

**EVALUATION OF PREWETTED SALT  
FOR ICE CONTROL**

**Final Report**

**J. H. DeFoe**

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Peter B. Fletcher, Chairman; Carl V. Pellonpaa,  
Vice-Chairman, Hannes Meyers, Jr., Weston E. Vivian  
John P. Woodford, Director  
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Since 1972 the Maintenance Division has been conducting a program to achieve more efficient and effective use of chlorides for highway ice and snow control through the use of sodium chloride (rock salt) that has been 'prewettered' with a calcium chloride brine (1). Application is made with a standard truck-mounted hopper/spreader with a prewetting calcium chloride brine added to the rock salt (ten gallons of brine per ton of rock salt) as it leaves the hopper on the belt.

During the summer of 1972 tests were conducted by the Maintenance Division to determine the effect of this prewetting on the lateral distribution of salt applied to the road. Applications under traffic conditions were started during the winter of 1972-73 with eight spreader units assigned to the work at different locations throughout the state. During the winter of 1973-74 the eight units were placed in one garage so that all the salt units at that location were equipped to spread prewettered salt. In 1974-75 the test program was expanded to five garages which were completely equipped to spread prewettered salt.

As a result of this initial program it was estimated that routine use of the method, on a statewide basis, could reduce the amount of sodium chloride required by 10,000 tons annually; resulting in a yearly savings of approximately \$59,000.

Even though the results were quite promising, it was felt that follow-up observations and confirmation would be required before further expenditures for expanding the method throughout the state could be justified. The Engineering Operations Committee, therefore, requested that the Research Laboratory participate with the Maintenance Division in follow-up observations and future reporting of comparative results.

This research investigation was thus initiated for the purpose of evaluating the effectiveness of the prewettered salt method for ice control operations.

### Evaluation Method

Evaluation of the effectiveness of the prewettered salt involved the use of prewettered salt and untreated rock salt, as is normally applied, on comparable sections of highway and observing their relative ice control capabilities. The test sections were located on I 96 in Ingham County, as shown in Figure 1. During daytime storms, observers were stationed on the Hagadorn Rd overpass to photograph test section conditions at selected time

