

## CEAC REPORT 2005-01

TO: Mayor and Members of Council

FROM: John Abbott, Chair of Caledon Environmental Advisory Committee (CEAC),

BY: Road Salt Subgroup; Don Webb, Pete Patterson, Gavin O'Brien, Scott Caspell, Neil Morris

DATE: June 7, 2005

**SUBJECT: Road Salt Use in the Town of Caledon**

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### RECOMMENDATIONS

1. That Council receive CEAC Report 2005-01;
2. That the Town of Caledon adopt a policy to minimize salt usage in areas of well-head protection, wetlands, and sensitive aquatic receptors (i.e., rivers and creeks). For example, the ratio of abrasive to salt could be increased for the mixture used on roads, which cross sensitive areas such as these;
3. That, in support of a policy to protect sensitive areas, the Town develop plans to identify such areas and to monitor road salt usage in their vicinity;
4. That the Town develop a policy to specifically prohibit the use of ferrocyanide salts as a de-icing agent, consistent with the Town's current practice (i.e., ferrocyanide salts are not currently used);
5. That the Town develop a policy requiring safe storage of salt at patrol yards. Such policies should be far-reaching, allowing them to apply to all third party organizations providing snow removal services under contract with the Town of Caledon;
6. That the Town develop a safe disposal policy for all snow moved by truck to designated snow dump storage areas. The policy should extend to all snow removal haulage firms, street sweeping operations and 3<sup>rd</sup> party firms providing snow haulage and street sweeping services under contract with the Town of Caledon during the winter and spring road clean-up seasons. The policy should restrict snow and sweepings dump sites to locations outside of well-head protection zones and away from areas adjacent to sensitive wetlands or other aquatic receptors; and

7. That, if deemed necessary, the Town develop a public information brochure to sell the public on the benefits of pre-snowfall application of salt and abrasive de-icing agents, with the aim of dispelling any public perception that salt is being over-applied through adoption of pre-emptive de-icing agent application.

CEAC has met with the Town of Caledon Public Works and Engineering Department to discuss issues related to road salt. We understand that the Town is aware of the environmental issues related to road salts and has been proactively developing road salt management plans that are conceptually in line with the above recommendations. CEAC would be pleased to assist the Public Works and Engineering Department in meeting their salt management objectives and in any other way desired.

## **INTRODUCTION**

On average, 5 million tonnes of road salts are used each year as de-icers on roadways in Canada. Due to concerns about the large quantities of chlorides being released to the environment, road salts underwent a comprehensive five-year scientific assessment under the *Canadian Environmental Protection Act (CEPA, 1999)*. The road salts assessment covered the chloride salts — sodium chloride (NaCl), calcium chloride (CaCl<sub>2</sub>), magnesium chloride (MgCl<sub>2</sub>) and potassium chloride (KCl) — as well as brines used in road de-icing/anti-icing and dust suppression, the salt portion of abrasive mixtures and ferrocyanide additives. The assessment concludes that road salts that contain inorganic chloride are “toxic” as defined in Section 64 of *CEPA* (1999). Any party responsible for the storage or use of road salt must comply with the Act, and in essence take all reasonable steps to manage releases of road salt to the environment.

The Town of Caledon Public Works and Engineering Department has developed a Salt Management Policy, with a primary objective of providing efficient and effective winter maintenance for road safety and in keeping with applicable Provincial Legislation and accepted standards, while striving to minimize adverse impacts to the environment. In support of the Policy, the Town establishes a Salt Management Plan. Regular monitoring, review, and staff training and education will be tools by which the Plan will be kept current and effective from all perspectives, including environmental protection. In going forward, it is advised that the environmental considerations of both the Policy and the Plan are reflective of the current general understanding of the potential impacts of road salt (e.g. as documented in Environment Canada’s Priority Substances Report) and are also based on factors specific to Caledon’s environment and its road maintenance efforts. To the extent possible, road salt management should also consider other key endpoints of concern that overlap with environmental protection (e.g. source water protection). Best management practices have been developed by other stakeholder groups (e.g. the Transportation Association of Canada) and could be of value to the Town in developing the Salt Management Plan.

The following report discusses the environmental concerns and obligations associated with road salt application, in context of the obligations associated with winter road

maintenance and public safety. The report also reviews and summarizes some of the existing practices and recommendations with respect to management of road salts for the perspective of environmental protection.

