Welcome

Overview

- Registration
- Introduction and Training Credibility
- Water Resources
- Weather
- Winter Materials
- Lunch
- Split for Calibration Clinic
- Open Discussion, Closing Remarks, Q & A
- Test

Jim

Who we are:

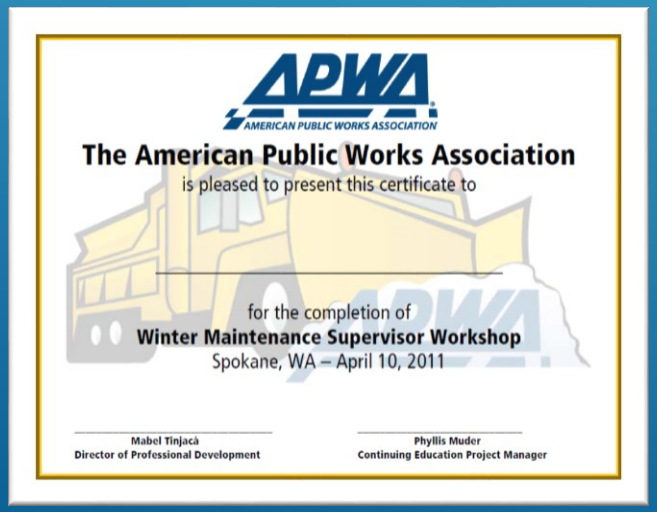
Matt Wittum:	Village of Spring Grove
Vince Kilcullen:	Village of Algonquin
Jim Veugeler:	City of Crystal lake
Bob Hensel:	McHenry County Division of Transportation
Scott Kuykendall:	McHenry County Planning and Development

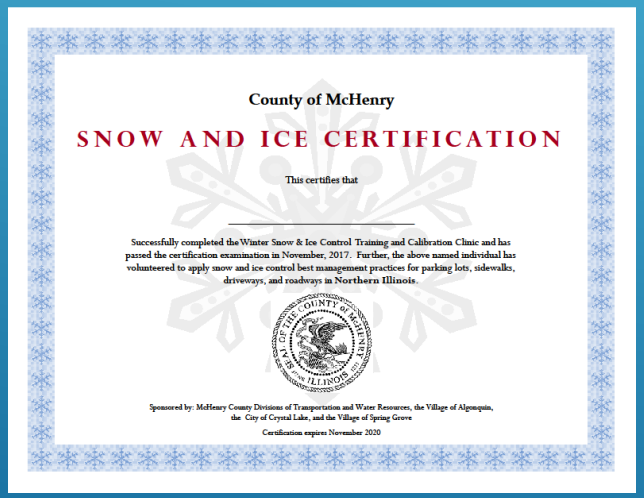
Who you are:

Public and private snow removal professionals who care about our environment.

Training Credibility

- Based on the APWA and Salt Institute Snow and Ice Handbook
- The McHenry County Parking Lot and Sidewalks Handbook
- The APWA Certificate Program – Over 1600 Supervisors Trained





WHY CERTIFY?

Why should we be concerned about certifying managers and operators?

Because it enforces training. Instead of "We Should" train our operators we go to "We Will" train our operators.

We also look to include "All" operators both Public and Private.

Because You Care

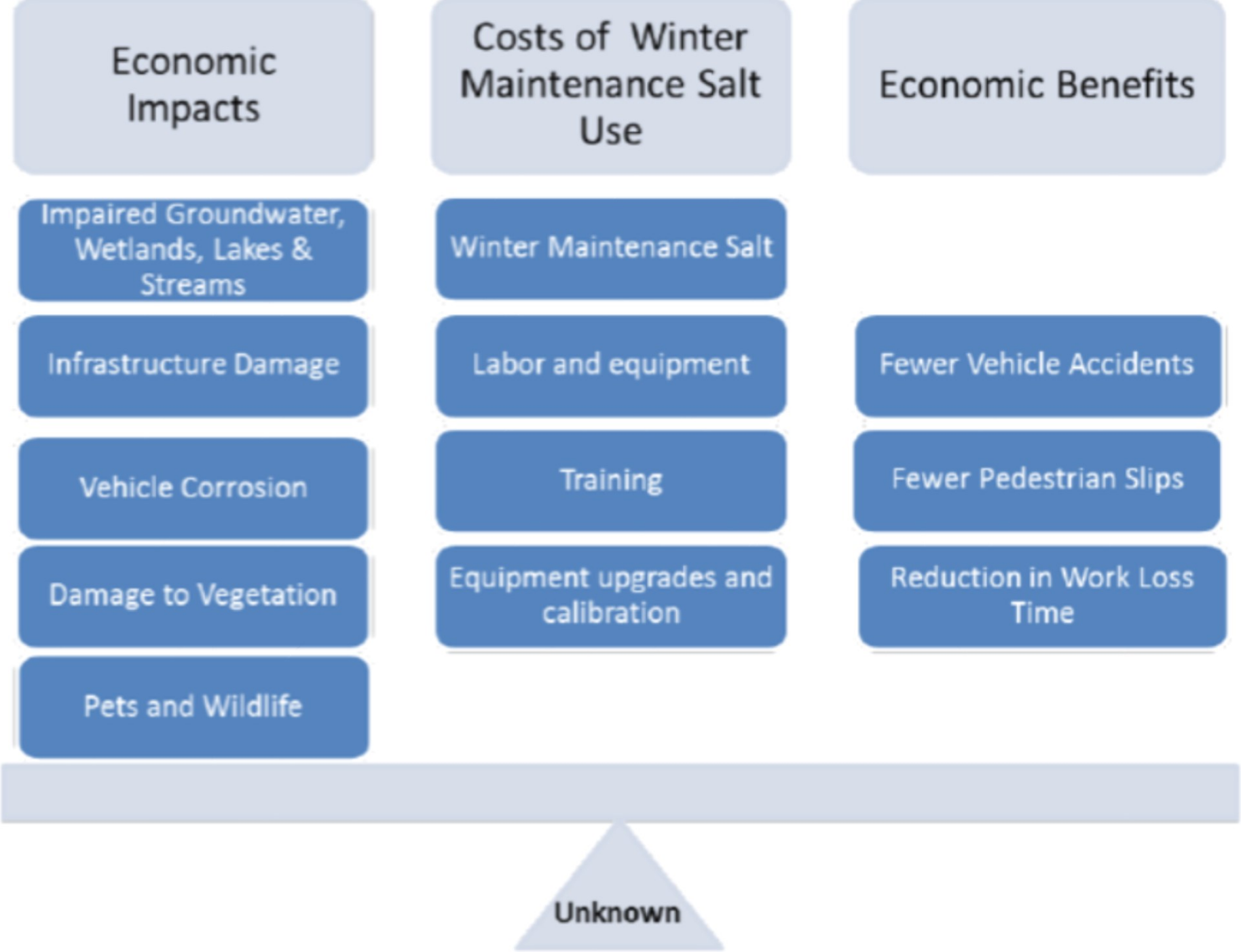
WHY THIS COURSE?

For Supervisors & Managers To:

- Expand Knowledge of Preparation and Training
- Increase Understanding of Winter Weather
- Better Use Traditional & Alternative Chemicals
- Consider What Equipment is Available & How to Maintain It
- Enhance Communications With the Public
- Improve Training

Resulting In:

- More Effective, Efficient, Equitable & Environmentally Friendly Snow & Ice Control


Economic Impacts
Costs of Winter Maintenance Salt Use
Economic Benefits
Impaired Groundwater, Wetlands, Lakes & Streams
Winter Maintenance Salt
Infrastructure Damage
Labor and equipment
Fewer Vehicle Accidents
Vehicle Corrosion
Training
Fewer Pedestrian Slips
Damage to Vegetation
Equipment upgrades and calibration
Reduction in Work Loss Time
Pets and Wildlife
Unknown

“Today’s society has little patience for travel delays and the “privilege” to travel is now seem as more of a right.”

