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by Mark Watson

ROAD SALT

Driving municipalities down the road to ruin

Municipalities risk contaminating drinking water, endangering all living creatures and eating away infrastructure by dumping tons of salt-based ice melting solutions on roads every winter.

It comes as no surprise to anyone who drives on North America's snow-belt roads in the winter. Treating surfaces with a salt-based de-icing compound improves traction, reducing risk to motoring traffic; but, at what cost?

Most drivers are aware of how road salt eats away at the investment in a vehicle, but that's just the tip of the salt block when it comes to environmental concerns around using salt on roads.

To be crystal clear, road "salt" is a lethal, chemical concoction of poisons, toxic compounds, and yes, actual salt. Sodium chloride, potassium chloride, calcium chloride and magnesium chloride, are only some of the components of road salt.

Road salt is typically mined from million-year-old deposits that naturally contain harmful substances such as lead, arsenic, and mercury. Ferro cyanide is added to keep it from clumping.

North America uses a lot of it on highways, streets, and sidewalks. In Canada, about 10 million tons of salt are spread on roads every winter, with another 30 million tons used in the U.S. alone. To put that in perspective, it would take 1.6 million transport trucks to move the pile. Canada's capital, the City of Ottawa is the country's largest single user of salt, averaging 177,000 metric tons of rock salt each winter, along with two million litres of liquid calcium chloride, at a cost of more than $13 million annually.

Hidden Costs in Road Salt

Though salt has proven to be effective and the cheapest method of de-icing roads, hidden costs to infrastructure and the environment are beginning to outweigh the initial savings. Using road salt every winter is degrading the soil and water crucial for human survival, as well as consuming the concrete and metal infrastructure of our urban landscape.

Salt doesn't wash away harmlessly. It is a highly corrosive substance that corrodes the infrastructure of municipalities where it's used. Roads, sidewalks, and bridges are subjected to higher rates of deterioration based on their proximity to salt. Even trees and shrubs that line public walkways suffer every season from salt absorbed into their roots.

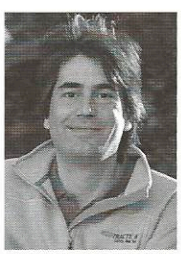
Though the upfront cost of road salt may make it seem more attractive than alternatives, when one considers the hidden costs related to the destruction of infrastructure, the cost of a ton of road salt takes on a new perspective. In fact, the International Association of Corrosion Engineers says the main cause of concrete bridge deterioration is the use of road salts.

According to Canada's National Research Council, Transportation Research Board, although road salt rarely jeopardizes the structural integrity of bridges, its corrosive properties do damage bridge decks. Chloride ions penetrate concrete and corrode reinforcing rods, causing the surrounding concrete to crack and fragment. Installing corrosion protection measures in new bridges and repairing old bridges could cost snow-belt areas millions of dollars per year.

Similarly, road salt causes the reinforcing steel in parking garages to rust, thereby compromising the structural integrity of the surrounding concrete. Installing corrosion protection measures in parking garages and restoring damaged parking garages easily runs into millions of dollars per year. Other roadside hardware and some non-highway objects near salt-treated roads also are affected by the corrosive properties of salts.

The Transportation Association of Canada confirmed in a 2003 report that, "salt can accelerate damage to some poorly-designed or poorly-constructed hot-mix asphalt pavements. Salt can cause scaling of poor-quality concrete pavements and concrete pavers. Salt can cause spalling of steel reinforced concrete by accelerating steel corrosion if cracks allow chloride ions access to the reinforcing steel. The brine resulting from road salt use can damage some thin, cracked, or poorly drained flexible pavements by causing differential frost heaving at the pavement edge or at unsealed cracks. The magnesium in magnesium chloride may react with the cement paste in concrete, weakening the pavement structure."

In the United States, the Department of Transportation Federal Highway Division says nearly one quarter of the more than 600,000 road bridges



MARK WATSON is the founder and CEO of Earth Innovations Inc and author of the "Truth About Salt" which can be viewed at www.youtube.com/thetruthaboutsalt. He can reached at 613-232-4379, ext 104 or <mwatson@earthinnovations.ca>.

in the country have deteriorated decks.

Health and Environmental Concerns

Beyond the obvious detrimental aspects of salt on infrastructure, there are also serious health and environmental concerns to be considered.

Salt doesn't break down. In fact, every ton of salt contaminates 1.64 million litres of water. And, once salt has made its way into the underground aquifers and rivers that supply our drinking water, it can never be removed. It continues to build up until water supplies have to be diluted and treated with other chemicals to become potable again.

