A Proactive Treatment
Anti-icing before a storm is very similar to using a non-stick spray on a pan before cooking. Just like a non-stick spray prevents food from bonding to the pan, anti-icing prevents snow and ice from bonding to the pavement so that it can be plowed away. Anti-icing can save you money as it costs 50% less than reactive deicing.

Make Your Own Salt Brine
When making brine it is important to add enough salt to produce a 23.3% solution which freezes around 0°F. Roughly 2.5lb per gallon of water will produce a 23.3% solution. You can verify using a salometer (~$20) a 23.3% solution will have a specific gravity of 1.176, or 85% salinity. Consult the Brine Making BMP sheet for more info.

How Much Should I Use and When?
You can apply brine up to 24 hours in advance of the storm. Typical application rates range from 0.5 to 0.75 gallon per 1000 sq.ft. (10’ x 100’ area). Other chemicals such as magnesium are also available—consult your supplier for application rates. Anti-icing is not advised prior to freezing rain events.

Getting Started
Try making your own salt brine by putting 13 lb of salt in 5 gallons of water to get a 23.3% salt brine solution. Mix the brine until all of the salt is dissolved. Using a masonry sprayer apply the liquid several hours before a storm. Start by applying about 0.25—0.5 gallons to a 10’ x 50’ area. Adjust the application rates based on your experience. Being careful not to over apply and cause a slippery condition.

Produced in partnership with:
PRE-WETTING?
Pre-wetting is the process of coating a solid de-icer with a liquid before it is spread on a roadway.

WHY PRE-WET?
De-icing chemicals must form a brine before they can begin melting ice. Pre-wetting your chemicals accelerates the brine making process, which improves the melting action of the material. Pre-wetting also reduces bounce and scatter of material during spreading, and reduces the total amount of de-icer needed to obtain the desired results.

REDUCED RATES
If you are pre-wetting, don’t forget to reduce your application rates accordingly. Reductions in the range of 15-20% are typical.

HOW MUCH LIQUID?
A good rule of thumb is to use 8-10 gallons of pre-wetting liquid for every ton of de-icer. For other chemicals, such as magnesium chloride, consult your supplier for application rates.

Pre-wetting Liquids
You have a few options for pre-wetting liquids. The most commonly used is a 23% sodium chloride brine solution. Calcium chloride at 32% solution is also used, as well as Magic Minus Zero™ and other patented products.

Spraying the Pile
This is the easiest and most cost effective way to get started in pre-wetting. The first step is to spread your salt pile on a flat, impermeable surface. Next, spray the salt while it is spread out, and mix it around to ensure adequate and consistent liquid coverage. After the salt is sufficiently covered, re-stack the salt in your storage shed for later use.

Getting Started
Wet the pile! There are two ways to pre-wet your de-icing chemicals. The easiest way to get started with pre-wetting is to spread your salt pile, spray it with pre-wetting liquid, mix it around, and re-pile it. More advanced truck mounted pre-wet systems can be installed on your trucks if you decide to make the investment.

Truck Mounted Systems
These systems are mounted in the truck bed and coat the de-icer with liquid as it comes off the conveyor/auger onto the spinner. These systems have the benefit of applying liquid only to the material you use as you use it. However, these systems must be installed on every truck that will be used to spread pre-wetted material.
BE PROACTIVE - ANTI-ICE
Anti-icing is the proactive method of preventing snow and ice from bonding to pavement. It can be more than 50% more efficient than deicing. See the NH Anti-Icing Factsheet for more information.

PRE-WETTING FOR FASTER ACTING SALT
Adding brine to salt before you apply it to pavement jump starts the melting process which means your pavement will be clear sooner. See the Pre-wetting Fact Sheet for more information.

KNOW YOUR LIMITS
Dry salt becomes ineffective below 15°F if possible wait until the temperature rises before applying salt. At 30°F 1 lb of salt can melt 46.3 lb of ice in 5 minutes. At 15°F 1 lb of salt can melt 6.3 lb of ice in 1 hour.

PLOW FIRST
Always plow before applying any kind of chemical deicer to avoid pushing it away!

