SALT MANAGEMENT PLAN

Town of Caledon

May 2005

Submitted by:
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Appendix A - Winter Operations - Sidewalk Maintenance, Town of Caledon
Appendix B - Wellington County Level of Service Policies for Winter Operations and Road Patrol
1.0 Introduction

1.1. Overview

In response to concerns over the impacts of road salt on the environment, Environment Canada published in April, 2004 the Code of Practice for the Environmental Management of Road Salts in the Canada Gazette stating that road salts are on the Priority Substance List compiled under the Canadian Environmental Protection Act, 1999. The Code of Practice was developed by Environment Canada through a multi-stakeholder consultation and includes practices relating to:

- salt storage;
- snow disposal; and
- salt application with all the environmental impacts considered.

This code applies to organizations that:

- use more than 500 tonnes of road salts per year (five year rolling average); and
- have vulnerable areas that could be potentially impacted by road salts.

Any organization which meets the criteria listed in the code is required to prepare a Salt Management Plan (SMP) and file a report with Environment Canada by June 30th, 2005. The implementation of the SMP is to begin in the financial period or fiscal year immediately following the preparation of the plan.

The Town of Caledon meets the criteria listed in the Code of Practice for the Environmental Management of Road Salts. In general, the maintenance of Caledon's roadways during the winter season is both challenging and costly. Municipal staff currently utilize a salt/sand mix as their main tool in maintaining a safe and efficient roadway system during the winter season. An efficient winter maintenance plan has many benefits to the community, these include:

- lower accident rates;
- lower associated insurance and liability claims;
- time savings from faster travel;
- fuel savings from better traction and less congestion;
- reduced productivity losses due to late days and absenteeism;
These benefits have been shown to have benefit/cost ratios of 2:1 to 18:1. In other words, two dollars to eighteen dollars in benefits are derived from each dollar spent on winter maintenance activities.

An effective winter maintenance plan must include methods to provide safe roadway conditions and to ensure that the right amount of salt is used in the right place at the right time. Reduction of salt usage may also be achieved through improved training, new techniques, new technologies as well as improvements in the type of anti-icing/de-icing material used.

The SMP is considered to be a “living” document. Once developed, the Town of Caledon will be required to undertake a formal annual review with the goal of improving their winter maintenance operations. This review will also require that new technologies be investigated where appropriate, trial/pilots can be conducted and monitored to determine the cost/effectiveness of incorporating new developments into the capital and current budget planning.

1.2. Purpose of the Document

This SMP is intended to set out a policy and procedural framework for ensuring that the Town of Caledon continuously improves on the effective delivery of winter maintenance services and the management of road salt used in winter maintenance operations, as outlined in the Code of Practice for the Environmental Management of Road Salts.

The SMP is meant to be dynamic to allow the Town to evaluate and phase in any changes, new approaches and technologies in winter maintenance activities in a fiscally sound manner. At the same time any modifications to Caledon’s winter maintenance activities must ensure that roadway safety is not compromised.

As specified in the Code of Practice for the Environmental Management of Road Salts, the SMP is to be endorsed by the “highest level of government”. Therefore, Town Council will be requested to endorse this plan.

1.3. Legislation

The minimum standards for winter maintenance are mandated under provincial legislation. The standards set within the Town of Caledon are currently at the same level or higher than the minimum standards specified in the Ontario Regulation 239/02 of the Municipal Act, 2001. As well, the Town is mandated under provincial legislation to maintain public roads in a good state of repair.

The Code of Practice for the Environmental Management of Road Salts, under the Canadian Environmental Protection Act, 1999 recommends that the Salt Management Plan follow the best management practices that have been set out by the Transportation Association of Canada. This Code of Practice was prompted by subsection 54 (1) of the Act which allows the Ministry of the Environment to issue codes of practice respecting pollution prevention or specifying procedures, practices or release limits for environmental control relating to works, undertakings and activities during any phase of their development and operation.
2.0 Salt Management Policy

2.1 Vision, Mission, Mandate

Vision: The Town of Caledon will be recognized as a leader in improving winter maintenance operations while reducing environmental impacts and ensuring public safety.

Mission: The Town of Caledon Public Works and Engineering Department will continue to optimize the use of de-icers on all Town roads while striving to minimize salt impacts to the environment.

Mandate: The Town of Caledon Public Works and Engineering Department will provide safe winter conditions for vehicular and pedestrian movements as required by the level of service policies and funding established by Council.

2.2 Policy Statement

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

- adhering to the procedures contained within the Salt Management Plan;
- monitoring, reviewing and upgrading the Salt Management Plan on an annual basis to incorporate new technologies and/or new developments and to ensure the effectiveness of the Plan;
- committing to ongoing winter maintenance staff training and education; and
- council allocating sufficient financial resources.

2.3 Application

The SMP is to be endorsed by the Town Council of Caledon, and the SMP, as adopted, will apply to all Caledon Public Works and Engineering employees who are involved in winter maintenance operations.

2.4 Principles

To allow for the continued progression of the Salt Management Plan several principles will be set in place to guide decision making. These include:
Salt Management Plan  
Town of Caledon

- implementation and documentation of the plan;
- education and training of staff;
- monitoring and analysis;
- yearly management review; and
- practices and policy revision.
3.0 Current Winter Maintenance Program and Policies

3.1 Introduction

This chapter is intended to provide a brief overview of the present activities, conditions and policies currently in place for each municipality within the Town of Caledon as it relates to winter maintenance. The major activities related to winter maintenance are:

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

3.2 Town of Caledon Program and Policies

Overall the Town is responsible for the maintenance and construction of some 716km of road of which 338km are paved; 238km are surface treated; and 145km are gravel. In turn, the Town roads have been classified (Class 3, 4, 5 and 6) based on the posted/regulated speed and annual average daily traffic (AADT) in order that level of service and maintenance standards can be clearly defined, and accepted by the community at large.