TOTALS

- Over the past five winters the United States has spent an average of 1.13 BILLION dollars
- Spread 6 MILLION tons of salt and
- Logged 8 MILLION work hours on winter maintenance operations

A LITTLE HUMOR TO GET US STARTED

MAINTENANCE VS. LEVEL OF SERVICE

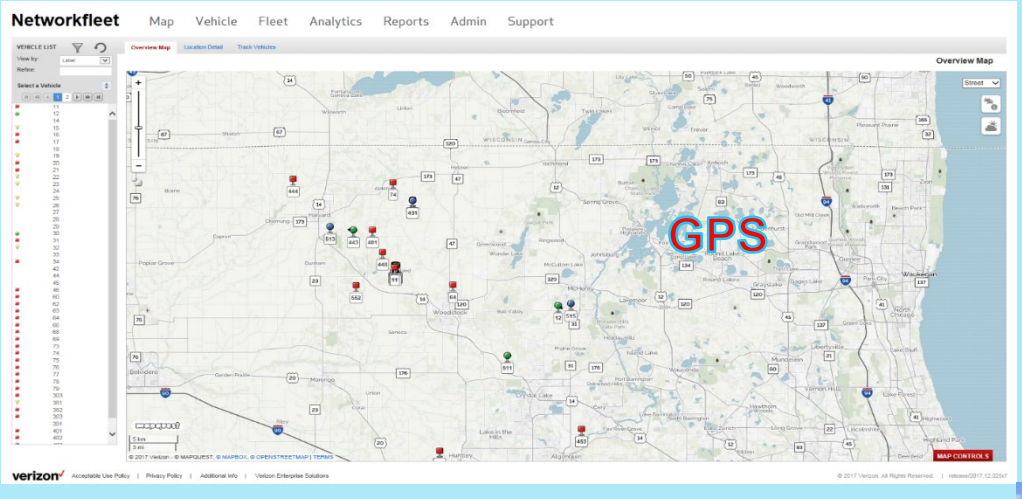
- **It's NOT just plowing**
- **It's NOT just about the budget**
- **It IS about re-elections and the customers**
- **It IS about the next generation and protecting the environment**

SUSTAINABILITY

Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

WINTER OPERATIONS HAS GREATLY EVOLVED IN 20 YEARS:

Advances In Equipment, Materials, Technology



GPS

Beet Heet is an organic-based, corrosion-inhibited, liquid deicer containing a highly refined carbohydrate concentrate, two exothermic chlorides and two non-exothermic chlorides.

Materials

1000 Gallon Tanks

- **Winter Operations Has Greatly Evolved In 20 Years:**

More Visibility & Scrutiny By Public

Public Perception

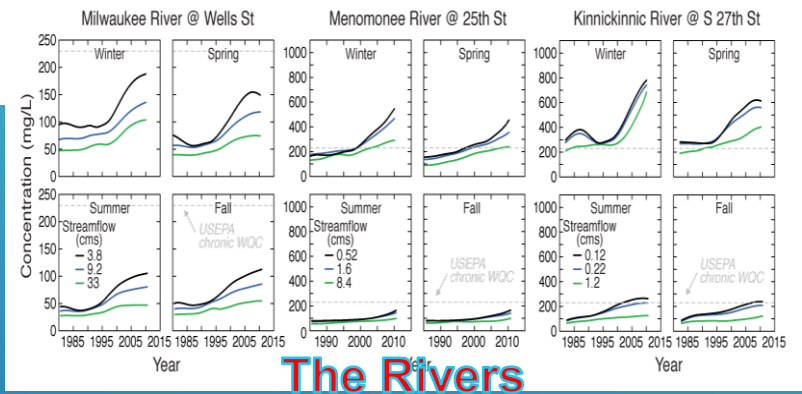
https://www.youtube.com/watch?v=lU4iYBYMTDM

- **Winter Operations Has Greatly Evolved In 20 Years:**

More Visibility & Scrutiny By Public

Winter Operations Has Greatly Evolved In 20 Years:

Increased Environmental Concerns



The Rivers

The Vegetation

Vehicles & Equipment

Infrastructure

Winter Operations Has Greatly Evolved In 20 Years:

Workforce Changes

Technology

For much of American history, workplace technology changed slowly, with workers given ample time to learn a few new tools and techniques during their careers. Not only are new products entering the workforce on a seemingly monthly basis, they also require retraining as they frequently upgrade.

Staffing

The effectiveness and low cost of telecommuting employees now allow most companies to hire off-site workers, and many administrative and white-collar professionals to work from home. As the older workforce retires, companies are not rehiring their position (doing more with less).

Demographic Shifts

Beginning with the women's movement in the 1970s, the workplace has shifted from one dominated by older white males to a more multicultural community. Women, minorities, the handicapped and younger workers now share the workplace at all levels.

More Legalities

With an increase in workforce diversity has come increasing harassment laws and legal actions. Jokes, outbursts, insensitive remarks, hiring and termination practices and other behaviors toward workers can result in crippling lawsuits.

Winter Operations Has Greatly Evolved In 20 Years:

Significant Budgetary Issues

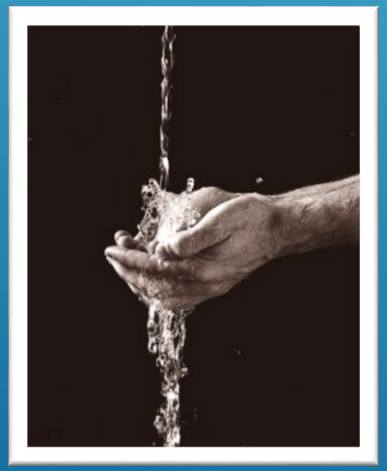
- Layoff's
- Utilizing older equipment
- Not hiring seasonal help
- Lack of snow/ice materials
- Wage freezes
- Politics

HOW DO THE EFFECTS OF A SEVERE WINTER STORM IMPACT OUR LIVES

- Highways closed or difficult to travel on
- Airports closed, business and pleasure trips cancelled or delayed
- Commuter trains and buses delayed
- Mail delayed
- Difficulty in obtaining medical care (Unable to get to hospital - ambulances blocked by snow-covered roads)
- Shipment of food and other goods delayed
- Schools closed
- Businesses closed
- Stores lose business because patrons unable to get there
- Power and communications disrupted because of downed lines
- Fire and police delayed in responding to emergencies
- Cars hard to start, need assistance (often extra costs)
- Increased auto accidents
- Large costs to state, county, and local highway departments for snow removal

WINTER MAINTENANCE HAS ISSUES WITH WATER

IT'S NOT JUST THE ROADS WE SALT..



U.S. ENVIRONMENTAL PROTECTION AGENCY

Watershed Assessment, Tracking & Environmental ResultS

Share

Recent Additions | Contact Us **Search:** ○ All EPA ◉ This Area Go

You are here: EPA Home » Water » WATERS » Water Quality Assessment and TMDL Information » National Summary of Impaired Waters and TMDL Information

Return to home page

On This Page

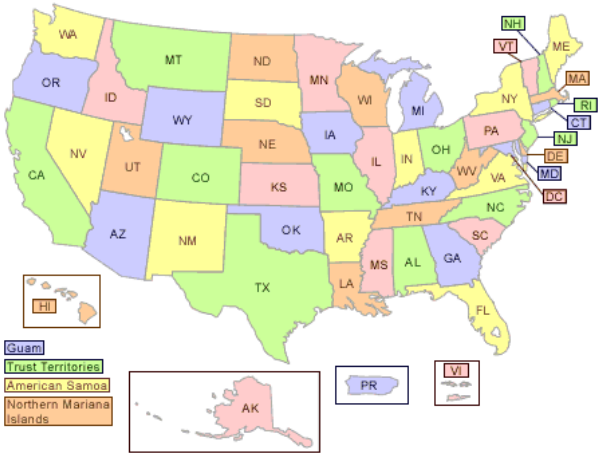
- Impaired Waters Listed by State
- Causes of Impairment for 303(d) Listed Waters
- Cumulative TMDLs by Pollutant
- Approved TMDLs by State
- Cumulative Number of TMDLs
- Status of Available Data Used in This Report

For More Information:

Download Excel compatible information

Download GIS Information (Internet Explorer only)

National Summary of Impaired Waters and TMDL Information



Depicted below are national summary tables and charts for available water quality data reported by the States to EPA under Section 305(b) and 303(d) of the Clean Water Act.

