Use of Liquid Routes for Winter Maintenance

Jim Scheffer, La Porte Sub-district Operations Manager, INDOT
Bryan Donze, La Porte District Highway Maint. Deputy Director, INDOT
Stacy Flick, La Porte District Highway Maint. Director, INDOT
Phil Ivy, Snow and Ice Program Manager, INDOT

March 6th, 2013
Topics for Discussion

- General Uses for Salt Brine
- Types of Liquid Routes
- Salt Brine Production
- Salt Brine Applicators
- Advantages/Disadvantages
- Questions/Comments
Different Uses For Salt Brine

Pre-Treating

- Bridges and Shady Areas When Frost is Anticipated
- All Roads Prior to a Winter Event
- 25-40 gal/ln-mi
Different Uses For Salt Brine

During Events

- Pre-Wetting Helps Activate Dry Salt
Different Uses For Salt Brine

During Events

- Brine Routes appear to be as effective as dry salt routes, at a lower cost
Different Uses For Salt Brine

I-94 Comparison in JTRP Liquid Routes Study

Michigan City Route
Salt all 3 lanes
2012 – 190 lbs/mi; $8.73 /mi

Chesterton Route
2 lanes Brine, 1 lane Salt
2012 – 121 lbs/mi; $6.77 /mi
Different Uses For Salt Brine

Brine Works Very Fast and Effectively With The Breakup of Hard Pack

Before Brine Application

20 Mins After Brine Application
Different Uses For Salt Brine

- 150 gals/ln-mi (or more) when treating hard pack
- Mixing salt brine with Agri-based chemicals will greatly enhance the melting power especially in temps under 10°

Treating hard pack 50/50 Brine – Ice Ban with salt behind

Close up of the tanker spraying both lanes
Types of Liquid Routes

4 Basic types of Liquid Routes

- Complete Liquid Route
  - Typically 2-lane road with a tanker
- Alternating Liquid/Granular Route
  - 2 routes (one liquid and one granular)
  - Every other round the trucks switch routes
- Multi-lane Liquid/Granular Routes
  - 2 (or more) trucks on a multi-lane road
  - 1 (or more) liquid and 1 salt
- Combination Vehicle
  - 1 truck with both liquid and granular
Types of Liquid Routes

- Complete Liquid Route
  - Usually on a 2-lane road
  - Spray 80-100 gal/ln-mi
  - Route Length based on capacity of tanker and fill locations.
  - Winamac Sub-district currently running 4 liquid routes
  - In the 2012 portion of the JTRP Study, these liquid routes had the lowest salt usage per mile in the study while still maintaining a quality level of service
Types of Liquid Routes

- Alternating Liquid/Granular Routes
  - Usually on a 2-lane road
  - Liquid truck sprays at 80-100 gal/ln-mi
  - Granular truck spreads at 175-250 lbs/ln-mi
  - 2 routes
    - As the trucks each finish their own route then they switch
    - Routes need to be similar length and type
  - 2012 JTRP study had mixed results on these routes
Types of Liquid Routes

- Multi-Lane Liquid/Granular Routes
  - Use on Multi-lane Roads
  - Liquid truck sprays at 80-100 gal/ln-mi
  - Granular truck spreads at 175-250 lbs/ln-mi
  - Mostly used on 4 lane roads with 1 of each
  - Used on I-94 as stated previously with great results
  - 2012 JTRP study had mixed results on these routes
Types of Liquid Routes

- **Combination Vehicle Route**
  - Using a Combination Vehicle with both hard salt and brine.
  - 2400 gal tank with 4 CY Hopper
  - Currently using 50 lbs/ln-mi and 100 gal/ln-mi in snows up to 2”
Types of Liquid Routes

- 2013 JTRP Study updates
  - Final Report not available yet
  - Current winter has provided more opportunity to collect data.
  - Current Bi-weekly reports show (12/10/12-3/2/13):
    - Liquid Routes cost range from $5.75/LM to $9.61/LM
    - Granular Control Routes cost range from $6.32/LM to $9.92/LM
    - Liquid Routes average $7.53/LM for the State
    - Granular Routes average $8.18/LN for the State
There are many different styles of brine makers, both homemade and pre-fabricated.

Makers can produce 1,000 to 5,000 gallons of brine per hour depending on the style.
Salt Brine Production

Winamac Salt Brine Maker

- Produces up to 5000 gallons per hour; averages 3500-4000 gallons per hour
Salt Brine Production

Monticello Brine Maker
- Produces up to 2000 gallons per hour

Logansport Brine Maker
- Produces up to 1200 gallons per hour
LaPorte Brine Makers

- LaPorte Unit’s brine maker is homemade and produces up to 2000 gallons per hour.
- It uses recycled wash water to make brine. This wash water is usually already between 7% & 12% salt concentration which saves salt during production.
Salt Brine Production

LaPorte Brine Makers

- Michigan City and Chesterton are using pre-fabricated, automated AccuBrine systems
- These can produce up to 3500 gallons of brine per hour and require very little manhours and equipment usage to produce brine.
Salt Brine Production
LaPorte Brine Makers

- Wanatah uses a pre-fabricated brine maker. This maker is not automated and requires someone to monitor its production and check salinity.
There are many different delivery systems for applying salt brine to the road.

- 2000 Gallon Stainless Steel Slide In Tanker
- 1800 Gallon Poly Slide In Tanker
- 5000 Gallon Stainless Steel Semi Tanker
Salt Brine Applicators

Centerline Sprayers
Bladder Tanks

- LaPorte District purchased 3 Bladder Tanks prior to last winter and used them successfully in the LaPorte Sub and the Winamac Sub
- The bladders are constructed out of a pliable vinyl material and they seemed to hold up well in all weather. We experienced no issues with these
- They were installed in the new Freightliners which have a heavier rear suspension
Salt Brine Applicators

Bladder Tanks
Advantages/Disadvantages

Advantages

- Reduces salt consumption
- Reduces overtime because it prohibits the bond of ice to the pavement and allows quicker cleanup than granular salt
- 100% of brine applied stays on the road surface, only approximately 70% of granular salt stays on the road
- Works well in drifting areas
- Works well for cleaning up areas of hard pack
- When used as a pre-treater, brine reduces winter related accidents by prohibiting the build up of frost on the pavement and slows down the bonding of ice which allows more time for snow removal equipment to be deployed
- Works great as a parking lot pre-treatment as well
Disadvantages

- Does not work well in freezing rain or wet snow events
- Does not work well in extreme cold temperatures, unless supplemented by other chemicals
- With a few exceptions, the brine making process is slow and it becomes difficult to keep up with demand
- More time consuming to load trucks with liquid
- Brine Storage needs to be increased. Low storage capacities cause issues during storms
QUESTIONS???
COMMENTS???

Jim Scheffer  
j scheffer@indot.in.gov  
219-325-7591

Bryan Donze  
b donze@indot.in.gov  
219-325-7533

Stacy Flick  
sflick@indot.in.gov  
219-325-7586

Phil Ivy  
pivy@indot.in.gov  
812-746-9652