Within these classifications:

- Class 3 roadway is considered as an arterial in nature;
- Class 4 roadway is considered as a collector in nature; and
- Class 5, 6 roadways are considered as local streets.

Table 3.1 provides a breakdown of the road system by urban/rural and class of road.

<table>
<thead>
<tr>
<th>Road Class</th>
<th>Rural</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>50.8</td>
<td>1.0</td>
<td>51.8</td>
</tr>
<tr>
<td>4</td>
<td>226.7</td>
<td>42.2</td>
<td>268.9</td>
</tr>
<tr>
<td>5</td>
<td>303.9</td>
<td>71.4</td>
<td>375.3</td>
</tr>
<tr>
<td>6</td>
<td>18.2</td>
<td>2.1</td>
<td>20.3</td>
</tr>
</tbody>
</table>

At this time, in compliance with the applicable law, the Town is utilizing the Minimum Maintenance Standards for Municipal Highways (Ontario Regulation 239/02 made under the Municipal Act). Staff have established winter level of
service and maintenance guidelines that have been accepted by the community at large.

For winter operations, these regulations specify for each class of highway:

- patrol frequency; and
- clearance of snow/ice.

In addition, Town staff provide winter maintenance services for some 91.7km of sidewalks and paths within the communities of:

- Alton;
- Bolton;
- Caledon East;
- Caledon Village;
- Inglewood;
- Mayfield West; and
- Palgrave.

Council has approved a Level of Service for Winter Operations, Sidewalk Maintenance (Appendix A) which provides for all sidewalks and pathways to be cleared within 48 hours following a storm event. With back to back storms, priority service is focused on priority 1 routes which exceed an AADT of 1000 or within 500 m of schools. Once normal operations are restored, all remaining secondary routes would be plowed.

Also, some 43 community and town hall parking lots, and fire and police facilities are maintained and cleaned of ice and snow during the winter season.

3.3 Winter Patrol

Commencing on November 15th, winter maintenance operations and patrol coverage are maintained around the clock 7 days per week until April 15th each year. As well, the Road Supervisor and the Lead Hands remain on call with a protocol in place to mobilize staff in response to storm and weather conditions.

Table 3.2 outlines the minimum patrol frequency established for each class of highway within Regulation 239/02. At the present time Town staff cover all roads at least once within 1 to 2 weeks. To supplement the Town patrol, regional staff also provide patrol coverage on all regional roads within Caledon and maintain contact with Town staff to advise of changing weather and/or pavement conditions.
TABLE 3.2 ROUTINE PATROLLING FREQUENCY

<table>
<thead>
<tr>
<th>Class of Highway</th>
<th>Patrolling Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Once every 7 days</td>
</tr>
<tr>
<td>4</td>
<td>Once every 14 days</td>
</tr>
<tr>
<td>5</td>
<td>Once every 30 days</td>
</tr>
</tbody>
</table>

At the present time Town staff cover all roads at least once within a 1 to 2 week time period. To supplement the Town patrol, regional staff also provide patrol coverage on all regional roads within Caledon and maintain contact with Town staff to advise of changing weather and/or pavement conditions.

3.4 Level of Service

Currently, Town staff work within the minimum level of service for clearing snow accumulation and for treating icy roadways on various classes of highways as established under Ontario Regulation 239/02. These levels of service at which the Town deploys resources are illustrated in Tables 3.3 and 3.4.

<table>
<thead>
<tr>
<th>CLASS 3.3 SNOW ACCUMULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class of Highway</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLASS 3.4 ICY ROADWAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class of Highway</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

3.5 Storm Response and Application Rates

Figure 1 portrays the spreader applications rates for a temperature range between 0°C and -10°C and below -10°C in combination with pavement conditions and spreader calibration settings. For the spreaders equipped with on board prewet capability, salt brine is added to the spreader material at the rate of 20 litres/tonne. Overall, the Operators are allowed latitude in adjusting the application rates based on experience and actual weather and road conditions.

For all Town roadways, staff strive to attain bare to centre bare pavement conditions following storm events.
### TOWN OF CALEDON

#### SPREADER APPLICATION RATE CALCULATION

**PRODUCT:** Pure Salt, prewet

<table>
<thead>
<tr>
<th>Temp in degrees C</th>
<th>Centre bare (3m)</th>
<th>Centrebare (3m)</th>
<th>Centre (5m)</th>
<th>Centre (5m)</th>
<th>0 to -5</th>
<th>1 to -10</th>
<th>1 to -10</th>
<th>0 to -5</th>
<th>0 to -5</th>
<th>0 to -5</th>
<th>0 to -5</th>
<th>0 to -5</th>
<th>0 to -5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to -5</td>
<td>12</td>
<td>18</td>
<td>36</td>
<td>54</td>
<td>84</td>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to -10</td>
<td>18</td>
<td>24</td>
<td>54</td>
<td>72</td>
<td>126</td>
<td>168</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to -5</td>
<td>32</td>
<td>96</td>
<td>224</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### SPREADER CALIBRATED SETTINGS

**PRODUCT:** Pure Salt

<table>
<thead>
<tr>
<th>Setting</th>
<th>Calibrated Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre bare (3m)</td>
<td>0 to -5</td>
</tr>
<tr>
<td>Kg salt/km</td>
<td>Kg salt/km</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