Frequent Questions

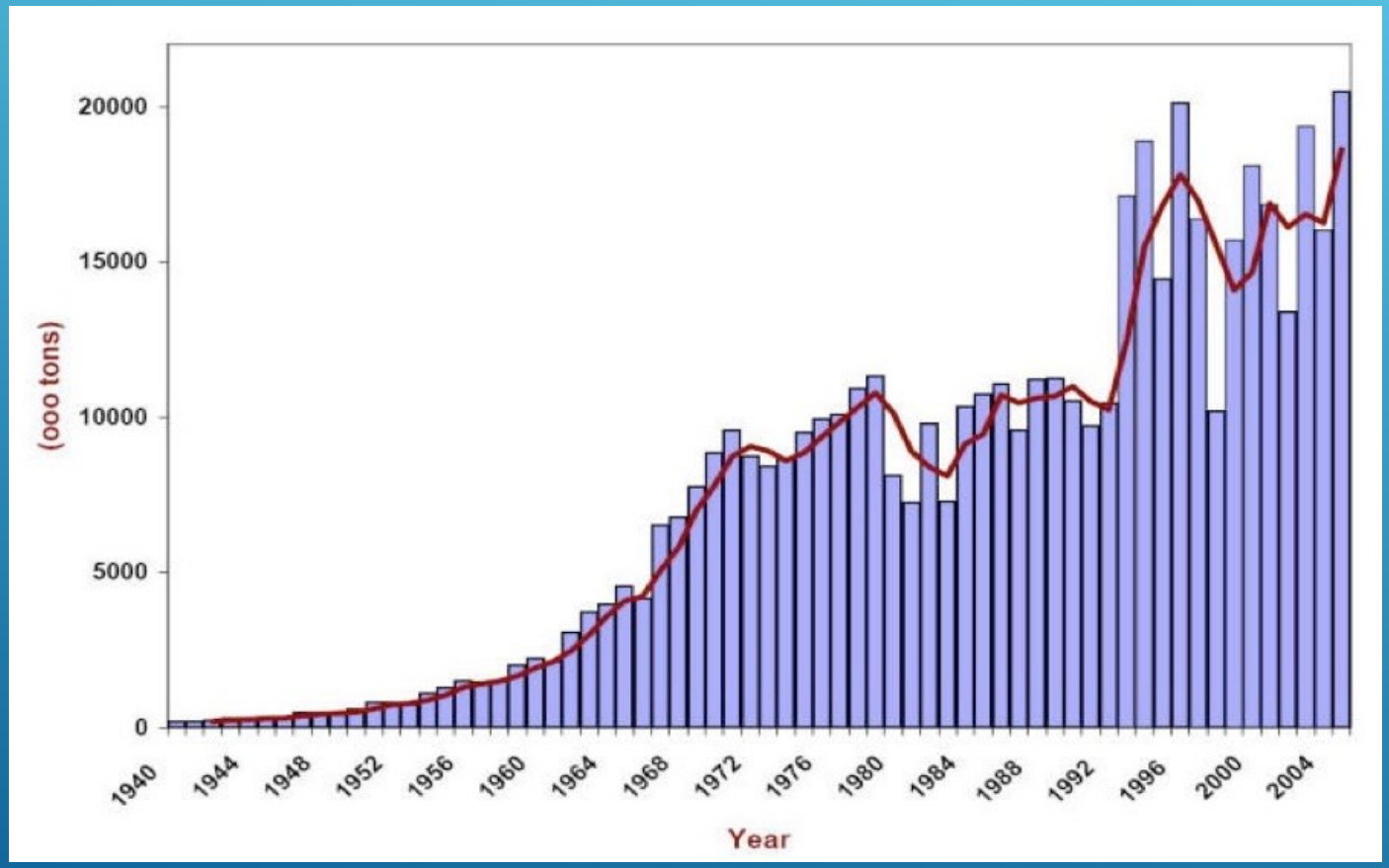
- About This Database (Integrated Report)
- About This Database (Separate Impaired and Assessed Waters Reports)
- Assessing Water Quality (Questions and Answers)
- Integrated Reporting Guidance
- Previous National Water Quality Reports
- EnviroMapper for Water
- AskWATERS
- EPA WATERS Homepage
- Exchange Network
- Assessment Database
- Statewide Statistical Surveys

NATIONAL POLLUANT DISCHARGE ELIMINATION SYSTEM – NPDES

Source: EPA

WHY BE CONCERNED ?

Road Salt in U.S.
First applied in earnest around 1960



Graph courtesy of Walt Kelly

SALT & WATER

THE ENVIRONMENTAL IMPACTS OF TREATING PAVEMENT

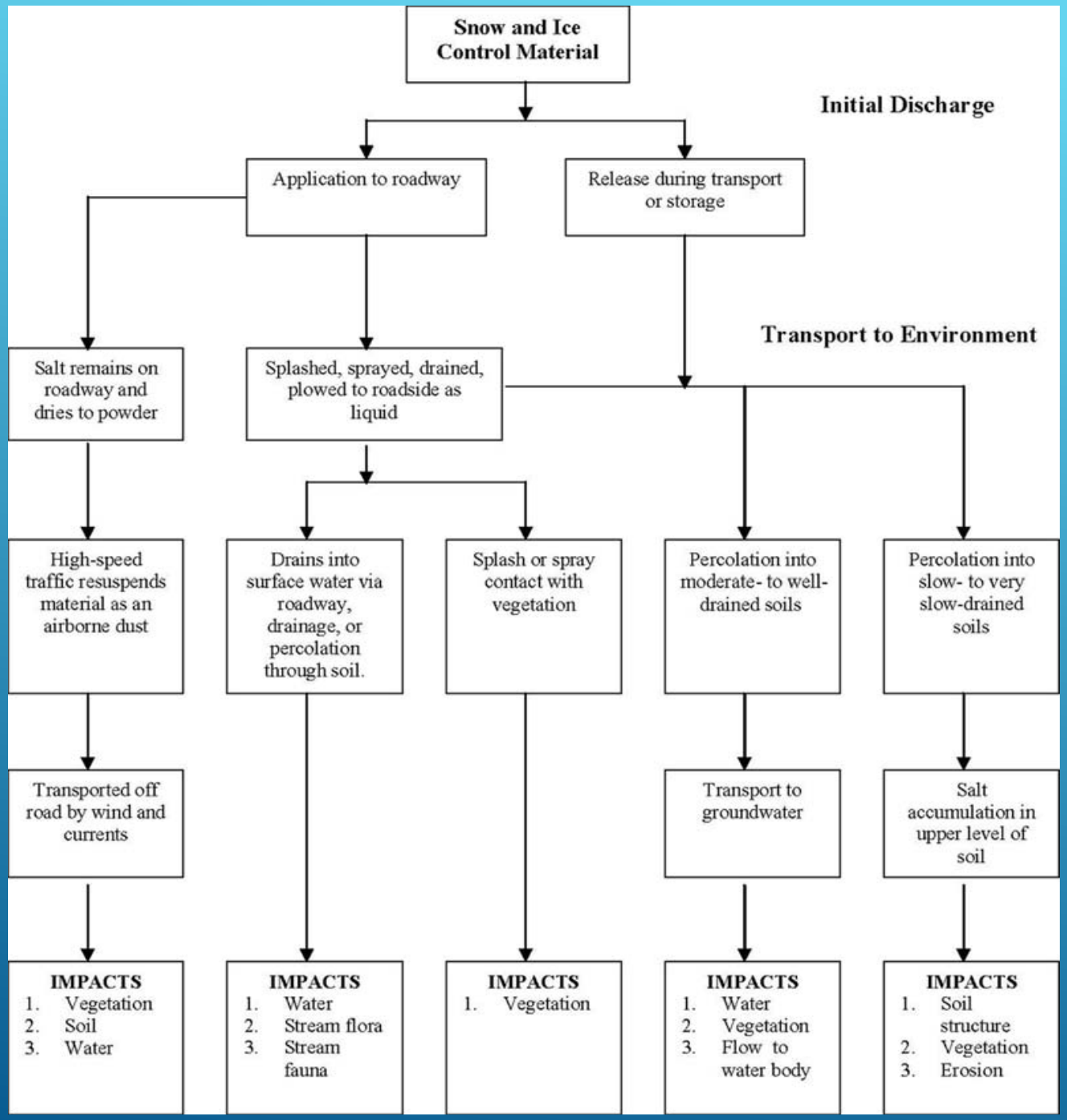
Once in solution, always in solution.

