



Research Need Statement 526

Date:	July 31, 2018
Need Statement Champion:	Nick Tiedeken / Tara Carson
Agency:	MnDOT
Email:	Nick.tiedeken@state.mn.us / tara.carson@state.mn.us
Phone:	651-366-3628 / 651-366-3638
Idea Submitted by:	Nick Tiedeken / Tara Carson Office of Environmental Services
Idea Originated from:	Office of Environmental Services

Select Program:

X MnDOT OR Local Road Research Board (LRRB)

X Research OR Implementation

Need Statement Title:

Environmental Field Evaluation of Potassium Acetate

Need Statement: Describe the problem or the opportunity. Include background and objective.

Salts, primarily sodium chloride have been used as a winter snow and ice control chemical for over 50 years in Minnesota. MnDOT alone used 197,417 tons of salt during the 2016-17 winter season, along with widespread use by local governments and private applicators. Due to corrosion issues and environmental impacts to soil and water quality, alternatives to chloride based chemicals have been explored and utilized. Potassium Acetate (KAc) is one such chemical which has a functional temperature lower than salt and contains no chloride. Unlike chloride, which does not break down, KAc does degrade in soil and water. Adverse impacts to organisms in soil and aquatic environments, however, can occur due to the depletion of oxygen during the microbial breakdown process.

District 1 has used KAc on routes for two seasons, and is embarking on a Potassium Acetate Field Study which is proposed to begin in August 2018. The D1 Field Study will focus on KAc effectiveness and application parameters, but will not investigate environmental factors.

A concurrent Environmental Field Evaluation could help to determine whether the KAc breakdown process is most likely to occur in roadside soils, melt water, or runoff. The study should determine the location and degree of KAc breakdown as it moves from the roadway to adjacent waterbodies. In addition, the study should evaluate the persistence or duration of breakdown of KAc in different conditions (season, temperature, precipitation, etc...).



Research Need Statement 526

The study should measure KAc concentrations in melt water and runoff, and evaluate how it alters biochemical oxygen demand (BOD) and dissolved oxygen (DO) environmental effects during and after the snow and ice season and spring snow melt period. In addition, the study should consider toxicity to aquatic and terrestrial flora and fauna. This Environmental Field Evaluation would ideally be concurrent with the D1 Potassium Acetate Field Study

Provide a summary of the potential benefits:

Understanding the potential environmental impacts associated with potassium acetate will allow appropriate evaluation of deicing materials. If the results of the field study show that KAc breaks down in a manner that does not result in adverse effects to aquatic environments, more widespread use of KAc could lead to a reduction in the application of chloride based deicing salts, which are increasingly found in the waters of the Minnesota.

How does this project build upon previous research (include title or reference to a completed research effort)?

TRS –Field Usage of Alternative Deicers for Snow and Ice Control, ([TRS#1706](#))
District 1 Alternative De-Icing Chemical – Potassium Acetate (beginning Aug 2018)
Clear Roads report “Determining the Toxicity of Deicing Materials,” December 2013
(<http://clearroads.org/project/11-02/>)

Provide names to consider for a technical advisory panel:

Tara Carson – OES
Nick Tiedeken - OES
Bob Vasek – Maintenance
Perry Collins – District 1
MPCA
MnDNR