**PRODUCT:** Premix, prewet

50% salt content

<table>
<thead>
<tr>
<th>Temp in degrees C</th>
<th>Centre bare</th>
<th>Centre bare</th>
<th>Centre</th>
<th>Centre</th>
<th>Centre</th>
<th>Centre</th>
<th>Centre</th>
<th>Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to -5</td>
<td>24</td>
<td>36</td>
<td>72</td>
<td>108</td>
<td>168</td>
<td>252</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to -10</td>
<td>38</td>
<td>48</td>
<td>108</td>
<td>144</td>
<td>252</td>
<td>336</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to -5</td>
<td>64</td>
<td>192</td>
<td>448</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PRODUCT:** Sand Only, prewet

<table>
<thead>
<tr>
<th>Pavement Temperature</th>
<th>Gravel</th>
<th>Gravel</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to -5 C and rising</td>
<td>1 to -10</td>
<td>1 to -10</td>
</tr>
<tr>
<td>Some snowpack or ice, no precipitation</td>
<td>84</td>
<td>126</td>
</tr>
<tr>
<td>Mostly snowpack or ice covered, or light precipitation</td>
<td>126</td>
<td>189</td>
</tr>
<tr>
<td>Snowpacked or Iced over, or heavy precipitation</td>
<td>224</td>
<td>336</td>
</tr>
</tbody>
</table>

**PRODUCT:** Premix

<table>
<thead>
<tr>
<th>Setting</th>
<th>Calibrated Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre bare (3m)</td>
<td>0 to -5</td>
</tr>
<tr>
<td>Kg premix/km</td>
<td>Kg premix/km</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

**PRODUCT:** Sand Only

<table>
<thead>
<tr>
<th>Setting</th>
<th>Calibrated Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre bare (3m)</td>
<td>0 to -5</td>
</tr>
<tr>
<td>Kg sand/km</td>
<td>Kg sand/km</td>
</tr>
<tr>
<td>1</td>
<td>65</td>
</tr>
<tr>
<td>2</td>
<td>130</td>
</tr>
<tr>
<td>3</td>
<td>250</td>
</tr>
<tr>
<td>4</td>
<td>500</td>
</tr>
<tr>
<td>5</td>
<td>650</td>
</tr>
<tr>
<td>6</td>
<td>950</td>
</tr>
<tr>
<td>7</td>
<td>1200</td>
</tr>
</tbody>
</table>

#### NOTES

- Assumes prewetting of all products - add 30% more if not
- Assumes loose snow is plowed off road prior to application
- See supervisor for applications under other conditions.
- Service Standard seeks centre bare conditions 4 hours after storm

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<table>
<thead>
<tr>
<th>Pavement Temperature</th>
<th>Gravel</th>
<th>Gravel</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to -5 C and rising</td>
<td>1 to -10</td>
<td>1 to -10</td>
</tr>
<tr>
<td>Some snowpack or ice, no precipitation</td>
<td>50 kg/km</td>
<td>100 kg/km</td>
</tr>
<tr>
<td>Mostly snowpack or ice covered, or light precipitation</td>
<td>100 kg/km</td>
<td>200 kg/km</td>
</tr>
<tr>
<td>Snowpacked or Iced over, or heavy precipitation</td>
<td>200 kg/km</td>
<td>300 kg/km</td>
</tr>
</tbody>
</table>
3.6 Material Usage

Table 3.5 portrays the chloride material usage over the past 3 year period.

<table>
<thead>
<tr>
<th>Year</th>
<th>Table 3.5 CHLORIDE USAGE</th>
<th>Winter Operations</th>
<th>Summer Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Salt/Sand Mix Tonnes</td>
<td>Winter Sand Tonnes</td>
</tr>
<tr>
<td>2005 to date</td>
<td></td>
<td>11201</td>
<td>977</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td>19409</td>
<td>1718</td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td>18537</td>
<td>3066</td>
</tr>
</tbody>
</table>

Note 2 – covers January to March, 2005

In 2004/2005, the stockpile contains a blended salt/sand mix containing 50 percent salt by weight for use on paved surfaces, while winter sand containing 5 percent salt to prevent freezing is used on gravel roads. Between 2004 and 2001, the stockpile contained a blended mix of 25 percent salt, 7 percent calcium, 68 percent sand for use on paved surfaces, while the winter sand contained 1 percent calcium.

Currently, salt brine is used as a prewetting agent in conjunction with on board pre wet equipment.

The use of calcium chloride for dust control during the summer months is a function of the number of gravel roads and general weather conditions. A continuation of the current program of paving rural gravel roads will achieve a reduction in calcium chloride usage.

3.7 Equipment

For winter maintenance the Town’s fleet consists of:

- 6 pick ups for road patrol;
- 10 tandem combination spreader/plow/wing units;
- 10 single axle combination spreader/plow units (one is a spare and the ¾ ton pickup is allocated to parking lots);
- 4 graders;
- 5 sidewalk maintainers;
• 4 loaders and
• 1 backhoe

In addition, contractors supplement Town resources by providing 2 tandem combination plow/spreader unit and 1 single axle combination plow/spreader unit together with operators. This equipment is garaged at Yards 1 and 2.

Table 3.6 provides an inventory of the winter maintenance fleet. Prior to each winter season the fleet undergoes a pre season mechanical review to determine road worthiness; the appropriate winter equipment is installed and safety checked. Nine of the eighteen spreader units are equipped with electronic controllers and with pre wet capability at this time.

3.8 Yard Facilities

The Town currently has 3 yards, namely:
• Yard 1, Castlederg Road;
• Yard 2, Quarry Road; and
• Yard 3, Highway 50/Columbia Way.

Table 3.7 provide a summary audit of these facilities. While Yard 3 does not contain winter material storage, it is used as a vehicle storage and mobilization area for winter operations.