## **BACKGROUND**

### **Road Safety**

“It is all about risk”.

How much risk we willing to assume while driving on the highways in Ontario, while at the same time reducing the environmental impact by using chlorides and other de-icing chemicals to keep our highways safe? Also, how safe is “safe”? We make statements such as “minimize traffic crashes, injuries and mortality”. How much salt do we have to use to minimize traffic crashes, injuries and mortality? These are the questions that the province and municipalities need to address. Equally, private property owners also need to practice ‘due diligence’ with respect to making sure the public do not suffer from slips and falls.

Application of a chemical freezing-point depressant onto a traveled surface inhibits the development of a bond between the snow or ice and that surface. Furthermore, moderate and periodic reapplications of the chemical during a precipitation event can continue this effect. Such preventive operations are the core of an “anti-icing” program. Anti-icing is simply the practice of *preventing* the formation or development of bonded snow and ice by timely applications of a chemical freezing-point depressant. It provides a maintenance manager with two major capabilities: the capability for maintaining roads in the best conditions possible during a winter storm, and the capability to do so in an efficient manner. As a consequence, anti-icing has the potential to provide the benefit of increased traffic safety at the lowest cost. However, to achieve this benefit, the maintenance manager must adopt a systematic approach to snow and ice control and must ensure that the performance of the operations is consistent with the objective of preventing the formation or development of bonded snow and ice. Such an approach requires use of considerable judgment in making decisions, requires that available information sources be utilized methodically, and requires that the operations be anticipatory or prompt in nature.

In contrast to anti-icing operations, a common procedure of traditional snow and ice control practice is to wait until an inch or more of snow accumulates on the pavement before beginning to plow and treat the highway with chemicals or abrasives. While this procedure is straight-forward, it frequently leads to a compacted snow layer (pack) that is tightly bonded to the pavement surface.

A subsequent "de-icing" of the pavement is then necessary, usually requiring a large quantity of chemical to work its way through the pack to reach the snow/pavement

interface and destroy or weaken the bond. Because this operation is reactionary, it requires less judgment than anti-icing. Yet as a result of its inherent delay, it often provides less safety, at higher cost, than anti-icing. Nonetheless, the reactive technique of de-icing will remain important for snow and ice control, as there will always be lower priority service levels that preclude preventive operations.

Anti-icing is well suited to routes with a higher level of service. This is because the vigilance and timeliness of successful anti-icing operations are most compatible with service levels requiring earlier and higher frequency winter maintenance operations. It is also because the preventive nature of anti-icing can support higher service level objectives such as maintaining bare pavement throughout a storm or returning to bare pavement as soon as possible following pack formation. In fact, because of the demanding requirements of higher service levels, many maintenance forces have been instinctively implementing elements of anti-icing practices for years. Sufficient evidence has accumulated from over the years that anti-icing testing demonstrates the effectiveness of anti-icing practices.

With these guiding principals, anti-icing practices are formulated into policies and procedures by local and regional governments.

## **Salt Usage in Canada**

Road salts are used as de-icing and anti-icing chemicals for winter road maintenance, with some use as summer dust suppressants. Inorganic chloride salts considered in this include sodium chloride, calcium chloride, potassium chloride and magnesium chloride.

In the environment, these compounds dissociate into the chloride “anion” (negatively charged ion) and the corresponding “cation” (positively charged ion, such as sodium or potassium). In addition, ferrocyanide salts are added as anti-caking agents to some road salt formulations.

It is estimated that approximately 4.75 million tonnes of sodium chloride were used as road salts in the winter of 1997–98 and that 110,000 tonnes of calcium chloride are used on roadways in a typical year. Very small amounts of other salts are used. Based on these estimates, about 4.9 million tonnes of road salts are released to the environment in Canada every year, accounting for about 3.0 million tonnes of chloride.

The highest annual loadings of road salts on a road-length basis are in Ontario and Quebec, with intermediate loadings in the Atlantic Provinces and lowest loadings in the western Provinces.

