Blending Salt Brine and Other Chemicals for Prewetting and Anti-Icing

Mark DeVries, McHenry County, Illinois
and
Bret Hodne, City of West Des Moines

TODAY’S FORMAT
• BLENDING HISTORY AND 07 UPDATES
• PANELISTS PRESENTATIONS
• OPEN DISCUSSION FROM THE FLOOR
• ENJOY THE DONUTS

Blending
• Add tools to your arsenal
• Improved residual value
• Lower working temperatures
MCHENRY COUNTY AND WEST DES MOINES DEVELOPED SYSTEMS TO BLEND LIQUID DE-ICING CHEMICALS TOGETHER PRECISELY

ALTERNATIVE CHEMICALS

<table>
<thead>
<tr>
<th>Category 1 - Corrosion Inhibited Liquid Magnesium Chloride</th>
<th>Concentration</th>
<th>Date Approved</th>
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<tbody>
<tr>
<td>Pacific Northwest Snow Fighters (PNS) Qualified Product List</td>
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<tr>
<td>• Magnum* America West</td>
<td>17</td>
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<tr>
<td>• HydroMelt Cargill</td>
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<td>5/10/2000</td>
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<td>• ICEBAN 200* Earth Friendly Chem.</td>
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<tr>
<td>• MeltDown - Shield LSW* Envirotech Services Inc.</td>
<td>23.5</td>
<td>10/8/2002</td>
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<tr>
<td>• Caliber M1000 AP Envirotech Services Inc.</td>
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<td>• MeltDown with Shield AP Envirotech Services Inc.</td>
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<td>• MeltDown Wendover AP Envirotech Services Inc.</td>
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<td>• Hydro-Melt Green Cargill</td>
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<td>• MeltDown APEX with Shield AP Envirotech Services Inc.</td>
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Note - ICEBAN 200 was formerly ICEBAN Performance Plus M

Those products marked with an asterisk (*) indicates that the stratification can be seen and agitation is required.

Category 2 - Corrosion Inhibited Liquid Calcium Chloride

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Manufacturer</th>
<th>Corrosion Rate %</th>
<th>Effectiveness %</th>
<th>Concentration</th>
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<td>LIQUIDOW ARMOR</td>
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<td>Tiger Calcium Services</td>
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<td>America West</td>
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<td>6/30/2005</td>
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<tr>
<td>Geomelt CT</td>
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<td>6/5/2006</td>
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<tr>
<td>Calcium Chloride with BOOST</td>
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**Product has been requalified.

Those products marked with an asterisk (*) indicates that the stratification can be seen and agitation is required.

Category 3 - Non Corrosion Inhibited Liquid Calcium Magnesium Acetate

<table>
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<th>Product Name</th>
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<td>Sure Crop Farm Services</td>
<td>2.8</td>
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LIQUID CHEMICALS USED BY MCDOT/WDM

- **SALT BRINE**
  - Very low cost
  - Dries quickly
  - Very effective at pavement temperatures above 20° F

- **CALCIUM CHLORIDE**
  - Fairly low cost
  - Very effective at low temperatures
  - Exothermic
  - Effective at low temperatures
  - Good residual effect

- **DE-ICE 55 (GEO-MELT)**
  - Non-Chloride Inhibitor

THE BLENDING SYSTEM COMBINES THE THREE CHEMICALS IN PRECISE AMOUNTS

Components
- Salt Brine: 45%
- Calcium Chloride: 5%
- De-Ice 55 (GEO-MELT): 50%
MANIFOLD BLENDING SYSTEM 2004

AFTER MANY REVISIONS

2005
BLENDING STATION RECONFIGURATION AFTER IT’S INITIAL SUCCESS

TODAY’S SYSTEM IN PLACE

Getting Started!
Computerized Blending

HOW DOES IT WORK?

Suction Manifold
Pressure Manifold
Mixing Board
**WDM’s System**

- Computerized Blending
- Can store or "blend on demand"
- Capability to blend 3 products
- Extensive filtering of liquids
- Extensive employee input
- MDSS Compatible

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**Blend Formulas**

<table>
<thead>
<tr>
<th>wt %</th>
<th>lbs/gal</th>
<th>wt %</th>
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**Anti-Foaming System**

**USING SUPER MIX IN ANTI-ICING**

**PRO-ACTIVE TREATMENT PRIOR TO AN EVENT**

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**RESIDUAL EFFECT**

**Anti-Ice 24 Hours After Application**

**Anti-Ice 48 Hours After Application**

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SUPERMIX - AFTER ONE WEEK

SuperMix

SuperMix in Action

SuperMix in Action
Preventing the "Bond"

Super Mix Application

WHAT'S NEW
ELECTRONIC TANK LEVEL METER
Automated Salinity System
Swedish Visitors

