

Deicing vs. Anti-Icing— Timing Is Everything

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Overview

- Background and Introduction
- Deicing
 - Description
 - Pre-Wetting
 - Direct Liquid Application
- Anti-Icing
 - Description
 - Materials Used
 - Anti-Icing Equipment
- Wrap-Up

Deicing—The Traditional Method of SRIC



- Removal of snow, ice or frost from the roadway after it is on the road (reactive)
- Typically done with chemicals
- How can we do it more efficiently?

Anti-Icing—A Proactive Strategy



- Anything we can do in advance of the roads becoming icy/snowy
- Reduces bonding of snow/ice to the road
- Prevents frost from forming on roads/bridges

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Reactive Strategies

Anything we do after roads become icy or snowy



Reactive Strategies

Costs us quite a bit in time, money and environmental impacts to make the roads safer



Still our largest component of winter maintenance

What Conditions Are Appropriate for Deicing?



Anytime there is snow or ice on the road unless your level of service allows it to be there.

No Easy Answer—Depends on Many Variables

- Pavement Temperature and Trend
- Types of Deicers
- Amount of Snow/Ice on the Road
- Weather Forecast
- Level of Service Target
- Wind
- Etc.

Amount of Snow/Ice on Road Guides Your Choices

Example 1:

Thin layer of ice on 25° degree pavement--
Direct liquid application of salt brine

Example 2:

It is 10 am, 2 inches of snow on 30° & rising pavement--
Plow, apply minimum amount of chemical
(i.e. 50 lbs/mile) and let the sun assist you.



Weather Forecast Guides Your Choices

Example 3:

It is snowing & 10 inches of snow forecast in the next 12 hours--
Plow, spot apply chemical only at critical areas.

Example 4:

It is snowing, we are staying on top of it and it is predicted to stop shortly. Pavement temps are 26°:
Plow, apply pre-wet salt at 100-140 lbs/mile.

Deicing Goal

Meet your level of service goal

- As efficiently as possible
- With smallest amount of chemicals

There is not just one way to do this.

Make your own path!



Materials Used in Deicing

- + Abrasives provide temporary traction.
- + Granular products have more melting power.
- + Liquids are fast acting and stay on target (recommended).

Understand how your tools work

- + Mix and match them to meet the needs of your road conditions.

Applying Dry Salt is Not a Recommended Practice

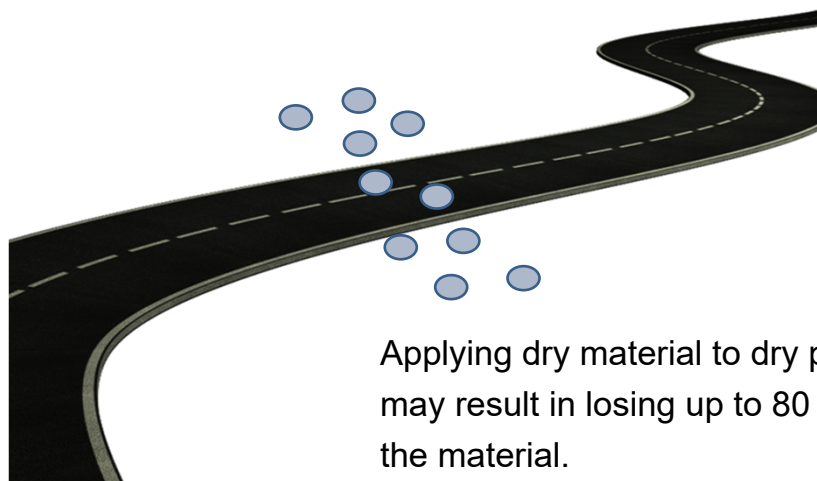
As we become more efficient and effective in de-icing we look for ways to reduce waste

Dry salt applications work, but there are better ways to get the same results.

Dry salt applications are wasteful of salt, much of it bounces off of the road.

