



Memorandum

To: Stephen McCracken, DRSCW

From: Dan Bounds, P.E., D.WRE

Date: December 10, 2008

Subject: Alternative Deicing Products for Chloride Reduction

Introduction

The DuPage River Salt Creek Workgroup (DRSCW) is seeking to reduce chloride water quality concentrations and achieve water quality standards in the water bodies within their area via education and outreach to local communities. This memorandum provides a summary of alternative deicing products that can be considered for chloride reduction.

The following information is included below:

- Summary of the deicing products currently used by communities, from DRSCW deicing questionnaire / survey
- Listing of deicing products available, developed from product research
- Conclusions and considerations

Currently Used Products: Deicing Questionnaire / Survey

In November 2006 and April 2007, the DRSCW distributed a questionnaire to about 80 municipalities and public works agencies; 39 responses were received. The questionnaire included a section asking about deicing products currently being used. Responses indicated 38 agencies use solid rock salt and 34 use liquid calcium chloride. Five agencies use salt brine (NaCl). Three agencies use magnesium chloride and no agencies reported using potassium chloride. Additionally, the following alternative products were reported as being used:

- Carol Stream uses GEOMELT® 55 (liquid non-chloride).
- Downers Grove uses potassium acetate (liquid non-chloride).
- DuPage DOT uses calcium magnesium acetate (CMA; solid non-chloride) in parking garages.

- Elmhurst uses CMA (solid non-chloride).
- Glen Ellyn uses ClearLane® (solid corrosion-inhibited chloride).
- Hanover Park uses CMA (solid non-chloride).
- Lisle uses potassium acetate (liquid non-chloride).
- Naperville uses urea (solid non-chloride) and CMA (liquid non-chloride).

Available Products: Research Findings

The array of available deicing products includes solids and liquids, both chloride and non-chloride containing, and proprietary and common substances. In the Chloride Usage Education and Reduction Study report, Table 2-2 listed several available products. The table has been updated and expanded to include phase (solid or liquid), alternate names, and distributors or manufacturers (**See Table 1**).

The approximate costs shown in **Table 1** are anecdotal and unverified; they are intended as a tool for order-of-magnitude comparisons only. Costs shown are for material purchase only, and may vary regionally and with time.

The column titled “Cl⁻ by mass” shows the percentage of chloride in the product or solution, if data were available. Non-chloride products show zero percent “Cl⁻ by mass” and are highlighted in bold text.

The eutectic temperature is the lowest temperature at which the deicing agent can remain in liquid form. The minimum working temperature is somewhat higher, but loosely defined; for example, rock salt’s eutectic temperature is -6°F, but its minimum working temperature is approximately 16 to 20°F.

Table 2 contains the contact information for several product suppliers that were contacted and provided information for this memo. The information provided in the table is not intended to recommend or endorse these companies, only to present the contacts if follow up information is needed.

Conclusions and Considerations

The communities in the DRSCW watersheds primarily use rock salt for deicing, and most of them use liquid calcium chloride as a pre-wetting agent or an anti-icing agent. A few communities use CMA or potassium acetate in addition to rock salt, and there is limited use of proprietary alternative products.

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The purchase cost of the non-chloride products (approximately \$200 to \$2,000 per ton) is generally higher than the cost of more traditional products (approximately \$40 to \$780 per ton). However, alternative products can lead to cost savings in a variety of ways. Direct cost savings could be realized through reduced labor hours and product usage, while indirect cost savings can be realized through reduced corrosion and infrastructure damage.

With Total Maximum Daily Loads (TMDLs) for chloride recently approved by EPA, and salt prices significantly higher in the area this year, there should be strong motivation to consider chloride-reducing alternatives throughout the DRSCW watersheds. The DRSCW is interested in coordinating with communities to provide more information or assist with pilot use of alternative, reduced-chloride products.