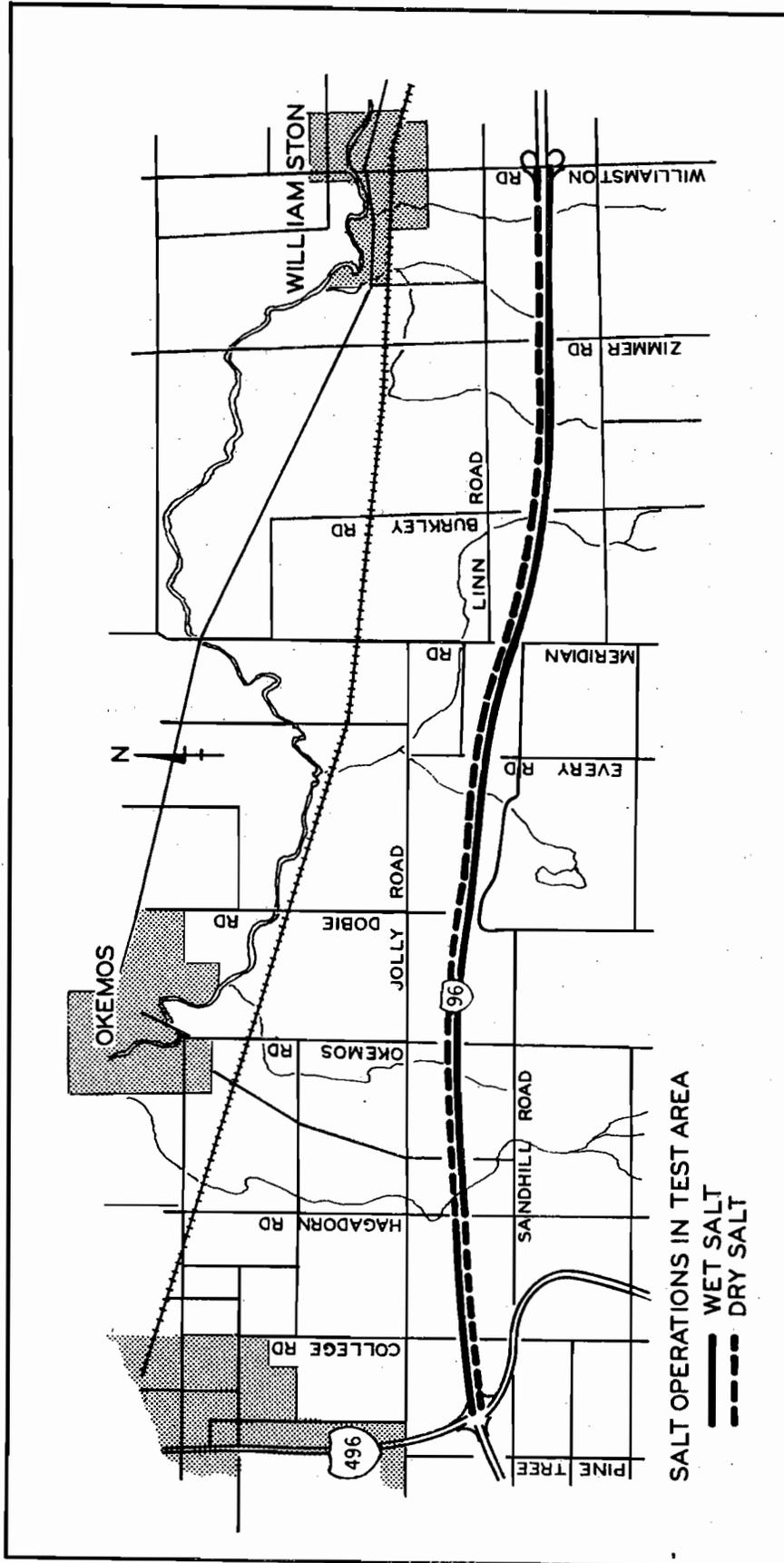


Figure 1. Location of pretwetted salt comparison tests.

intervals after salt application, observe weather conditions, and note any apparent differences in the effectiveness of the two treatments. Other observers, stationed at the Williamston Maintenance Garage, were prepared to observe salting operations 24 hours per day.

### Results

During the four-month period, December 1975 through March 1976, comparative applications were made during seven storms. In two of these comparisons observers noted a narrower spreading pattern with the pre-wetted salt than was obtained with the dry salt application when both were placed on the road with the auger mechanism of the salt spreader. No differences were noted during the remainder of the storms with regard to spreading pattern, melting capability, or subsequent pavement conditions.

Comparative photographs obtained during three of the storms also show no noticeable differences between the two salt treatments. Figure 2 shows a typical photographic comparison between the prewetted salt and the standard dry salt application at various time intervals after application.

### Problems

Testing was delayed at the beginning of the study because of equipment malfunctions caused by the formation of calcium chloride crystals in the storage tank and control valves on the spreader trucks. The storage tank was cleaned and refilled with a brine of lower concentration in an attempt to prevent further crystallization problems.

A second delay occurred as the result of a low salt supply, necessitating the mixing of sand with the salt in order to extend service until the next salt delivery could be made. Comparative applications were also cancelled a number of times because of equipment breakdowns or severe storm conditions on other roads which required reassignment of test trucks to different locations.

Experience in this, and other ice control studies, has shown that the severe and uncontrolled conditions encountered during testing make any differences very difficult to measure, particularly--as in these tests--where differences are quite small.

### Conclusions

Based on the limited number of tests conducted during this study the following conclusions and recommendations appear warranted.

