

Idaho Transportation Department

*Use of salt is essential to
road-clearing efforts*



**Your Safety • Your Mobility
Your Economic Opportunity**

November 2019

Key Message: *ITD currently employs the most effective approach to improve the safety and mobility of Idaho's road users through use of salt, and saves lives in the process by reducing crashes. However, we recognize the need to continuously improve in salt-management practices, and continue working to minimize wildlife or environmental impacts and the corrosion of vehicles on the road. ITD's commitment to serving the public and keeping commuters safe will always remain our top priority. The bottom line is ITD's winter road-clearing practices save lives.*

Key Stat: *Fatal and serious-injury crashes have declined significantly during the last decade, corresponding directly to ITD's increased salt usage in treating our roads. Fatal crashes have dropped from 15 to 4 in adverse winter conditions on state roads since 2011, and serious-injury crashes from 69 to 19 in that same time period. **Overall, crashes have been drastically reduced, from 1,966 to 643.***

Foreman's Decision: *The decision to use salt brine, a mix of salt and sand, or magnesium chloride, is up to each foreman for the roads they are responsible to keep clear. It may even vary within the same district, as topography, road geometry, elevation or weather characteristics can change from one place to the next. For instance, what the foreman uses to treat roads in New Meadows can vary quite a bit from what we use on I-84 in the Treasure Valley, although both are within District 3. Similarly, how we treat highways in Blaine County can be quite different than how we treat those around Twin Falls, even though both places are within District 4.*

The varying use of salts in the districts is a complex issue. All districts are now using salt in a granular form. There is still some use of anti-skid material (sand & fine gravel) mixed with salt in D3 and areas where low temperatures are expected.

From a liquid perspective, District 2 and 3 are still using magnesium chloride districtwide. District 2 is sampling the use of brine at the Potlatch Maintenance shed and is only using brine on US-95 from the shed to the district border next to District 1. District 4 also uses mostly brine, but is still using mag chloride only in Blaine County on ID-75 from the junction of US-20 to the District 6 border. They use mag because of the extremely cold temperatures that make brine not the preferred chemical of choice. District 5 and 6 both primarily use salt brine.

Effectiveness in the conditions the product is used is the most important factor. We also consider what is available at the time of need. Cost alone should not be the final determination. Safety is the top priority.

Basic info:

ITD is nationally recognized for the success of its winter maintenance program, which prioritizes the safety of the traveling public. A number of states and more than a dozen other countries have contacted ITD about our winter road performance program. Clear Roads, Intelligent Transportation Systems International, the Federal Highway Administration and Roads & Bridges magazine have all written articles on ITD's winter road maintenance program. The department won an award from the American Association of State Highway Officials (AASHTO) — the nation's highways group — for the winter-performance measuring system in 2013, and for the winter mobility indexing the following year.

The data shows we are saving lives through efficient, effective winter road maintenance. Salt is extremely effective at keeping roads free of ice and snow. The key is using the right product for the right place at the right time.

ITD began decreasing sand use and increasing salt use in the early 2000's because using sand alone wasn't providing the desired results.

The roadway safety and mobility benefits of clear and ice-free highways cannot be disputed. Serious injuries and fatalities during winter months have decreased over time, corresponding to increased adoption of salt use in Idaho. According to the Idaho Office of Highway Safety (OHS), fatal crashes have dropped from 15 to 4 in adverse winter conditions annually since 2010, and serious-injury crashes from 69 to 19 in that same time period. Overall crashes have been drastically reduced, from 1,966 to 643. See Figure 1 at end of this document.

Preventing formation of ice (anti-icing) is far more efficient than melting that same ice once it has formed (de-icing). This is why ITD places such effort in forecasting and anti-icing. It takes 200 pounds of salt per lane mile to clear snow and ice in typical snow storm conditions at 20°F and above. As it gets colder, more salt is required, and as it gets warmer less salt is needed.