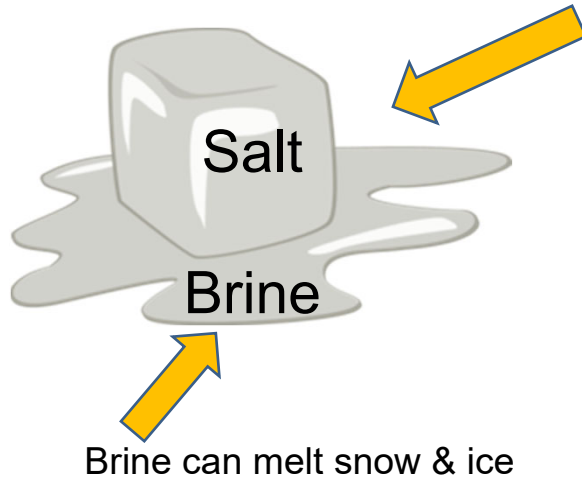
If you are using dry salt, re-examine your plowing policy, your anti-icing policy and your deicing policy. One or all might need to be updated.

Applying Dry Salt is Not a Recommended Practice



Applying dry material to dry pavement may result in losing up to 80 percent of the material.

Pre-Wet Salt Works Better Than Dry Salt



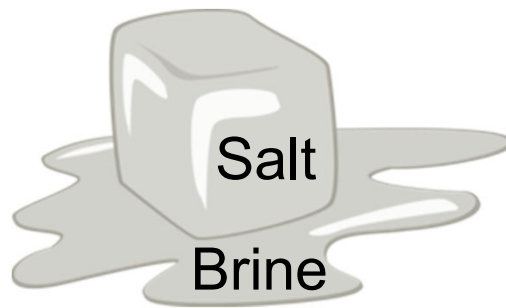
Salt cannot melt snow & ice...must change phase into a liquid.... With dry salt, this is sloooow

Brine can melt snow & ice

Pre-Wet Applications

Liquids have the potential to make salt work faster.

Depending on the ratio and the type, they can reduce the bounce and work at colder temperatures.



Pre-Wetting

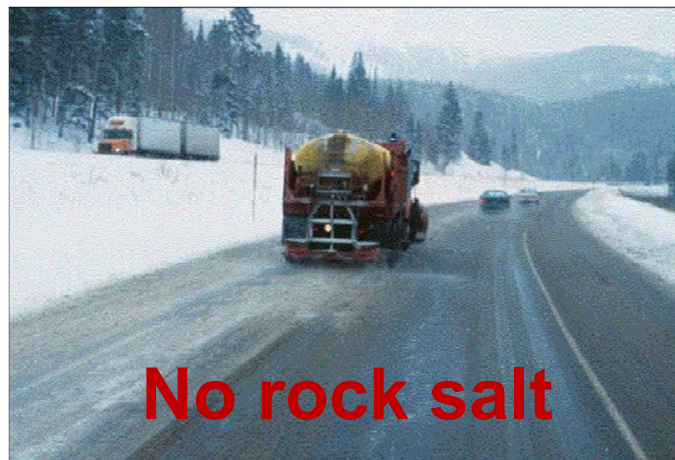
Typically you can reduce your application rate 30% if you are pre-wetting!

Some report up to 50% savings.

Savings depend on speed of application, ratio of liquid to granular, spread pattern, material selection and many factors.



Direct Liquid Application (DLA)



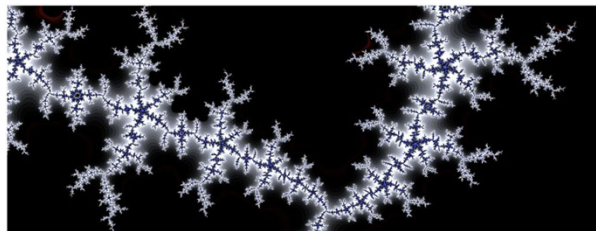
A Tip

Have enough bar pressure to melt holes through snow/ice so the deicer can spread out under it. This breaks the bond.



If you gently spray on top of snow and ice, you will act like the Zamboni.

