



# Loss Control TIPS

## Technical Information Paper Series

*Innovative Safety and Health Solutions<sup>SM</sup>*

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## Winter Highway Maintenance Using Anti-Icing Chemicals

Most state and municipal highway crews traditionally attack winter's problems of snow, sleet, and freezing rain with a combination of plowing, sand and salt, and/or sand or other traction materials (e.g., coal ash). But there is now a new and more efficient means of preventing vehicles from skidding out of control and into guardrails, ditches, and each other.

### Anti-Icing Chemicals Proven Effective

As a result of tests of anti-icing chemicals conducted in fifteen states, the Federal Highway Administration has determined that roads are less slick when anti-icing chemicals are sprayed onto the road surface *before* ice or frost forms. This proactive approach *prevents* snow and ice from sticking to the pavement, making the surface easier to plow and quicker to clear and return to normal frictional values.

An analysis by the Texas Transportation Institute found that highway crews could save more than twice the estimated start-up costs if they were fully geared-up to anti-icing operations. (This savings would be in addition to the estimated annual collision cost savings of \$228 million to \$447 million that would be saved by accidents that would be prevented if roads were made less slippery.)

### How Anti-Icing Chemicals Work

Anti-icing chemicals—either liquids or pre-wetted solids—lower the freezing point of water, thereby preventing a strong bond from forming between snow or ice and the pavement surface. The road remains wet or slushy, rather than becoming snow-packed or icy.

Although this process works best when road crews spray the roads before the pavement freezes, it is still effective even if the chemicals are applied later during the storm. The U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratories have written anti-icing guidelines for a variety of storm conditions; their *Manual of Practice for an Effective Anti-Icing Program* is available on the Internet.



## Materials Used for De-Icing

The following chemicals have been used effectively:

- magnesium chloride
- sodium chloride (pre-wetted salt)
- calcium chloride
- calcium magnesium acetate
- liquid potassium acetate

There is also a de-icing material made from corn processing by-products, which is deemed to be the most “environmentally friendly.”

## Cost-Effectiveness of De-Icing Programs

To illustrate the impact that anti-icing chemicals can have, in 1994 crews dumped 7,000 tons of sand at Glenwood Canyon in Colorado. In 1996, using magnesium chloride, they were able to reduce the amount of sand used to only 600 tons.

Many states and Canada are currently engaged in limited applications of anti-icing compounds to test both the effectiveness and cost reduction in keeping roads clear and safe.

In order to gear up for this type of application, trucks with tanks and sprayers need to be included in the fleet. Since at least 55 percent of the nation’s highways are impacted by at least five winter storms each year, this is a significant equipment consideration.

## Reference

*Manual of Practice for an Effective De-Icing Program: A Guide for Highway Winter Maintenance Personnel.* United States Department of Transportation, Federal Highway Administration, 1996.  
[www.fhwa.dot.gov/reports/mopeap/eapcov.htm](http://www.fhwa.dot.gov/reports/mopeap/eapcov.htm)

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