ITD has developed a partnership with The National Weather Service to have interactive winter weather briefings with special focus on storm response every week. NOAA has made their meteorologists available to our maintenance crews statewide at all hours to discuss current and forecasted conditions. ITD determines response and application rates for salt products based on those briefings, actual on-site conditions being continuously recorded at our Road and Weather Information Stations (RWIS, which have been placed in about 140 locations around Idaho), and on the Clear Roads salt application matrix (standard third-party guidance for salt application based on relevant conditions).

Since 2010, ITD's mobility index (the percentage of time during winter storms that

Idaho's state roads are clear and passable) increased from 28% to 86%. See Figure 2 at end of this document. The mobility score directly correlates to the efficient movement of goods and services.

Why ITD uses salt

ITD uses salt and plowing to treat the road surface in wintry, slick conditions because this is currently the most effective method for keeping winter roads as clear and as safe as possible. Proactive salt treatments prior to a storm can often preclude the formation of ice on the road in the first place.

Salt use has led to significant decreases in slick-road crashes in winter months. In fact, during the months of December-February when salt use is highest, there has been a decline in fatalities and serious injury crashes in the last decade. According to the Idaho Office of Highway Safety (OHS), fatal crashes have dropped from 15 to 4 in adverse winter conditions since 2011, and serious-injury crashes from 69 to 19 in that same time period. ***Overall, crashes have been drastically reduced, from 1,966 to 643.***

What Idahoans say: In the most recent survey of road users in Idaho (2014), 99.3% of people said ITD should maintain or increase winter maintenance efforts. Nearly 80% said they felt safe on Idaho highways during the winter, almost 76% said they are somewhat satisfied or very satisfied by our level of maintenance. The overwhelming majority of drivers were most comfortable with a "Bare Pavement" approach, which is achieved through the use of salt or salt products, not by plowing snow or sanding alone. Our practices reflect what drivers want, along with Roadway Salt Best Management Practices (2015) from Clear Roads — a coalition of 36 "snowbelt" states — and a salt study commissioned by ITD in 2014 that verifies salt as the best option for safe winter operations.

We actively seek to reduce the use of salt while still getting the job done. For instance, "pre-wetting" (wetting the salt before it is distributed, to help it stick to the road and accelerate its activation), reduces the amount of salt required by 30%-50%. In addition, ITD has taken a proactive approach to storm monitoring and forecasting, knowing that pre-treating the roadway, rather than de-icing after ice has already formed, requires up to 5 times less material.

Leading research: We are always looking at the most recent research to make sure we are using the best salt-management practice. Research to date, particularly Clear Roads' Roadway Salt Best Management Practices (2015), points toward continuing the use of salt. ITD also commissioned a salt study in 2014 that verifies salt as the best option for safe winter operations. Clear Roads has a study due out in 2020 regarding salt use and alternatives that may give us additional best practices to incorporate.

ITD actively works with Clear Roads, AASHTO, the Transportation Research Board's National Cooperative Highway Research Program, and Pacific Northwest Snowfighters,

among others, to develop our road-clearing practices. ITD's chemistry lab has been in a leading role in national organizations invested in getting better materials, equipment, decision-making tools, and procedures available to the states that experience snow and ice conditions.

Research to date by those organizations, particularly Clear Roads' Roadway Salt Best Management Practices (2015), points toward continuing the use of salt.

All but two states in the 18-state Western Association of State and Highway Transportation Officials (WASHTO) use salt (along with snow plowing) as their primary winter road treatment method.

Cost Benefits

There is a significant societal benefit to reducing the most serious crashes. Statistically, OHS research shows these crashes have a cost to society of about \$72,000 each, so reducing the number of those crashes through salt use amounts to significant savings.

Salt-related corrosion to vehicles

ITD acknowledges that salt can corrode vehicles and the roadway infrastructure, so we try to only use as much salt as necessary to do the job. ITD uses the application target rates recommended by Clear Roads, a national organization of states. Application rates used by ITD, recommended by the Clear Roads application matrix, are less than half those commonly used in mid-western states and on the East Coast. Application rates in Midwestern states are as high as 1,500 pounds of salt per lane mile. Application rates in Idaho are 125-175 pounds per lane mile in an anti-icing situation where ice has not yet formed on the road, and up to 475 pounds per lane mile in a situation where ice has already formed.

