c. Brine used in pre-wetting solid material

i. In the pre-wetting of solids, the brine is usually placed in a holding tank on the salt truck and sprayed on the salt at the time of spreading.

ii. Pre-wetting the solid material improves its effectiveness in many ways:

a) Accelerates the solution process

b) The pre-wetted material adheres to the road surface better than a dry material and results in less loss through bounce and scatter.

c) Provides faster effect of the chemical

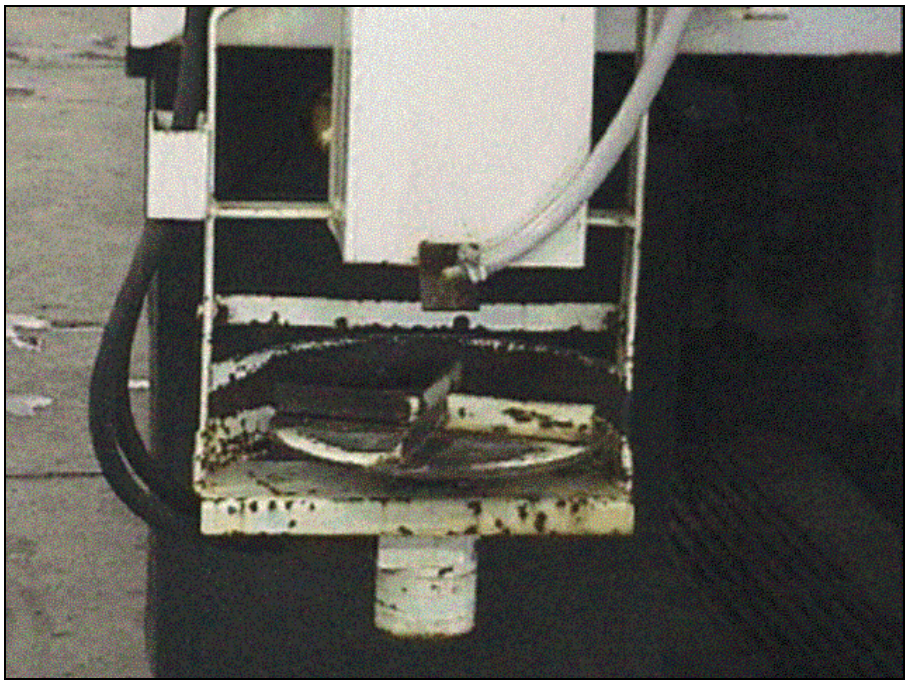
d) Reduces material requirements because more stays on the road surface.

iii. Salt brine is widely used because it is:

a) Readily available (easy to produce)

b) Very economical

c) Effective for events occurring at moderate subfreezing temperatures



7. Other Chlorides (Calcium or Magnesium)

a. What are chlorides?

i. These materials are also naturally occurring and are liquids in their natural state and maintain an affinity for returning to a liquid.

ii. Both materials are commercially manufactured by either an extraction or chemical process.

iii. Both are produced and sold as a liquid solution and as a solid flake form.

a) ODOT typically uses calcium chloride as it is more readily available and slightly less expensive than magnesium.

b. How calcium and magnesium chlorides work

i. Unlike salt (sodium chloride), these chemicals do not require heat energy to go into a solution; instead they give off heat when they go from a solid into solution.

a) Releasing heat when going into a solution is referred to as exothermic.

ii. Calcium and magnesium chloride also attract moisture from their surroundings.

a) This improves their effectiveness in dry, cold conditions.

iii. These materials have low eutectic temperatures so they provide more melting action at lower temperatures.

iv. Both materials are also very corrosive by nature and are frequently purchased with added corrosion inhibitors.

Exercise: Other Chlorides

True or False? Calcium chloride releases heat as it goes into solution which improves effectiveness in cold weather.

c. How calcium chloride is used

i. The liquid calcium chloride and the corrosion-inhibited versions as purchased by ODOT are within a 30-33% solution.

a) This is the concentration that relates back to the eutectic temperature (-60° F).

ii. These products are typically used for pre-wetting salt and can be used to pre-wet abrasives.

iii. It is also common to purchase calcium chloride in a dry flake form and mix it with salt or abrasives for effective melting at low temperatures.

iv. The higher cost of calcium products frequently prohibits use for routine purposes.

a) These products can also be used in anti-icing; however, at the higher cost they quickly become uneconomical.

v. As detailed on ODOT's Route Application Guidelines and Goals document, the use of calcium chloride (or a corrosion-inhibited version) is recommended for use at temperature ranges below 25° F.

8. Agricultural By-products

a. Agricultural by-products work basically the same way as other snow and ice control chemicals although they do not form a brine.

i. They are soluble in water and the resulting solution acts by depressing the freezing point of water.

b. In addition to the melting characteristics, the agricultural by-products are environmentally friendly and less corrosive than many conventional materials.

c. These products are the concentrated liquid residues from the processing of grains and other agricultural products.

i. They are derived from the processing of agricultural raw materials and are often used in combination with other materials (for example, mixed with magnesium chloride).

ii. Like the chloride materials, their higher cost frequently prohibits use for routine purposes.

C. Material Handling and Storage

1. Material Handling

a. Handling abrasives, salt and other chemicals need not be hazardous, if you know what you are handling, and follow common sense requirements for personal protection.

2. MSDS Sheets

a. All chemical manufacturers are required to have a Materials Safety Data Sheet (MSDS) for each of their products.