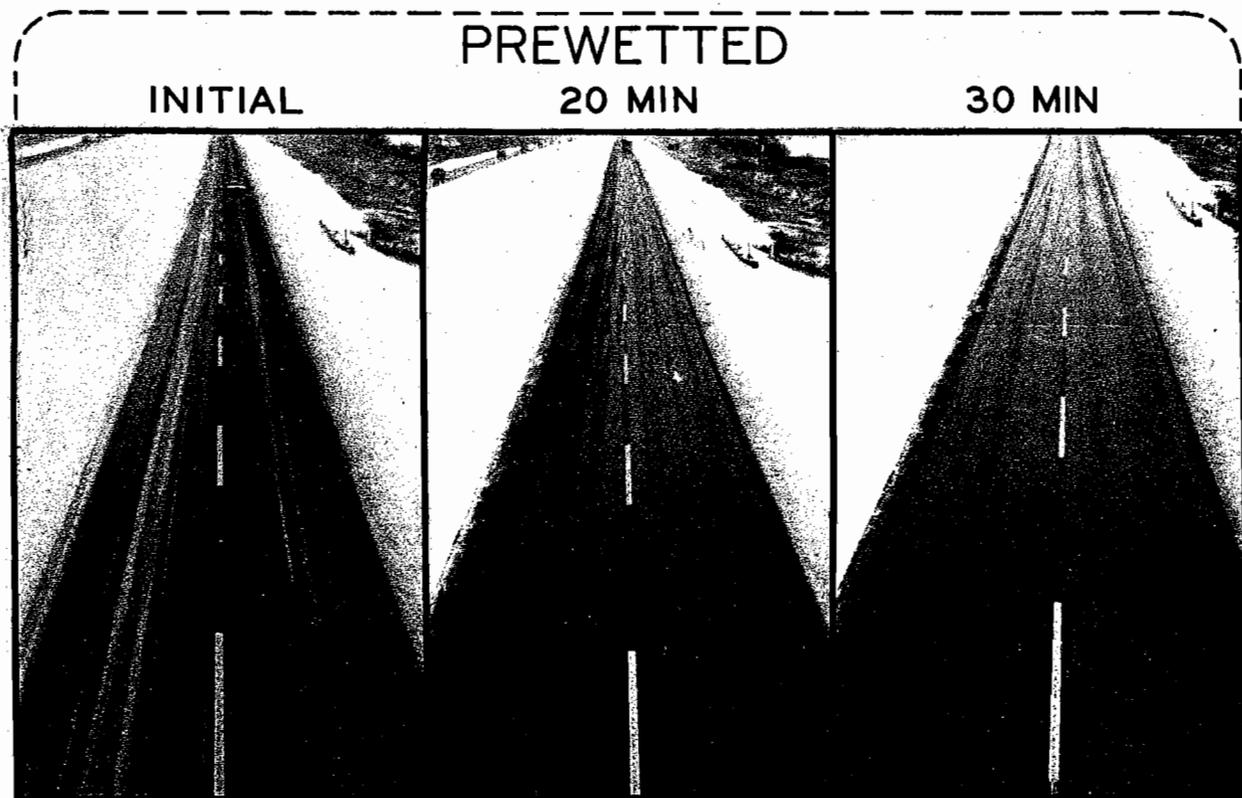
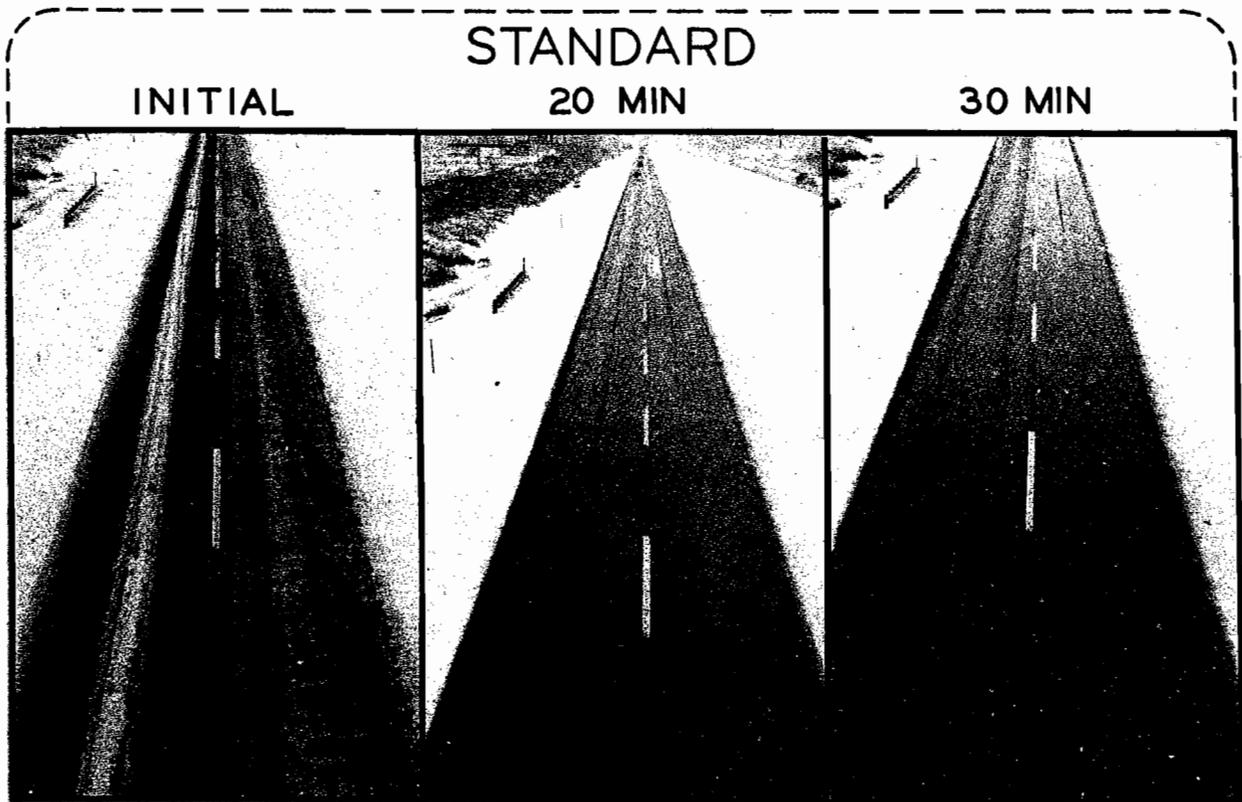