**Table 1 Salt Usage in Canada by Province**

Jurisdiction	Sodium chloride (tonnes)	% of Total
Ontario	1,845,000	39%
Quebec	1,545,000	33%
Nova Scotia	374,000	8%
New Brunswick	285,000	6%
Newfoundland	222,000	5%
Alberta	182,000	4%
British Columbia	142,000	3%
Saskatchewan	53,000	1%
Manitoba	70,000	1%
Prince Edward Island	29,000	1%
Yukon	2,000	0%
Northwest Territories Nunavut	2,000	0%
<b>Canada</b>	<b>4,750,000</b>	

### **Salt Accumulation in the Natural Environment**

In 1995, road salts were added to the Priority Substances List (PSL) under the *Canadian Environmental Protection Act (CEPA, 1999)* because of concerns about the large quantities used in Canada and the potential effects of chlorides on the environment. As a result, Environment Canada had a legal obligation to conduct a comprehensive science assessment under CEPA. The assessment concludes that road salts that contain inorganic chloride are “toxic” as defined in Section 64 of *CEPA* (1999). Any party that produces, stores, or uses road salts must comply with the *Act*, and in essence take all reasonable steps to ensure that there are not unwarranted releases of road salt to the environment.

The federal Government also recognizes in the *CEPA* assessment the importance of road salts in protecting roadway safety, and is not proposing a ban on road salts or to put in place any measures that would compromise or reduce road safety. The *CEPA* assessment also notes the benefits relating to source water protection that could be realized as a result of any efforts to manage road salt applications to protect the natural environment.

Road salts enter the environment through their storage and use and through disposal of snow cleared from roadways. Road salts enter surface water, soil and groundwater after snowmelt, and are dispersed through the air by splashing and spray from vehicles and as wind-borne powder. Chloride ions are conservative, moving with water without being significantly retarded or lost. Accordingly, almost all chloride ions that enter the soil and groundwater can ultimately be expected to reach surface water; it may take from a few years to several decades or more for steady-state groundwater concentrations to be reached. Because road salts can disperse throughout the environment, environmental concerns can be associated with most environmental media (surface water, ground water, soil).

In water, natural background concentrations of chloride are generally no more than a few mg/L, with some local or regional instances of higher natural salinity, notably in some areas of the Prairies and British Columbia. High concentrations of chloride related to the use of road salts on roadways or releases from patrol yards or snow dumps have been measured. For example, concentrations of chloride over 18,000 mg/L were observed in runoff from roadways. Chloride concentrations up to 82,000 mg/L were also observed in runoff from uncovered blended abrasive/salt piles in a patrol yard. Chloride concentrations in snow cleared from city streets can be quite variable. For example, the average chloride concentrations in snow cleared from streets in Montreal ranged from 3,000 to 5,000 mg/L for secondary and primary streets, respectively. Waters from roadways, patrol yards or snow dumps can be diluted to various degrees when entering the environment. In the environment, resulting chloride concentrations have been measured as high as 2,800 mg/L in groundwater in areas adjacent to storage yards, 4,000 mg/L in ponds and wetlands, 4,300 mg/L in watercourses, 2,000 to 5,000 mg/L in urban impoundment lakes and 150 to 300 mg/L in rural lakes. While highest concentrations are usually associated with winter or spring thaws, high concentrations can also be measured in the summer, as a result of the travel time of the ions to surface waters and the reduced water flows in the summer. Water bodies most subject to the impacts of road salts are small ponds and watercourses draining large urbanized areas, as well as streams, wetlands or lakes draining major roadways. Field measurements have shown that roadway applications in rural areas can result in increased chloride concentrations in lakes located a few hundred metres from roadways.

The potential for impacts on regional groundwater systems was evaluated using a mass balance technique that provides an indication of potential chloride concentrations down-gradient from saltable road networks. The mass balance modeling and field measurements indicated that regional-scale groundwater concentrations of chloride greater than 250 mg/L will likely result under high-density road networks subject to annual loadings above 20 tonnes sodium chloride per two-lane-kilometre. Considering data on loadings of road salts, urban areas in southern Ontario, southern Quebec and the Atlantic provinces face the greatest risk of regional groundwater impacts. Groundwater will eventually well up into the surface water or emerge as seeps and springs. Research has shown 10 to 60% of the salt applied enters shallow subsurface waters and accumulates until steady-state concentrations are attained. Elevated concentrations of chlorides have been detected in groundwater springs emerging to the surface.

