Cost-Effectiveness of Abrasives, Salt Brine, and LCS for Winter Operations in Nebraska

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ABSTRACT

The primary objective of winter maintenance operations is to improve traffic safety and efficiency during winter storm periods. Abrasives and salt brines have been successfully applied to increase traction and prevent snow and ice from bonding to road surface. However, because of some undesired side effects, such as corrosion and damage to the environment, salt and abrasives may need to be supplemented by other substances in some areas. Powerful non-corrosive acetate-based chemicals have been considered by several agencies, but their high price has limited their use. Recent research has focused on the use of some new, less corrosive, and highly effective chemicals, such as liquid corn salt (LCS). This research evaluates and compares the cost-effectiveness of using salt brine, and LCS on two highway sections in Nebraska. Field studies were conducted during the winter of 2002-2003. Field data included weather information, chemical use, time to achieve bare pavement, and other information available from maintenance logs. A benefit-cost analysis was performed to determine the cost-effectiveness of each treatment alternative. The operational benefits were the savings in road user costs resulting from reduction in travel time and delay. They were determined from field study data. The safety benefits related to accident reduction due to improved road surface conditions were estimated based on findings of previous research. The costs, including material and operational costs, were obtained from maintenance logs and a review of the relevant literature. The cost-effectiveness of salt brine and LCS were compared based on their benefit-cost ratios calculated over a range of ADTs and truck percentages. Guidelines were developed for the most appropriate use of these chemicals under various weather and traffic conditions.

Key words: abrasives—liquid corn salt—winter maintenance operations—salt brine

Note: Preparation of this paper was still in progress at the time of publication; final results will be presented at the symposium.