


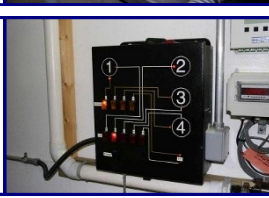




Salt + Water = Brine: Warren County Supplies Four Counties

Warren County created an efficient salt-brine making process that supplies four District 1 counties: Warren, Forest, Venango, and Crawford. Upon completion of a construction project, a salt-brine maker became available and Assistant Highway Maintenance Manager Dennis Waite put it to use at the County Garage. Equipment Operator Douglas Becket built a processing plant around the brine maker that achieves efficiency through automated high-volume and high-quality production.



A Six-Step Production Process:

1	The brine maker is loaded with evaporated salt	
2	Water is added through spray nozzles	
3	Brine is pumped from the brine maker to storage tank	
4	A control panel automates the transfer of brine from maker to storage tanks 1-4	
5	Gauges provide continuous production and quality control monitoring	
6	A tanker truck distributes brine to county stockpiles	

INNOVATION INFORMATION

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Bureau of Planning and Research

400 North Street
6th Floor East
Harrisburg, PA 17120

Phone: 717.787.6567
Fax: 717.783.9152
Email: ra-penndotresearch@state.pa.us

Keys to Successful Brine Making:

Continuous Quality Control



Automated pumping and transfer system provides continuous readouts of product quality

SALT BRINE DILUTION CHART

Brine makers are generally designed to produce saturated brines. Pre-writing higher concentrations while in storage to prevent recrystallization of the salt. The following table shows the amount of salt to add to a gallon of water to reach a 23% concentration.

% Salt by Wt.	Freezing Temp. °F	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
23.0	-5.2	0	0	0	0	0	0	0	0	0	0	0	0	0
23.2	-5.8	7	8	9	11	12	13	16	19	21	24	27	30	33
23.3	-6.2	9	11	12	14	16	18	21	25	28	32	36	40	44
23.5	-6.7	13	16	19	21	24	27	32	37	43	48	54	60	66
23.8	-7.5	23	28	34	39	45	51	58	66	74	82	91	100	110

Adjustments to maintain product quality are fast and easy



Product is optimized for low temperature performance

User Friendly Product



Blue dye increases product visibility in storage tanks and helps equipment operators work with confidence during roadway applications



High quality product flows easily through pipes and equipment, minimizing chances of malfunctions and breakdowns

Standardization and Consistency



Standard valves and piping used by all customer counties make for smooth brine transfer operations

Quality Raw Materials and Equipment



Clean solar salt greatly reduces equipment maintenance and downtime (vs. mine salt high in particulates, shown clogging a pipe above)



Cone-shaped tank bottom allows solid particulates to settle for easy clean-out



Mercury switches in brine maker automate water saturation and prevent overflow



Storage tanks located in containment wells minimize environmental impact of spills and allow easy clean-up

Cost Savings

- Volume production and process automation save unit costs
- Customer counties save by not duplicating brine-making facilities

For more information, contact Dennis Waite, Assistant Highway Maintenance Manager, Warren/Forest Counties (dwaite@state.pa.us).