How Do We Melt Ice?
Ice can be melted by increasing the temperature, or lowering the freezing point of the water. It’s not cost effective to use heat to melt ice on our roads so we use chemicals to reduce the freezing point—anything that will dissolve in water will work, including: salt, sugar, even alcohol!

Why Use Salt?
Salt (Sodium Chloride) is the cheapest and most readily available chemical that efficiently melts ice and can be easily applied to our roadways and parking lots. However salt does corrode our cars and bridges, contaminates drinking water and pollutes our streams. Alternatives include potassium acetate, and calcium magnesium acetate (CMA), — all of which are considerably more expensive than calcium chloride, and have their own environmental concerns.

Brine Makes It Happen
The first step in melting ice is the formation of a brine. Salt crystals pull water molecules out of ice formation which creates a brine with a lower freeze point. Once the brine is formed melting is greatly accelerated. Save time and money by pre-wetting your salt with a brine before it hits the pavement to jump start melting! See the Pre-Wetting fact sheet for more information.

Save $$ and the Environment
In New Hampshire there are over 40 watersheds currently contaminated from road salt. As the pavement temperature drops more salt is required. As the pavement temperature rises less salt is required. Save money and the environment by using only what is needed to do the job. See NH application rate charts for recommended rates.
IMPERMEABLE SURFACE STORAGE
Store salt and liquids on an impermeable surface to prevent groundwater contamination.

COVERED STORAGE AREAS
If possible, store your salt in a covered shed to prevent runoff. If there is not a shed available, cover your salt pile well with an impermeable membrane or tarp.

SECONDARY CONTAINMENT
Keep your liquids in an appropriate storage container. Secondary containment should be used incase a leak develops in the primary container.

PROPER DRAINAGE & COLLECTION
Protect your groundwater supply! A drainage system should be in place to collect runoff from your salt pile, as well as to collect any liquids that may escape containment. Remember, the collected liquid can be used as a base for salt brine.

Proper Material Storage
Proper storage of materials (especially chemicals) is essential. If impermeable surfaces are NOT used in your storage facilities and brine infiltrates the ground or groundwater, you need to register with the DES under the Groundwater Discharge Permit and Registration Rules, Env-Wq 402. It is a free registration used for tracking potential contaminant sources.

Secondary Containment
Secondary containment for your liquid storage is a HIGHLY recommended technique to help reduce soil and groundwater contamination. If a tank begins leak, the secondary containment prevents liquid from seeping into sensitive environments.

Liquid Storage
Brine stored using holding tanks must be managed so that there are no releases to drains, groundwater or surface water.

NHDES Fact Sheet DWGB-22-30
This fact sheet outlines the basic required specifications for salt and chemical storage facilities. For additional information, please contact the Drinking Water and Groundwater Bureau at (603)271-2513 or dwgbinfo@des.nh.gov, or visit their website at: http://des.nh.gov/organization/divisions/water/dwgb/index.html. The Salt Storage Handbook contains more information and guidelines that should be referenced.
WHY CALIBRATE?
You can't reduce your salt use if you don't know how much salt you actually use! The goal of calibrating is to know how much material you are putting down on a roadway or parking lot for every setting on your truck that you use. This is why calibrating your equipment is the first step to reducing salt use and saving money!

REMEMBER:
Each truck must be independently calibrated for each material it will be used to spread (the salt calibration card will be different than the sand calibration card).

Calibrations should be performed annually, or after a spreader is serviced.

CALCULATIONS:
There are a few simple calculations you must perform in order to complete the calibration. Once all of the necessary data is recorded, head back inside and warm up! Refer to the reverse side of this fact sheet for calculation instructions. The formula you will be using is shown below:

\[ D = \frac{B \times C}{A} \]

Step 1: Load the Truck
Partially load the truck. Half of a full load should be more than adequate for calibration purposes.

Step 2: Set Your Controls
Gate Height: Set the gate height to its lowest practical setting to start (approximately 1” to 1.5”). After the truck is calibrated for the lowest gate setting, calibrate for each 1/2” increment greater than the lowest setting. Continue until all gate settings you use are calibrated.
Engine Speed: Set the pony motor speed to the maximum setting, or to the setting you would normally use.

Step 3: Measure Spread Width
Measure the width that the material covers during spreading. Do this for each gate setting you are calibrating. Round your numbers to the nearest half foot and record them in column “W” of the calibration chart (see reverse side).