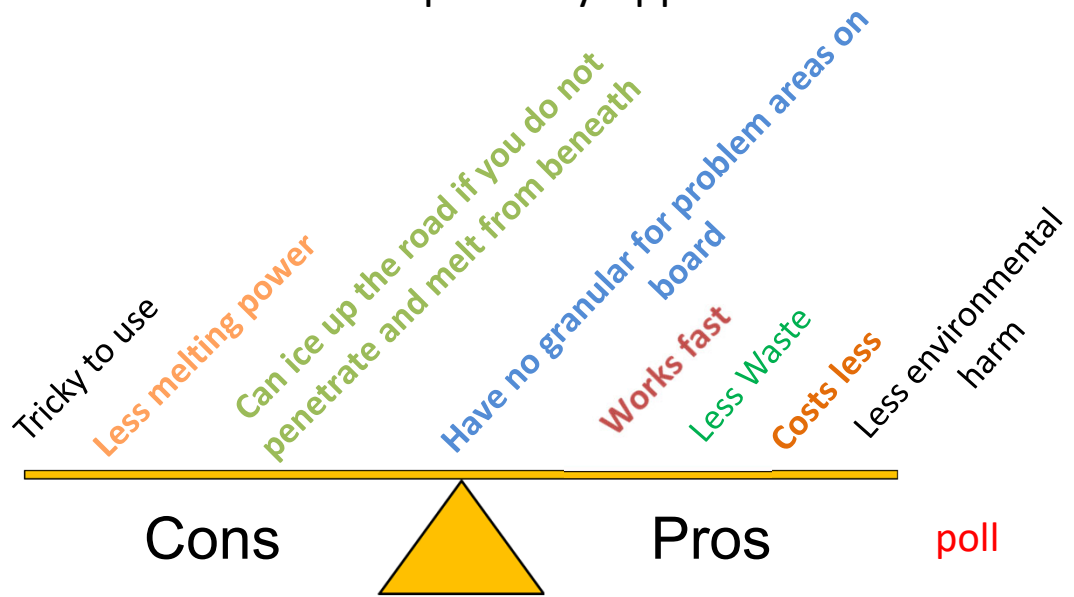
Best Use of Direct Liquids



Liquids are the best tool for a thin layer of ice or frost



Pros and Cons of Liquid Only Applications



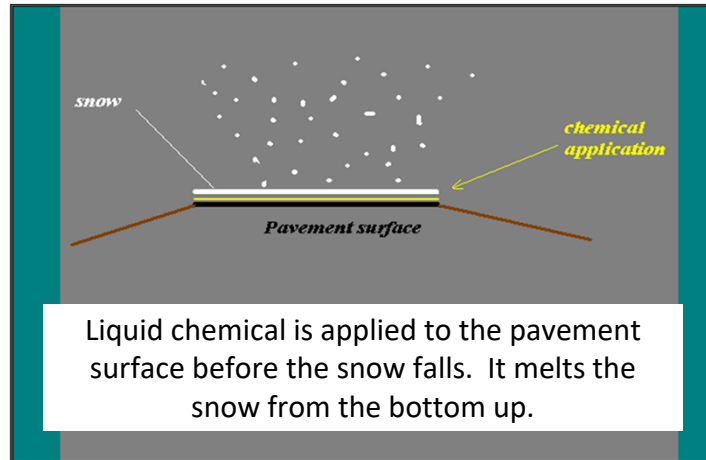
Anti-Icing is “Pre-Treating the Roadway”



Anti-icing is the application of de-icers before there is frost, snow or ice on the roads.

- Typically done with liquids.
- Chemically reduces the bond of snow to pavement.
- Buys your crew time at the beginning of a storm.

Chemical Layer Prevents the Bond of Snow to Road



Anti-Icing—A Proactive Strategy



Melts from the bottom up.

Weakens the bond between the road and snow/ice.

Prevents frost from occurring on roads or bridges.

Proactive Strategies



Save us time, money and reduces environmental impacts.
Can reduce the amount of de-icing material needed.



Should be a part of your operations



How Anti-Icing Works

Anti-icing is not meant to melt everything, only to have a thin layer of melting between the pavement and the snow.