Improper storage

Calibration

Excess Salting

Sidewalks - Parking Lots


Snow and Ice Control Material
Initial Discharge
Application to roadway
Release during transport or storage
Transport to Environment
Salt remains on roadway and dries to powder
Splashed, sprayed, drained, plowed to roadside as liquid
High-speed traffic resuspends material as an airborne dust
Drains into surface water via roadway, drainage, or percolation through soil.
Splash or spray contact with vegetation
Percolation into moderate- to well-drained soils
Percolation into slow- to very slow-drained soils
Transported off road by wind and currents
Transport to groundwater
Salt accumulation in upper level of soil
IMPACTS
1. Vegetation
2. Soil
3. Water
IMPACTS
1. Water
2. Stream flora
3. Stream fauna
IMPACTS
1. Vegetation
IMPACTS
1. Water
2. Vegetation
3. Flow to water body
IMPACTS
1. Soil structure
2. Vegetation
3. Erosion

Groundwater Protection

Scott

SNOW AND ICE CONTROL

What We Will Cover

- Basic Winter Maintenance Concepts
- Before Winter
- Before the Storm
- During the Storm
- After the Storm
- Application Rate Guidelines
- Material and Quality Control

Matt

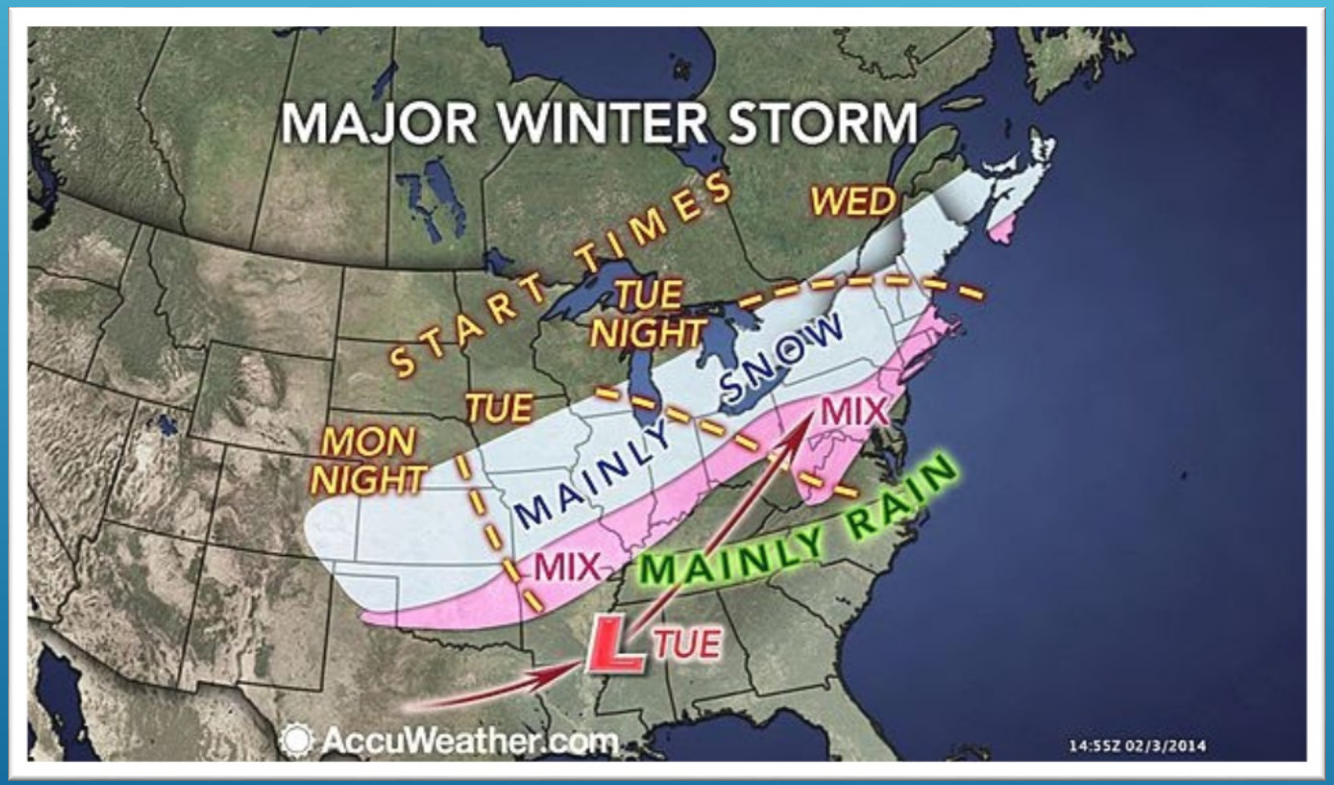
Basic Concepts

How does your agency or company decide when to respond?

Is This Too Late ?

WEATHER BASICS

Understanding the weather is the first thing to overcome when dealing with weather and winter maintenance.

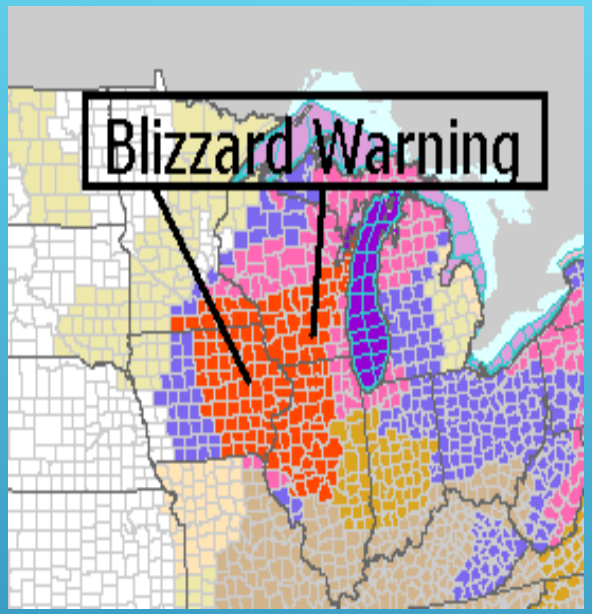


Make sure you have the right tools.

Don’t trust every forecast you read or see!

www.noaa.gov

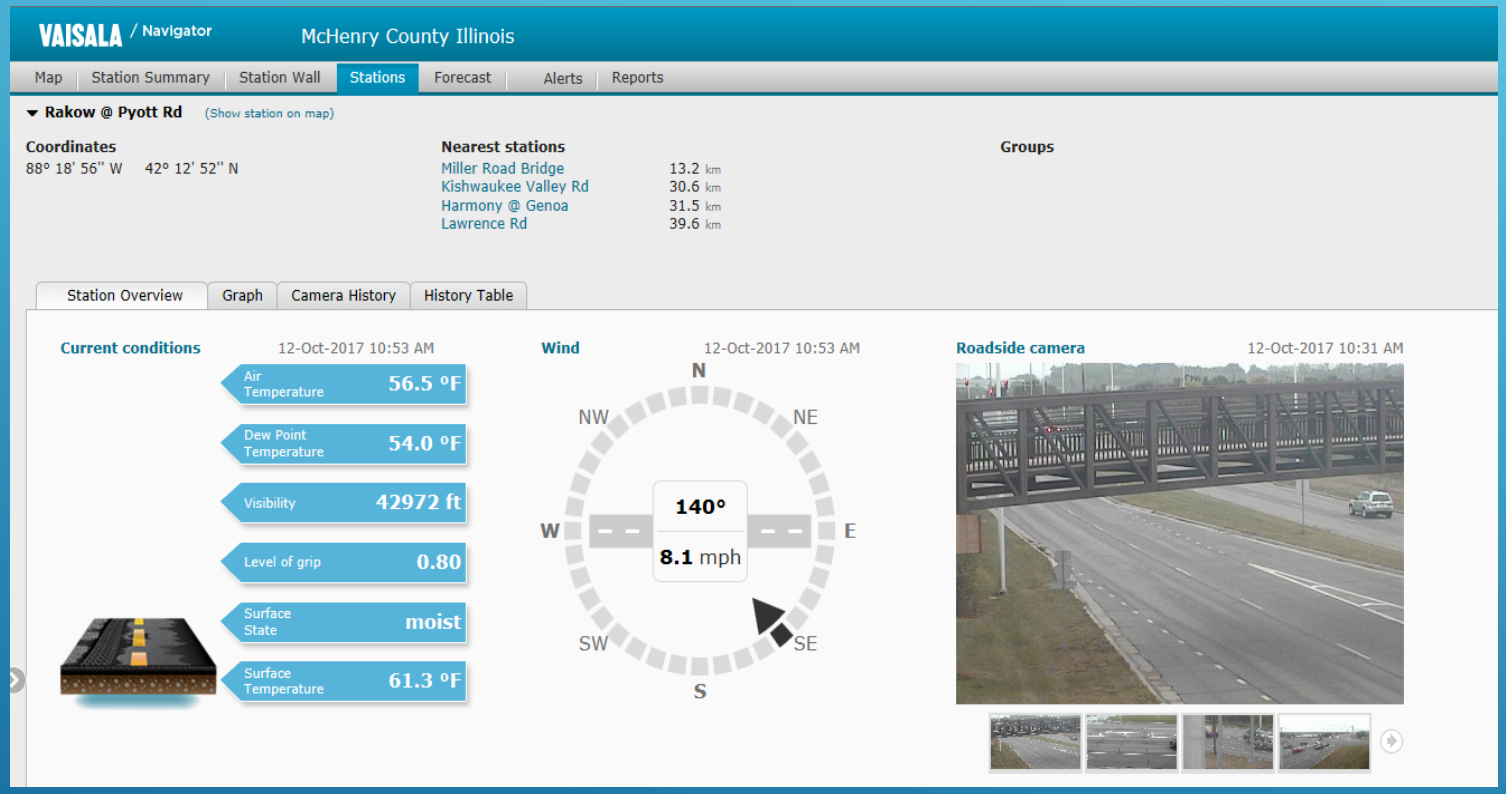
Great resource for weather available on the internet.



