

Salt Priority: New approach to snow and ice control

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By Michael L. Starn, Editor

Even though it has been used on roads in this country since the mid-1940's, salt as the primary material for snow and ice control is a relatively new approach to winter road maintenance, particularly for municipalities.

For as long as most people can remember, sand has been the primary material used by Maine's state and local highway crews to treat roads during winter storms. Sand has been used because it is cheaper than salt and is perceived to provide more traction. Salt also has the reputation of being corrosive and environmentally harmful. As with most long-standing traditions, there is some truth and some fiction to the "salt or sand" question.

Salt Priority Program

Attitudes toward salt as a primary winter road treatment material took a big momentum shift in Maine in the late 1990's, when the Maine Department of Transportation (MDOT) started its "Salt Priority Program". "Salt priority" means that salt, not sand or a sand/salt mix, is MDOT's first choice in treating roads during winter storms.

The state's Salt Priority Program started incrementally with the state highway system in southern Maine first coming under it in 1998. After that, MDOT continued adding road miles to where in 2004 the program is about 98 percent implemented, according to MDOT's Brian Burne.

So, how successful has the program been?

One obvious indicator of the program's success is the amount of sand being used. Burne says that MDOT has dropped its sand usage from 500,000 cubic yards to just 30,000 cubic yards. Surprisingly, at the same time, MDOT's use of salt has changed little, staying in a range of 70,000 to 75,000 tons during an average winter.

Burne says there is a common misperception that salt usage increases under a "salt priority" program. With the right equipment and the right application system, the amount of salt used does not increase, he says.

From a public relation standpoint, the program has also been a winner. One obvious change has been the number of complaints of windshield damage blamed on MDOT plow trucks. That used to be quite common, Burne says, "Now we don't have any of those complaints."

HOW DOES IT WORK?

The first objective of winter snow and ice control is to keep ice from bonding to pavement – a process called anti-icing. A second, equally important objective is to return the road surface to bare pavement as quickly as possible after a storm – a process called de-icing. For melting snow and ice, salt, liquid calcium chloride and a few other de-icing chemical products are clearly superior to sand, or a sand/salt mixture. In fact, sand by itself has no de-icing capacity.

Peter Coughlan, director of MDOT's Community Services Division and the Maine Local Roads Center, says that "salt priority" works because of the 3T's – timing, technology, and training.

Timing. Getting the trucks out quickly before or at the beginning of a storm event is crucial. MDOT uses an anti-icing approach where the crews pre-treat roadways with a brine mix up to six hours before a storm starts. According to MDOT's Burne, state highway crews use a 23% brine mix that gets dispensed at 1,000 lbs. per lane mile. When the snow falls, the dried material becomes a brine mix again and coats the pavement inhibiting the formation of ice on the surface.

Timing is also affected by the type of storm. An all-snow event requires a different method of treatment from sleet or freezing rain.

Spreading small amounts of de-icers (salt or chemicals) more often with lots of plowing is the most effective way of handling most storms. When snow is loosened up and unpacked by the salt, it starts to melt and then turns to slush. The more traffic on a road, the better, as the salt works its way into the snow before getting plowed off.

Temperature (of the pavement) also impacts the timing and amount of salt or other materials that are used. Salt works best when the pavement temperature is at temperatures between 20 and 30 degrees Fahrenheit. At temperatures below 20 degrees, a mix of salt and liquid calcium chloride (or the liquid calcium by itself) is required for melting.

Technology. Wholesale equipment changes are not needed to go to a "salt priority" program. Spreaders used for sand can also dispense salt. Calibration of the spreader, however, is very important. Ground speed control units that attach to the spreader and synchronize the dispensing of the salt to the RPMs of the engine can be very helpful in conserving salt. Installing a sprayer (for liquid calcium chloride) on the plow truck allows for pre-wetting of the salt (or sand) making it more effective as a treatment material because it lessens the bounce and scatter of the material. Instruments to measure pavement temperature (costing from \$50 to \$500) are also needed.

Training. The successful implementation of a "salt priority" program requires an understanding of how different road treatment materials work. De-icing chemicals – like salt and calcium chloride – work by lowering the freezing point of water. The surface temperature of the road determines which chemicals are used, and in what amounts to get maximum melting rates.

