EXPLANATION OF KINDS OF SNOW AND ICE

Formation of Snow: Tiny ice crystals form in the atmosphere (usually very small with 300 to the inch).

Ice crystals form into a wide variety of geometrical shapes.

As the crystal falls it grows in size and fuses together to form a snowflake.

Snowflakes reaching the ground can vary widely in size and shape depending on weather conditions. There may be several hundred to the inch or up to one inch in size.

Fresh Snow: Snow forming near freezing (32°F) is likely to be wet and heavy while snow formed at colder temperatures may be dry and light.

Fresh snow density may range between 3 to 7 lbs. per cubic foot with a compressive strength less than 1.0 PSI.

Wind Blown Snow: Loose snow is readily picked up by winds of 8-10 mph. Blowing snow becomes rounded and will form a dense layer when deposited. Density can increase to 10 lbs. per cubic foot.

Snow Changes: Changes in ambient temperature and humidity cause changes in snow density and physical properties. Melting causes consolidation. Refreezing will strengthen the snow.

Snow cover from a number of snowfalls will be highly variable.

Natural snow can increase in density up to approximately 25 lbs. per cubic foot with a compressive strength of approximately 30 PSI.

Snow physically moved (by plows, etc.) is compacted and within a short time (1-2 hours) becomes much stronger.

Snowpack: Consolidation from freeze/thaw or under traffic can produce very hard dense snowpack. Maximum density is approximately 50 lbs. per cubic foot and it becomes essentially ice.

Slight melting at the pavement surface can refreeze and develop a very strong bond between the snowpack and pavement. It may be impossible to remove it by plowing alone.

Medium salt application is helpful to prevent formation.

Heavy salt application is required to break bond for removal by plows. Time is required for salt penetration to pavement surface. Traffic is helpful to promote breakup.

Slush:

Slush is a mixture of water and snow with the water content between 15% and 30%.

Slush can be plowed and will not freeze to the pavement. If it becomes too dry (less than 15% water) it tends to pack or bond to the pavement.

Vehicle tires will throw slush sideways and eventually off the road.

When slush approaches 15% moisture, tires will start to pick up the slush and throw it backwards.

Light to medium salt application can be very beneficial to prevent slush from forming into snowpack, allowing time to be removed by plowing.

Surface Frost: (Hoar frost)

Water vapor can condense from the air and freeze into frost on cold surfaces such as bridges, shaded pavements, etc.

Very sensitive to small temperature differences. Can form and disappear relatively quickly.

Can develop on short segments causing differential driving conditions.

Surface bond is not strong and fairly easy to melt.

Light salting or sanding is helpful.

Black Ice:

Dew may freeze into thin "invisible" layer of ice.

Tightly bonded to pavement.

Light to medium salt or sand application.

Glare Ice:

Rain on cold pavements or bridges will freeze into ice.

Ice bonds tight to pavement surface and is almost impossible to plow. Slippery.

Very cold ice (0° F.) has much better traction than ice near thawing (32° F.)

Medium to heavy salt required to achieve bare pavement.

Sand is helpful, but be careful, it is hard ice conditions.

Icings: Melted water can refreeze on pavement or bridge surfaces.

Same characteristics as glare ice, but may be caused by poor maintenance rather than natural causes.

BLACK ICE

So what is black ice? Are we ever exposed to it? Yes, I'm afraid so, and in this state you may be exposed all winter long. Black ice is clear ice, glazed, and extremely slippery, created by temperature, in this case by automobile exhaust discharged on roadways when there is humidity present. The exhaust temperature of passing cars raises the affected area temperature, flash-melts that humid surface and then it immediately freezes to an extremely slippery and dangerous glazed surface call black ice.

The auto exhaust will only raise the surface temperature a small amount, but if there is road salt present, which melts at 17 degrees, it couldn't and doesn't have to raise the temperature to 32 degrees when pure ice melts, rather only to 17 degrees, a flashmelt of the salted ice mix - and you have black ice.

We know that under certain winter temperatures we experience here, road salt can cause black ice, and so many lives are endangered. However, highway people are bombarded by the public when extreme conditions exist, asking them to put on even more salt, which is futile since salt bine also freezes at 17 degrees and stays frozen and more slippery at all temperatures below that. So asking for more salt may influence, in part, accidents.