Table 1: Deicing Products Available

Product	Phase	Approximate Cost	Cl ⁻ by mass	Eutectic Temperature	Other Characteristics	Other Names	Distributors or Manufacturers
	Solids						
Rock salt (NaCl)	Solid or liquid	\$40-160 / ton or \$0.03-0.10 / gal	61%	-6°F	Very corrosive; harmful to vegetation; can attract wildlife	Sodium chloride, Halite	Several
Calcium chloride (CaCl ₂)	Solid or liquid	\$150-340 / ton	64%	-60°F	Extremely corrosive; exothermic melting; dissolves in atmospheric moisture; harmful to vegetation		Several
Magnesium chloride (MgCl ₂)	Solid or liquid	\$45-780 / ton	75%	-27°F	Corrosive; can attack concrete		Several
Potassium chloride (KCl)	Solid or liquid	\$240 / ton	48%	12°F	Corrosive		Several
Blizzard Wizard®	Solid	(no data)	Some	(no data)	Rock salt treated with M50 and liquid MgCl ₂		MeltSnow.com
Calso98	Solid	(no data)	Some	(no data)	Flake form amalgamate of several chlorides; extreme exothermic melting		MeltSnow.com, Kojex
CG-90® Surface Saver®	Solid	\$185-250 / ton	63%	-5°F	Handles like road salt; 76% NaCl, 22% MgCl ₂ plus corrosion-inhibitor		Cargill
ClearLane®	Solid	(no data)	61%	(no data)	Rock salt plus pre-wetting agent (mostly MgCl ₂ plus a corrosion inhibitor)		Cargill
Ice Slicer®	Solid	\$58-64 / ton	Some	-6°F	Granular and reddish, with naturally occurring complex chlorides (Mg, Ca, Na and K chlorides); 20-70% less corrosive than rock salt; harmful to vegetation		EnviroTech
MagicSalt®	Solid	1.4 times rock salt	61%	(no data)	Rock salt treated with M50; effective down to -35°F; use 30 to 50% less than plain rock salt		MeltSnow.com, Clear Path Products
Calcium magnesium acetate (CMA)	Solid or liquid	\$450-2000 / ton	0%	-18°F	Low toxicity; non-corrosive; can cause O ₂ depletion; whey-based CMA may be cheaper		Cryotech, Schoenberg, Meltsnow.com
Potassium acetate	Solid or liquid	\$2.60-3.90 / gal or \$600 / ton	0%	-76°F	Non-corrosive; can cause O ₂ depletion; CF7® is the liquid form	CF7®, Alpine Ice-Melt	Cryotech, SynTech, Schoenberg, Meltsnow.com, NASi
Sodium Acetate	Solid or liquid	\$1500 / ton	0%	-8°F	Spherical pellets; compatible with pre-wetting; exothermic melting	Cryotech NAAC®	Cryotech, Meltsnow.com
Sodium Formate	Solid or liquid	\$200 / ton	0%	-8°F	Similar to sodium acetate; suitable for airports and places where corrosion is unacceptable		Meltsnow.com
Urea	Solid or liquid	\$200-280 / ton	0%	+10°F	Endothermic; degrades to ammonia, then nitrate; working temperature same as CMA		Meltsnow.com

