



Transportation Research Division



Technical Brief (09 – 5)
Evaluation of the Monroe Slurry Maker

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Introduction

In early February, 2009, the Maine Department of Transportation (MaineDOT) installed a Monroe Slurry Maker on one of its 2009 Volvo Wheelers (see Photos 1 and 2). This truck was equipped with a Henderson Utility Body. An 18 gallon per minute spool was added to the existing hydraulic system on truck as recommended by the Slurry Maker manufacturer. The Slurry Maker installation took two days to complete at an approximate cost of \$1,000. The truck was put in service the first week of February and the Slurry Maker was utilized for approximately 10 storm events.

The intent of the Slurry Maker is to crush large particle size salt to a much smaller size. When this smaller salt is combined with significant liquid (salt brine); 50 gallons per ton or more, the resulting slurry-like material stays on the road better.



Photo 1: 2009 Volvo Wheeler



Photo 2: Monroe Slurry Maker

MaineDOT has been utilizing a 70 percent granular, 30 percent liquid application (57 gallons/ton) on several of its trucks since the winter of 2003-2004. Better salt placement and a minimizing of bounce and scatter have been attained, but a slurry or paste consistency has yet to be realized. It is believed this slurry has not been achieved because of the large particle size of the salt purchased by the Department.

MaineDOT welcomed the capability of crushing its large particle salt in an effort to create a salt slurry mixture that would better stay on the roadway and potentially enable its trucks to apply this material in an anti-icing mode of operation.

Results

Results from this evaluation were limited to 10 storm events. The Slurry Maker performed well in the function of crushing the salt to a more desirable size. An issue with the hydraulic system caused the spinner and crusher to slow when the plow and wing were operated. This resulted in the unit plugging or material not being properly spread. Whenever the plow and wing were operated, or the truck engine RPM's were allowed to drop below 1,600, this problem became more prevalent.

MaineDOT staff also noticed that the smaller salt seemed to cause the road to refreeze quicker on storms occurring in combination with air temperatures below 20 degrees. It is believed that a larger particle size (3/8") may work best for the colder storms and a smaller particle size (1/4") would be best for the warmer storms occurring in the late fall, early winter and early spring. This theory would need additional evaluation to determine what size works best for the given condition.

Additionally, DOT staff suggested that using crushed salt may greatly expedite the salt brine making process. Finer salt would dilute much quicker than the large particle size currently being used.

Approximately 30 yards of salt was ground and stockpiled at the Bangor facility for use in the Schmidt STRATOS spreaders. MaineDOT has been using the STRATOS spreader since the winter of 2003-2004. The STRATOS equipment is manufactured in Germany and was the primary influence in the Department's initial efforts to evaluate the potential of using the 70 percent granular, 30 percent liquid application. The finer salt was used during small storm events, where the total snow accumulation was less than 3 inches. The supervisor indicated that air temperatures during those storms were 20 degrees and higher. The finer salt performed very well and no refreeze because of dilution was experienced. This smaller salt flowed freely from the hoppers and did not "pack in" at any location within the hopper.

Although a higher rate of saturation was realized with the smaller particle salt, a slurry or paste consistency was not achieved.

Conclusions/Recommendations

Overall, the Monroe Slurry Maker performed well during the abbreviated evaluation period. If the Department were to purchase the Slurry Maker unit, the hydraulic issue that caused the spinner and crusher to slow down, must be addressed. One possible solution is to install a bigger hydraulic pump. Additional testing of the hydraulic functions, as well as discussions with the manufacturer would be required to determine what the best corrective action might be.

Evaluation of this equipment also brought to light two additional cost saving possibilities to crushing existing salt. MaineDOT staff believes salt brine could be made much faster using smaller particle size salt, because of quicker dilution times. The possibility of establishing optimum granular size depending on air and pavement temperature also presents the opportunity to save resources. Each of these possibilities would require additional research and evaluation.

Even with the smaller particle size salt, the desired slurry consistency was not realized. Crushing the salt finer and moving the location of the liquid nozzle may provide the necessary combination to achieve the paste or slurry solution. Adding a second liquid nozzle, allowing liquid to be introduced at two locations may also aid in the slurry making process.

Although greater saturation was realized with the smaller salt size, which lessened the bounce and scatter of material, the consistency achieved will not enable successful anti-icing application on bare pavement. On two occasions, this material was applied to bare pavement and though the material stayed in the lane better, traffic quickly caused the material to blow off the roadway.

It is recommended the Department continue its efforts to achieve the slurry or paste material because of the potential benefits of applying the material in an anti-icing mode of operation with its existing plow vehicles.

If the capability of crushing existing salt supplies is determined to be beneficial, the Department should consider securing equipment to accomplish this on a larger scale at the maintenance facility. For example; the Department may want to consider building or purchasing a large crusher capable of stockpiling significant quantities of crushed salt at maintenance facilities that use the 70 percent Granular/30 percent liquid application method mentioned in the Introduction portion of this report.

Consideration should also be given to discussing purchase options of varying granular sizes with the Departments salt suppliers.

Prepared by:

Stephen Colson
Senior Technician
Maine Department of Transportation
219 Hogan Road
Bangor, Maine 04402-1208
Tel. 207-941-4529
e-mail: stephen.colson@maine.gov

Reviewed By:

Dale Peabody
Transportation Research Engineer
Maine Department of Transportation
16 State House Station
Augusta, Maine 04333-0016
Tel. 207-624-3305
e-mail: dale.peabody@maine.gov