

OFFICE MEMORANDUM



MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

November 10, 1970

To: L. T. Oehler
Engineer of Research

From: R. C. Mainfort

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Subject: Evaluation of Hardy Salt for Ice Control Purposes. Research Project 69 G-171. Research Report No. R-754.

Hardy Salt is the brand name of a compressed, granulated sodium chloride manufactured for various commercial and industrial purposes by the Hardy Salt Company of Manistee, Michigan. As a result of a memorandum from P. J. Marek (June 5, 1969) the Research Laboratory was requested to assist personnel of the Maintenance Division in evaluating the physical properties of this compressed salt product. The purpose of the study was to evaluate its handling and performance for snow and ice control as compared with rock salt. It was specifically requested that we assist in obtaining samples and that we test these samples for gradation, speed of melting, and resistance to break-down which might cause plugging of spreading equipment.

As a result of this request, personnel from the Laboratory accompanied Maintenance engineers on an inspection of the Hardy Salt Company facilities and obtained representative samples of the synthetic salt. Laboratory testing of these samples has been completed. Although field evaluation under road use conditions is desirable, the control and measurement of all pertinent variables would not be possible under such conditions. Therefore, laboratory tests were developed and used to test each desired characteristic separately and the results compared with observations made by field engineers.

Melting rates of the salts (Hardy and rock salt) were determined using a modified version of a test described in Highway Research Bulletin No. 252. For this test, a layer of ice was formed on the surface of a concrete disc, in which was embedded a layer of hardware cloth, frozen in the ice near the interface of the ice and concrete surfaces. The unit was supported by wires attached to the hardware cloth. Salt was applied uniformly over the ice surface and the length of time required for the ice to melt and allow the concrete to fall was determined for both types of salts. Two ambient temperatures were used during the tests; 20 F and 30 F. Results of these tests showed no significant difference between melting rates of Hardy salt and rock salt.

Free flowing characteristics of the salts (subjected to no abrasion action during the tests) were determined by allowing them to flow by gravity through a funnel shaped orifice. The amount of salt retained in the narrow portion of the funnel was a measure of free flowing characteristics. These tests showed

Hardy salt to be the more free flowing of the two when there was no abrasive action which might cause breakdown of particle size.

Dissolving rates of the salts were determined by placing weighed amounts on a retaining sieve, immersing in water at near freezing temperature, and measuring weight losses after a given period of time. During this test, the Hardy salt dissolved at about a 20 percent faster rate than the rock salt.

The resistance of the salt particles to breaking down during handling and spreading was determined by placing samples of known grain size distribution (using specification sieves) in a ball mill and measuring the grain size distribution after twenty minutes of milling. The change in grain size, reflected by the final sieving, was a measure of the breakdown, or degradation, due to abrasive action. Tests were made with the salt samples in a dry state and with moisture contents ranging between 2 and 3 percent at the time of milling. These tests showed the degradation of Hardy salt to be significantly greater than that of rock salt.

Following the laboratory tests, visits were made during the 1969-70 winter seasons to maintenance sites at Big Rapids and Remus where Hardy salt was used in ice control application. Discussions with Maintenance personnel at these areas indicated that no problems had been encountered with the use of Hardy salt.

More detailed descriptions of the laboratory testing and results are available in the Research Laboratory files should they be needed for future work on this project. This work was supervised by J. H. DeFoe of the Soils and Aggregates Unit.

TESTING AND RESEARCH DIVISION



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RCM:sjt