

# SMARTER ROAD SALT USAGE

New technologies help you get a better handle on salt application so you can cut costs, reduce environmental impacts and increase the safety of your customers

**SALT:** there's no way around it.

In parts of the world that experience significant ice and snow, public safety depends heavily on salt to keep roads safe. Yet road salt is in the cross-hairs of many government departmental budgets, regulatory bodies, concerned environmental experts and the general public. Agencies responsible for roadway maintenance are asking how they can balance the need for:

- Safe driving conditions on public roads
- Managing material costs more effectively, and;
- Minimizing salt's effects on vehicles, roads and the environment

This paper examines the factors escalating concerns about salt, current and emerging technology solutions, and the steps agencies can take to balance needs listed above. This paper is based on interviews with key managers at both the city and county level who have decades of experience meeting customer expectations with respect to snow and ice management.

## Why is concern about salt growing?

### Increasing Salt Costs

With the increasing cost of salt in recent years from about \$18/ton to the neighborhood of \$50 to \$70/ton, salt is becoming a significant expense for many agencies. As a commodity, salt can change significantly in price, due to factors beyond buyer's control.

### What will you do in the next salt shortage?

Any commodity can undergo periods of local or widespread shortage. In the case of salt, this can lead to serious consequences for public safety and liability. For example salt production and existing supplies have not yet fully recovered from the salt shortage experienced in the winter of 2013-2014.

Over 70% of U.S. roads are located in snowy regions, those which receive more than five inches average of snowfall annually

Nearly 70% of the U.S. population lives in these snowy regions

*Statistics kept by the Federal Highway Administration*

## Why is concern about salt growing? cont'd...

### Environmental concerns lead to tighter regulations

There is growing concern among researchers, political leaders and the general public about the environmental effects of road salt. This includes concern for aquatic life that can be harmed by salt washing into streams, rivers and lakes. Members of the public also worry that the salt will end up in groundwater, with the potential to negatively affect well-water and agricultural crops.

This has led the Canadian government's environmental agency, Environment Canada, to determine that in sufficient concentrations, road salt poses an environmental hazard. Accordingly, public entities must develop Salt Management Plans, and follow best practices for salt storage, disposal and application.

In the United States, there are federal regulations on the Total Daily Maximum Load of salt that can be released. In some parts of the US, environmental regulators are already limiting the use of salt, with some highways displaying signs that salt application in that area is restricted to protect the environment.

### Customers demand more transparent service

With the adoption of social media, including Yelp, Rotten Tomatoes and Twitter, government services customers expect to get answers to their questions, preferably automatically, and preferably on their mobile device. This includes finding out when it's safe for them to venture onto the roads after a snowstorm, and when they can expect snowplows to service their streets.

They also want to know that their city, town or county is providing them with good service in exchange for their tax dollars.

Current technology is increasingly able to do that. Several of Webtech Wireless' public sector customers are using Webtech 511, a suite of public information services that provide customers with real-time municipal information where and when they need it. Some Webtech Wireless customers also make use of this data through a web-browser, for optimum customer transparency.

The service is invaluable for residents (even police departments rely on data provided by Webtech 511) who access Webtech 511 to get updates on snowplow routes, road conditions, garbage collection pick-ups, weather alerts, traffic jams and much more.

Each year 24% of weather-related vehicle crashes occur on snowy, slushy or icy pavement and 15% happen during snowfall or sleet

Freeway speeds are reduced by 3 to 13% in light snow and by 5 to 40% in heavy snow

*Statistics kept by the Federal Highway Administration*

## What are the new tools for better salt usage outcomes?

Both government bodies and customers will expect their roads authorities to walk a fine line between using too much salt on the roads, damaging vehicles, road surfaces, groundwater and surface water -- and using too little, which has the potential to cause driver hazards.

Here are some new tools and developments that can help agencies walk that line, saving money in the process. Call it “smart salt.”

### **Better weather data allows for a measured response**

Wide availability of more detailed and accurate weather forecasts help agencies plan and position crews wisely to literally get ahead of the storm.

Of crucial importance to good ice and snow management are increasingly reliable pavement temperature forecasts that enable effective and efficient use of salt and pre-wetting agents. Proper use of salt and pre-wetting agents helps salt stick to the pavement rather than bounce into the gutters. Consider two scenarios courtesy of Bret Hodne of the City of West Des Moines IA:

*“If you have a storm coming in with a wet, heavy snow that has a lot of moisture in it, you might have to use a higher application of rock salt because the moisture in the snow will dilute the rock salt reducing the effectiveness of the chemical. But if you have a drier, warmer snow, there’s not going to be a lot of moisture in the snow and if it’s warmer out, it’s not going to take as much material. So there really is a science behind everything we do.”*

*Bret Hodne, Director of Public Works, City of West Des Moines*

### **Better Use of Automatic Vehicle Location (AVL) data**

The ability to locate and track vehicles using transponders connected to GPS systems has been in place for several years. What’s emerging today is a better way to use Automatic Vehicle Location (AVL) information to guide decisions:

**Training support:** Reconstructing the agency’s response to a storm can help determine whether driver, salt management and storm response training actually worked. This can help guide an agency to provide better training, and coaching in future.