### **Acute and Chronic Toxic Effects of Salt**

Acute toxic effects of chloride on aquatic organisms are usually observed at relatively elevated concentrations. For example, the 4-day median lethal concentration (LC<sub>50</sub>) for the cladoceran *Ceriodaphnia dubia* is 1400 mg/L. Exposure to such concentrations may occur in small streams located in heavily-populated urban areas with dense road networks and elevated road salt loadings, in ponds and wetlands adjacent to roadways, near poorly managed salt storage depots, and at certain snow disposal sites.

Chronic toxicity occurs at lower concentrations. Toxic effects on aquatic biota are associated with exposures to chloride concentrations as low as 870, 990 and 1070 mg/L for median lethal effects (fathead minnow embryos, rainbow trout eggs/embryos and daphnids, respectively). The No-Observed-Effect Concentration (NOEC) for the 33-day early life stage test for survival of the fathead minnow was 252 mg chloride/L. Furthermore, it is estimated that 5% of aquatic species would be affected (median lethal concentration) at chloride concentrations of about 210 mg/L, and 10% of species would be affected at chloride concentrations of about 240 mg/L.

Changes in populations or community structure can occur at lower concentrations. Because of differences in the optimal chloride concentrations for the growth and reproduction of different species of algae, shifts in populations in lakes were associated with concentrations of 12 to 235 mg/L. Increased salt concentrations in lakes can lead to stratification which retards or prevents the seasonal mixing of waters, thereby affecting the distribution of oxygen and nutrients.

Chloride concentrations between 100 and 1000 mg/L or more have been observed in a variety of urban watercourses and lakes. For example, maximum chloride concentrations in water samples from four Toronto-area creeks ranged from 1390 to 4310 mg/L. Chloride concentrations greater than about 230 mg/L, corresponding to those having chronic effects on sensitive organisms, have been reported from these four watercourses through much of the year. In areas of heavy use of road salts, especially southern Ontario, Quebec, and the Maritimes, chloride concentrations in groundwater and surface water are frequently at levels likely to affect biota, as demonstrated by laboratory and field studies.

## **Abrasives Use**

Common to many snow and ice control operations is the use of abrasives. It is recognized that abrasives may be necessary when a rapid increase in friction coefficient is required, particularly at temperatures so low that chemical action is slow, and in conditions where snow or ice is strongly bonded to the pavement and cannot easily be removed. As these latter conditions are more likely to occur in the course of de-icing, abrasives treatments can be an important tool for de-icing operations.

Abrasives are not ice-control chemicals, however, and will not support the fundamental objective of either anti-icing or de-icing. Their sole function is to increase the coefficient of friction. This increase may be short lived, because traffic will rapidly disperse abrasives.

There is generally no advantage gained from the routine use of abrasives in an anti-icing program. When anti-icing operations have successfully prevented or mitigated the hazards of packed snow, for example, straight abrasives applications will provide no significant increase in friction or improvement in pavement condition. Further, a mix of abrasives and chemical will usually be no more effective as an anti-icing treatment during snowstorms than the same amount of chemical placed alone.

It even appears that the use of abrasives in the mix can be detrimental to the effectiveness of the chemical. Because of the cost associated with both application and clean-up of roads and drainage facilities, and because of the potential airborne dust problem accompanying their use, abrasives applications should not be a routine operation of an anti-icing program.

## **Risk Management**

With regard to the formulation of a road salt management and usage policy, several stakeholders have reviewed and compiled recommendations regarding best management policies and practices. For example, Environment Canada has developed a *Code of Practice for the Environmental Management of Road Salts*. This Code includes discussions of Environmental impact indicators, identification of areas vulnerable to road salts, and monitoring and measurement of progress.

Similarly, the Transportation Association of Canada (TAC) has prepared a *Syntheses of Best Practices Road Salt Management*. This calls for the adoption of proactive de-icing policies, with the aim of efficient application of de-icing salts, when required. Efficient application of salts should aim to minimize its use during application, particularly when applied preemptively. Policies should focus on development of methods to accurately predict snowfall accumulation to trigger pre-emptive salt application events, which should hopefully result in minimizing the salt quantity applied.

Environment Canada is forming a working group to advise on the selection and development of measures to limit the negative impact of de-icing chemical in Canada. A full range of options will be considered. Possible management measures could focus, for example, on reducing losses at salt storage sites, improved salt application technology and practices, meteorological forecasting tools that could lead to reduced salt use, and the use of alternate products. These measures can reduce road salt loss into the environment without affecting road safety.

