

# Best Practices for Road Weather Management

## Version 2.0

### Idaho DOT Anti-Icing/Deicing Operations

In 1996 maintenance managers with the Idaho Department of Transportation (DOT) began an anti-icing program on a 29-mile (47-kilometer) section of US Route 12. This highway segment is located in a deep canyon and is highly prone to snowfall and pavement frost (i.e., black ice) due to sharp curves and shaded areas. An anti-icing chemical is applied to road surfaces as an alternative to spreading high quantities of abrasives. Abrasives are thrown to the roadside by passing vehicles and only improve roadway traction temporarily.

*System Components:* Winter maintenance managers modified maintenance vehicles for use in anti-icing operations and installed chemical storage tanks. Trucks with 1,000-gallon (3,785-liter) and 1,500-gallon (5,678-liter) tanks were equipped with spray controls to dispense liquid magnesium chloride. A chemical storage facility with two 6,900-gallon (26,117-liter) storage tanks and an electric pump for chemical circulation and truck loading was located in the Orofino maintenance yard.

*System Operations:* Maintenance managers utilize the Internet to access weather forecast data and identify threatening winter storms or frost events. When an impending threat is predicted, maintenance vehicles are deployed to spray small amounts of the anti-icing chemical on road surfaces before snowfall begins or frost forms. Chemical application rates vary from ten to 50 gallons (37.9 to 189.3 liters) per lane mile, depending on the nature and magnitude of the threat. Maintenance crews regularly check four “indicator areas” along the highway to determine when frost on shoulder lanes begins to migrate into travel lanes. The status of these areas indicates that the road should be retreated to ensure that chemical concentrations are high enough to prevent freezing.

*Transportation Outcome:* To assess the effectiveness of anti-icing operations, winter road maintenance activities were analyzed for five years prior to the anti-icing program and for three years after implementation. Annual averages of abrasive quantities, labor hours, and winter crashes are shown in the table.



**Idaho DOT  
Maintenance Vehicles**



**Idaho DOT  
Chemical Storage Tanks**

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Idaho DOT Winter Maintenance Performance Measures  
(Annual Averages)

	1992 to 1997 (Without Anti-Icing)	1997 to 2000 (With Anti-Icing)	Percent Reduction
Abrasive Quantities	1,929 cubic yards (1,475 cubic meters)	323 cubic yards (247 cubic meters)	83%
Labor Hours	650	248	62%
Number of Crashes	16.2	2.7	83%

Mobility, productivity, and safety enhancements resulted from the anti-icing treatment strategy. Mobility was improved, as a single application of magnesium chloride was typically effective at improving traction for three to seven days—depending on precipitation, pavement temperature, and humidity. Faster clearing of snow and ice reduced operation costs and enhanced productivity. Safety improvements were realized by reducing the frequency of wintertime crashes.

*Implementation Issues:* Maintenance managers selected the US Route 12 segment for their anti-icing pilot program due to the high crash rate and high maintenance costs. Relatively mild winter temperatures, hazardous winter road conditions, and moderate traffic volumes also made this roadway a good candidate for anti-icing operations.

Other Idaho DOT maintenance districts had successful anti-icing programs. By consulting other districts and assessing existing vehicles, managers developed treatment equipment requirements. Trucks, previously used to spray weed-killing and other chemicals, were modified to dispense liquid magnesium chloride. After configuring the treatment equipment, crews were trained in all aspects of anti-icing procedures. They learned about various anti-icing chemicals and their properties, chemical application criteria and rates, equipment operation, and progress tracking. As a result of the successful pilot program, anti-icing was expanded to other highways in District 2 and throughout the state.

*Contact(s):*

- Bryon Breen, Assistant Maintenance Engineer, 208-334-8417, [bbreen@itd.state.id.us](mailto:bbreen@itd.state.id.us).

*Reference(s):*

- Breen, B. D., "Anti Icing Success Fuels Expansion of the Program in Idaho," Idaho Transportation Department, March 2001.

*Keywords:* snow, ice, winter storm, anti-icing/deicing operations, freeway management, winter maintenance, treatment strategy, internet/web site, forecasts, weather information, maintenance vehicle, chemicals, crashes, mobility, productivity, safety