



## Please Pass The Brine

Motorists driving in winter storms are used to seeing big yellow INDOT trucks dispersing primarily salt to de-ice roadways and bridges on more than 900 snow routes. Research performed through the [Joint Transportation Research Program](#) (JTRP) is helping INDOT evaluate the use of liquid-only routes, or brine, to remove snow and ice off roadways and bridges. The JTRP study started during the 2011-12 winter season, primarily in the LaPorte District, and is being rolled out to all six districts for the 2012-13 season.

Brine is water with a salt concentration of 23.3 percent. It has been used for years by INDOT crews in anti-icing efforts, but in a limited capacity — such as spraying bridge decks to prevent frost from forming. Brine has advantages over salt. At typical distribution rates, less salt is used when comparing brine to salt. Additionally, less salt reduces corrosion effects on pavement, structures and adjacent roadway areas. Also, since brine is liquid, it covers better and acts quicker when compared to salt.

Salt and brine have the same temperature thresholds because they are derived from the same product, just in different forms —solid and liquid. Below 20 degrees, salt and brine become less effective; at minus 5 degrees, all melting action stops and other products are needed to enhance the melting action of salt.

Last winter was very mild by Indiana standards, as only 28 measurable events — most classified as light — occurred. The JTRP study involved side-by-side comparisons between liquid and salt on 21 routes at nine different locations. Analysis of these events revealed the following:

- The lowest salt usage occurred on a brine route, which dispersed 63 pounds per lane mile, well below the average salt distribution rate of 250 pounds per mile on salt routes.
- In one interstate route comparison, the liquid route used 129 pounds of salt per lane mile, compared to an adjacent salt route that used 190 pounds per mile.
- The cost per lane mile per weather hour ranged from \$.04 for a brine route to \$0.10 on a salt route.

Winamac Subdistrict Manager Tom Kasten is very familiar with brine.

“We experimented with brine only about seven years ago, and it was a total failure,” said Kasten. “A few years ago, we got brave and tried it again on another route. We were successful on our second try, as we learned to put more brine down and got the timeliness right. We disperse brine both for anti-icing, before a storm, and also as clean-up, or de-icing, in areas where snow and ice are compacted.”

“This year approximately 150 of our subdistrict’s 770 miles, or nearly 20 percent, will be strictly brine,” Kasten said. “One route is as long as 40 miles, and the shortest is 23 miles. Brine is working faster for us, so when those routes are done, the brine drivers will help the drivers using salt.”

“The 2012-13 winter season has been more typical, so we can get a complete sample for the study and provide full comparisons,” said Purdue University Project Principal Investigator Dr. Bob McCullouch. “We are excited that we expanded the study to 41 routes, 23 which are brine only and 18 which are salt routes for comparison, and 19 locations.”

Research and Development Director Barry Partridge shares McCullouch's enthusiasm in evaluating the cost effectiveness of liquid routes.

“There should be enough data to evaluate the cost savings from liquid routes and define any operational issues,” said Partridge. “This research project is another example of how INDOT's investment in research can provide financial and operational efficiencies.”

INDOT's Snow and Ice Program Manager Phil Ivy notes that INDOT will be testing additional brine only routes outside the JTRP study, bringing this season's brine only routes total to nearly 10 percent.



*The Indianapolis Subdistrict crews designed and fabricated a combination unit truck that will disburse salt, brine or both. The truck features a 2,400-gallon tank for brine and a 4-cubic-yard hopper for salt. INDOT was able to build this at less than half the cost of a similar commercial product. The truck, completed at the end of February 2012, will be tested during the 2012-2013 winter season.*

### **Purdue University Meteorology Students Help Winter Operations**

In another JTRP study aiding winter operations, Purdue University meteorology students traveled the state with Purdue Professor Mike Baldwin to conduct weather conferences in the districts.

“The conferences gave students an opportunity to meet with INDOT staff and discuss the affects that winter weather forecasting — and the accuracy of forecasts — has on effective planning and scheduling for INDOT crews,” said INDOT Winter Operations Manager Phil Ivy. “The conference content also will help decision-makers and managers on how to interpret weather terminology and read weather forecasts with a higher level of confidence.”

As part of the training, unit foremen and crew leaders were reminded to utilize the internet for forecast information, the extended weather outlook and hazardous weather outlook websites.