Step 4: Collect & Weigh Material
You will need either a sheet of canvas, a tarp, or a bucket to collect the material that is dispensed from the spreader, as well as a scale. Weight the object you are using to collect the material in, and record that value in the purple box above the discharge rate column. Collect material for 1 minute. Weigh the collected material and subtract the weight of the tarp/canvas/bucket. Record this value in the first purple column of the calibration chart. Do this 3 times for each gate opening that is typically used. Average these three values together and record in the orange column in the calibration chart.

Step 5: Perform Calculations
Go inside and calculate your discharge rate using the calibration chart for each truck speed and gate setting you normally use. Refer to the reverse side of this fact sheet for calculation instructions. The formula you will be using is shown below:

Step 6: Distribute Completed Calibration Cards!
Put a copy of the calibration card in the truck you just calibrated. Also, leave a copy of the calibration card in the office so you have a copy in case the original is damaged.

Produced in partnership with:

[Logos]
## Calibration Chart (Pony Motor Type)

<table>
<thead>
<tr>
<th>Gate Opening</th>
<th>Spread Width (ft.)</th>
<th>B</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1 Run 2 Run 3</td>
<td>5.28 × W</td>
<td>5 mph 10 mph 15 mph 20 mph 25 mph 30 mph</td>
<td>(Run1 + Run2 + Run3)/3</td>
</tr>
<tr>
<td>1”</td>
<td>5.28 × 14 = 73.92</td>
<td>87</td>
<td>92</td>
</tr>
<tr>
<td>1.5”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EX</td>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Calculation Instructions:** Multiply the spread width from column **W** by **5.28** and record the answer in column **A**. For each gate setting, add **Run 1**, **Run 2**, and **Run 3** together. Divide the result by 3 and record in column **B** to get the average discharge rate. To find the pounds of material discharge per 1000 square feet, you must know the number of minutes it takes to travel one mile at every truck speed you intend to calibrate for. These numbers are designated as variable “C”. The “C” value for each travel speed is shown in red under that given speed. Multiply column **B** by the “C” value for that speed and divide by the **A** column to find the number of pounds of material discharged per 1000 square feet for the given speed. Record these numbers in the **D** columns. The full equation is shown here:

\[
D = \frac{B \times C}{A}
\]
Hydraulic-Run Spreader Calibration
NH Best Management Practices

WHY CALIBRATE?
You can’t reduce your salt use if you don’t know how much salt you actually use! The goal of calibrating is to know how much material you are putting down on a roadway or parking lot for every setting on your truck that you use. This is why calibrating your equipment is the first step to reducing salt use and saving money!

REMEMBER:
Each truck must be independently calibrated for each material it will be used to spread (the salt calibration chart will be different than the sand calibration chart).

Calibrations should be performed annually, or after a spreader is serviced.

CALCULATIONS:
There are a few simple calculations you must perform in order to complete the calibration. Once all of the necessary data is recorded, head back inside and warm up! Refer to the reverse side of this fact sheet for calculation instructions.

Step 1: Load the Truck
Partially load the truck. Half of a full load should be more than adequate for calibration purposes.

Step 2: Set Your Controls
Gate Height: Set the gate height to its lowest practical setting (~ 2”). This should be kept constant throughout the calibration process. If you find that not enough material is dispensed with this setting, try 2.5” to 3”.
Engine Speed: Warm the truck up and run the engine at the typical rate seen during spreading (approximately 2000 rpm).

Step 3: Measure Spread Width
Measure the width that the material covers during spreading. Do this for each conveyor/auger setting you are calibrating. Round your numbers to the nearest half foot and record them in column “W” of the calibration chart (see reverse side).

Step 4: Collect & Weigh Material
You will need either a sheet of canvas, a tarp, or a bucket to collect the material that is dispensed from the spreader, as well as a scale. Weight the object you are using to collect the material in, and record that value in the purple box above the discharge rate column. Collect material for 1 minute. Weigh the collected material and subtract the weight of the tarp/canvas/bucket. Record this value in the first purple column of the calibration chart. Do this 3 times for each conveyor/auger setting that is typically used. Average these three values together and record in the orange column in the calibration chart.

