

PRETREATING SALT AND SAND PROVIDES MANY BENEFITS WITH RESPECT TO WINTER ROAD MAINTENANCE. FIRST, COATING GRANULARS WITH A LIQUID PRETREATMENT DRASTICALLY REDUCES BOUNCE AND SCATTER OF THE GRANULARS DURING APPLICATION. THE MICHIGAN DEPARTMENT OF TRANSPORTATION CONDUCTED A STUDY ON BOUNCE AND SCATTER WITH TREATED SALT VERSUS UNTREATED AND FOUND THAT TREATING SALT CONSERVED MORE THAN 23% OF SALT THAT WOULD BE LOST TO BOUNCE AND SCATTER (BUREAU OF FIELD SERVICES, MDOT OPERATIONS FILED SERVICES DIVISION, 2012). IT SHOULD BE NOTED THAT 23% IS THE MINIMUM EXPECTED REDUCTION IN USAGE AS BOUNCE AND SCATTER IS LIKELY REDUCED TO A GREATER DEGREE.

BELOW IS AN INTERACTIVE CALCULATOR THAT SHOWS THE SAVINGS OF USING TREATED SALT BASED ON THE MDOT STUDY AND ENVIROTECH SERVICES' SOS SALT TREATMENT LIQUID. THE CALCULATOR CAN BE ALTERED TO REFLECT THE USER'S TYPICAL SALT USAGE AND COST OF SALT (DOUBLE-CLICK THE CALCULATOR TO MANIPULATE).

Input: Typical Usage in One Season (tons)	50,000.00
Input: Typical Price (\$/ton)	\$ 85.00
Input: Cost of Liquid Treatment (\$/gal)	\$ 1.90
Typical Dollars Spent on Salt in One Season	\$ 4,250,000.00

Input: Percent Salt Saved by Treating (23.6% based on MDOT Study)	23.6%
Tons of Salt Saved by Treating	11,790.00
Dollars Saved on Salt by Treating	\$ 1,002,150.00

Gallons of Treatment Required	300,000.00
Cost of Liquid Treatment for One Season	\$ 570,000.00

Net Dollars Saved by Treating	\$ 432,150.00
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THESE FIGURES REPRESENT A DECREASE IN PRODUCT USAGE AS IT RELATES TO PRODUCT COST ALONE. OTHER VALUES RELATED TO REDUCED USAGE INCLUDE LONGER ROUTES FOR APPLICATION VEHICLES, FEWER RELOAD PERIODS DURING A STORM AND MORE MILES TREATED DURING A SINGLE STORM EVENT. SAVINGS CAN ALSO, THEN, BE EXTRAPOLATED TO SPENDING ON FUEL AND LABOR, AND REDUCTIONS ON MAINTENANCE DUE TO CORROSION.

FURTHER, TREATING SALT PROVIDES A LIQUID DE-ICER TO JUMP-START THE MELTING PROCESSES ONCE THE SALT HAS BEEN APPLIED TO ICE OR SNOW. THIS, IN TURN, ALLOWS THE SALT TO PENETRATE DEEPER INTO THE LAYER OF SNOW AND ICE TO WHICH IT IS APPLIED AND MELT THE SNOW AND ICE FROM A DEEPER LEVEL THAN THE SURFACE. THIS ALSO PROVIDES THE LIQUID TO BEGIN THE BRINING OF THE GRANULAR SALT, WHICH IS NOT EFFECTIVE IN ITS DRY STATE. SAND THAT IS PRETREATED WILL IMBED, OR "DRILL" INTO THE SNOW AND ICE TO WHICH IT IS APPLIED, AND NOT KICK OFF THE ROAD AS QUICKLY DUE TO TRAFFIC.

ADDITIONALLY, MANY SALT TREATMENTS INCLUDE A CORROSION INHIBITOR. IT IS WELL KNOWN THAT ROCK SALT IS EXTREMELY CORROSIVE. INDEED, THE PACIFIC NORTHWEST SNOWFIGHTERS ASSOCIATION CALCULATES THEIR CORROSION SCALE WHEREBY ROCK SALT IS THE MOST CORROSIVE SUBSTANCE, WATER IS THE LEAST, AND EVERY OTHER SUBSTANCE

RANGES SOMEWHERE IN BETWEEN. TREATMENT WITH CERTAIN LIQUIDS CAN SIGNIFICANTLY REDUCE THE CORROSIVENESS OF ROCK SALT.