Of note, is the lack of containment cells for the existing salt brine tanks to contain leaks or a major tank rupture. As well, general yard grading and paving of the outdoor circulation areas would improve surface drainage and minimize ponding in all three yards. Plans are underway in Yards 1 and 2 for site improvements in 2005 which would accommodate these deficiencies.

3.9 Snow Removal and Disposal

Generally speaking, the removal of snow from Town roadways and facilities is undertaken when the accumulation of snow impacts public safety, emergency access routes, street parking in commercial areas, vehicular and pedestrian traffic and parking lot capacity. As well, cul-de-sacs and dead end roads having little or no capacity to store snow are candidates for snow removal.
Table 3.8 describes the general site conditions for the Town's snow storage area south of Yard 3. The storage site at Highway 50/Columbia Way accommodates the snow storage from the eastern sector of the Town. For the western sector, staff currently rely on the Peel Region facility in Alton. Currently, the Region are reviewing their snow storage sites from an environmental perspective with a view to initiating best practices for the continued storage of snow and/or finding new storage sites.

3.10 Weather Monitoring and Communications

To supplement the Town road patrol information, staff interface with emergency service providers and Regional patrollers who monitor regional roads within Caledon. The Region also provides staff with weather forecasts for the Caledon area 4 times/day from their service provider World Weather Watch. As well, staff access the Weather Network website for event and forecast weather information.
## TABLE 3.6  WINTER FLEET AUDIT

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>VEHICLE ID</th>
<th>Painted Vehicle</th>
<th>Tandem</th>
<th>Tri-Axle</th>
<th>Single Axle</th>
<th>Electronic Controllers</th>
<th>FreQuency Wetting</th>
<th>Spinners</th>
<th>LOADERS</th>
<th>GRADERS</th>
<th>SIDEWALK PLOW SPREADER</th>
<th>BACKHOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yard 1</td>
<td>316</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>348</td>
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<td>Yes</td>
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### TABLE 3.6 WINTER FLEET AUDIT

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>VEHICLE ID</th>
<th>Patrol Vehicle</th>
<th>Fandom</th>
<th>Tri axle</th>
<th>Single Axle</th>
<th>Electronic Controllers</th>
<th>Pre Wet</th>
<th>Spinners</th>
<th>LOADERS</th>
<th>GRADERS</th>
<th>SIDEWALK PLOW/SPREADER</th>
<th>BACKHOE</th>
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### TABLE 3.7 FACILITY AUDIT

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<th>LOCATION</th>
<th>VEHICLE ID</th>
<th>Washing On- Side</th>
<th>Washing Inside Outside</th>
<th>Oil/Water Separation</th>
<th>Drainage</th>
<th>Material Storage</th>
<th>Structure Type</th>
<th>Floor Impervious</th>
<th>Loading Inside/Outside</th>
<th>Door Overhang</th>
<th>Lighting</th>
<th>Ventilation</th>
<th>Perfor Loading Pad</th>
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<tr>
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<td>Yes</td>
<td>Inside</td>
<td>Yes</td>
<td>To perimeter ditch and Retention pond</td>
<td>Sand and Salt</td>
<td>Coverall</td>
<td>Yes (Outside)</td>
<td>No</td>
<td>Yes</td>
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<td>Yard 2</td>
<td>Yes</td>
<td>Inside</td>
<td>Yes</td>
<td>Surface run off to storm sewer/well tile drain, out fall into conservation lands</td>
<td>Sand and Salt</td>
<td>Wood/Steel Cladding</td>
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<td>Surface run off to roadside ditch and conservation lands</td>
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</table>
Infra red thermometers (IRT’s) mounted on all of the winter maintenance fleet are capable of measuring pavement temperatures which further improves the storm response capabilities. All winter maintenance vehicles are equipped with two way radios and staff are responsible for reporting changing weather and/or road conditions. External communication with the general public ranges from media press releases to responding to individual inquiries.

3.11 Training and Documentation

The Public Works and Engineering Department has provided training for the Town’s maintenance staff for many years. Each year the Manager of Public Works together with key managerial staff within the Department assesses the need and available resources required for winter maintenance staff training programs. All current winter maintenance staff have successfully completed training modules to effectively deal with ice/snow control. For the past two years, the training has focused on legislative requirements and hands on training to ensure winter readiness.

Prior to the winter season, senior staff convene a 1 ½ day winter focus session with staff to review the goals and objectives for the upcoming winter season, reinforce procedures and protocols, discuss equipment, material and timing requirements, assignment of tasks and schedules, health and safety issues, and clarify questions or any areas of concern. During the winter season biweekly meetings are held with the operators to review operations or any areas of concern, and compliance issues. In addition, operator training courses and external winter maintenance seminars for supervisors and lead hands have been provided in the past.

Key staff maintain documentation on:
- Vehicle call numbers by staff;
- Employee/yard/key contacts;
- Sidewalk and walkway winter maintenance route inventory;
- Roadway snow plow routes; and
- Parking lot inventory.

On a daily basis, storm response details are summarized as outlined in Figure 2. Figures 3 to 6 illustrate the daily activity logs that patrollers and operators are required to complete and hand in. Town staff also retain records for the purchase of salt, salt brine and winter sand. On the other hand, staff have not, as yet, utilized the download capabilities of the electronic controllers on their spreaders to obtain detailed spread data by routes and storm event.
## 2005 Storm Summary

### Salt Management Plan

### Town of Caledon

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<th>Date</th>
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<td>Jan 2 - Jan 3</td>
<td>510 - 5 hrs</td>
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**Figure 3**
# Figure 5

## Daily Time Sheet & Activity Report

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### Labour

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### Inventory Materials

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### Sign Material

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### Rented Equipment

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**Operator**

**Foreman**

© Giffels
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<tr>
<th>TIME OUT</th>
<th>TIME IN</th>
<th>SAND LOAD</th>
<th>SALT LOAD</th>
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<th>FOR SIGN INSTALLATION MARK IN TYPE, POST AND LOCATION</th>
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4.0 Salt Management Plan

4.1 Overview

This chapter will present the elements of the SMP for the Town of Caledon. The plan will outline the steps required to effectively manage road salt for winter maintenance activities within the Town, and will cover the following areas:

- winter maintenance policies;
- equipment upgrading, calibration and washing;
- materials ordering, delivery, storage, handling and record keeping;
- weather forecasting;
- storm response;
- snow removal and disposal;
- snow and ice control training;
- technology review;
- communications strategy; and
- environmentally sensitive areas.

