Best Management Practices for Road Salt

Wilfrid A. Nixon¹, R. Mark DeVries²

¹: Salt Institute
²: Vaisala

July 2016
Map of the Talk

• What was the goal of the study?
• What was discovered?
• Conclusions and the guide
• Determine best management practices for all stages of the “road salt lifecycle” pertinent to highway agencies.
• Create a handbook that presents those BMPs in an accessible and effective manner
• Provide a report detailing the processes by which the BMPs were identified and the handbook created

Study Goals
The Road Salt Lifecycle

Mined → Primary Distribution → Terminal Storage

Transfer to Spreaders → Agency Storage

Placed on Road → Deliver to Agency
### Agencies Interviewed

<table>
<thead>
<tr>
<th>Virginia Department of Transportation (DOT)</th>
<th>New Hampshire DOT</th>
<th>New York DOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montana DOT</td>
<td>Wyoming DOT</td>
<td>Nebraska Department of Roads</td>
</tr>
<tr>
<td>Missouri DOT</td>
<td>Oregon DOT</td>
<td>Michigan DOT</td>
</tr>
<tr>
<td>South Dakota DOT</td>
<td>Maine DOT</td>
<td>Louisiana DOT</td>
</tr>
<tr>
<td>Illinois DOT</td>
<td>Kansas DOT</td>
<td>Minnesota DOT</td>
</tr>
<tr>
<td>Colorado DOT</td>
<td>New Jersey DOT</td>
<td>Utah DOT</td>
</tr>
<tr>
<td>Wisconsin DOT</td>
<td>Kentucky DOT</td>
<td>Ohio DOT</td>
</tr>
<tr>
<td>North Dakota DOT</td>
<td>Iowa DOT</td>
<td>City of Toronto</td>
</tr>
</tbody>
</table>

- Driven by State (or other agency) bidding processes
- Data collected by phone interviews
- Interesting findings
Contract Lengths

- 56% had one year contracts that could be renewed for up to a total of 5 years
- 20% had one year contracts not renewable
- 24% had contract lengths between 3 and 5 years, with options to extend further
• 36% had no limits on the quantity of salt that had to be provided
• 64% had ranges to be supplied
  • 70% to 150%
  • 50% - 120%
  • 90% - 110%
• One agency had recently tightened limits (from 70 – 110 to 80 – 110) and saw an average price drop in response of 3.37% per ton

Quantity Limits
Delivery Time Frames

- Required delivery between 2 and 15 business days from placing of order
- During normal working hours unless by prior arrangement
- Penalties for late delivery although not always assessed
- Flexibility and relationships are key

Storage Capacity Issues

- Range of capacities from 20% to 150%
- 44% can store 100% of average annual salt usage
- 40% can store less than 100% (between 20% and 80% in responses)
- Even if you can store 100+% may not be in right place
- But, having storage for 100+% greatly reduces issues with delivery in winter weather
• More storage is better because then there are fewer issues with in-winter delivery and it makes the quantity required less variable
• The tighter the limits on the quantities to be supplied, the lower the price is likely to be
• Anything that eases the delivery process (longer delivery time frames, more delivery pre-season) will likely reduce price
• The BMPs are fairly well known already (cf. Salt Institute Safe and Sustainable Storage Handbook)
• While the handbook will reiterate those well tested practices, it will also highlight some newer practices
Newer Issues

- Shared Facilities
- Yard and storage building layouts
- Need for liquid storage
- Unique storage facilities
- Regional Storage (emergency storage)
A shared facility in the UK
One of the best examples of a shared site, with a great yard layout and the facility is optimized with multi access points, conveyor loading, treating material while loading, brine making and liquid storage.
A regional storage facility in Iowa that stores emergency supplies of material.
A unique facility in Indiana where salt is stored, loaded, brine is made and loaded, trucks are washed and the rinse water reused all inside the facility.
• Again, most information is well known
• Goal is to collect it into one place
• Eleven different areas identified
You can save up to the following percentages of salt (compared to a standard deicing strategy) by using the following practices:

- Pre-wetting – 30%
- Anti-icing – 75%
- Varying application rates to account for pavement temperature, storm type, and cycle time – 50%
- Calibrating your equipment – unknown but can be big!
• Measure what you put down and where you put it
• Hold your organization accountable for the salt it uses (measure it and make sure it is in keeping with what you should have used)
• Use liquids where appropriate – and have a process to determine whether or not their use is appropriate
• Quit using salt when it gets too cold – and define what is too cold for your operations
• Get the best possible forecast you can
• Base your operations off your levels of service, and measure whether you have achieved them relentlessly
• Appropriate and effective training

Other BMPs
• In times of emergencies what can be done?
• Declarations of disasters
• Recovery of funds

EMAC and FEMA
• The report and guide compile best practices in one place.
• The guide is designed to be 21 stand alone documents for quick reference
• While identified as a best practice, all agencies may not be able to adopt these methods based on budget, procurement policies and political decisions.
• While identified as a best practice, not every practice will result in lower costs in every situation.
• These best practices can and should be applicable to all agencies, not only State agencies

Conclusions
Now – on to the Guide