

Treating or pre-wetting salt stockpiles has many advantages. Salt treatment keeps salt flowing for stockpile movement and salt application. Material loss due to bounce and scatter during application and from traffic is proven to be significantly decreased. Melting capacity, melting time and effective melting temperature can all be improved with salt treatment. However, liquid treatment leaching can prevent these advantages from being realized. Treating salt with the appropriate liquid is crucial to realizing all the benefits of pre-wetting as many of those advantages can be lost through leaching.

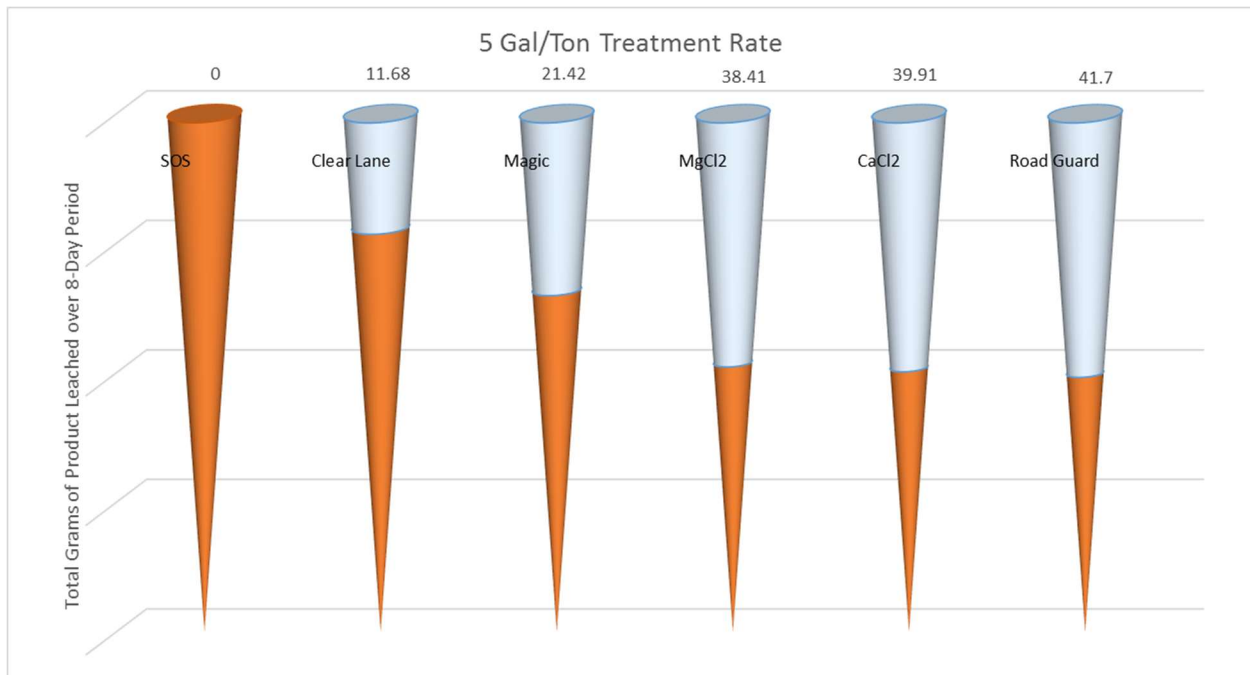
Salt treatment, or pre-wetting, has been in practice for more than 20 years. A 2005 study found that of those road maintenance operations surveyed, the average experience with pre-wetting salt, up to that year, was 10 years (O'Keefe & Shi, 2005). A follow-up study in 2014 found that 50% of road maintenance operations pre-wet 100% of solid deicers used, and 80% of respondents used treated salt in some quantity (Cui & Shi, 2014).

Treatment leaching can be a major problem when pre-wetting salt. Treating a salt stockpile in advance of salt use allows for a main pre-wetting advantage to be realized: pre-wetted salt flows more freely. Additionally, treating in advance allows for preparation, i.e. one fewer step to execute at the time of a snow event. Untreated salt stockpiles have a tendency to clump and “freeze”, making it extremely difficult to work with, and subsequently spread. However, if liquid salt treatment leaches out of a salt stockpile rapidly, the product is wasted and the advantages of salt pre-wetting are lost. Because of this risk, there can be a tendency in the industry to treat salt immediately prior to a snow event or at the salt spinner during application.

