

Alaska Department of Transportation and Public Facilities

Anti-Icing Fact Sheet

What are the ADOT/PF maintenance vehicles spreading on the highway before a winter storm?

The Alaska Department of Transportation and Public Facilities (ADOT/PF) is utilizing enhanced salt brine that we produce locally as an anti-icing agent that helps melt snow and reduce ice formation on the roadway. The ADOT/PF uses chloride (salt) brine diluted with water to 23.3% sodium chloride. Sodium chloride is considered by many transportation experts to be the safest and most cost-effective anti-icing product available. This approach and technology has been used successfully in many of the lower 48 states for several years now and is rapidly spreading across the country. In Alaska, the enhanced brine is currently being produced and utilized in Juneau, Sitka, Klawock, Valdez, Fairbanks, Soldotna, Homer, Seward, Dillingham, and Kodiak. The Fairbanks brining unit is producing enhanced brine for the Nenana, Healy, and Cantwell maintenance stations as well.

Salt Brine is made by simply mixing salt and water until we have a mixture that is 23% salt. At this mixture, salt brine melts ice at temperatures down to its eutectic point of -6° F. Most snowstorms occur when the air temperature is between 20° F (-7° C) and 32° F (0° C), the temperature range where salt is very effective.

Salt brine is utilized in two different ways. It is either sprayed onto the pavement before a storm which is known as “*pre-treating*” or it is sprayed onto road sand or salt as it is being applied which is known as “*pre-wetting*”. When sprayed on as a liquid for anti-icing, the brine dries leaving sodium chloride on the pavement and its presence slows or prevents the development of a bond between the snow or ice and the pavement “buying time” until further storm response can be implemented. If applied just before a winter storm, the enhanced salt brine will begin working as soon as the first snowflake falls and will delay the accumulation of snow and ice pack on the pavement. It is important to note that 20F is the limiting temperature for almost all chemicals used for anti-icing on our nation’s highways. Anti-icing is not as effective with a pavement temperature below 20F.

Pre-wetting operations will commence once a winter storm is in progress, or road conditions become slick. Salt brine is sprayed onto sand as it is applied by our sand

trucks to the road surface allowing the sand to better penetrate the ice on the road surface while retaining more of the sand on the road.

The ADOT/PF is also purchasing an anti-icing additive (the addition of the additive is why we call it an enhanced salt brine) that when added to salt in specific proportions, significantly lowers the working temperature of chloride salt, allowing longer working time, better adherence and residual effect, and greatly reducing corrosion. Lower working temperatures coupled with better adherence and the residual effect of the additive results in a 30 - 40 percent salt saving.

What is anti-icing?

Anti-icing is a pro-active approach to winter road maintenance. It involves the application of anti-icing products (also known as freezing-point depressants) to the roadway before a winter storm. It forms a bond-breaker between the pavement surface and the snow and ice layer which melts snow more quickly and reduces the chance that ice will form and bond to the road surface

Anti-icing reduces the amount of time required to restore the roads to a clear, dry condition. ADOT/PF uses snow plows, snow TowPlows, tankers, automatic bridge deck sprayers, and other equipment in the anti-icing process. Effective anti-icing is dependent upon having the right amount of anti-icing liquid in the right place at the right time. Applying anti-icing liquids to the roadways is generally the most effective approach to prevent icy and snow-compacted roads.

Are anti-icing products corrosive?

All chloride products used for anti-icing can be corrosive. The best source of information about vehicle corrosion is NACE International (formerly the National Association of Corrosion Engineers). Every few years NACE International conducts a study of corrosion on older vehicles. Starting in 1976, it looked at corrosion on 6 year-old vehicles and found 90 percent of them had rust perforation. Improvements implemented by automobile manufacturers over the last 30 years (galvanized steel panels and wheel houses; anodic electro-deposition primer; anti-chip lower body coatings; crystal-size phosphate to obtain improved corrosion resistance; weatherpac electrical connectors; stainless steel exhaust systems; two-sided pre-coated steel products) have reduced rust perforation from 90 percent in 1976 to just 20 percent in 1980. By 1990, the percentage of rust perforation dropped to only 6 percent. The most recent survey found an

insignificant percentage (less than 1 percent) of 6 year-old vehicles had any type of rust perforation.

Although salt can be minimally corrosive to vehicles, the addition of an organic by-product reduces the corrosiveness of the salt even further. The department utilizes an organic additive that is approved by the Pacific Northwest Snow-fighters (PNS) and results in a mixture that is only one-third as corrosive as salt. The PNS is an internationally recognized organization of snow-fighting professionals that conduct extensive product testing and only certify anti-icing products that meet their stringent requirements for performance and corrosion. The additive that the department utilizes is certified by the PNS and meets the national standard for corrosion.

Will the salt put on roads hurt the environment?

The volume of anti-icing products needed to manage road ice in Alaska is relatively low. Because of this, environmental impact is considered minimal. The Washington State Transportation Center and Washington State University conducted a thorough scientific study regarding the effect of chloride anti-icing products on the environment. The study looked at a stretch of Washington State Route 97 near Leavenworth, located near Peshastin Creek, a known fish-bearing stream. High volumes of chloride products are used on that stretch of road to prevent ice on the road surface. The results of the study indicated that the application of chloride products had no measurable impact on Peshastin Creek. See details at www.wsdot.wa.gov/research/reports/fullreports/500.1.pdf.

What are the benefits of anti-icing compared to traditional methods?

- Anti-icing is a proactive approach to winter road maintenance.
- Anti-icing involves applying anti-icing products to the roadway BEFORE a winter storm. Anti-icing on roadways is used to prevent ice and snow from adhering to the pavement, allowing easier removal by mechanical methods (snowplows). It reduces the amount of time required to restore the roads to a clear, dry condition.
- Reduced use of abrasives (sand) on the road results in reduced environmental impacts.
- Snow and ice control cost savings results in benefits to ADOT/PF and the public.

- Improved winter roadway conditions results in safer driving conditions for motorists.
- Reduced impact on roadside vegetation, aquifers, and watercourses.
- Improved air quality as a result of reduced abrasive usage.
- Lower accident rates.

Anti-icing enhanced salt brine equipment photos.



Figure 1 - Salt Brine Control Panel



Figure 2 - Salt Brine Mixing Unit and Storage Tank



Figure 3 - Homer Anti-icing Truck



Figure 4 - Sand Truck with Salt Brine Saddle Tanks for Pre-Wetting



Figure 55 - Soldotna TowPlow Applying Enhanced Anti-Icing Salt Brine