Figure 2. Comparison of standard salt application with prewetted salt application during one of the observed storms.

1) There is no significant difference between the ice melting capabilities of the prewetted and the conventional salt applications.

2) In two of the seven storm observations, findings of the previous study (1) were verified in that the prewetted salt could be applied in a more controllable width, with less salt being wasted by bouncing off the roadway onto the shoulders.

3) Crystallization of chloride within the equipment can cause frequent mechanical breakdowns. Thorough periodic maintenance of equipment, including daily flushing of truck brine pumps and valves, is required to keep the prewetted salt system working.

4) Concentration of calcium chloride solutions to be used for prewetting rock salt should be within the range of 25 to 30 percent. The solutions specified in Section 6.31.02 m of MDSHT Standard Specifications, for use as dust palliatives, can crystallize at temperatures ranging from -5 F for the 33 percent solution to 43 F for the 38 percent solution and, consequently, are not suitable for ice control use.

If the special handling and equipment maintenance offers no great problems and the use of prewetted salt is more economical, as found in Ref. (1), it is recommended that use of the method be continued or expanded. If this is done, it is suggested that accurate cost records be kept at similar, adjacent areas where both methods of application are being used. In this way, long-term cost comparisons, under diversified storm conditions, could be made between the prewetted and the straight salt applications.

#### REFERENCES

1. Lemon, Harold, "1974-75 Prewetted Salt Report," MDSHT Maintenance Division, Administration Services Section, June 1975.