

Salt and ice minnesotas battle

War



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Salt and Ice; Minnesotas Battle Abstract Salt is applied in the thousands of tons every year to reduce ice and, in turn, reduce accidents on Minnesota roads. When the ice and snow melt each spring, the majority of this solution is relieved into rivers and lakes through storm drains on Minnesota roads. The salt negatively affects fish and aquatic plants by dehydrating them and altering fertilization. The damaging effects of sodium chloride are long term and not easily repaired. The Minnesota Department of Transportation can take effective action by reducing salt usage and opting to alternate the biodegradable solution potassium formate.

Every year the metropolitan area of Minnesota uses 350, 00 tons, commercial and government, of road salt. (Homstad). To put this in perspective, if the salt was distributed to the residence of the Minneapolis-St. Paul area, each person would lay 260 pounds of salt on the roads. Sodium Chloride (NaCl), the salt that is applied to roads, is the most common practice to reduce ice on roads in Minnesota and around snowy parts of the United States. Salt has been the most effective means of deicing roads because it lowers the freezing point of water, therefore melting the snow, and it is the one of the cheapest products to use.

According to a study done by Marquette University in 1992, accident rates are eight times higher when salt is not applied to icy, snowy roads. Salt is proven an effective reducer of accidents (Kuemmel). What people commonly are not aware of is that salt is generally effective until 15 degrees Fahrenheit. After that point, the salt's ability to break the bond between the ice and the road rapidly decreases until, at about 5°F, salt is no longer a method to melt

ice. Once the ice and snow melt, the water product runs into storm drains, which consequently drain into our bodies of water.

The main drainage exit of metro storm drains is into our rivers and streams. The most common; the Mississippi river. Studies vary but between 70 and 80 percent of all salt applied to roads, ends up in water bodies. Both sodium and chloride are natural products, both already present in water and in living species. However, increased levels of both elements have a deadly, long term effect on aquatic life. Chloride in high concentrations is especially harmful to fresh water aquatic life. It dehydrates plants and reduces aeration in water, giving fish less oxygen.

The salt, also draws moisture from fish and water species, creating an imbalance in electrolytes (Marshall). Not only does this imbalance kill and harm living fish, it often times creates alterations in the tissue. Often time this chloride increase reduces fish's fertility and increases disease susceptibility for generations to come. Education will only go so far. Humans, especially Americans, have a psychological hard-wiring to think that more is more. Naturally, the assumption is made that applying more salt deices the roads faster. This is incorrect. We generally need a very small amount.

Increase in amount does not lower the freezing point further. The most viable solution is to use alternative chemicals to melt salt. Potassium formate is a more costly alternative. The substance melts ice at about the same temperature that salt does however, the product is biodegradable. (Marshall) It has little to no negative effects in water and generally biodegrades in the ground before ever reaching the water. (JSNLM) The

product is man-made, so it is more costly, however a little bit goes a long way with the substance and it does not contain chloride; the most harmful factor in salt.

The solution is not to replace salt. Salt is an effective deicer and with reduced usage and usage n rotation with potassium formate, chloride levels will be lowered in water bodies. Training programs are currently in the works to educate snowplow drivers and residence as to how much salt is necessary. (MPCA) The drivers who took these classes significantly reduced the amount of salt they were dispersing on roads owever they are not mandatory so not all drivers are taking them and there for the overall effect is quite small.

Storm drain alterations are a solution but not an effective enough one. In placeing filterationg systems within them small amounts of salt can be prevented from entering lakes and rivers. These filteration systems would still allow the majority of chloride to enter water bodies because upon sodium chloride melting ice it sperates itself into its two elements and essentially dissolves in the water. Understandably, tax payers may disagree with the higher price of potassium ormate. However, the solution is not to replace salt with this substance.

The solution is to use potassium formate in conjunction with salt therefore, reducing salt usage and chloride concentrations in water bodies. The price would only be slightly more and would reduce prices for fish when more can be naturally harvested. The price for water filtration and purification will lower as well when salinity levels decrease. With correct usage, Potassium

formate is only needed in small quantities. The benefit to consumers being able to consume more local fresh water fish is also valuable.