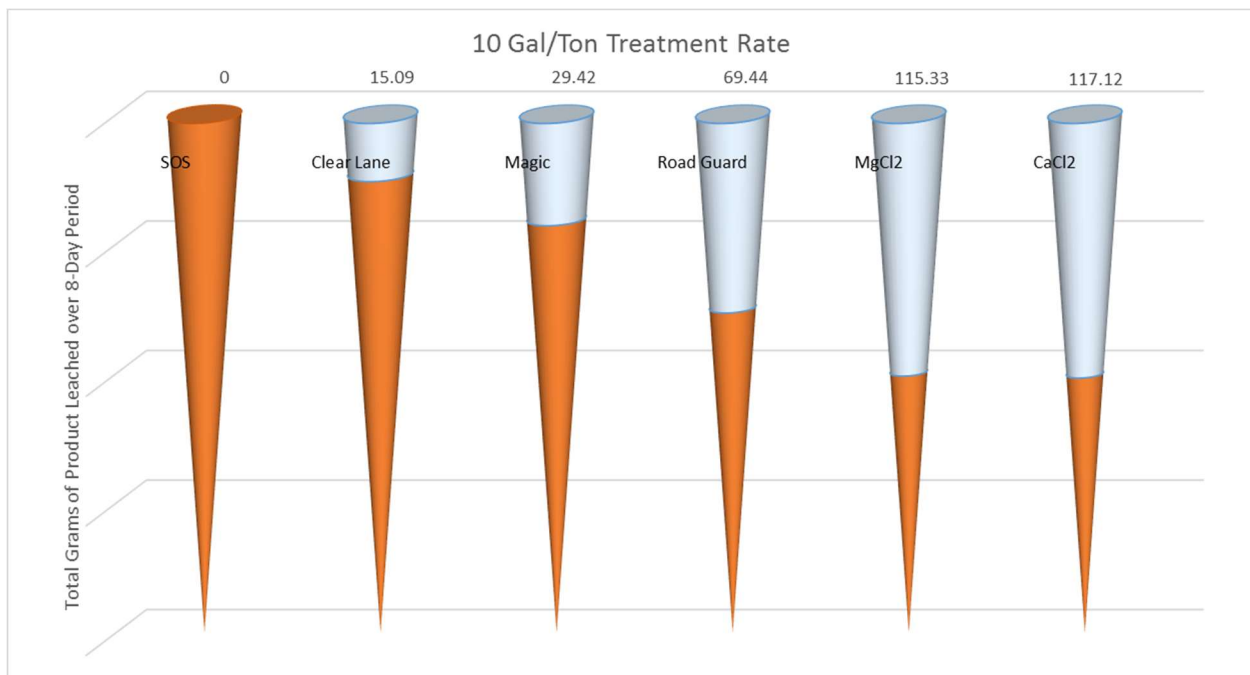
In order to quantify the extent of liquid treatment leaching, EnviroTech Services, Inc.® (EnviroTech) conducted the first in a series of leaching studies of several common pre-wetting liquids. Kansas rock salt was pre-wet with the equivalent of 5 and 10 gallons per ton treatment rates of pre-wetting, thoroughly mixed, and poured in Imhoff cones for daily observation (see Figures 1 and 2). The environmental conditions were consistent across samples at temperatures between 72.0°F and 73.6°F, humidity between 25% and 35% and sea level pressure between 29.75in and 30.02in. Liquid product that leached from the treated salt and dripped from the Imhoff cones was collected and weighed each day for eight days. The quantities of product leached are given in Graphs 1 and 2.



Figures 1 and 2: Imhoff cones filled with treated salt; Illustration of product leaching. (Treatment liquids dyed for visibility.)



Graph 1: Leaching Rates (Grams/Day) of Treatment at Application Rate of 5 gal/ton.



Graph 2: Leaching Rates (Grams/Day) of Treatment at Application Rate of 10 gal/ton.

Treatment liquids used include SOS™ by EnviroTech, Clear Lane® by Cargill, Ice B'Gone Magic™, Roadguard by Tiger Calcium Services, Inc., Magnesium Chloride (MgCl₂) (a commodity product of wide availability) and Calcium Chloride (CaCl₂) (also a commodity product). SOS™, Clear Lane® and Magic™ are all products manufactured for the purpose of salt pre-wetting.

As can be seen from the graphs above, those products that are specifically intended for use as a dry salt treatment generally adhere to the salt better, and thus, leach less. Standard commodity products that may provide some benefit to the melting time, capacity and effective temperature of dry salt leach out of salt at an extremely rapid pace. Indeed, at a 5 gallons per ton treatment rate, both Calcium Chloride and Magnesium Chloride lost approximately 24% of the treatment liquid applied over 8 days, and at 10 gallons per ton they lost 30% and 33%, respectively.

SOS™ outperformed all other treatment liquids, even those others that are manufactured specifically for salt treatment. At both 5 and 10 gallons per ton, SOS™ did not leach at all over the course of observation. All other liquids leached off the salt at a progressively increasing rate, with one exception (Clear Lane® leached at a consistent rate over the course of the observation period), indicating that over time the entirety of the product would leach out of the salt to which it was applied.

Additional testing at lower temperatures and higher humidity levels will explore the leaching characteristics of SOS™ and other common pre-wetting liquids in different environmental conditions.

EnviroTech Services, Inc.® developed the SOS™ family of products to provide customers with an easy-to-use, highly effective salt treatment. EnviroTech's proprietary formulation was specifically engineered to improve the effectiveness, efficiency and longevity of solid de-icers while adhering to salt for long periods of time.

For more information on the SOS™ family of products please visit EnviroTechServices.com.

Works Cited

Cui, N., & Shi, X. (2014). *Improved user experience and scientific understanding of anti-icing and pre-wetting for winter maintenance in North America*. Washington, DC: Transportation Research Board.

O'Keefe, K., & Shi, X. (2005). Synthesis of Information on Anti-icing and Pre-wetting for Winter Highway Maintenance Practices in North America . *Pacific Northwest Snofighters Association*, 87.