CLEAR ROADS
research for winter highway maintenance

RESEARCH BRIEF

AUGUST 2015

DEVELOPING AN ENVIRONMENTAL BEST PRACTICES MANUAL FOR SNOW AND ICE CONTROL

RESULTS SUMMARY

The manual developed through this project will help agencies assess the environmental impacts of different snow and ice control products and implement best practices for reducing these effects. Key strategies include minimizing material use, improving deicer storage and training operators.

PROJECT DETAILS

Project Title: Snow and Ice Control Environmental Best Management Practices Manual

Project Number: No. CR13-01

Project Cost: $180,107

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Winter maintenance professionals are increasingly concerned about the effects of deicing materials on the environment, including damage to vegetation, corrosion of vehicles and infrastructure, and negative impacts on water, wildlife, soil and air. Agencies are looking for ways to minimize the environmental impacts of deicers while continuing to provide a high level of service on roadways.

Need for Research

While there has been extensive research into the environmental effects of winter maintenance and best practices for minimizing these impacts, there was a need to synthesize this information in a practical guide that could serve as an implementation resource for practitioners.

Objectives and Methodology

The goal of this project was to develop a *Snow and Ice Control Environmental Best Practices Manual* by compiling information on the impacts of snow and ice control products and identifying best practices for using these products in an environmentally responsible way.

To develop the manual, the researchers began by conducting a literature review on:

- The use of chemical deicers and abrasives and their effects on air, surface and ground water, and roadside soils, flora and fauna.
- Cost-effective equipment, practices and strategies for minimizing the use of deicing materials while maintaining the desired levels of service.

The researchers then surveyed snow and ice control professionals and operators to capture best practices and lessons learned in environmental management. The

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One of the most important environmental practices for winter maintenance is calibrating salt spreaders so that they dispense only the intended amount of salt.

survey targeted Clear Roads member states as well as operators across the country and internationally. The researchers then interviewed six of the survey respondents as the basis for case studies that were incorporated into the manual.

Results

The researchers analyzed and organized the literature review, survey and interview results to develop the *Snow and Ice Control Environmental Best Practices Manual*. This user-friendly manual is designed to:

- Present proactive strategies, detailing their effectiveness and limitations. The manual includes at-a-glance tables for snow and ice control products that show environmental impacts, performance characteristics and best practices for using them.
- Provide specific recommendations for mainstream use by the intended audience, which includes winter maintenance field supervisors and managers.

The researchers identified several key best practices that are most efficient in helping agencies minimize the environmental impact of deicers:

- **Effective application strategies,** including minimizing application rates, prewetting materials and conducting anti-icing before storms. Using these strategies and investing in modern application equipment have been shown to allow agencies to achieve an equal or higher level of service using less materials, which in turn lowers costs.
- **Equipment calibration,** which should be done more than once per season to ensure accurate application of the intended amount of material.
- **Facilities management,** which includes storing deicers in a covered area on an impermeable surface, cleaning up spilled materials, using proper labeling, and creating a safe work environment. These practices have been shown to significantly reduce the loss of salt into the environment.
- **Training operators** so that environmental best practices are successfully implemented.
- **Keeping records and monitoring trends,** since many agencies find that reducing environmental impacts with efficient programs leads to cost savings.

Benefits and Implementation

Modifying or improving upon existing snow and ice control practices has been shown to significantly reduce environmental impacts associated with winter maintenance operations, mostly through source control (limiting the amount of materials applied or lost to the environment). Adopting one or many of the best practices presented in the *Snow and Ice Control Environmental Best Practices Manual* can help agencies significantly reduce materials use, saving on costs and lessening environmental impacts. Ultimately, the goal is to use the right amount of material in the right place at the right time, with an eye toward the "triple bottom line" of economic, social and environmental sustainability.

Beyond its primary use as a guidance document, the manual also serves as a resource in communicating about winter maintenance strategies and budgets with other agencies, elected officials and the public.

"DOTs recognize the need to minimize the effects of deicing materials on the environment, but they are also under pressure to provide the highest level of service possible. This manual helps agencies find a balance between the two."

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