Applied Before
Storm



Melting During
Storm



Snow-Covered
During Storm

Anti-Icing—Doesn't Melt Much But Prevents the Bond



Without Anti-Icing



With Anti-Icing

The Clear Driving Lane Was Anti-Iced



Materials Used for Anti-Icing

Any liquid de-icer

Most commonly used is NaCl or salt brine.

Next most common is a salt brine blend.

Often containing calcium or magnesium chloride and an organic component (beet juice, corn syrup...)

But can be straight Magnesium Chloride, Calcium Chloride, Acetates, or your de-icer of choice.



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Anti-Icing with Pre-Wet Salt

Anti-icing with liquids is the rule

Anti-icing with pre-wet is the exception

In storms starting with rain or freezing rain.

Use a very light rate.

The more liquid the better.

Timing is critical, must be done as the storm is starting.

Risk: very likely to leave the road before it is used.



Anti-Icing Application Rates

To standardize your performance, create and follow an application rate chart. The chart should be updated as your materials and techniques change.

EXAMPLE APPLICATION RATE CHART

Condition	Gallons per lane mile		
	CaCl ₂ or MgCl ₂	Brine	Brine Blends
Regularly scheduled application	15-25	20-40	Ask manufacturer
Prior to frost or black ice	15-25	20-40	Ask manufacturer
Prior to light or moderate snow	15-25	20-50	Ask manufacturer

Regularly Scheduled Applications

Typically not recommended because:

- Can load up the roads with too much product.

- Lead to excess applications of salt.

- Increase corrosion of bridges.

Better to monitor the weather and apply when conditions are likely to need anti-icing



Take Time to Calibrate



Cost Savings

As your anti-icing operations grow, so will your cost savings. Anytime we integrate pro-active strategies we will increase our productivity.



Anti-Icing Equipment

Equipment can range from semi-truck tankers to totes in the back of a pick up.



Anti-Icing Nozzles

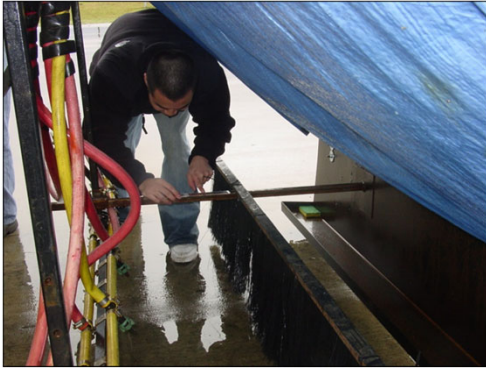


More risk

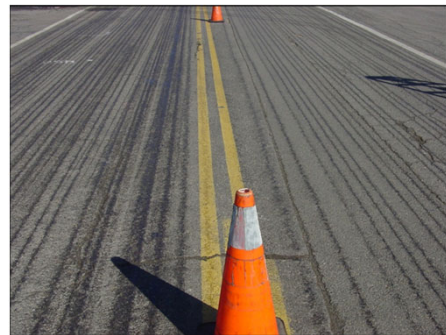
Less risk

Streamer nozzles allow for a wet dry pattern and less risk of loss of friction on roadway.

Drift Control



Note: 30% more liquid is applied to the road by putting spray skirt 18 inches behind nozzles.



Drift Control (2)



Hoses




Hoses and Skirt

Where to Anti-Ice

Where frost or black ice is likely.

- On any roads that you de-ice
- Especially those demanding high level of service, such as, hills, curves and bridges

A photograph of a multi-lane highway curving through a hilly, wooded area. Several cars are visible on the road, and a guardrail is on the right side. The road appears to be a multi-lane highway with a yellow center line and white edge lines. The surrounding landscape is hilly and covered in trees, suggesting a rural or mountainous area. The lighting is somewhat dim, possibly due to overcast weather or the time of day.

- Especially those demanding high level of service, such as, hills, curves and bridges



Weather Forecast

Having and using weather and forecast information is one of the keys to successful and effective anti-icing.