**Rewarding good performance:** This can include determining whether the target amount of salt was used -- enough to do the job according to conditions, but not enough to cause excessive cost or environmental impact. Some drivers may think “more salt” means “better” -- and may need to be shown this is not necessarily the case.

**Healthy competition:** At the end of a storm event, some agencies try to develop a healthy sense of competition by displaying wall charts stating road conditions and salt usage by driver. “I used 200 tons and my zone looked just as good as that other driver, who used 300.”

### **More control and measurement of salt application volumes**

Better weather data, together with reliable current information on vehicle location, are important tools in helping agencies balance the need for public safety against salt impacts and costs. The missing piece of the puzzle, for many agencies, has been control and measurement of salt application volumes.

## What are the new tools for better salt usage outcomes? cont'd...

Traditionally, a mirror and a flashlight have been essential tools for drivers, eyeballing the amount of salt their truck is applying in the pre-dawn darkness, trying to judge between “too much” and “not enough.” More accuracy wasn’t a priority, due to the relatively low financial cost of salt, and low concern about its environmental impacts. However, as this paper has indicated, that picture is shifting.

One way this has changed is increased focus on accountability. This shows up partly in more training and awareness of salt issues among drivers.

The other major change has been seen mostly in the larger agencies, but increasingly in smaller agencies that are particularly concerned about salt costs and impacts. This change has been increased use of automated spreader controls that accurately track salt usage. These systems, which include those developed by Webtech Wireless, can provide instant feedback to the driver indicating how much salt and pre-wet liquid is being applied.

This data can then be tied to the fleet management system, to give dispatchers and supervisors real-time information on driver performance. Resources can then be allocated appropriately – for example, if a storm gets unexpectedly worse, it may be possible to focus efforts on keeping open the main thoroughfares.

### **Better understanding of ice-melting techniques**

Recent research and experience has brought about big salt application improvements, knowing when and how much salt should be applied. Pre-wet liquids have also improved, increasing salt’s ability to adhere to the road.

### **How fleet management tools deliver better outcomes for your salt investment**

One of the biggest changes comes through computerized fleet management systems that help pull all these conveniences together delivering significant

Average speeds on arterial roads decline by 30 to 40% on snowy or slushy pavement

Winter road maintenance accounts for roughly 20% of state Department of Transportation maintenance budgets

*Statistics kept by the Federal Highway Administration*

## How fleet management tools deliver better outcomes for your salt investment. cont'd...

benefits for agencies. For example, Webtech Wireless' Webtech Fleet Center ([http://www.webtechwireless.com/en/solutions/webtech\\_fleet\\_center\\_government/](http://www.webtechwireless.com/en/solutions/webtech_fleet_center_government/)) can help with capabilities such as:

### Maximized Operational Performance

Enhanced fleet intelligence allows agencies to determine the value and importance of various fleet activities, develop key performance indicators, and measure them against organizational goals. The benefits of such data can translate into improved business processes, the ability to manage by exception, make smarter, more strategic decisions and improve bottom-line results.

### Achieve greater accountability and transparency

Many agencies are already gathering fleet data. New tools can help them develop and make agency processes and tracking methods available to their customers – ensuring full transparency of the progressive mechanisms the agency uses to rapidly resolve issues.

For example, a common customer complaint is that roads have not been cleared. In this case an agency might be able to consult their database and indicate that appropriate clearing has taken place only an hour or two before. Or, the agency might be challenged at the end of the winter by elected officials or by local environmental groups, concerned that too much salt had been used. In this case, the agency would have verifiable, accurate numbers on the volume of salt used during each snowfall for the season.

### Minimize liability

Many agencies are concerned about possible legal liability in collisions causing property damage, injury or loss-of-life, which can possibly be attributed to unsafe driving conditions. Equipped with verifiable and reliable, historical data, the agency can protect itself against roadway incident complaints. This data also helps an agency show that during a snowstorm, they met expected road condition and maintenance service levels and government body transportation standards. Webtech Wireless has supported its clients in several multi-million dollar legal claims along these lines.

