

State Planning and Research Program Quarterly Report

PROJECT TITLE: *Evaluation of Direct Liquid Application of Salt Brine vs Granular Salt as Measured through Various Performance and Safety Metrics*

OBJECTIVES: To collect and synthesize available information about the differences between the Direct Liquid Application (DLA) of salt brine (mixed with any one of up to three different additives applied as recommended depending on the situation) and the application of granular salt as reflected in various performance and safety metrics.

PERIOD COVERED: July 1 to September 30, 2025

PARTICIPATING AGENCIES: Minnesota Department of Transportation, Clear Roads Technical Advisory Committee, and the Board of Regents of the University of Wisconsin System on behalf of the University of Wisconsin – Madison.

PROJECT MANAGER: Hafiz Munir / Sheila Johnson	SP&R PROJECT NO: MnDOT Contract No. 1036345	PROJECT IS: ____ Planning <u>X</u> Research & Development
LEAD AGENCY: MnDOT	Federal Project Number: TPF-5(479)	
PRINCIPAL INVESTIGATOR: David A. Noyce, UW-Madison		
PROJECT BUDGET: \$125,000	PROJECT EXPENDITURES TO DATE: \$ 125,000	

WORK COMPLETED:

Part 1

- **Task 0: Project Management**
 - Project administration, coordination, management, progress reports, and invoicing.
 - Kick off meeting on July 13, 2023.
- **Task 1: Literature Review**
 - Review of relevant literature on performance measures in winter maintenance and the observed effects of winter weather on traveling speed, recovery time, delay, volume, capacity, friction, and crashes.
 - Draft literature review submitted on July 31, 2023.
 - Addressed TAC comments and submitted revised literature review for final approval on September 29, 2023.
- **Task 2: Agency Survey**
 - For this task, information gathered from the literature review was considered to prepare the questions for the survey.
 - Draft survey questions were submitted on August 30, 2023.
 - The research team met with the Clear Roads project committee on September 9, 2023, to go over the proposed survey questions.
 - The research team addressed feedback provided and prepared the online version of the survey which was submitted to the Clear Roads project committee on September 27, 2023 for final review.

- The research team met with the Clear Roads project committee on December 14, 2023, and presented the results of the survey of practice. After deliberation, the project committee approved to move forward with Part 2 of the project.
- On December 15, 2023, the research team submitted the draft of Task 3: Field Testing Protocol.

Part 2

• Task 3: Field Testing Protocol

- Information gathered from survey results and practitioners' feedback were used to identify commonly used and quantifiable performance metrics. Based on the location and logistics of the agency participating in the study, pairs of test and control routes are recommended to be selected for data collection. Field data was proposed to be collected during storms using available weather, friction, and speed through existing tools/applications (Maintenance Decision Support System [MDSS], ViewMondo) or patrol vehicles instrumentation (MARWIS, Vaisala MD-30).

• Task 4: Field Data Collection

- The research team reached out to agencies willing to adjust operations to collect data in a study and control scenario.
- Jefferson and Sheboygan Counties in Wisconsin committed to collect field data on divided roadways in which one direction of travel is treated with salt brine and the opposite direction with solid salt.
- Friction devices available in Wisconsin have been made available to two participating counties. According to resources available, friction devices were installed on trucks or patrol vehicles.
- Report forms and processes for agencies to share data were developed and distributed.
- Historical storm, AVL and RWIS stations data in Iowa was collected to evaluate temporal effects on pavement friction.
- Field data collection in Jefferson and Sheboygan Counties in Wisconsin was completed.
- Data submissions were monitored. Data quality control was conducted by checking data entries with counties' staff to guarantee data accuracy.
- Task 4 deliverable was prepared with a summary of the data collected.

• Task 5: Data Analysis

- Data analysis was completed. Field data was analyzed to compare the operational and safety performance of DLA of salt brine with granular salt. Different analyses including time series and statistical tests were conducted. Draft and final deliverables of Task 5 were submitted.
- Results of the data analysis were presented to the Technical Advisory Committee during a virtual meeting on September 29, 2025.

Amendment request

An amendment request was approved to extend the project until December 31, 2025. The extension will contribute to coordinate field data collection during the 2024-2025 winter season. Due to limited time and agency engagement, data was not collected for the 2023-2024 winter season.

SUMMARY OF ACTIVITIES EXPECTED TO BE PERFORMED NEXT QUARTER:

Part 2

• Task 6: Final report, infographic, and webinar

- Deliverables summarizing the research effort, findings, and results will be provided.

STATUS AND COMPLETION DATE:

An amendment request was approved, and the project is anticipated to be completed by December 31, 2025.