



Increasing Brine Usage by Modifying Standard Equipment

Josh Dix

City of Roseville Street Maintenance Foreman





Gravity Pre-wet System

Towmaster Build, Varitech Pre-wet,
Force 6100 Controls

Calibration

- ❖ Initial goal of 10 gallons of brine per ton of granular salt



Remove the nozzle

- ❖ With nozzle:
.35 gal/min
- ❖ Nozzle removed:
1.30 gal/min
- ❖ Nearly 400%
increase



Brine Rate Comparison

✦ **20 mph, 400 lb/mi granular rate**

✦ **With nozzle: 5.25 gal/ton**

✦ **Without nozzle: 19.5 gal/ton**

Brine Rate Comparison

✦ **30 mph, 400 lbs/mi**

✦ **With Nozzle: 3.5 gal/ton**

✦ **Nozzle Removed: 13 gal/ton**

What about granule coverage without a fan nozzle?

No pressure

=

No fanning



Upgrade to Hydraulic Pre-wet Pumps

- ❖ Easy calibration
- ❖ Speed control
- ❖ Higher rates
- ❖ Material records



Rates with Hydraulic Pump

- ❖ Rates of up to 72 gal/ton allowed in controller
- ❖ Pump is approximately 10 gal/min capacity
- ❖ Flow seemed restricted at higher rates

What about the nozzle?

Pull it!

	Pressure			GPM
TP6520† TP8020† TP11020†	30			1.73
	35			1.87
	40			2.00
	50			2.24
	60			2.45

How Do Pre-wet Rates Compare to Direct Liquid Application Rates?

- ❖ DLA rates generally higher than anti-icing rates, 50-100 gallons per mile
- ❖ Pre-wet brine rates are tied to granular rate, low granular rate means low brine output

Pre-wet vs. DLA Rate Comparison

❖ **100 lb/mi granular rate, 15 gal/ton**

❖ **DLA equivalent *.75 gal/mi***

❖ **200 lb/mi granular rate, 15 gal/ton**

❖ **DLA equivalent *1.5 gal/mi***

Pre-wet vs. DLA Rate Comparison

✦ At 200 lb/mi granular rate:

✦ **32 gal/ton**

✦ DLA rate equivalent *3.2 gal/mi*

✦ **65 gal/ton**

✦ DLA rate equivalent *6.5 gal/mi*

My conclusion?

ected granular deicer and not counting on



How can we best merge these two?



Change the Pre-wet Pump to a Direct Pump

No equipment change,
just programming.

Upload HW Config file from Force.

Adjust calibration settings

Adjust logging options if using
PreCise

New Rates to Consider

- ❖ 10 gal/mi seems to be the best balance on a single axle for us
- ❖ At 200 lb/mi granular rate this compares to a pre-wet rate of *100 gal/ton* of salt

Results 2017-18

- ❖ Season of 2017-18, the modified truck averaged **34% less** salt than an average of other comparable routes in 8 events
- ❖ 3 of those events the modified truck averaged **42-68% less**, 1 event it was over the average by 20%

Results 2018-19

- ❖ Most recent event: Dec 31, 2018
- ❖ Second truck with modification for first time was a typical a high user
- ❖ Salt use **33% less** than average of other 7 trucks

Ready for More

- ❖ Limited by pump & storage capacity
- ❖ Larger pump & tank coming soon
- ❖ Spray in auger vs. at the spinner



Higher brine rates are possible

- ❖ Simple changes increase output and yield salt savings
- ❖ Remove the nozzle to increase brine output on gravity systems nearly 400%
- ❖ Reprogram controller maximize pump output





Let it snow!

Josh.Dix@cityofroseville.com