Much of the salt is first absorbed into the earth, becoming an elemental ingredient in the nutrients sought out by roots. Trees, plants, and animals are subjected to unnatural amounts of salt, which in turn makes its way to our dinner tables. And, salt consumption is of course linked to major health risks such as hypertension, heart disease, and strokes. The federal government in Canada has warned that road salt is a hazard to health and infrastructure.

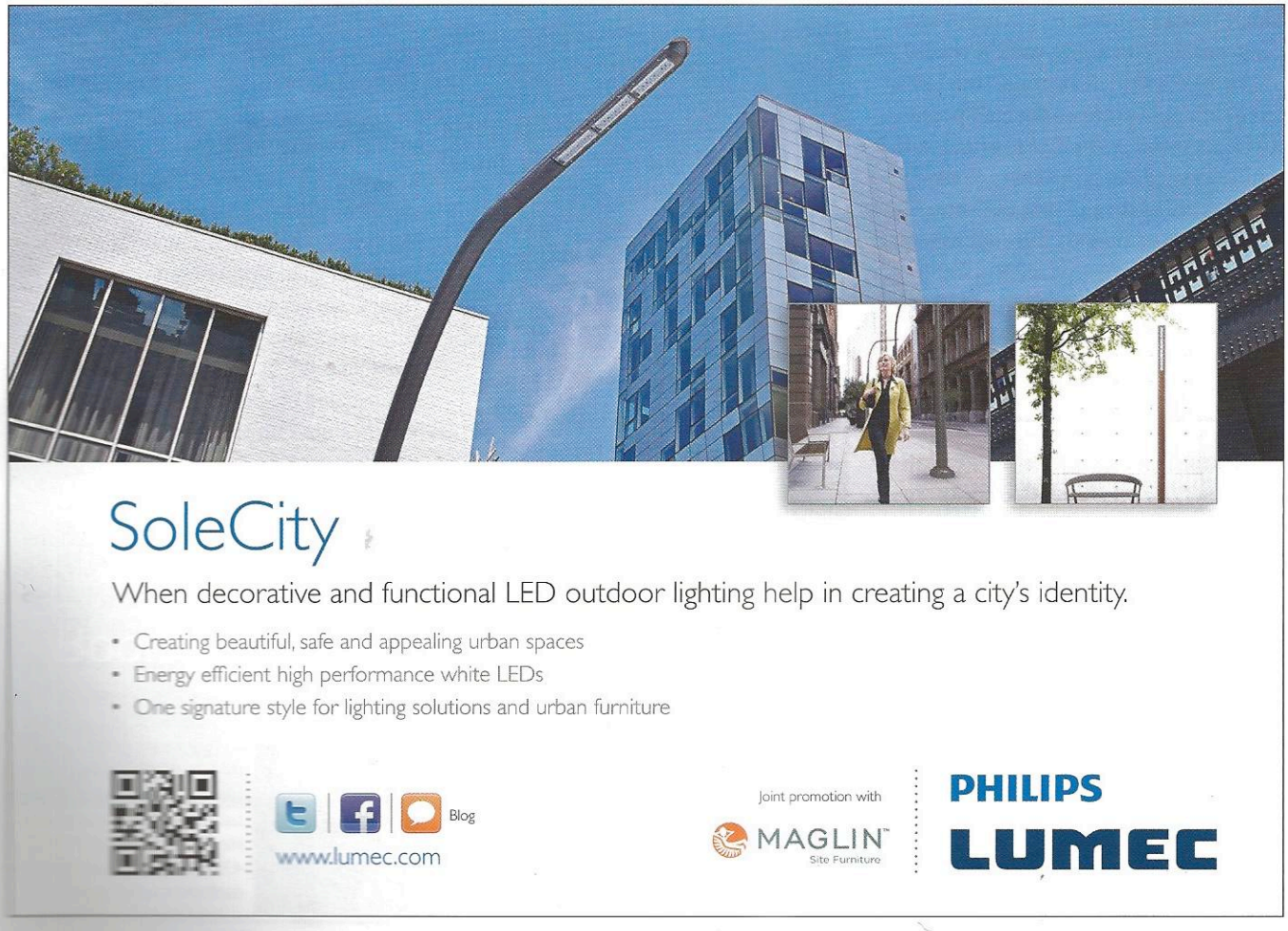
Health Canada says, "High concentrations of chloride related to the use of road salts on roadways or releases from patrol yards or snow dumps have been measured. For example, concentrations of chloride over 18,000 mg/L were observed in runoff from roadways. Chloride concentrations up to 82,000 mg/L were also observed in runoff from uncovered blended abrasive/salt piles in a patrol yard. 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, 2,000-5,000 mg/L in urban impoundment lakes, and 150-300 mg/L in rural lakes."