FINALLY, DRY SALT HAS A TENDENCY TO BRIDGE AND “FREEZE” IN A STOCKPILE. UNDER THE PRESSURE OF THE WEIGHT OF THE SALT ATOP IT AND UNDER HUMID CONDITIONS, SALT CAN AGGLOMERATE, CAUSING PROBLEMS DURING MOVING AND LOADING AS WELL AS AT THE POINT OF APPLICATION. PRETREATMENT WITH NON-LEACHING LIQUIDS KEEPS THE SALT FROM “FREEZING” AND KEEPS A PILE “FLOWING”. NOT ALL TREATMENT LIQUIDS ARE DESIGNED TO ADHERE TO SALT AND SAND, HOWEVER. CHOOSING THE CORRECT TREATMENT LIQUID IS CRUCIAL TO PRETREATING STOCKPILES.

THOUGH THE BENEFITS OF TREATING SALT AND SAND ARE WELL KNOWN AND APPARENT, MANY ROAD MAINTENANCE CREWS MAY NOT TREAT BECAUSE THEY DO NOT SEE THAT THEY HAVE THE CAPABILITY OR THE RESOURCES TO DO SO, OR THEY SIMPLY DO NOT KNOW HOW TO TREAT THEIR SALT AND SAND STOCKPILES. THE GOAL OF THIS PAPER IS TO SHOW HOW EASY IT IS TO TREAT SALT AND SAND.

**APPLICATION RATES**

THE FIRST STEP IS KNOWING HOW MUCH TREATMENT LIQUID TO PURCHASE. APPLICATION RATES MAY VARY SLIGHTLY DEPENDING ON THE PERFORMANCE ASPECT AND DEGREE OF PERFORMANCE DESIRED. APPLICATION RATES ALSO VARY BASED ON THE GRANULAR BEING TREATED. THE CHART BELOW SHOWS A VARIETY OF PERFORMANCE GOALS AND THE APPLICATION RATES RECOMMENDED BY ENVIROTECH SERVICES TO REACH THEM FOR BOTH SALT AND SAND.

	PERFORMANCE GOAL	TREATMENT RATE (GAL/TON)
SALT	FLOWABILITY OF STOCKPILE	4 - 6
	FLOWABILITY AND IMPROVEMENT IN MELTING TIME AND CAPACITY	6 - 8
	DRASTIC IMPROVEMENT IN MELTING TIME AND CAPACITY	8 - 10
SAND	FLOWABILITY OF STOCKPILE	1 - 2
	FLOWABILITY AND SOME DRILLING	2 - 3
	FASTER DRILLING	3 - 4

FOR A QUICK REFERENCE, EXAMPLES ARE PROVIDED FOR THE MIDDLE APPLICATION RANGE FOR BOTH SALT AND SAND FOR A FEW SAMPLE STOCKPILES. FOR EASY REFERENCE, THOUGH, ONE TRUCKLOAD OF ENVIROTECH SERVICES’ SOS SALT TREATMENT WILL TREAT 750 TONS OF SALT AT 6 GALLONS PER TON.

SALT STOCKPILE (IN TONS)	GALLONS OF TREATMENT LIQUID
1,000	6,000 – 8,000
5,000	30,000 – 40,000
10,000	60000 - 80000
20,000	120,000 – 160,000
SAND STOCKPILE (IN TONS)	GALLONS OF TREATMENT LIQUID
1,000	2,000 – 3,000
5,000	10,000 – 15,000

10,000	20,000 – 30,000
20,000	40,000 – 60,000

BELOW IS A CALCULATOR THAT CAN BE USED TO DETERMINE THE NUMBER OF GALLONS REQUIRED TO TREAT A SPECIFIC STOCKPILE (DOUBLE-CLICK TO USE).

Are you treating salt or sand?	Salt
What degree of coverage would you like?	Medium
How many tons are you treating?	50,000.00

Gallons of liquid treatment necessary:	300,000.00
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### APPLICATION METHODS

METHODS OF TREATING SALT STOCKPILES VARY BASED ON A FEW FACTORS. FIRST, WHAT IS THE TOTAL VOLUME TO BE TREATED IN ONE INSTANCE? SECOND, WILL STOCKPILES BE TREATED ON AN ON-GOING BASIS, OR WITH LESS FREQUENCY? THIRD, WHAT RESOURCES ARE READILY AVAILABLE ON HAND?