FUSION

Tested Blends

<table>
<thead>
<tr>
<th>Blend 1</th>
<th>Blend 2</th>
<th>Blend 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>55% Salt Brine</td>
<td>80% Salt Brine</td>
<td>67% Salt Brine</td>
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<tr>
<td>10% GeoMelt</td>
<td>15% GeoMelt</td>
<td>10% GeoMelt</td>
</tr>
<tr>
<td>5% Calcium</td>
<td>5% Calcium</td>
<td>3% Calcium</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Blend 4</th>
<th>Blend 5</th>
<th>Blend 6</th>
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<tbody>
<tr>
<td>80% Salt Brine</td>
<td>80% Salt Brine</td>
<td>83% Salt Brine</td>
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<tr>
<td>10% GeoMelt</td>
<td>20% GeoMelt</td>
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</tr>
<tr>
<td>10% Calcium</td>
<td>20% Calcium</td>
<td>2% Calcium</td>
</tr>
</tbody>
</table>

SO WHERE DOES SUPERMIX "REALLY" COME FROM?

SUPERMIX COWS!!!
IT’S BEEN AN INTERESTING YEAR

BRET’S HOUSE

BRET’S FRIDGE !!!!!!

THANK YOU!

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Blending and Liquid Use

Bob Miller
Highway Commissioner
Algonquin Township Road District

Evolution of the System
How we got where we are today.

- Sand & salt treated by the bucket with liquid calcium chloride
- Salt treated by spraying truck bed with liquid calcium chloride
- Salt sprayed with calcium chloride by truck-mounted system on spinners
- Salt sprayed with calcium chloride by truck-mounted system in spreaders
- Liquids sprayed on the road
- Blended liquids

70% salt brine
20% geomelt
10% calcium chloride

Spreaders
From a roller spreader powered by the rear wheels...
...to electronic spreaders powered by a computer.
Experiences in Blending Chemicals for Anti & De-icing Use

Michael Silvestri
City of Lake Forest, Illinois

CITY DATA
- Population: 21,500
- Suburban Community
- 17 square miles
- 240 miles of paved roadways
- 86 miles of sidewalks
- 17 parking lots & 1 parking structure
- Extremely high service level expectations

PERSONNEL
Primary Field Operators and Administrative Staff

Fleet Technicians/Mechanics

City of Lake Forest
- Snow Fall
  - 30 - 35 inches annually
- Border Lake Michigan on the east - lake effect
- Blowing snow is prominent in the western part of the city
STARTING OUT

- Tailor it to your needs
- It doesn't have to be complex
- Always seek to improve
- Embrace change, don't fear it

PROGRAM EXPECTATIONS:

- City wide bare pavement & curb to curb plowing policy
- Extensive operator training and education
- Effective use of labor, equipment and materials
- Sensible salting program:
  a. Snow and ice control strategies have reduced overall salt usage by 30%
  b. Reduce environment impact to plants, trees, soil and water resources

ROUTES

- Streets: 14
- Parking lots: 6
- Sidewalks: 3
- Anti-icing: 3

ROUTE/ZONE ASSIGNMENTS

- Snow/ice control:
  - Full callout = 14 routes
  - Arterials and/or residential collectors = 4 zones or 7 routes
- Anti-icing:
  - Primary arterials
  - Residential collectors
  - Residential side streets

EQUIPMENT

Brine Production Unit

FLEET & EQUIPMENT
**FLEET**

Primary Units:

A. 2 tandems and 11- 5 yd. dump trucks
   - 140-260 gallon saddle tanks on each truck
B. Anti-ice tankers/hook lifts
   - 1 - 1,000 gallon
   - 1 - 1,260 gallon
   - 1 - 3,200 gallon
C. Misc. vehicles/equipment

**EQUIPMENT**

Anti-Icing 1,260 Gallon Hook Lift System

Anti-Icing 3,200 Gallon Tanker Hook Lift System

5-Yard V-Box Hook Lift System

5-Yard Dump Truck

**Thoughts on Chemicals**

- Chemicals do not have personalities
- Chemicals do not “perform”
- Chemicals are applied
  (either correctly or incorrectly)
- Chemicals are just a tool
  (all tools have limitations)
Program History

- 1998 Salt brine - start of in-house program
- 2005 Chemical blending - three year trial program to access product effectiveness

2005 - 2006: Special Blend Mix

- 85% salt brine, 10% geo melt and 5% calcium chloride
- Cost per gallon 0.27
- (2) trucks with on board pre-wet dispensing systems @ 10 gallons per ton
- Initial trials showed promise, second year program approved

2006 - 2007: Special Blend Mix

- 80% salt brine, 10% geo melt and 10% calcium chloride
- Cost per gallon 0.30
- Pre-wet and anti-icing program expansion
- Blendability with primary product salt brine
- No tank or plugged nozzle concerns
- Ability to work at lower eutectic temperature - 9°F
- Reduction in chloride corrosiveness
- Field operators support product use
- Enhance residual values

Challenges

- Program costs
- Various products
- Production & dispensing systems
- Future program expansion
- Education & buy in from residents, senior staff & administration

KEYS TO SUCCESS

- Be proactive
- Get employees involved
- Have a plan
- Good weather information
- Proper material selection
- Keep good records

QUESTIONS?

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