DO NOT JUST USE ONE SOURCE FOR YOUR INFORMATION!

BENEFITS IN YOUR TOOL CHEST

RWIS stations



- Local Forecast
- 10 Day Forecast
- Hourly Forecast
- Graphs / Charts
- Forecast Graphics
- High Impact Weather
- Regional Weather
- National Weather
- International Weather
- NWS Weather Reports
- Historical Weather
- My Favorites

dtn meteorlogix

YOU'RE USING THE MOST-ADVANCED FORECASTS IN THE UNITED STATES.

CLICK FOR DETAILS.

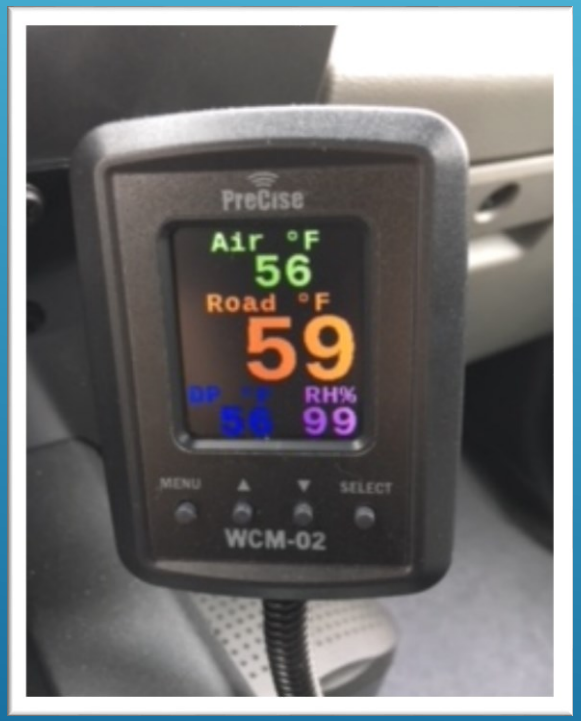
MCDOT (MX0015)

Change Threshold Settings...

Hour	Wed 10PM	Wed 11PM	Thu 12AM	Thu 01AM	Thu 02AM	Thu 03AM	Thu 04AM	Thu 05AM	Thu 06AM	Thu 07AM	Thu 08AM	Thu 09AM	Thu 10AM	Thu 11AM
Weather Condition														
Weather	Mostly Cloudy	Mostly Cloudy	Cloudy	Snow Possible	Snow Possible	Snow Possible	Snow Possible	Snow Likely	Snow Likely	Snow Likely	Snow Likely	Snow Likely	Snow Likely	Snow Likely
Temperature (°F)	30	29	29	28	28	28	28	27	29	30	31	33	34	35
Feels Like (°F)	25	23	23	21	19	18	18	16	18	19	20	22	24	26
Wind Direction	E	ESE	ESE	ESE	ESE	E	ESE	ESE	ESE	ESE	ESE	ESE	E	E
Wind Speed/Gusts (mph)	5	6	6	7	9	11	12 G 18	13 G 20	14 G 21	15 G 22	17 G 25	17 G 25	16 G 24	14 G 21
Dew Point (°F)	24	25	24	25	25	26	26	26	26	27	28	29	29	29
Humidity (%)	78	85	82	89	89	92	92	96	89	89	89	85	82	79
Precipitation Chance (%)	-	-	-	20	20	20	35	53	68	72	71	68	67	66
Precipitation Type	-	-	-	Wet Snow	Wet Snow	Wet Snow	Wet Snow	Wet Snow	Wet Snow	Wet Snow	Wet Snow	Wet Snow	Wet Snow	Wet Snow
Precipitation Amount			None			S: <1.0 R: 0.04			S: <1.0 R: 0.04			S: <1.0 R: 0.11		
Blowing Snow Potential	-	-	-	Medium	Medium	Medium	Medium	Medium	High	High	High	High	High	High
Bridge Temp (°F)	35	34	33	32	31	31	30	30	30	30	31	32	33	-
Road Temp (°F)	38	37	36	35	35	34	33	33	32	33	34	35	36	-
24Hr Snow Accum (08AM-08AM)	0	0	0	0.17	0.34	0.42	0.5	0.7	0.78	1.05	-	-	-	-
Bridge Frost Likely?	No	No	No	No	No	No	No	No	No	No	No	No	No	-
Road Frost Likely?	No	No	No	No	No	No	No	No	No	No	No	No	No	-
Treatment Recommendation														-

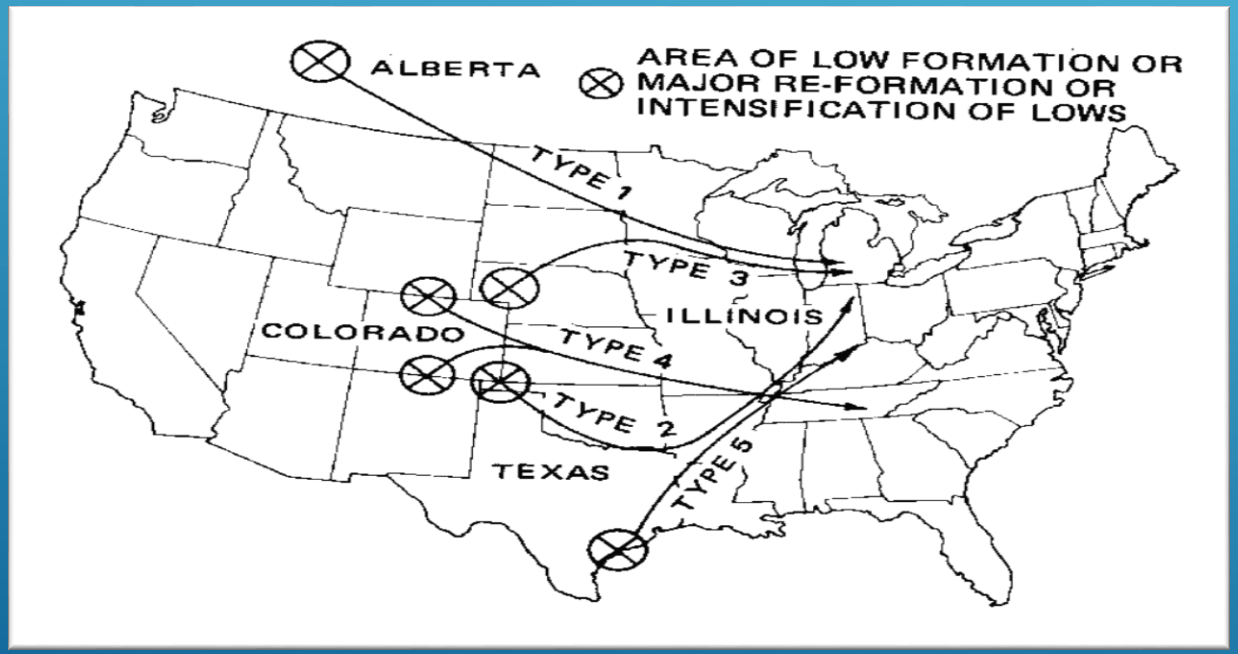
BENEFITS IN YOUR TOOL CHEST

Road pavement sensors
Infra-red thermometers



PROXIMITY TO STORM TRACKS (HISTORICAL)

Review your geographical area.
Are you in a location that receives major storm events every 5, 10, 20 years ?
Use this info to prepare for the worst case scenario.