Evaluating a storm and getting the right concentration of salt on the roads, at the right time, comes from a combination of training and experience. The Local Roads Center puts on its annual Snow & Ice Control Workshop at six or seven locations around the state each fall. Phil Curtis, former road commissioner in Madison, conducts the workshop. Curtis is a strong proponent of MDOT's Salt Priority Program.

STRONG SUPPORT FOR SALT

Phil Curtis says that the evidence clearly shows that salt is preferable to sand for winter snow and ice control. He believes that salt is not only more effective on roads but less costly as well.

Studies comparing salt to sand application in the northeastern snowbelt states, according to Curtis, have shown that when all of the costs associated with using sand are factored in, salt becomes much more economically advantageous. He believes that the true cost of sand, which can be purchased for about \$7 to \$8 a ton, is actually about \$100 a ton when you add the cost of storage and cleanup to the purchase price. Salt has a price tag of about \$32 per ton and with the addition of the liquid calcium chloride for pre-wetting, Curtis calculates the total cost to be \$37.50 per ton. Labor costs would be about the same whether you were applying salt or sand.

Once you get your salting system down, it works more effectively and at a lower cost, says Curtis. His mantra for a proper salting system is “right amount, right place, and right time”.

“The public has been duped into thinking that a sanded road is a safe road,” says Curtis. He believes that only situation where sand would be preferred over salt is on gravel roads, and even on gravel roads, it might be a good idea to use some liquid calcium chloride with the sand, he says.

MUNICIPAL VIEWPOINT

The municipal viewpoint on “salt priority” ranges from strong support to tempered skepticism.

For downtown or compact areas of a community, municipal public works directors interviewed for this article expressed strong support for using salt and de-icing chemicals.

Steve Johnson, public works director in South Portland, says he absolutely believes in “salt priority” and his city has been using salt and other chemical de-icers for several years. The key to treating a road with salt or other chemicals is to start the treatment at the beginning of the storm, says Johnson. He believes it’s two or three times more expensive to treat a road surface “top-down” after ice and hardpack have formed, as opposed to his anti-icing approach.

South Portland is also one of the few communities that use Ice b’Gone, a sugar cane and magnesium chloride product. Most communities use the liquid calcium chloride for pre-treatment and pre-wetting.

Johnson is a big fan of ground control speed devices which time the amount of salt spreading to engine speed. “Three years ago we outfitted our trucks with speed control devices and we’ve reduced the amount of salt used by half,” he says, adding that the equipment paid for itself in one year.

The South Portland public works director does, however, believe that there is a time and place for sand to be used. For residential street, S. P. public works still uses sand. “We don’t get enough traffic (on them) to make salt work,” he says.

Low traffic volume is a concern shared by other public works directors.

Gerry James in Presque Isle says that salt is great, “but you need a certain amount of traffic to make it work effectively.” He says the rural roads within the city limits of Presque Isle do not get enough traffic to warrant salt.

Presque Isle public works crews plow and salt or sand 110 miles of road in the wintertime. All but 40 miles of roadway gets the salt-only treatment.

Getting some heat from the state DEP for the amount of dust stirred up during spring cleanup, Presque Isle started using liquid calcium chloride on its downtown streets in 1989. Since that time, it has increased the use of salt and chemical de-icers to all of the city’s compact area. Only the rural roads get sand.

James is a little skeptical about the state’s claim of no increased salt usage for municipalities switching to “salt priority”. The state uses a lot less salt per lane mile that most municipalities would use, he says. That’s because the state plows their roads more often. He says that in Presque Isle they would need to use twice as much salt, per lane mile, as the state because of the long plow runs. James substantiates his claim by saying that the Aroostook division of MDOT’s *longest* plow run is 1 ½ hours whereas the city’s *shortest* run is 3 hours.

Brunswick Public Works Director John Foster is concerned about the price difference between salt and sand. He says the town pays \$32 a ton for salt and \$7.50 per yard for sand. “We can’t afford to go all salt,” he says.

The Brunswick public works crew does, however, use mostly salt in its downtown area.

Skowhegan’s long-time elected road commissioner Greg Dore acknowledges that the purchase of salt is much more expensive than sand, but says cleanup is a clear advantage for salt. For a normal year, Skowhegan crews spend about six weeks cleaning up the sand from winter spreading. The town puts salt-only on its major arterials and collector roads. Side streets and rural roads get sanded.