These plans are not meant to be a comprehensive consideration of every possible best management practice, yet rather a listing of improvements that are seen to be beneficial and feasible considering current conditions. Each element within the plan will cover:

- the activity intent and current situation;
- the goals;
- the timetable for achieving the stated goals;
- the responsibility for implementation;
- the environmental impacts; and
- performance measures.

The following provides the elements of the SMP pertaining to the Town of Caledon:

4.2 Winter Maintenance Policies

General: It is intended that the various policies relating to the winter maintenance program be reviewed on an
annual basis to determine whether any revisions are required or warranted.

Staff have established level of service and maintenance operating procedures in accordance with the Minimum Maintenance Standards for Municipal Highways which have been accepted by the community at large. Council has also adopted a level of service policy for the winter maintenance of Town sidewalks and paths.

Goal/Timetable:
- Staff will continue to work in compliance with the Minimum Maintenance Standards for Municipal Highways.
- Winter maintenance operating procedures will be reviewed annually and updated as needed. If changes are required, Council endorsement is to be obtained.

Responsibility: Director of Public Works and Engineering, and the Manager of Public Works.

Environmental Impacts: Winter maintenance operating procedures form the foundation for program delivery and can have a significant impact on the environment.

Performance Measure: Standard operating procedures for winter maintenance.

4.3 Equipment Upgrading

General: It is intended that the winter maintenance fleet be capable of delivering appropriate levels of de-icing materials within a full range of climatic conditions.

Currently nine of the eighteen spreader units are equipped with:
- electronic controllers capable of monitoring the volume and location of material spread;
- pre wet capabilities which allow more material to remain on the pavement and result in a faster longer lasting effect of the salt/sand mix breaking the snow/ice bond; and

All of the winter maintenance fleet are also
4.4 Equipment Calibration

General: Properly calibrated equipment is one of the keys to the effective placement of de-icer material on Town roadways.

Currently, the spreaders are being calibrated and the spreader routes are benchmarked.

Goal/Timetable: All spreaders are to be calibrated and all routes benchmarked each year (i.e. calculate the theoretical material spread/km). During the winter season as the equipment comes in for maintenance the spreader units are to be checked and recalibrated as needed, or as a minimum the calibration settings should be rechecked mid winter.

Responsibility: Manager of Public Works and Fleet Supervisor

Environmental Impacts: Proper equipment calibration and maintenance will ensure that the proper volume of de-icing salts can be spread onto the roadway.
Performance Measure: Spreaders calibrated by November 1 of each year. Routes benchmarked by November 1 of each year. Number of spreaders checked/recalibrated each year.
Comparisons are to be developed over the winter season:
• of material spread rates across routes, across vehicle units and across operators;
• of each route and vehicle unit; and
• of actual spread ratio performance against industry spread rates.

4.5 Equipment Washing

General: It is intended to reduce the amount of chlorides, oil grease and grit that is discharged back into the environment.
At the present time, the equipment is washed indoors with all wash bays having oil/water separation prior to its release.

Goal/Timetable:
• All equipment washing will continue to be inside to minimize any discharge back into the environment.
• At the conclusion of each storm cycle, all vehicles involved in winter maintenance activities are to be washed and placed in readiness for the next storm event.

Responsibility: Public Works Supervisors and Operators to ensure equipment washing is completed at the end of each storm cycle and the vehicle washing is indoors.

Environmental Impacts: Vehicle wash water contains salts, oil, grease and dirt and can have an adverse affect on the environment if allowed to be unchecked.

Performance Measure: Percentage of vehicles washed indoors and passed through oil/water separator before being placed in readiness for the next shift.

4.6 Material Ordering and Delivery

General: It is intended to maintain best practices and procedures in the ordering and delivery of de-icer
In the fall season, salt, winter sand and salt brine is delivered and stockpiled. The winter sand is mixed with salt (50 percent) for use on paved roads and mixed with a 5 percent salt content for use on gravel roads. The mixing occurs on paved surfaces and all material is transferred into a covered structure within 24 hours. Liquid salt brine is transferred into storage tanks at Yards 1 and 2.

Goal/Timetable: • To minimize salt loss to the environment, the following measures are to be taken each year:
  (a) ensure that the deliveries of salt and sand are covered with a waterproof tarpaulin and occur in good weather; and
  (b) ensure that the loading pads are swept clean following the transfer of material to storage.
  (c) ensure that the salt brine tanks have been properly inspected for leaks and containment units are in place to prevent major spills (also refer to Section 4.7) prior to accepting salt brine deliveries.

• All deliveries are to be recorded on approved forms to summarize:
  (a) weather conditions;
  (b) required tarping;
  (c) transfer of material indoors within 24 hours;
  (d) loading pad cleaned; and
  (e) weigh ticket with truck number and net weight.

• The initial stockpiling at each yard should be completed prior to October 31st of each year. During the initial stockpiling a sample to ascertain the material gradation and moisture content should be completed and appropriate action taken should the samples fail.

