CLEAR ROADS
research for winter highway maintenance

RESEARCH BRIEF

FEBRUARY 2016

BEST PRACTICES FOR PURCHASING, STORING AND APPLYING ROAD SALT

RESULTS SUMMARY

Researchers created a manual of road salt best management practices based on a literature review and interviews with practitioners. The manual provides BMPs that can reduce costs in procurement, storage and application of road salt in a highly accessible format.

PROJECT DETAILS

Project Title: Development of a Handbook of Best Management Practices for Road Salt in Winter Maintenance Operations

Project Number: CR14-10

Project Cost: $58,171 (Funding by FHWA and Clear Roads)

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The 2013-2014 winter was particularly severe for much of the country. The resulting shortage of road salt supplies had a negative impact on winter maintenance operations that year and led to increased demand and higher prices the next year.

Need for Research

Road salt is mined to anticipate typical seasonal usage, which reduces costs by minimizing storage and waste related to overproduction. A consequence, however, is that there are limits to how quickly production can be increased to respond to an unusually harsh winter. As a result, road salt users need to stretch available supplies by finding ways to use less.

The administrator of the Federal Highway Administration (FHWA) initiated this research to synthesize best management practices (BMPs) for procuring, storing and applying road salt. These BMPs are intended to help winter maintenance agencies meet performance goals at the lowest possible cost by increasing efficiency at all phases of the salt usage process. Additionally, minimizing salt usage by effective application will minimize environmental and infrastructure impacts as well as vehicle corrosion.

Through its collaboration with Clear Roads, FHWA contributed significant funding and technical knowledge to this research project.

Objectives and Methodology

Researchers gathered information about road salt BMPs through a literature review and interviews with practitioners, including representatives of 23 state departments of transportation as well as two city winter maintenance agencies.

Both the literature review and interviews focused on three areas: bidding and procurement, storage and application. Several interview subjects provided copies of bidding documents, specifications and contracts.

Researchers synthesized the information into a manual of BMPs for road salt in winter maintenance.

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Conveyor systems that fill a salt storage facility from its highest point maximize the capacity of the facility and are safer than simply pushing salt into a stockpile.

Results

In general, agencies can reduce the price they pay for salt by offering vendors flexibility in delivery times and storing enough salt to avoid the need for last-minute orders. Minimizing vendor risk by tightly specifying salt quantities will also typically reduce prices, rather than having a wide range between a minimum amount of salt that the agency agrees to purchase and a maximum that the vendor must agree to supply if needed but that the agency is not obligated to buy.

Specific BMPs described in the manual include:

- Procurement: Providing adequate storage for 100 to 150 percent of the agency's average annual needs, creating an emergency stockpile of 20 to 40 percent of average annual needs, specifying salt quantities as tightly as possible in bid documents, having multiyear contracts to reduce costs, and bidding early and filling stockpiles before the winter season.
- Storage: Building environmentally sound storage facilities; creating an optimal facility layout that allows efficient loading and traffic flow; encouraging multiple agencies to share facilities; and providing optimized facility operations that include loading by conveyor, providing drive-through facilities and re-using truck washing runoff.
- Application: Prewetting salt, using anti-icing where appropriate, adjusting application rates as appropriate for conditions, calibrating equipment to minimize waste, measuring performance, maintaining accountability among all staff, using liquids in the right conditions, adjusting strategies in cold temperatures when salt becomes less effective, utilizing accurate weather forecasting, setting appropriate levels of service and offering training programs that include classroom and hands-on training.

Novel ideas for storage facilities that may be appropriate for some agencies include regional storage facilities that serve multiple agencies, facilities with multiple entrances and exits, and remote facilities where operators can load trucks without coming to the main yard.

The guide also includes a brief overview of the procedures necessary to obtain federal reimbursement after storms that are severe enough to be declared disasters, and a flowchart to help users determine situations where anti-icing is likely to be effective.

Benefits and Further Research

The manual describes each BMP on a single page, front and back. Researchers organized it this way so that information about each BMP could be separated from the manual and shared with relevant personnel or placed in a break room so staff could review and consider the information in an easy-to-understand format.

In many cases, these best practices are known but not universally implemented. Clear Roads hopes that providing salt management BMPs in a highly accessible manner will help prompt winter maintenance professionals to evaluate and implement them where they have potential to improve winter maintenance practices. Additionally, some agencies are already incorporating this manual into their training programs.

> "The handbook is really well organized. Hopefully agencies will use it to look at their practices, both operationally and in planning and procurement, and see what they can do to create a more effective system."
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