Step 5: Perform Calculations
Go inside and calculate your discharge rate using the calibration chart for each truck speed and conveyor/auger setting you normally use. Refer to the reverse side of this fact sheet for calculation instructions. The formula you will be using is shown below:

\[ D = \frac{B \times C}{A} \]

Step 6: Distribute Completed Calibration Cards!
Put a copy of the calibration chart in the truck you just calibrated. Also, leave a copy of the calibration chart in the office so you have a copy incase the original is damaged.

Produced in partnership with:
**Calibration Chart (Hydraulic Type)**

Material: ___________________________________________  Truck/Spreader ID: ______________________________________________________________

Date: _______________________________________________  Performed by: __________________________________________________________________

Tarp/Canvas/Bucket Weight: ____________________________

<table>
<thead>
<tr>
<th>Conveyor or Auger Setting</th>
<th>W</th>
<th>A</th>
<th>Discharge Rate (lb/min.)</th>
<th>B</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Average Discharge Rate (\frac{(Run1 + Run2 + Run3)}{3})</td>
<td>Pounds of Material Discharged per 1000 square ft. (D = \frac{B \times C}{A})</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 mph (C = 12)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10 mph (C = 6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 mph (C = 4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20 mph (C = 3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25 mph (C = 2.4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30 mph (C = 2)</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
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<td>3</td>
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<td>4</td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EX</td>
<td>14</td>
<td>5.28 × 14 = 73.92</td>
<td>87 92 93</td>
<td>(87+92+93) ÷ 3 = 90.67</td>
<td>12 × 90.67 ÷ 73.92 = 14.72</td>
</tr>
</tbody>
</table>

**Calculation Instructions:** Multiply the spread width from column **W** by **5.28** and record the answer in column **A**. For each conveyor/auger setting, add Run 1, Run 2, and Run 3 together. Divide the result by 3 and record in column **B** to get the average discharge rate. To find the pounds of material discharge per 1000 square feet, you must know the number of minutes it takes to travel one mile at every truck speed you intend to calibrate for. These numbers are designated as variable “C”. The “C” value for each travel speed is shown in red under that given speed. Multiply column **B** by the “C” value for that speed and divide by the **A** column to find the number of pounds of material discharged per 1000 square feet for the given speed. Record these numbers in the **D** columns. The full equation is shown here:

\[
D = \frac{B \times C}{A}
\]
GET THE LOWEST FREEZE POINT
When salt brine is 23% salt (measured with a hydrometer: 1.176, or with a salimeter: 85%) it has the lowest freeze point possible (about 0°F).

BRINE STORAGE
23% brine solution may be stored outside, however if temperatures get below 0°F the brine may freeze. A circulator pump will reduce the risk of freezing. If possible store brine indoors to eliminate risk of freezing.

COST OF BRINE
Calcium chloride brine costs about 7¢ / gallon (assuming $58/ton for salt) after you have your equipment setup.

MULTIPLE USES
Brine can be used directly for anti-icing, for prewetting salt as it is dispensed from your truck, or to pretreat salt before it is loaded into your truck. Brine can be safely stored for up to a year, however, the concentration should be tested before use.

What Do You Need?
Brine making is a fairly simple process—the only ingredients are salt and water, and the only equipment you’ll need is an open top mixing tank, a holding tank, a small pump, and a salimeter.

Step 1: Fill Mixing Tank
Add Salt: Add about 2.5 lb of salt per gallon of water you plan to add. Make sure your mixing tank has a large opening to make adding salt easy.

Add Water: Slowly add water from the bottom of your brine mixing tank. This will allow it to percolate up through the salt and overflow into the holding tank.

Step 2: Check Concentration
Float a hydrometer or salimeter directly in your holding tank and read the value at the surface of the water. The number should be either 85% or 1.176 depending on the units of your device.

If the values are too low, pump some brine from your holding tank back into the mixing tank and allow it to overflow. If values are too high simply add some fresh water.

Quality Control & Documentation
Make sure that you record the date when you create each batch of brine and document who mixed it and checked the concentration. It is also a good idea to note the final concentration. These records should be kept for at least two years to protect your group in the event of litigation.