Responsibility: Manager of Public Works for ensuring that the ordering and delivery practices are complied with.

Roads Supervisors for ensuring that the ordering and delivery practices are implemented.
4.7 Materials Storage and Handling

General: It is intended to maintain best practices and procedures for the storage and handling of winter maintenance materials.

The Town currently stores salt in covered structures at Yard 1 and 2. Paved loading pads are used for delivery and loading/unloading the spreaders. The loading pads are graded inward to prevent any drainage from leaving the inside storage areas. The inside storage areas have an impervious pad. The structures are inspected each spring to identify and repair any deficiencies to the floor or exterior areas of the structure. Repairs to the structures are normally scheduled and completed prior to the following winter season.

Salt brine is also stored in outside tanks in Yard 1 and 2 for pre wet application. The tanks currently do not have any containment cells to protect against major spills or leakage.

Goal/Timetable:
- To properly maintain the storage and handling of de-icing liquid. The following measures are recommended:
  (a) the storage tanks are to be inspected
regularly for leaks;

(b) the storage tanks must be protected against
damage from vehicles;

(c) the storage tanks must possess automatic
shut off valves; and

(d) containment units for all liquid storage
tanks are to be installed.

• To improve storage and handling of sand and
salt, the following measures are to be followed
each year:

(a) when loading/unloading spreaders outside
the storage structure, the loading is to occur
on the impervious loading pad; any
material spilled during loading/unloading
spreader equipment should be collected
and conveyed back to the storage area as
soon as possible;

(b) spreaders should not be loaded beyond
their capacity to avoid spillage during
operations;

(c) ensure no frozen blocks of material are
placed in the spreaders when loading. Any
frozen blocks should be pushed into a
corner of the storage area and allowed to
thaw and dry prior to introducing this
material to the stockpile;

(d) check the area lighting at to ensure that the
lighting is functional;

(e) document the inspection and repair of the
storage structures; and

(f) when replacing a storage structure or
adding a new structure the TAC Code of
Practice for Design and Operation of Road
Maintenance Yards should be followed.

• To improve the overall yard drainage, areas
that are used for circulation and parking are to
be paved within the next 3 years in accordance
with a staged plan which would also
incorporate the salt management
improvements in each yard.

Responsibility: Manager of Public Works to ensure the guidelines for “good house keeping practices” are
Roads Supervisors and Operators to ensure that the guidelines for “good housekeeping practices” are followed.

Environmental Impacts: Improper housekeeping practices related to the storage and handling of salt can increase the potential for loss to the environment.

Performance Measure: Audit compliance through periodic yard inspection.

4.8 Material Record Keeping

General: It is intended to retain an accurate record of the amount of material used by routes by vehicle and by storm event.

At the present time, material usage by route, vehicle and storm is reported by daily Operator logs and storm summaries are prepared. Typically, material usage is rationalized by comparing the amount of material ordered with the residual inventory.

Nine of the eighteen Town spreaders are equipped with electronic controllers. In January, 2005 staff have initiated a process of downloading data from the electronic controllers. However, staff have yet to implement a review/analysis process for the data.

Goal/Timetable: For the 2005 – 2006 winter season, a material tracking system is to be implemented to track material usage by vehicle, route and storm and be capable of comparing usage to benchmarked rates. By providing an accurate record of material usage by route and vehicle and by storm, staff will be able to fine tune the amount of material to be spread for varying climatic and pavement conditions. The immediate goal will be to compare usage with benchmarked routes and to rationalize the amount of material ordered with the residual inventory.
Responsibility:

• Staff will continue to experiment with spread rates on vehicles equipped with pre wet capability with the goal of reducing the amount of material spread.

• On a seasonal basis the amount of material used versus amount stored is to be reconciled with the deliveries and the daily usage records.

• For the 2005 – 2006 winter season, staff are to download data from the electronic controllers to assist in maintaining material records.

Manager of Public Works and Roads Supervisors for the design and implementation of a material tracking system.

Roads Supervisors for ensuring that the necessary equipment is operating properly to measure the amount of material placed on roads, and for summarizing the data.

Operators for completing and returning a daily sanding, salting and plowing log at the end of each day.

Environmental Considerations:

Effective salt management requires an accurate accounting of usage by storm, route and vehicle.

Performance Measure:

Record of material usage by storm, route and vehicle together with a year end material reconciliation.

4.9 Weather Forecasting

General:

The intent is to provide timely and accurate weather information to assist in decision making.

Currently, staff have access to various meteorological sources (Section 3.10). In addition to the weather forecast data, the Town’s supervisory and patrol fleet are equipped with IRT’s to measure pavement temperatures.
Goal/Timetable:

- Continue to utilize the pavement temperature data from the IRT's to assist in decision making of when to apply material.
- Continue to use meteorological services to obtain accurate weather forecasting information four (4) times daily throughout the winter season.
- Ensure that the weather forecast data is made available to the appropriate supervisory staff and after hours patrol staff.
- Explore opportunities and options with the Region in providing enhanced forecasted and real time weather and pavement information on Town Roads.

Responsibility:

Director of Public Works and Engineering, and Manager of Public Works meet with representatives of the Region to explore options and/or opportunities for providing enhanced weather and pavement data.

Manager of Public Works to ensure that accurate weather forecasting information is reported at least four (4) times daily throughout the winter season.

Environmental Impacts:

The effective use of de-icing material is dependant on accurate weather information and informed decision making. Inaccurate weather information and/or poor decision making can result in untimely use of salt.

Performance Measure:

Delivery of clear, accurate weather forecasts at least 4 times daily between November and April each year.

4.10 Storm Response

General:

It is intended to provide criteria and guidelines to standardize staff response for various combinations of precipitation, pavement temperature and traffic volumes.