The department measures how much salt our trucks use every year, to ensure we use only the amount needed to keep the roads clear and to reduce impacts to the environment and to vehicles. ITD has seen the effects of the increased salt usage on our own snowplow trucks and equipment, and we have found that frequent washing of the equipment is the best way to reduce potential corrosion.

For motorists in the general public, washing vehicles frequently helps reduce corrosion. Many commercial car washes include an undercarriage wash that is highly recommended to combat corrosion.

In addition, ITD continues to explore the use of corrosion inhibitors to mix in with road salt when it is used. We conducted field tests and did not see a reasonable amount of corrosion resistance that would justify the cost. Some products, such as magnesium chloride, come with corrosion inhibitors. Anywhere that is using magnesium chloride

(primarily in southwest Idaho) is effectively already using corrosion inhibitors.

Ongoing research into impacts on the environment and wildlife

Needle Browning: Generally, needle browning on coniferous trees only happens when the salt makes physical contact with the tree. Clearing trees from the side of the highway not only eliminates needle browning, but also has a huge safety benefit by reducing shadowing on the road to aid in snow melting, and creates a recovery zone for errant vehicles. More mature, larger trees are typically more resistant to needle browning, and deciduous trees are more resistant than conifers. Trees in areas of greater precipitation are also more resistant, as the moisture helps to wash off the salt residue.

Vehicle/Animal Conflicts: While wildlife may be attracted to a big salt block on the road, the amount of salt we typically use starts to dilute as soon as we apply it to the roads during storms. Typically, the residual salt content dissipated further by late spring, when the animals' desire for it increases. Although not widely observed in Idaho, in some cases animals may occasionally lick salt from brackish pools on the roads. The bigger issue is wildlife migration patterns and the fact that deer and elk tend to want to use the clearest part of the road to cross, too.

In addition, ITD has taken a much more proactive approach to storm monitoring and forecasting as well, knowing that pre-treating the roadway, as compared to de-icing after ice has already formed, requires from 3 to 5 times less material. The National Weather Service provides our maintenance personnel with customized, interactive weather briefings at least twice a week and in advance of significant winter storm warnings, watches and advisories in winter months.

ITD continues to evaluate different types of materials to minimize salt quantities applied. We choose the best type of salt to match storm attributes.

ITD recognizes the need to continuously improve in salt-management practices, and we are working on ways to do this. Education, on-the-job training, using data, accountability, and technology will be the main drivers in this improvement process. We evaluate the practices of yesterday to build upon for future changes, to be better tomorrow.

Alternatives

Beet Juice: Sugars in the juice make it freeze at a lower temperature, just like salt. However, corrosion can still happen, with vehicles becoming a sticky mess - beet juice is thick like molasses. It is also expensive. Beet juice can be a great additive, but is not currently cost-efficient for primary use.

Other alternatives include doing nothing, plowing but not trying to get to bare

pavement, or plowing and using only sand for traction on a “snow floor.” None of these are really viable options. The first one is simply not responsible or acceptable. The second one does not provide adequate mobility or safety for the vast majority of Idaho motorists. The third one provides limited traction but does nothing to try to clear the road. These practices are not proactive and only begin after compacted ice and snow have severely deteriorated driving conditions and mobility.

Different products are used to address different areas and different conditions. ITD strives to be as efficient as possible, with safety as our top priority and cost effectively maintaining mobility the other main consideration. ITD is constantly evaluating and improving our winter road-clearing practices to optimize safety and our mobility cost efficiency.

Additional Resources

The ITD website has a great deal of information about salt usage and its benefits. Please consider visiting <https://itd.idaho.gov/road-mtce/>

Other frequent inquiries:

What else can drivers do to remove salt or help prevent corrosion to their vehicles, especially if they don't have access to a nearby car wash?

