 2003.</td>
<td>Outfit at least one City anti-icing unit in 2003.</td>
</tr>
<tr>
<td>Evaluate the merits of alternative liquids and identify the most cost-effective long-term supply of the chosen liquid (e.g. in-house production and storage of salt brine vs importing of proprietary liquids).</td>
<td>Evaluate the merits of alternative liquids and identify the most cost-effective long-term supply of the chosen liquid (e.g. in-house production and storage of salt brine vs importing of proprietary liquids).</td>
</tr>
<tr>
<td>Spreader Calibration</td>
<td>A calibration procedure will be developed and implemented by October 2002.</td>
</tr>
<tr>
<td></td>
<td>All spreaders shall be properly calibrated each fall.</td>
</tr>
<tr>
<td></td>
<td>Standardized Salter Calibration Forms and procedures will be developed by November 2002.</td>
</tr>
<tr>
<td></td>
<td>All routes will be benchmarked with a quantity for a given application rate. The benchmarks will be revised each time the routes are adjusted.</td>
</tr>
<tr>
<td></td>
<td>Salt use will be checked against the benchmark after each storm to highlight equipment that needs to be recalibrated.</td>
</tr>
<tr>
<td></td>
<td>Equipment will be recalibrated after any repair that affects the delivery system.</td>
</tr>
<tr>
<td></td>
<td>A calibration history for all spreaders will be maintained by designated Supervisors and reviewed annually.</td>
</tr>
<tr>
<td>Equipment Washing</td>
<td>By 2008 all vehicle washwater shall pass through oil/water separators before being discharged.</td>
</tr>
<tr>
<td>Material Ordering And Delivery</td>
<td>Specify and enforce minimum moisture content standards for all salt delivered.</td>
</tr>
<tr>
<td></td>
<td>Schedule salt deliveries to minimize outdoor storage.</td>
</tr>
<tr>
<td></td>
<td>Ensure that pre-treatment is properly adjusted in accordance with the moisture content to reduce leachate.</td>
</tr>
<tr>
<td>Sand/Salt Blend Record Keeping</td>
<td>To track the location and amount of sand/salt blends being used.</td>
</tr>
<tr>
<td></td>
<td>To optimize the use of sand/salt blends as opposed to straight salt.</td>
</tr>
<tr>
<td>ACTIVITY</td>
<td>SUMMARY OF SALT MANAGEMENT GOALS</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **Salt Record Keeping**      | ● Document usage for each spreader, along with weather and road conditions after every run.  
● Benchmarking (salt quantity per application setting) for each route will be established for the 2002-2003 season.  
● A standardized usage log will be developed and implemented during the 2002-2003 season. The log will include weather and road conditions and rationale for treatment strategy  
● Usage logs will be compared to the benchmarks at the end of each day to check calibration.  
● Salt delivery records and end-of-season residual will be logged to allow for year-end reconciliation of salt use.  
● Periodic comparisons of usage by run will be carried out to identify and address any inconsistencies.  
● Record-keeping training                                                                                                                                                                                                                          |
| **Sand/Salt Mixtures**       | ● The maximum sand/salt blends will be 25% by volume, meaning 1 m³ of salt per 3 m³ of sand.  
● To optimize the % of salt in sand/salt blends.                                                                                                                                                                                                                                                            |
| **Salt Storage / Handling**  | ● By Fall 2002 all salt shall be stored inside buildings on impermeable floors.  
● All new maintenance facilities will be designed in accordance with the principles set out in TAC’s Code of Practice for Design of Maintenance Yards.  
● Impermeable loading pads will be installed beginning in 2002 with completion in 2005.  
● The City will investigate approaches to dealing with chloride contaminated runoff containment.                                                                                                                                                                                                 |
| **Sand/Salt Blend - Storage / Handling** | ● By 2007 all of sand/salt blends shall be stored under cover and on impermeable pads – assuming completion of 2 yards per year.                                                                                                                                                                                                                                 |
| **Good Housekeeping Practices** | ● Implement the Good Housekeeping Code of Practice by the October 2002.  
● Provide annual training on good housekeeping practices by December of each Year.                                                                                                                                                                                                                     |
| **Weather Forecasting**      | ● Develop a contract with a weather provider to provide dedicated forecasts before the start of each snow and ice controls season.  
● Work with the weather provider to make the information accessible over the Internet.  
● Provide access to Doppler radar for all personnel making call-out decisions.  
● Provide annual training in use of weather information.                                                                                                                                                                                                                                                |
<p>| <strong>Road Weather Information Systems</strong> | ● Assess micro-climate and area road network to do a preliminary design for the ultimate RWIS network                                                                                                                                                                                                                                           |</p>
<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>SUMMARY OF SALT MANAGEMENT GOALS</th>
</tr>
</thead>
</table>
| (RWIS)                   | • Carry out an initial planning study and develop a network concept design including data sharing with others and a phase-in strategy.  
• Install hardware in accordance with the phase-in strategy.  
• When RWIS is available to staff, develop a contract with a weather provider to provide dedicated pavement condition forecasts before the start of each snow and ice controls season.  
• When required, provide annual training in use of weather and pavement temperature information.                                                                                                                                                                                                 |
| Infrared Thermometers (IRTS) | • Add truck-mounted IRTs on all patrol vehicles by 2003.  
• Provide annual training in use of IRTs.                                                                                                                                                                                                                                                                                                           |
| Storm Response           | • To prepare documented guidelines and training for decision-making staff to provide consistent response throughout various storm scenarios.  
• Review storm response practices and revise the guidelines as needed.  
• Promote a climate of continual learning and promote learning from both successes and failures.  
• To develop standard methodology to report/summarize storm response.  
• To train all supervisors and operators in proper record keeping by December of each year.                                                                                                                                                                                                 |
| Winter Road Patrol       | • To develop a Winter Road Patrol policy by November 2002.  
• To amend Patrol guideline to ensure that the Level of Service Policy is understood, met and demonstrated.                                                                                                                                                                                                                                           |
| Training                 | • Prepare training modules in the following subject areas as they become needed:  
  • Policy context  
  • Level of Service Policy  
  • Proper use of equipment and controllers  
  • Equipment calibration  
  • Interpretation of weather and pavement conditions and their use to make snow and ice control decisions  
  • Proper use of infra-red thermometers & RWIS  
  • When and how to apply chemicals  
  • Concepts and merits of use of liquid chemicals for pre-wetting and anti-icing  
  • Proper record keeping and review  
  • Good Housekeeping Practices  
  • Storm response & record keeping  
• Present the training in November of each year.                                                                                                                                                                                                                                       |
## ACTIVITY