The left screenshot displays a '5-Day Forecast' for West Des Moines, IA. It features a large snowflake graphic and a high of 31°F. The forecast shows temperatures ranging from 14°F to 30°F over the next five days. The right screenshot shows a 'METRAD + Projection' forecast for Maple Grove, MN. It includes a detailed hourly forecast table with columns for Time (CST), Temp, Wind, Precip, and other weather parameters. The table shows a snow event on Monday, with temperatures dropping to 14°F and precipitation of 0.2 inches.

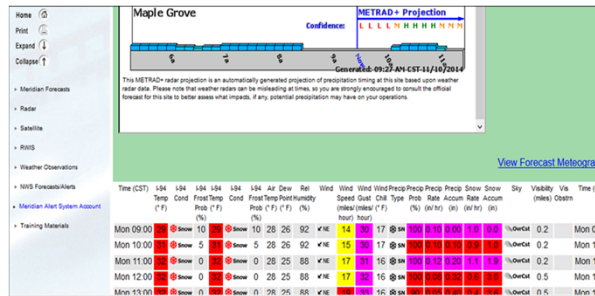
There are many weather and weather forecasting tools and services available. You need pavement temperature in addition to other weather information .

31°
West Des Moines

5-Day Forecast

Tonight	Wed	Thu	Fri	Sat
25°	30°	28°	20°	-3°

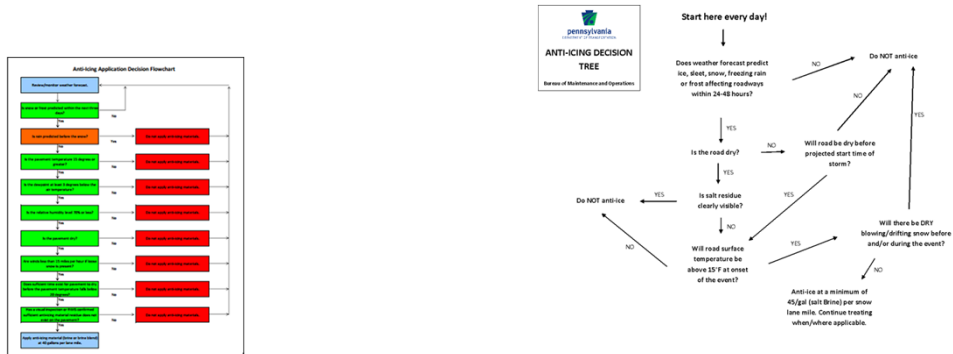
Extended Forecast from weather.com



There are many weather and weather forecasting tools and services available. You need pavement temperature in addition to other weather information .

Develop A Decision Tree for Anti-Icing

If you are just getting into anti-icing or considering it, take time to look at other organizations anti-icing decision trees and develop one for your organization. You can modify and improve the logic as you gain confidence and experience in anti-icing.



Avoid Anti-Icing If:

- Drifting or blowing locations.
- Predicted heavy rain.
- Extreme cold pavement temperatures.
- You don't have the right equipment.
- You haven't calibrated your truck.
- You haven't tested your system on "safe" location (parking lot, side road...)
- You don't understand the practical melting range of your de-icers.



Tips from Experienced Supervisors

- If using mag chloride or calcium chloride, use no more than 15 gallons per mile
- Do not do system-wide anti-icing unless the storm is imminent
- Anti-ice bridge decks and critical areas (e. g., hills and intersections)
- Stream spray only; no fan spraying
- Spend the \$\$ and put together a unit that will accurately measure what you are applying

Tips from Experienced Supervisors (2)

- Start with gravity-feed equipment to apply liquid at the auger in the sander or directly to the spinner. This is easier and less frustrating than with pumps to start
- Agencies need a good weather forecasting tool and training to help them apply materials accurately and efficiently
- Start with minimum application rates for liquids, especially if using magnesium chloride or calcium chloride
- New equipment purchases should include spreader controls that will measure granular and liquid materials

Anti-Icing Is Like Frying Eggs



By preparing the pan prior to frying eggs, the egg is easily removed, there's very little work and easy clean up.

Thank You and
Good Luck This Winter!

Questions?