Typical tracks of winter low pressure systems

APPLIED WEATHER – BEFORE THE STORM

What is the forecast in general ?

What is the probability of precipitation?

What is the wind forecast?

Can we anti-ice?

Is there blowing or drifting snow expected?

What is the forecast confidence with the storm?

What and how much is forecasted ?

When will the precipitation start ?

APPLIED WEATHER – DURING THE STORM

- Are there restrictions to visibility forecast?
- What cloud cover is expected?
- Is the forecast going as planned?
- What is the dew point forecast and is it relevant?
- Is this in line with a Storm Track?

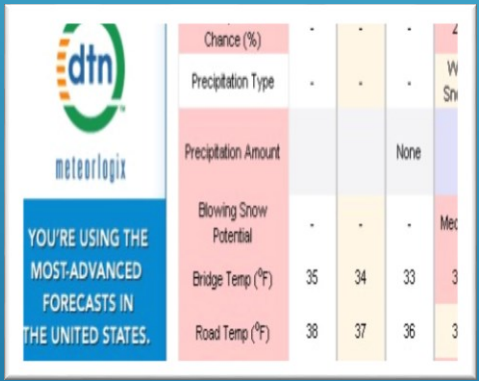
APPLIED WEATHER – NEAR/AFTER THE STORM

- When is the forecasted end to the storm ?
- What weather is forecasted following the storm?
  - Blowing and/or Drifting expected ?
  - Sunshine, clear skies ?
  - Lake-effect snow squalls possible ?
  - Dew point forecast, will there be a re-freeze ?

Use Pavement Temperature in Decision Making

- Air Measured 6 feet above ground could vary 10 to 20 degrees from air temperature
- Pavement type, frozen ground, day/night, sun/shade all influence pavement temperature

GETTING REAL TIME INFORMATION



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REAL TIME VISUAL IMAGES AS WELL

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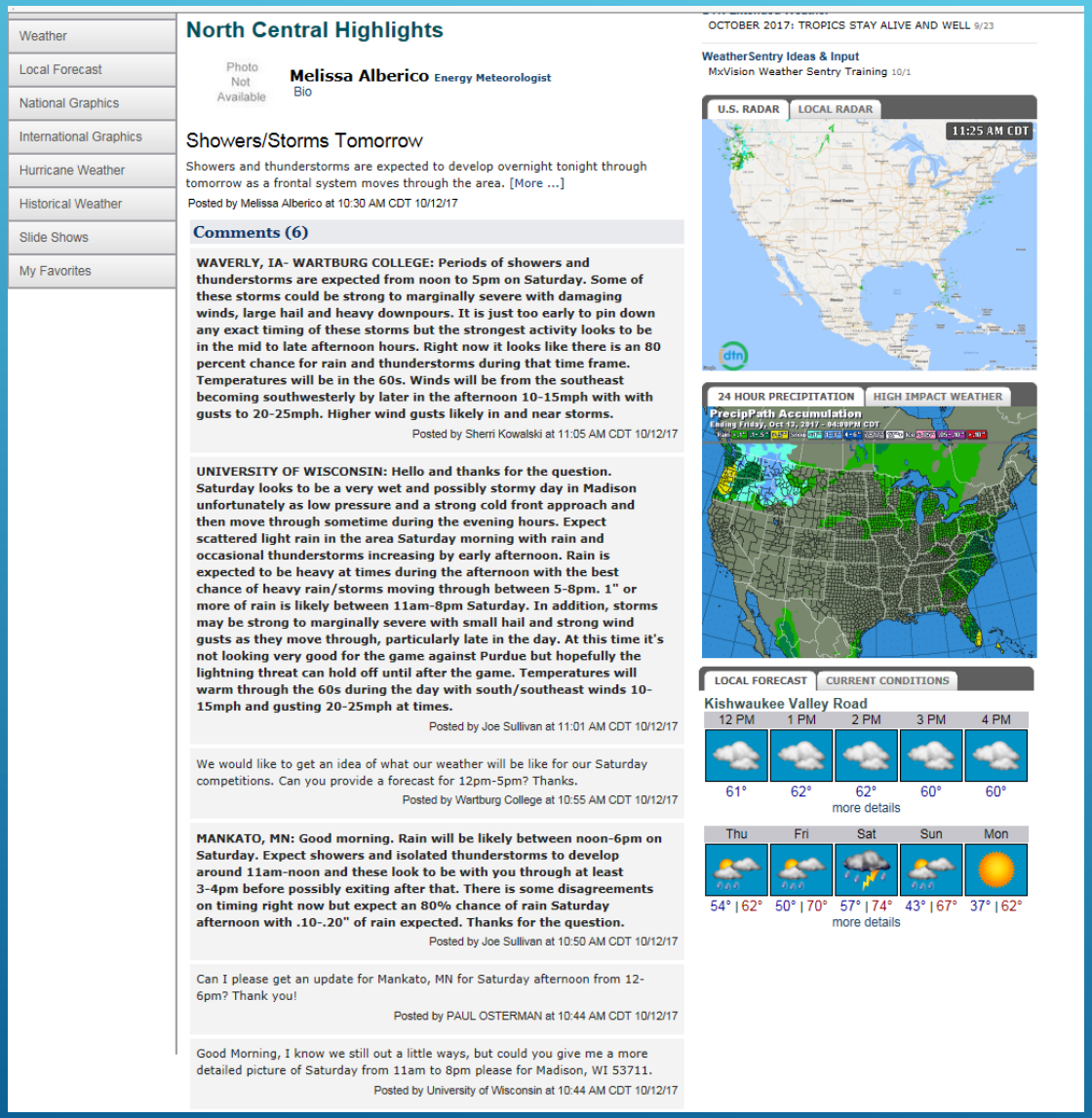
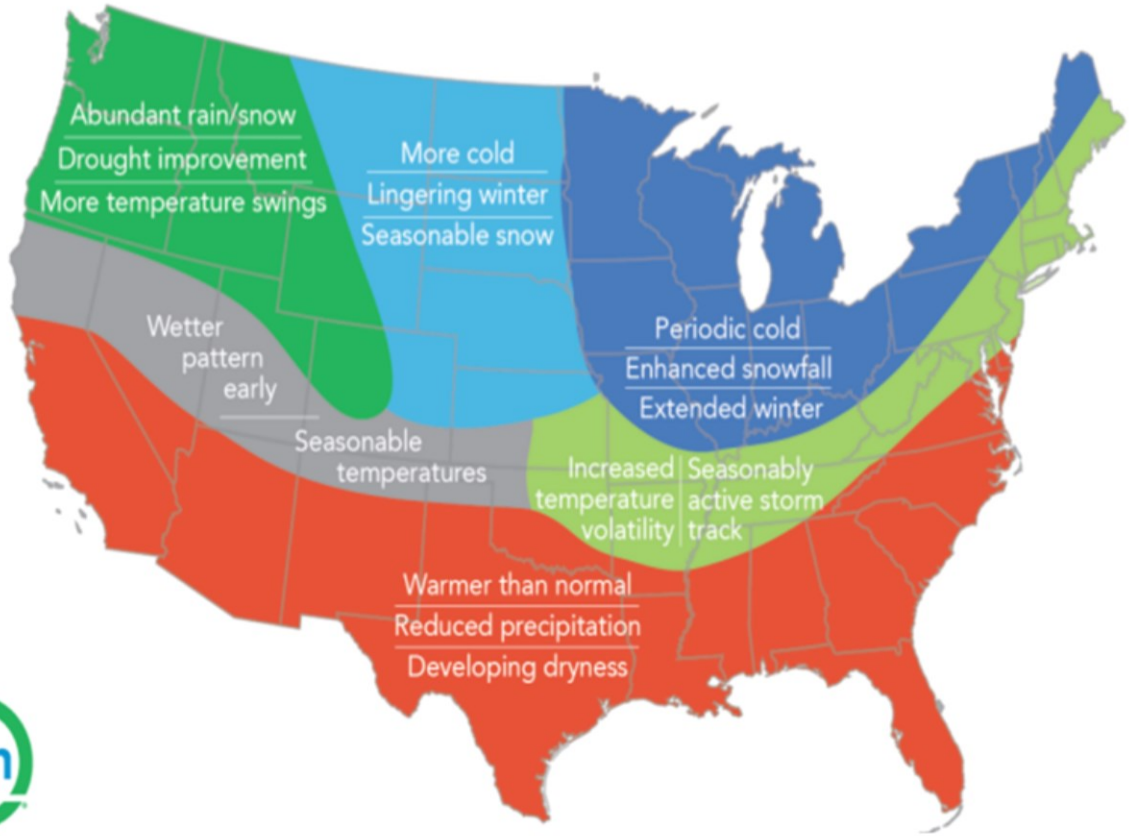
FORECAST CONSULTATION IS THE KEY!