Table 1: Deicing Products Available

Product	Phase	Approximate Cost	Cl ⁻ by mass	Eutectic Temperature	Other Characteristics	Other Names	Distributors or Manufacturers
	Liquids						
Caliber® M1000	Liquid	\$0.55-1.50 / gal	23%	-86°F	Corn derivative liquid deicer plus 30% MgCl ₂ ; corrosion inhibitor; can cause O ₂ depletion		Glacial Technologies, Clear Path Products, SynTech, EnviroTech
Caliber® M2000	Liquid	\$0.83-1.65 / gal	23%	(no data)	Corn derivative liquid deicer plus 30% MgCl ₂ ; corrosion inhibitor; can cause O ₂ depletion		Glacial Technologies, Syntech
Hydro Melt®	Liquid	(no data)	22%	(no data)	Primarily MgCl ₂ ; from evaporated seawater plus anticorrosives; produced in Newark, CA; meets PNS spec		Cargill
M50	Liquid	\$0.70-0.85 / gal	11%	-78°F	Organic deicer plus MgCl ₂ solution (15% MgCl ₂ by weight); less corrosive than water; oxygen demand equivalent to CMA; pH < 4.0	Liquid Ice B'Gone, Ice Ban®, Magic Minus Zero®	Clear Path Products, Meltsnow.com
SolNat	Liquid	(no data)	Some	(no data)	Naturally occurring calcium chloride solution from Quebec		MeltSnow.com, Kojex
Apogee	Liquid	(no data)	0%	-54°F	Proprietary non-chloride non-acetate deicer; meets PNS spec		EnviroTech
BIO-D55F	Liquid	(no data)	0%	(no data)	Effective to -60 F; non-corrosive		SNI Solutions
GEOMELT® 55	Liquid	\$1.25-1.90 / gal	0%	-44°F	Organic anti-icer/ deicer; 4x less corrosive than water; can be mixed with brines or solid salts		Hawkeye Ready-Mix, Inc., SNI Solutions
LCS	Liquid	\$0.65-1.35 / gal	0%	-11°F	(Liquid Corn Salt) Liquid deicer; additive for use with sodium chloride brine		EnviroTech
NC 2000	Liquid	(no data)	0%	-65°F	Non-corrosive and non-toxic; biodegrades with low BOD; sugar processing derivative; clear liquid		Glacial Technologies
NC 3000	Liquid	(no data)	0%	-36°F	Non-corrosive and non-toxic; biodegrades with low BOD; sugar processing derivative; clear blue-green liquid; best for vegetated areas		Glacial Technologies, Syntech, EnviroTech

Table 2: Product Supplier Information

Company Name	URL	Contact Information
Cargill	http://www.cargilldeicing.com/	Cargill Deicing Technology 1-800-600-7258 P.O. Box 9300 Minneapolis, MN 55440-9300
Clear Path Products	http://clearpathproducts.com/index.html	410-679-3100 714 Philadelphia Road Joppa Maryland 21085 clearpath@comcast.net
EnviroTech Services	http://www.envirotechservices.com/	Elgin, Illinois 847-608-8130
Glacial Technologies	http://www.anti-icers.com/index.htm	12 Delaware Trail Malvern, OH 44644 Ph: 330-863-9531 Fax: 330-863-9441 rgreene@anti-icers.com
Hawkeye Ready-Mix, Inc.	http://www.hawkeyereadymix.com/index.html	Hawkeye Ready-Mix, Inc. 1340 Hawkeye Drive Hiawatha, IA 52233
Kojex	http://www.kojex.com/Kojex_Products_Road.htm	111 Spartan Crescent, Pointe-Claire, Quebec, Canada H9R 3R4 Tel: 514.630.8931 Fax: 514.630.8926 info@kojex.com
MeltSnow.com	www.meltsnow.com	Chemical Solutions, Inc. 1000 Franklin Village Drive Franklin, Massachusetts 02038-0675 508.520.3900
NASi (NACHURS ALPINE SOLUTIONS)	http://www.nasindustrial.com/	421 Leader St. Marion, OH 43302 800-622.4877 ext 305 indsales@nachurs-alpine.com
Schoenberg Deicing	http://www.gosalt.com/deicing.html	Sales 1-800-221-5105 wintersales@gosalt.com
SNI Solutions	http://www.snisolutions.com/	205 N Stewart St. Geneseo, IL 61254 Phone: (309) 944-3168 Fax: (309) 944-4620 mike@snisolutions.com
SynTech Products	http://www.syntechproducts.com/	520 E. Woodruff Toledo, Ohio 43604 1-800-537-0288