### Lower operational, material and capital costs

**Operational costs** can be reduced by having a good understanding of how thoroughly a vehicle is being utilized. For example, if the agency is not fully utilizing four of its vehicles, can they eliminate two of them, saving the costs of manning, maintaining, fueling and insuring those vehicles? An agency can also lower operational costs through proactive maintenance scheduling. This avoids unnecessary vehicle wear, which can result in more breakdowns, excessive maintenance costs and shorter vehicle lifespans.

**Material costs** can be cut through responsible salt and sand usage. No more than necessary is used to maintain required service levels on the roads. Many drivers tend to think "If I put down more salt, I'm doing a better job!" – not realizing that using excessive salt, and using the right amount of salt (calculated through weather and pavement forecasts) results in the same safety levels. However, extreme use of salt comes with the downside of additional costs to the

## How fleet management tools deliver better outcomes for your salt investment. cont'd...

agency and taxpayers, and negative environmental impacts. Good scrutiny of each driver's performance forms opportunities for coaching towards better performance, and rewarding those drivers who meet the standards.

Consider the experience of Jim Davis, of the City of North Canton OH, in achieving better salt management using a GPS/AVL fleet management system (from an interview in November 2014):

*"We did have low salt supplies and we managed it well. But if we did not have those computer systems in place, we would have been in trouble. We would have depleted our salt stores in a hurry. In the winter of 2012/2013 we had 28 snow events and we used 6800 lbs of salt. In the winter of 2013/2014 we had 63 snow events and used 3700 lbs of salt. That was pretty crazy. We are now in a situation where we haven't used any of last year's salt order. Everybody else is scrambling for salt and we're still using salt from 2013. We actually have 5,000 tons of salt sitting in storage. We basically saved one whole year's salt purchase, equating to about \$300,000! We are now one year ahead in terms of salt on hand and will not need to purchase any salt for the coming year. This is the advantage of the solution."*

*Jim Davis, Superintendent of City Services, City of North Canton*

Capital costs can be better managed through detailed information on how vehicles are being used. If an agency determines some of its vehicles see little use they can consider removing them from the fleet -- eliminating not just the capital cost of the vehicle, but its ancillary equipment, as well as its insurance, fuel, maintenance, parts and other costs.

### Meet compliance initiatives

Gain real-time visibility to your fleet for enhanced internal and external compliance initiatives. Having defensible salt-usage data can help an agency remain compliant with internal material usage guidelines and policies. Access to the gamut of AVL and telematics data including route completion and live service mapping ensures the agency as a whole is compliant with external service level agreements.

### Smart salt leads to smarter decisions

A good fleet management system can help with operational decision-making. Here's the view of Jim Davis at North Canton OH on how Webtech Fleet Center has been able to help his operations:

*"If we miss a specific area during a snowstorm, and we determine we need to dispatch crews to address the oversight - we're able to use our fleet management solution to maneuver work forces that way. Using our solution in this manner has also totally changed our priority routes and how we snowplow the City. Instead of assigning everyone to a vehicle and directing drivers to a general area, our fleet management solution has allowed us to break the City up in to quadrants and prioritize every single City street. So a manager can look on a computer and compare actual routes against the priority map and determine if a street has not been cleared for three hours. We've also go our main streets - the arteries in and out of the City that absolutely must remain open. With our fleet management solution, we have ..."*

## How fleet management tools deliver better outcomes for your salt investment. cont'd...

*better visibility to the status of these main arteries. In addition, we have primary routes, school routes, secondary roads etc. that must be maintained. Now when we prioritize our work force based on what our fleet management solution tells us, my manager can say "OK, I need this priority route done first, this one second, third, fourth etc... and we can actually see it firsthand on screen."*

*Jim Davis, Superintendent of City Services, City of North Canton*

### An investment that pays off quickly

Fiscal realities being what they are, many agencies will think twice (or more) before spending on a system that incorporates GPS/AVL with salt application measurement and control systems.

The experience of Webtech Wireless with many agencies has been that the system pays for itself quickly, potentially saving thousands of dollars in its first winter of use alone. These savings continue year after year, and that money can be diverted into vehicle maintenance, replacement, and personnel costs as required.

It's clear all government agencies that must deal with winter should investigate the benefits of implementing their own GPS/AVL solution.

#### Do you need help with:

- Determining if a GPS/AVL system is a good fit for your agency?
- Comparisons on the various solutions available?
- Developing a cost/benefit analysis tailored to your situation?

### Contact Us

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Over 1,300 people are killed and more than 116,800 people are injured in vehicle crashes on snowy, slushy or icy pavement annually

Every year, roughly 900 people are killed and approximately 76,000 people are injured in vehicle crashes during snowfall or sleet

*Statistics kept by the Federal Highway Administration*