

# Dover NH Salt Brine Research Project

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Doug Steele, is the community services director in Dover. Dover has adopted the use of salt brine in the city. Previously, they have tried rock salt, solar salt, calcium chloride, hot sand, and ice-be-gone. Doug finds that brine's unique characteristics prevent the snow and ice from bonding to the pavement. Doug believes that, like all products, brine has certain conditions where it works best.

## Why use Salt Brine?

Dover became interested in salt brine as both the NHDOT and Maine DOT have reported positive results. The city decided to test the brine with the assistance of the NHDOT research grant.

## Site Preparation

Store brine inside, covered, and in a warm environment. Dover DPW used a bay in their building to make and store the brine. A large garage door was installed to allow the loader to enter the building and transport salt to the brine mixing system. A three inch water line and electrical updates were installed for the new equipment.

The new door cost \$8,780 (including installation), the water line \$13,420; and the electrical work

\$970. Total site preparation: \$24,970.

Dover used existing equipment to measure pavement temperature before applying the salt brine. Do not use brine if the road temperature is below 15 degrees.

## Creating the Salt Brine

Dover purchased a mixing unit, two 6,000 gallon storage tanks, pump and hoses, and a portable tank with brine distribution unit. The tank combined salt, at one ton per 1,000 gallons, of water to produce the brine.

## Training

The vendor provided brine mixing training. Salt is placed in the mixer and water added. The circulation pump mixes the materials. The mixture is tested with a hydrometer for salinity levels. Once the brine is at 23% salinity, it is pumped to storage tanks or an anti-icing unit. Doug reports that now there are now units available that automatically mix brine.

## Applying the Brine

Two similar plows routes were selected with residential areas and heavily traveled streets. One

route used salt pre-wetted with a chemical de-icer. The other used salt brine. They performed this comparison five times in 2005.

### Application Rates and Cost

Cost of salt brine is \$4.71 per 1,000 gallons water; \$45.96 for 2,000 pounds of salt; and \$10.50 of employee's time (to make the brine). Therefore, cost of the brine was \$61.17 or 0.061 per gallon.

Dover DPW began applying salt brine with an application rate of 40-50 gallons per lane mile. They increased the application rate to 80 gallons per lane mile. Therefore, 80 gallons with \$.061 per gallon totals \$4.88 per lane mile.

In comparison they believe that salt alone costs \$5.70 per lane mile.

### Savings

Brine can be applied during regular work hours, reducing overtime. It can be applied up to three days before the storm. Brine allows the city up one to two hours of light snow before calling in staff. Brine dries on the road compared to rock salt that traffic blows off.

Dover has found many benefits to salt brine. Salt brine is less costly. It is environmentally friendly and less wasteful. Brine is helpful in typical problematic areas, such as bridges and shaded areas. Brine eases worry about the impact of the storm and is effective when used correctly.

### Future Use

The city will continue to use brine. This year, they plan to use existing saddle tanks on trucks to pre-wet salt with brine at the spreader.



*The hydrometer measures the level of the salt brine.*

## Avoid Hypothermia

Prolonged exposure to cold temperatures can result in hypothermia. People exposed to the cold need to notice its effects.

Cold is the most common cause of hypothermia. Chilled air cools the body. Hypothermia can occur on a mild winter's day or in damp weather. People can become hypothermic at temperatures above freezing if exposed to a combination of wind and wet clothing.

In windy conditions, the head, chest and groin are especially vulnerable. Fatigue increases one's risk of hypothermia.

Proper clothing and adequate insulation trap warm air around the body and prevents hypothermia.

Wear a hat as up to 50 percent of body heat is lost through the head. Protect feet and hands. Wear waterproof boots and mittens or gloves.

Layer clothing. The first layer of clothing should allow the skin to breathe and sweat to escape. Wear underwear, socks and glove liners of polypropylene or knitted silk to allow sweat to wick off the skin.

The second layer should absorb perspiration and not allow heat to escape. Wool is ideal as it stays warm even when wet and comes in many thicknesses. Layer two light sweaters on top of each other.

To prevent exhaustion, drink plenty of non-alcoholic fluids. Heated drinks work well, but limit coffee and tea. Pace yourself. Take regular breaks to get out from the cold. Don't become weak with fatigue. People who are fit are less prone to hypothermia.

Source  
Precautions to avoid hypothermia, Nevada Milepost, Winter 2006, p. 3