Drivers should spray down the undercarriage of their vehicle regularly to prevent corrosion during winter when road salt is being used. When winter season closes, drivers should utilize a hose or car wash with undercarriage sprays to remove any residue from brake, driveshaft, frame and other vulnerable portions of the vehicle. There are products such as “Fluid Film” that are designed to prevent or reduce the effects of salt corrosion on vehicles. The applications of these simple spray-on products are usually applied once per year.

Why can't we use more sand on the roads?

While some in the public want us to use more sand, it has a negative environmental impact on air quality as dust is spread upward. Sand also creates drainage issues as it builds up in streambeds and spawning beds.

What are we doing to minimize corrosion from salt usage?

On ITD equipment, we wash or rinse equipment after use, and conducting regular preventative maintenance to ensure longevity of our equipment. Citizens are encouraged to regularly wash vehicles to limit vehicle corrosion.

Figure 1. Decreases in Serious Injury and Fatality Crashes, Reflecting Anti-Icing and De-Icing.

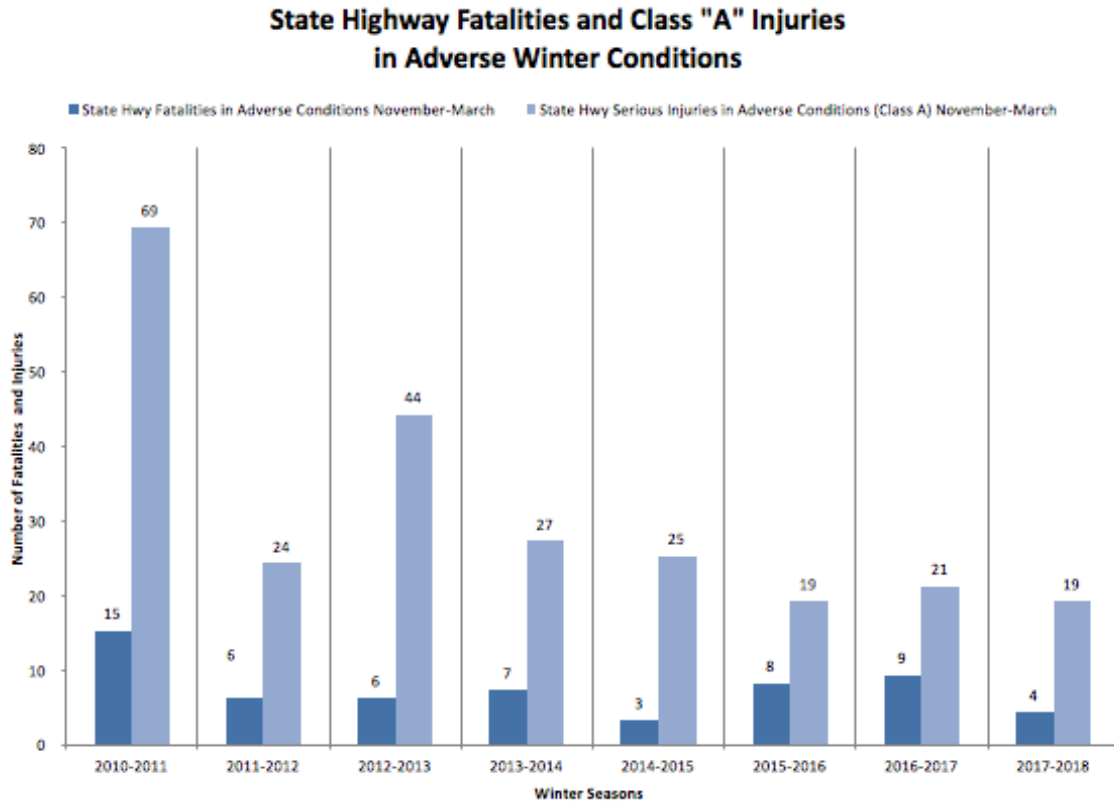


Figure 2. Increase in Mobility Metric for Idaho’s State Highways (Mobility Metric is the percentage of time during storms that the roads are free and clear of snow and ice).