<table>
<thead>
<tr>
<th>Snow Removal And Disposal Guideline</th>
<th>Summary of Salt Management Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>• To assess snow disposal requirements and existing disposal sites and determine required improvements by October 2003.</td>
<td></td>
</tr>
<tr>
<td>• To develop a snow disposal plan by October 2003.</td>
<td></td>
</tr>
<tr>
<td>• To implement the snow disposal plan as soon as feasible.</td>
<td></td>
</tr>
<tr>
<td>• To monitor contaminants in melt water being discharged at snow disposal sites.</td>
<td></td>
</tr>
<tr>
<td>• Use the Class EA as a guide for conducting environmental assessments for new disposal sites selection.</td>
<td></td>
</tr>
<tr>
<td>• To establish pilot monitoring programme at selected snow disposal site by 2003.</td>
<td></td>
</tr>
<tr>
<td>• To establish site management criteria of snow disposal sites by 2003.</td>
<td></td>
</tr>
</tbody>
</table>

### Technology Transfer Review

- To ensure latest technologies are studied and reviewed and adopted as appropriate.
- To participate actively on the Regional Road Salt Management Group.
- To participate in other conferences and forums geared to development of salt best management practices.
- Complete study of a FAST system on the Red Hill Creek Expressway.
- To investigate the merit of GPS [2], AVL [3], and RWIS [4].

### Communications

- Produce an annual brochure to inform the council, public and local regulatory agencies about the actions being taken by the Hamilton to reduce the environmental effects of excessive road salt use, and the City’s winter maintenance program.
- Provide information during training to allay worker’s potential concerns over the use of the term “Toxic” as it relates to road salt under the Canadian Environmental Protection Act (CEPA).
- Produce a summary of the Salt Management Plan for public and political consumption.
- Identify a spokesperson to which the media can go with questions about the winter maintenance program.
- Develop a communications strategy that responds to the needs of Council, the public and the media.

### Environmentally Sensitive Areas

- Monitor Environment Canada’s approach to addressing ESAs.
- Identify salt sensitive areas within the City.
- Develop strategies for reducing salt use affecting ESAs.

---

2 GPS – Global Positioning System  
3 AVL - Automatic Vehicle Location  
4 RWIS - Road Weather Information System
ACTIVITY | SUMMARY OF SALT MANAGEMENT GOALS
--- | ---
| • Establish criteria and indicators for determining impact
| • Develop a monitoring program in accordance with guidelines being developed by Environment Canada.
| Monitoring Program | • Develop a monitoring program as part of the EMS.

CLOSING

The City of Hamilton has committed to ensuring that its roads are properly maintained in accordance with its stated level of service policy. While doing so, the City has committed to reducing the environmental impacts of excessive use of snow and ice control chemicals, such as salt, while maintaining roadway safety.

The City’s Salt Management Plan identifies how the City will implement a managed salt strategy over the next few years. The City will also monitor improvements in snow and ice control practices, and revise the plan as more salt best management practices become available.