FOR LARGE OPERATIONS WHICH TREAT STOCKPILES AT A HIGH FREQUENCY (E.G. WEEKLY), THE MOST RAPID AND LEAST LABOR INTENSIVE METHOD IS TO TREAT SALT THROUGH A PUG MILL. THE APPLICATION RATE CAN BE STRICTLY CONTROLLED, THE MILL SET UP TO DEPOSIT TREATED SALT OR SAND IN A SPECIFIC LOCATION, AND MAN-HOURS REQUIRED ARE DETERMINED BY THE SIZE OF THE STOCKPILE. ALTERNATIVELY, A PUG MILL COULD BE RENTED TO TREAT A SEASON’S WORTH OF SALT IN ONE GO.



FIGURE 1: PUG MILL TREATMENT APPLICATION METHOD ON SAND

AN ALTERNATIVE TO PUG MILL TREATMENT WOULD BE TO TREAT SALT AS IT IS DEPOSITED AT ITS STORAGE LOCATION ON A CONVEYOR SYSTEM. WETTING SYSTEMS ARE AVAILABLE FOR CONVEYOR ATTACHMENT, AND BY CALCULATING THE FLOW OF SALT FROM THE CONVEYOR BELT AND THE FLOW OF LIQUID FROM SUCH A SYSTEM, THE TWO FLOW RATES CAN BE TUNED TO

THE APPROPRIATE TREATMENT RATE. FOR INSTANCE, IF THE CONVEYOR MOVES 70 TONS PER HOUR, AND THE SALT IS BEING TREATED AT 6 GALLONS PER TON, THE SPRAY SYSTEM WOULD BE SET TO SPRAY AT 420 GALLONS PER HOUR. THE ADVANTAGES ARE SIMILAR TO THOSE OF THE PUG MILL TREATMENT METHOD, IN THAT THE LABOR REQUIRED IS MINIMAL AND THE TREATMENT RATE CAN BE STRICTLY CONTROLLED. PLEASE NOTE, THOUGH, THAT DIFFERENT TREATMENT LIQUIDS HAVE DIFFERENT VISCOSITIES, AND THE SPRAY SYSTEM MAY NEED TO BE ADJUSTED BASED ON THE VISCOSITY OF THE LIQUID.



*FIGURE 2: CONVEYOR SPRAY SYSTEM OUTPUT*

FOR OPERATIONS THAT DO NOT HAVE READY ACCESS TO A PUG MILL OR CONVEYOR SYSTEM AND DO NOT SEE THE VALUE IN INVESTING IN THEM, A MANUAL MIX PROCESS MAY SUITE BETTER. IN THIS METHOD, THE SALT OR SAND STOCKPILE IS LAID OUT TO COVER A LARGE FOOTPRINT, THE TREATMENT LIQUID IS APPLIED BY HOSE IN A UNIFORMED MANNER, AND THE STOCKPILE IS TURNED AND MIXED, THEN DEPOSITED IN ITS STORAGE LOCATION WITH SOME SORT OF EARTH-MOVING EQUIPMENT (E.G. SKID STEER OR FRONT-END LOADER). BELOW IS A PHOTO OF JUST SUCH AN OPERATION UNDERWAY.



*FIGURE 3: MANUAL SALT TREATMENT*

FOR MORE INFORMATION REGARDING SALT OR SAND TREATMENT LIQUIDS, OR TREATMENT APPLICATION RATES AND METHODS, PLEASE CONTACT AN ENVIROTECH SERVICES SALES REPRESENTATIVE OR FIELD APPLICATION SPECIALIST.

ENVIROTECH SERVICES IS AN INDUSTRY LEADER IN KNOWLEDGE AND EXPERIENCE WHEN IT COMES TO WINTER ROAD MAINTENANCE. VISIT OUR WEBSITE AT [WWW.ENVIROTECHSERVICES.COM](http://WWW.ENVIROTECHSERVICES.COM) FOR MORE INFORMATION.