Currently, staff react to visual patrols and weather reports from various sources to initiate the mobilization of the operators for plowing, de-icing
action. General guidelines are presently available to patrollers and operators for storm response.

Goal/Timetable: • Prior to the 2005 - 2006 winter season, formal guidelines for maintenance actions for each type of storm event, for various pavement temperatures and conditions, and for various initial and subsequent operations are to be prepared. [Appendix D provides an example from the Region of York covering weather events of light snowfalls, light snowfalls with periods of moderate or heavy snow, moderate to heavy snow storms, frost or black ice, freezing rain and sleet storms. Appendix E provides an example from the District of Muskoka for centre bare and snow covered roadways.]

• A 2 to 5 year goal will be to monitor the records of storm response in relation to the established guidelines in order to assess any necessary changes.


Roads Supervisors and Operators for ensuring the implementation of appropriate storm response treatments.

Environmental Impacts: Snow and ice control decisions that are not consistent with actual weather and road conditions will lead to inefficiencies in storm response and inappropriate material usage.

Performance Measure: A documented storm response plan

Accurate and complete record of storm response

4.11 Snow Disposal Sites

General: It is intended to examine the Town's existing snow disposal site to reduce or eliminate the environmental impacts.

Currently, collected snow is stored either in the Town's Highway 50/Columbia Way site or in the Region's Alton site. There has been no benchmark
established to determine the levels of salt, oil/grease and sedimentation at either site. The Region is in the process of assessing the environmental issues surrounding their snow storage areas.

Overall, there does not seem to be a long term strategy in place for the handling and storage of snow which is removed from Town facilities.

Goal/Timetable:

- The snow storage area at Highway 50 and Columbia Way is to be monitored to determine the levels of salt, oil/grease and heavy metals present prior to the 2005/2006 winter season, during the season and after the season. The results of the monitoring program are to be used to initiate the mitigation of any adverse environmental impacts which have been identified before the 2007/2008 winter season.

- Each Spring, all litter and debris are to be collected from the snow storage area and disposed of.

- Prior to the 2006 – 2007 winter season, staff are to develop a long term strategy for snow removal from Town facilities which may include such consideration as the use of mechanical melters, new storage sites, revised criteria for removal, and site specific storage design (i.e.-ensure storage areas have impervious liners and melt water directed to a collection area prior to its release into a storm water system). The results of this review are intended to be presented to Council with the recommendations programmed for implementation in the 2006 – 2010 Capital Works Program.

- Best Practices for site operation and record keeping as it relates to snow storage areas (Syntheses of Best Practices, Road Salt Management, Transportation Association of Canada) are to be followed on an annual basis.

Responsibility: Manager of Public Works for implementing a monitoring/mitigation program for snow storage areas.
Roads Supervisors for ensuring all litter and debris are collected and disposed of.

Environmental Impacts: Review of the snow disposal site and the disposal operations together with a long term strategy for snow removal operations can lead to a reduction of environmental impacts.

Performance Measure: Compliance with Ministry of Environment regulations.

4.12 Winter Patrol and Level of Service

General: It is intended that winter road conditions are monitored in an appropriate fashion to be able to react to changing weather and road conditions and to ensure that the levels of service for the motoring public are maintained.

Currently, the Town provides a patrol to inspect and monitor road conditions in compliance with the Provincial Minimum Maintenance Standards.

It should be noted that in providing 24 hour around the clock winter patrol between November and April each year, staff resources are stretched (in some cases beyond the limit) in dealing with “hot spots” between storms, response to public inquiries and adhering to.

Goal/Timetable: • Prior to the 2005 – 2006 winter season standard operating procedures for road patrol are to be developed. (Appendix B provides an example of Wellington County’s level of service policies for winter operations and road patrol as adopted by County Council).

• The operating procedures are to be reviewed annually to ensure that the guidelines are consistent with the Town’s level of service expectations.

• Prior to the 2005 – 2006 winter season, staff are to report on the appropriate level of staffing required to ensure that the established overall level of patrol service is maintained for routine and emergency situations.
Responsibility: Director of Public Works and Engineering, and the Manager of Public Works for preparing the standard operating procedures.

Road Supervisors for monitoring the Patrollers to ensure that the standard operating procedures are met.

Patrollers to monitor road and weather information and make timely responses.

Environmental Impacts: Accurate interpretation of conditions and appropriate levels of action to provide safe road conditions will result in timely and efficient application of winter de-icing materials.

Performance Measure: Percentage of staff trained in snow and ice decision making.

Documentation of routine and emergency road and weather conditions and appropriate responses to situations.

4.13 Snow and Ice Control Training

General: It is intended that all staff involved in snow and ice control and effective salt management are adequately trained.

At the present time, staff receive training on an annual basis which is geared to the upcoming winter season, any legislative changes and hands on training to ensure winter readiness. However, there is no formal on going winter training program in place for snow/ice control and salt management.

Goal/Timetable: To ensure that all staff are trained and their training is refreshed annually in snow and ice control including salt management practices, training modules are to be provided in the following areas:

(a) good housekeeping practices;
(b) interpretation of weather and pavement conditions;
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(c) proper use of infra red thermometers;
(d) when and how to apply chemicals;
(e) health and safety requirements; and
(f) proper record keeping and review.

Appendix G provides an example of the OGRA winter maintenance training module for staff which are involved with winter operations.

Responsibility: Director of Public Works and Engineering, and the Manager of Public Works to arrange for the appropriate annual training modules for all staff involved in winter maintenance activities.

Environmental Impacts: Thorough understanding of good housekeeping practices, the measures of snow and ice control and the expectations of program delivery will result in a greater probability of success with the salt management plan.