Nearly a decade ago, Environment Canada declared road salt to be "toxic." Although a voluntary road salt reduction program was put in place as a result of the 2001 Environment Canada road salt report, salt use remains unabated in most Canadian cities, especially Ottawa and Toronto.

And where all that salt eventually goes is still a threat to humanity.

"Road salts enter the Canadian 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 windborne powder. All chloride ions that enter the soil and groundwater can ultimately be expected to reach surface water," says a Health Canada report.

ROAD SALT, cont'd on p. 48



0% INCREASES, cont'd from p. 20

3. Life-Cycle Costing

Life-cycle cost analysis is a method of calculating the cost of an asset over its entire useful life span and budgeting for it. It includes such costs as planning and concept design, design and development costs, maintenance costs, and disposal costs. This concept is reflected in the PSAB 3150 compliance exercise that all Ontario municipalities recently went through. It can also apply to the employment span of municipal staff asset in terms of providing enough personnel adequately trained and motivated to do the job.

Managing municipal assets responsibly is really full life-cycle costing and budgeting. The taxpayer wants government to be run more like a business. Life-cycle costing is an efficient business practice that manages long-term costs so that taxes can be kept as low as possible (*not low, but as low as possible*) by managing an efficient operation.

4. Long-Term Budget Planning - Costs Annualized

So, where are we now? We know that we are ***managing the risk***; we know that we are using the ***best practice*** available in operation/maintenance and management of the municipality; we know the real or ***life-cycle cost*** of the assets. So what can we do with that?

Well, we can use that information to undertake long-range capital planning with annualized costs. We are in a position to undertake five-, 10- and 20-year capital and operational budgeting on the major assets, including staff.

We can establish reserve funds to manage deficit financing of major projects. We can extend the life of the asset because we know when (approximately) major rehabilitation can be undertaken to do so. Reserve fund contribution also allows us to take advantage of federal/provincial funding opportunities. We know when to expect upgrading or replacement. Remember, this also applies to staff training and retirement/replacement. The best thing about that is: no surprises!

With long-term planning and annualized cost, we can slowly build reserves with the gradual increase of user fees and/or taxes, in preparation for the major costs. Taxpayers (voters) are far more receptive to an annual increase of, say, three percent, than a 15 percent increase every five years because they, too, can do long-term budgeting to cover the costs.

Not only are long-term budgeting and annualized costs good business practices – they are also things that taxpayers can relate to their own financial management. Long-term planning is an efficient business practice that manages costs. Undertaking long-term budget planning therefore means that taxes can be kept as low as possible (*not low, but as low as possible*) by managing an efficient operation.

5. Cheaper in the Long Run!

Managing municipal assets responsibly allows for the anticipation of major capital and operational costs. It indicates when money must be spent to prolong an asset's service life and when it needs to be replaced. It also indicates when to increase staff to properly maintain the asset. It indicates that a little bit of money over a longer period of time maintains an acceptable level of service and extends the life of the asset. That means it's cheaper in the long run!

Considering everything that we've touched upon, managing municipal assets is really the ***responsible stewardship of the public assets and, therefore, the public purse***. It is the sum of several standard or best business practices that minimize the risk; achieve superior results in the operation/management of the corporation; eliminate (or at least minimize) major expensive surprises; manage deficit financing; allow for long-term planning; and allow for small but regular increases in taxes/user fees over time, instead of big (election-losing) increases. It will free up money to build those parks, arenas, and libraries.

Managing a municipal corporation isn't only about low taxes. It's about progressive leadership that allows for the intelligent and efficient operation of a multi-million dollar corporation serving the ultimate customer, the ultimate shareholder: the taxpayer. MW

ROAD SALT, cont'd from p. 22

Road Salt Is Toxic

It continues "based on the available data, it is considered that road salts that contain inorganic chloride salts with or without ferrocyanide salts are entering the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity, or that constitute or may constitute a danger to the environment on which life depends. Therefore, it is concluded that road salts that contain inorganic chloride salts with or without ferrocyanide salts are 'toxic' as defined in section 64 of the *Canadian Environmental Protection Act, 1999*."

"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," says Health Canada. "Any measures developed as a result of this assessment 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."

Ultimately, the question must be asked: Are we willing to take all these risks to keep roads safer?

The Salt Institute of North America says, "salt is the de-icer of choice for it's quick action, economical cost, and ease of use. Dozens of other de-icer products are available but, none has matched salt's cost-effectiveness."

Something can be done about this predicament. There are alternatives.

A look around the globe indicates that progressive countries like Sweden, Norway, and Finland are finding ways to kick their salt habit to the curb. The use of non-corrosive alternatives is having a positive impact, with impressive results. Vehicular accidents have not increased; at the same time, roads and infrastructure have not suffered as much damage, and cars are lasting longer, too. MW