In developing management measures, Environment Canada is considering a best management practices approach through a code of practice or guideline that would build on existing work being undertaken in the provinces and territories and on measures identified by the TAC in its *Salt Management Guide* and *Salt Management Action Plan*.

Specifically the TAC Plan identifies areas for reduction in the release of salts, which are as follows:

***Patrol Yards:*** Key concerns relate to contamination of groundwater at patrol yards, which in turn can be associated with problems of groundwater quality, discharge to surface water and effects on aquatic biota. In addition, run-off can result in direct impacts on surface water and on vegetation. Salt losses from patrol yards are associated with loss at storage piles—including salt piles as well as piles of sand and gravel to which salts have been added—and during the handling of salts, relating to both storage and loading of trucks. Measures would be considered to ensure

appropriate storage of salts and abrasives to help reduce losses through weathering, management practices to reduce losses during transfers, and management of stormwater and equipment washwater to minimize releases.

***Snow Disposal:*** Key environmental concerns relate to eventual loss of meltwater into surface water and into soil and groundwater at snow disposal sites. Measures would be considered to minimize percolation into soil and groundwater and direct release into water.

***Roadway Application:*** Key environmental concerns have been associated with areas of high salt use and high road density, especially in urban areas. However, in rural environmentally sensitive areas, surface and ground waters receiving drainage from roadways may also be susceptible to contamination. The selection of appropriate technology and practices or alternative products to reduce salt use will be considered subject to the overriding priority of maintaining roadway safety.

Best management practices for general use could include the use of better salt application technologies such as electronic spreader controllers, anti-icing, pre-wetting, and road weather information systems. Some of these practices prevent ice formation and lead to reduce use of salts while actually improving road safety. New technologies for general use have shown significant reductions of as much as 20 percent or more in the quantities of salts applied while improving road safety.

***Ferrocyanide Salts:*** Ferrocyanide salts are added as anti-caking agents in certain road salt formulations. The science assessment indicated possible adverse exposure for the more sensitive aquatic vertebrates in areas of very high use of road salts. To reduce possible exposure, producers of road salts could consider reducing the ratio of ferrocyanide added to road salt. Any reduction in total salt use would be expected to result in an equivalent reduction in release of ferrocyanides.

The TAC Plan also provides recommendations for optimizing the use of road salts. Considerable effort is being made by road authorities at all levels to improve the management of road salts. Some jurisdictions are well advanced in introducing technologies whereas others are just beginning to investigate these practices. The assessment of road salts and initiatives by some provinces and territories and TAC have heightened the interest in better road salt management and have been the incentive for greater action across Canada. Best management practices at salt storage facilities could significantly reduce environmental impacts without affecting road safety. However, the amount used in a season depends on the weather and severity of the winter.

The state of Massachusetts has examined the costs of using road salt and alternative anti-icing or de-icing agents or methods. In a draft report released last year, the Massachusetts Department of Public Works examined the environmental costs of sodium chloride, including the cost of corrosion to vehicles and bridges, the cost of contaminated water supplies, and the cost of damage to vegetation. The study concludes that every

additional dollar spent on the use of “pre-mix”, a 4 to 1 mixture of sodium chloride and calcium chloride, will result in a savings of at least two dollars in environmental costs. Other de-icing chemicals were not reported to be as cost-effective. Based on this report, Massachusetts will be moving to the use of pre-mix rather than straight salt (sodium chloride).

The approach of simply banning the use of salt has not worked. Such ordinances have been passed in a number of cities over the years, in part because of salt’s ability to cause corrosion in auto bodies. However, all bans were later rescinded after problems with ice buildup. For example, Tulsa, Oklahoma stopped using salt during the winter of 1985-1986. “We did make it through the entire winter without using salt.” says Mr. Winston Anderson of Tulsa’s Transportation Section. “However, we had to apply sand over and over, and the sand accumulated on the roads until it was a real problem. We also had areas where the ice never melted. The next year, we returned to our normal practice of applying a mixture of sand and salt.”

Many of the most severe cases of contamination have been caused by improper storage. When salt is stockpiled outside, uncovered, precipitation can carry high levels of salt to surrounding soil and water. The Salt Institute, a trade association for the salt industry, developed a model salt-storage building, and has encouraged states to use the model. Mr. Bruce Bertram, Technical Director, says that while they haven’t done any surveys, “We feel that most states are moving quickly to cover their salt piles. However, if a community is poor, the cost of proper salt storage can be a great burden.”