Performance Measure: Percentage of staff receiving snow and ice control training.

4.14 Technology Review

General: It is intended that existing and new technologies be continually reviewed to determine their applicability in altering current practices.

At the present time, there are two areas of review and investigation which would improve the Town's overall winter operations and salt management. They are:

- A review of alternate liquid deicing products which are more environmentally friendly than salt brine. Two of the more common products that are used by municipal organizations in Ontario are Geomelt, a sugar beet based anti-icing liquid, and Caliber M1000/M2000, a corn based product blended with magnesium chloride; and
- A review of upgrading the Operations fleet by installing an automated vehicle location system to provide enriched data on winter operations, such as:
Goal/Timetable:  • On an annual basis new technologies and proven alternative methods to combat winter storms will be reviewed. Pilot studies incorporating relevant winter maintenance methodologies will be recommended where deemed appropriate.

• Consideration should be given to upgrading the Operations fleet within the next 3 years by installing an automated vehicle location system. In this regard, it is suggested that program funds be allocated in the 2006 budget to initiate a pilot study.

• Prior to the 2006 – 2007 winter season, staff are to investigate the use of alternative de-icing liquids for use in on board pre-wet applications.

Responsibility:  Director of Public Works and Engineering, and Manager of Public Works to monitor, report on new technologies.

Environmental Impacts:  New techniques, procedures and technologies may provide more effective methods of monitoring and/or reducing the amount of salt entering the environment.

Performance Measure:  Annual report on new developments in snow and ice control.

4.15 Communications Strategy

General:  It is intended that an overall communications strategy with respect to the Town’s winter maintenance program be effectively communicated to not only staff but also the public.

Currently, the Town posts a brief winter road operations message on the time to clear roads.
following storm events.

As well, staff have produced an Operations Manual which provides:

(a) key staff contact list with emergency telephone numbers; and

(b) sand/salt, plow and patrol routes.

Goal/Timetable:

• Prior to the 2005 - 2006 winter season, a “Winter Maintenance and Control Brochure” is to be prepared and distributed to the general public and the media to inform residents that road salt is not toxic to humans and to provide information on the specifics of the Town’s winter maintenance program.

• Highlights of the Winter Maintenance and Control Brochure is to be placed on the Town webpage and updated annually to provide fresh information relative to winter operations.

• Prior to the 2005 - 2006 Winter season, the Operations Manual for staff is to be supplemented to also include:
  
  (a) maintenance procedures;
  
  (b) material application rates;
  
  (c) expected load coverage by various sizes of equipment;
  
  (d) operator and patroller assignments and shift coverage including holiday schedules;
  
  (e) guidelines for calibration and benchmarking routes;
  
  (f) record keeping requirements;
  
  (g) communication strategy with area media, school board transportation agencies and the public;
  
  (h) arrangements to recharge facilities;
  
  (i) loader responsibilities; and
  
  (j) pre event planning for possible road closing that may occur due to reduced visibility and drifting snow or for snow removal operations.
Responsibility: Manager of Public Works.

Environmental Impacts: Increased awareness of the role and management of snow and ice control in winter maintenance operations will provide the area residents and staff with a greater understanding of the challenges in combating winter storms.


Up to date information on winter maintenance operations on the Town web site.

4.16 Environmentally Sensitive Areas

General: It is intended to understand the impacts of the winter maintenance practices on environmentally sensitive areas within the Town of Caledon.

Currently the Region of Peel and Town Official Plans defines the green lands system which includes:

- wetlands;
- environmentally sensitive areas;
- streams and valley lands;
- ponds, lakes and reservoirs;
- areas of natural and scientific interest;
- woodlands;
- fish, wild life and plant habitat;
- flood plains and hazardous lands; and
- threatened or endangered species.

To date, there has been no information available regarding the impacts of winter maintenance activities on Town's existing environmentally sensitive areas.

Goal/Timetable: Year 1 - Town staff in collaboration with area conservation staff and Region of Peel Public Works will start to identify and rank environmentally sensitive areas within Caledon. For the most vulnerable areas (highest ranked), a monitoring program will be
investigated and developed, where appropriate, to explore the level of impact resulting from the Town and Region winter maintenance practices.

- Year 2 - The areas subjected to monitoring will be reviewed and an appropriate action plan is to be developed where practical. Also in year 2 consideration is to be given to an expansion of the monitoring program to other environmentally sensitive areas.

- Beyond Year 3 - A monitoring program of environmentally sensitive areas is to continue in order to provide a historical record of chloride concentrations as it relates to winter maintenance practices within the Town.

**Responsibility:** Director of Public Works and Engineering, and Manager of Public Works in collaboration with the Regional staff and area Conservation Authority staff.

**Environmental Impacts:** Environmentally sensitive areas that are impacted by winter maintenance practices may require unique solutions and specific action programs to mitigate the impacts.

**Performance Measure:** Identification and ranking of environmentally sensitive areas monitoring test results against current practices and mitigation measures.
5.0 Monitoring and Updating

The Salt Management Plan is intended as a starting point for the Town of Caledon to proceed with the implementation and continuance of best management practices for winter maintenance operations. The long term goal of this plan is to protect the environment from excessive concentrations of road salts while at the same time, ensure that winter roads are kept safe.

The Salt Management Plan proposes a number of initial goals and estimated timelines for implementation by Caledon. Subject to endorsement and resource allocation by Council, the plan elements are to be programmed into the capital and operating budget.

As well, in order that Environment Canada is kept abreast with the existence of a Salt Management Plan, its stage of implementation and the use of road salts, each municipality has been requested to submit a report by June 30, 2005 and every June 30th thereafter. Appendix H contains a copy of the “Annual Report Form” that Environment Canada has prepared together with submission information.