In addition to proper storage, there are methods for reducing the use of salt. Many cities simply don’t use salt in flat residential areas, except during ice storms. Like Tulsa, many use a mix of sand and salt, instead of pure salt. Spreading equipment can be made more accurate, so that less salt is needed. The salt can be wetted before being spread, so that it sticks to the road. Snow fences and rows of trees can keep snow from blowing onto the road. In Minnesota, farmers are paid to leave their corn standing through the winter in fields along the highway because it can hold blowing snow.

Mr. Rodney Pletan, State Maintenance Engineer for the Minnesota Department of Transportation, says that salt’s reputation for causing auto bodies to rust actually prevents his crews from using less of it. “If we could spread salt before forecasted snow or ice arrives, we could prevent road icing and use less salt overall. But citizens aren’t happy when they see a truck spreading corrosive salt on dry pavement.”

Alternative de-icing chemicals do exist, but are too expensive for most situations. Calcium magnesium acetate (CMA) is an alternative that has been tested. It works, and appears to cause fewer environmental problems, but is approximately 20 times more expensive to use than salt. Verglimit is a mixture of de-icing chemicals that are bonded with an asphalt roadway during paving. It is effective even in very cold temperatures, and causes very little runoff, but its installation doubles the cost of surfacing a road.

Reducing or eliminating the use of de-icing salt would mean using potentially more expensive alternatives to ensure continued management of ice on roadways. However, the use of de-icing salt can be significantly reduced through a number of measures, and covering salt stockpiles will prevent many of the most severe cases of contamination. These solutions are within reach of most transportation departments.

## **CONCLUSIONS**

The use of de-icing agents is an important component of strategies to keep roadways open and safe during the winter and minimize traffic crashes, injuries and mortality under icy and snowy conditions. Local and regional governments responsible for road maintenance are compelled to use de-icing salt as part of winter road maintenance programs. However, there are acute and chronic negative impacts potentially associated with the use of de-icing salts to maintain highways and roads free from ice and snow. Other issues include the additional costs associated with the negative impacts such as corrosion. Additionally, recent focus on the protection of drinking water quality has identified road salt application as a potential source of impairment of both surface water and groundwater sources.

Various regulatory agencies in Canada and elsewhere have recognized the potential impacts of road salts. Recently, Environment Canada assessed the environmental implications of road salt under the Priority Substances List (PSL). The benefits of road salt use were recognized by the Ministers' Expert Advisory Panel, even as they recommended that this assessment of potential impacts on the environment be conducted.

The PSL assessment concludes that any measures developed to address the environmental impacts associated with road salt applications must never compromise human safety; selection of options must be based on optimization of winter road maintenance practices so as not to jeopardize road safety, while minimizing the potential for harm to the environment. Any action taken to reduce impacts on the environment is also likely to reduce potential for contamination of groundwater-based drinking water supplies, which is clearly desirable.

In recognizing both the benefits and potential impacts of road salt, a series of best management practices have been developed by stakeholder agencies, including the Transportation Association of Canada. These practices can be used as the basis for salt management efforts by municipalities.

At present, the Town of Caledon Public Works and Engineering Department recognizes the benefits and potential impacts of using road salt as part of their winter road maintenance efforts. The Department has developed a Salt Management Policy, with a primary objective of providing efficient and effective winter maintenance for road safety and in keeping with applicable Provincial Legislation and accepted standards, while

striving to minimize adverse impacts to the environment. In support of the Policy, the Town establishes a Salt Management Plan. Regular monitoring, review, and staff training and education will be tools by which the Plan will be kept current and effective from all perspectives, including environmental protection.

In going forward, it is advised that the environmental considerations of both the Policy and the Plan are reflective of the current general understanding of the potential impacts of road salt (e.g. as documented in the Priority Substances Report) and are also based on factors specific to Caledon's environment and its road maintenance efforts. To the extent possible, road salt management should also consider other key endpoints of concern that overlap with environmental protection (e.g. source water protection). Best management practices (as discussed in the "Background" section of this report) have been developed by other stakeholder groups (e.g. the Transportation Association of Canada) and could be of value to the Town in developing its Salt Management Plan.

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John Abbott  
Chair, Caledon Environmental Advisory Committee

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