Who do you call for updated forecasts?

What's the good news Matt?

DTN Winter Outlook (Nov-Mar) 2017/2018



Maybe Not!

WINTER MATERIALS

Jim and Vince

VIDEO

CHEMICALS

- Chemicals are applied to prevent or break the bond between ice and snow to the road surface
- We don't use chemicals to "burn off" the snow
- We remove snow & ice with the plow – we make it easier to remove with the chemicals
- It takes 4 times more chemicals to remove ice than to prevent it!

De-Icing Chemical Information Sheet

Material and Quality Control Chemical and Description	Lowest Practical Melting Temp (˚F)	Eutectic Temp. (˚F)	Optimal Concentration
NaCl (Sodium Chloride) Delivered as solid rock salt, also can be made into a brine. The basis of most deicing materials. Very corrosive. Inexpensive. Very available. Rarely has a corrosion inhibitor added.	15	-6	23%
MgCl2 (Magnesium Chloride) Delivered as a liquid. Often used to wet NaCl crystals to increase adherence to surface and reduce melting points. Corrosive. Higher cost. Often has a corrosion inhibitor added.	-10	-28	27-30%
CaCl2 (Calcium Chloride) Delivered as flakes, pellets, or liquid. Powerful deicer but extremely corrosive. Sometimes used incorrectly to open storm drains. Higher cost. Often has a corrosion inhibitor added.	-20	-60	30%
CMA (Calcium Magnesium Acetate) Delivered as a powder, crystals, pellets, or liquid. Liquid CMA is used mainly on automated bridge deicing systems. Noncorrosive, biodegradable. Sometimes added to sodium chloride as a corrosion inhibiter. Alternative for areas where chloride use must be limited. Often higher cost.	20	-18	32%
KAc (Potassium Acetate) Delivered as a liquid. Often used on automated bridge deicing systems and airports. Use for anti-icing, deicing, and prewetting. Non-corrosive, biodegradable. Alternative for areas where chloride use must be limited. Higher cost.	-15	-76	50%
Blends Both chlorides and acetates exist in blends. Talk to your supplier and determine the lowest practical melting temperature, the optimal concentration and the basic components in the blend. Most blends are centered on rock salt since it is cheap.	Varies	Varies	Varies
Winter Sand/Abrasives Winter sand has some salt mixed in it to keep it from freezing. Abrasives should be used for cold temperatures when deicers are not effective. They provide temporary traction but only work when they are on top of the ice.	Never melts; provides traction only		

Public Pg.20
Private Pg.32

MATERIAL OPTIONS

ABRASIVES

CHEMICALS

OR NOTHING AT ALL

WINTER MAINTENANCE JARGON

The Percent (By Weight) of the Ice Control Chemical in the Liquid or Solid

Dilution	• **Reducing** Solution **Concentration By Adding Water**
Form	• The **Physical State Of The Chemical** – Usually Solid Or Liquid
Gradation:	• A Characterization Of The Distribution Of **Particle Sizes** For Solid Chemicals And Abrasives, (I.E., Fine, Coarse, Percent Passing Various Sieve Sizes, Etc.)
Hygroscopic	• Having The **Ability To Draw Water Vapor From The Air**
Solution	• A **Liquid Containing Chemicals And Water**

WHAT HAPPENS WHEN MATERIALS HIT THE ROAD?

The Material Must Go Into Solution

- Liquids Are Already There
- Rock Salt Needs Moisture To Go To Work

Once In Solution (I.E. Mixed With Water)

- It Lowers The Freezing Point
- As Soon As It Goes Into Solution, It Starts To Dilute Out

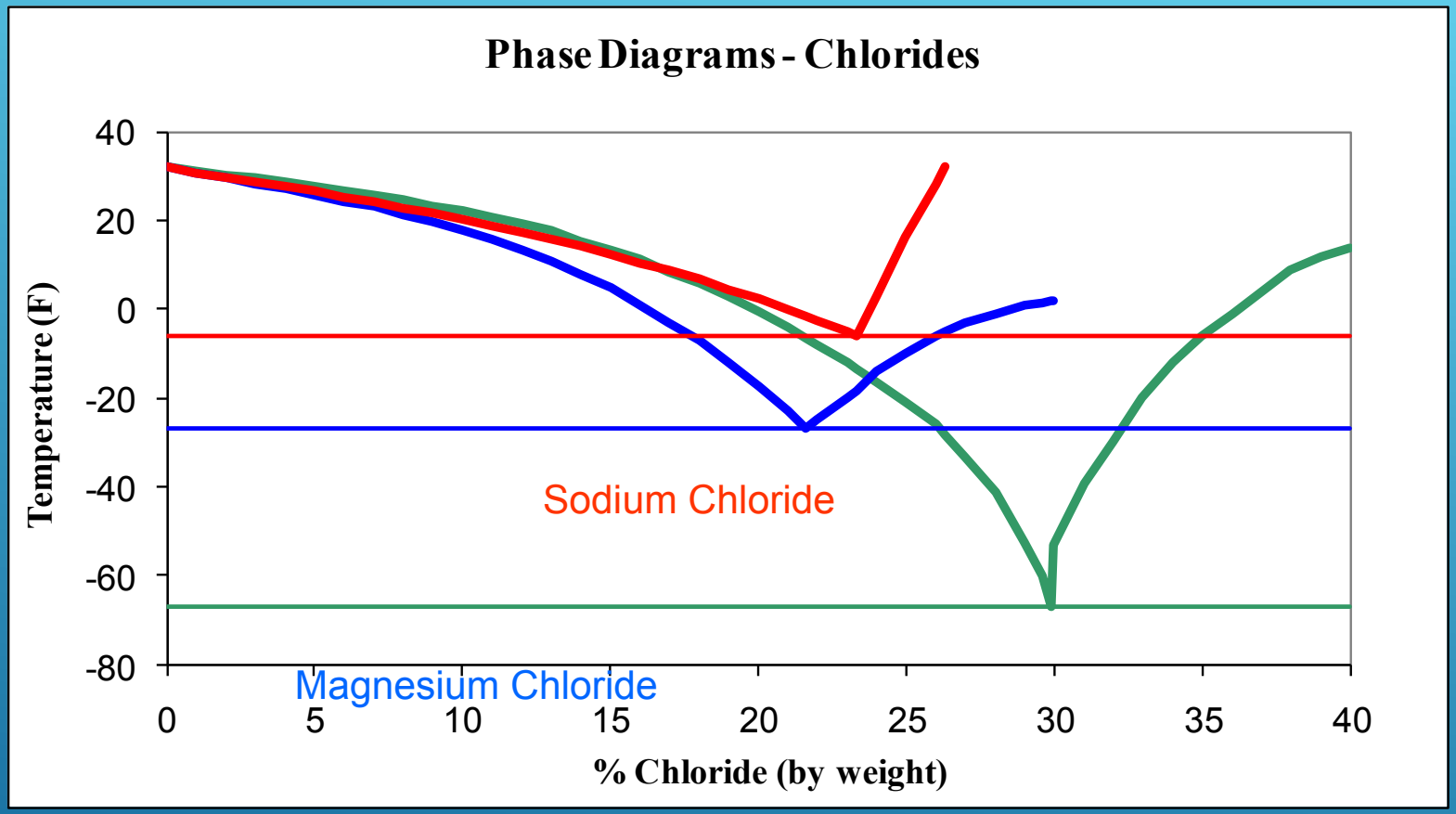
How Long? Depends On:

- Pavement Temperature
- Cycle Time

Amount

- Storm Type & Amount Of Precipitation
- Amount Of Material Used

ICE CONTROL CHEMICALS

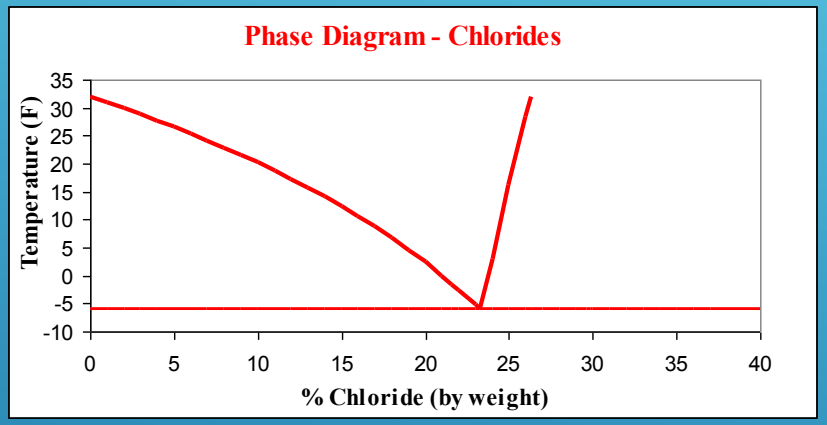


Calcium Chloride

THOUGHTS ON TEMPERATURE

When We Are Using Chemicals, **We Are Only Concerned With The Pavement Temperature!**

The **Eutectic Temperature** (The Low Point Of The V) Is **Not** The Lowest Effective Working Temperature Of The Chemical



SOLIDS OR LIQUIDS?

- It is all liquid when it is working!
- Each have benefits, each have drawbacks, ideally have both
- Having both is not a luxury – it is getting the right tools in your tool box

You are already using liquids

SOLID MATERIALS

- Best practice – pre-wet materials or use a treated salt
- Almost all solids are sodium chloride
- Snow pack and freezing rain really need solids
- Will take longer to dilute than liquids, so good if you have long route times

LIQUIDS

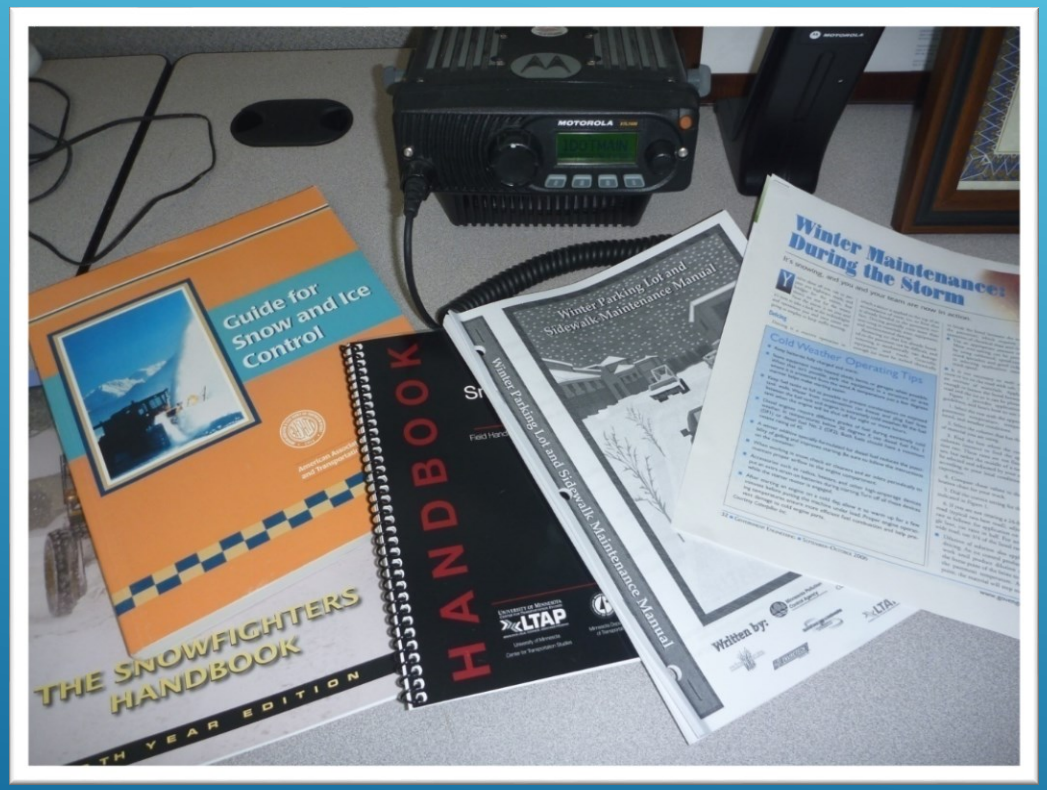
- React quickly, dilute quickly
- Excellent for pre-treatments, especially for frost management
- Be very careful using on snow pack or ice
- Appropriate equipment selection allows for easy liquid pre-treatment and solid in-storm application
- Blending can allow enormous versatility

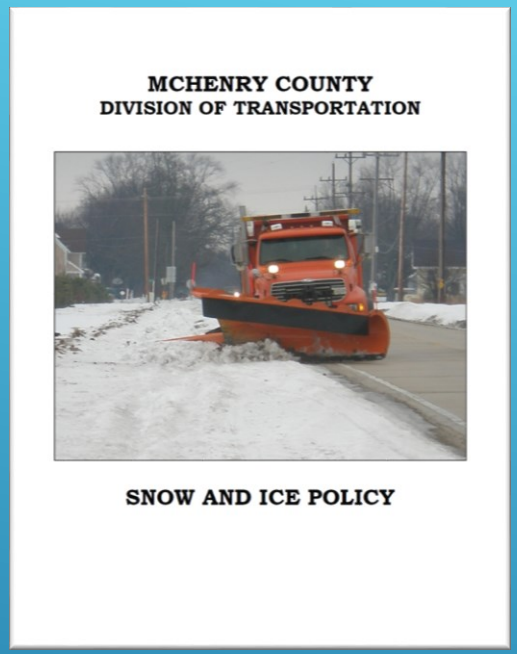
Before Winter

KEY PRE-SEASON ACTIVITIES

- Employee training
- Get equipment ready early
- Repair potential street problems
- “Dry-runs” of routes
- Notify residents of mailbox problems
- Press Releases/Mailings
- Snow Fence/ Passive techniques
- Calibration

Winter Operations Policy and Manual





PRIMARY REASONS FOR A WRITTEN POLICY AND MANUAL:

- Establishes reason and authority.
- Identifies responsibilities and roles.
- Stipulates service the agency will provide.
- Outlines strategies, tactics and resources.

ROUTE OPTIMIZATION

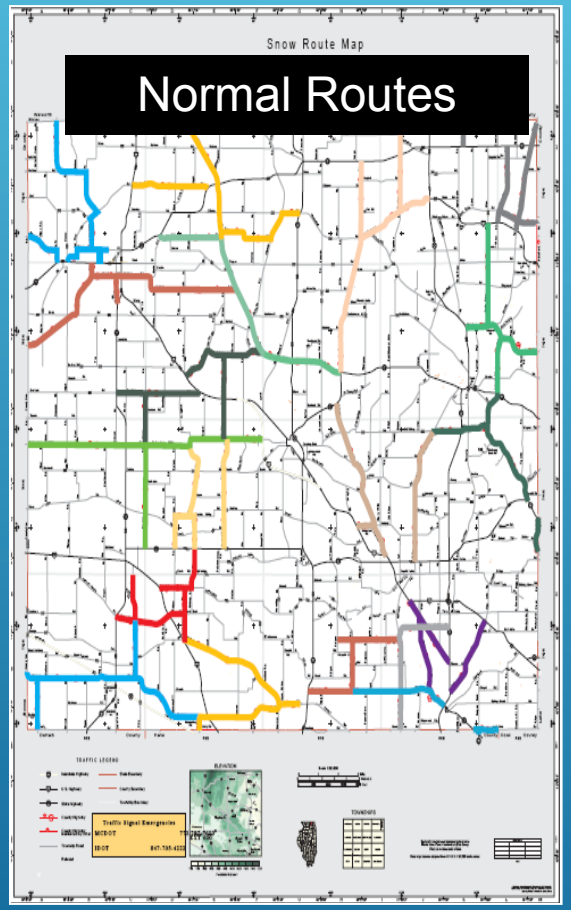
- Maximize efficiency by minimizing duplication
- Review routes annually
  - Length (lane/ miles or km)
  - Cycle –time
  - Priority classification
  - Topography
  - Traffic volumes / patterns throughout day

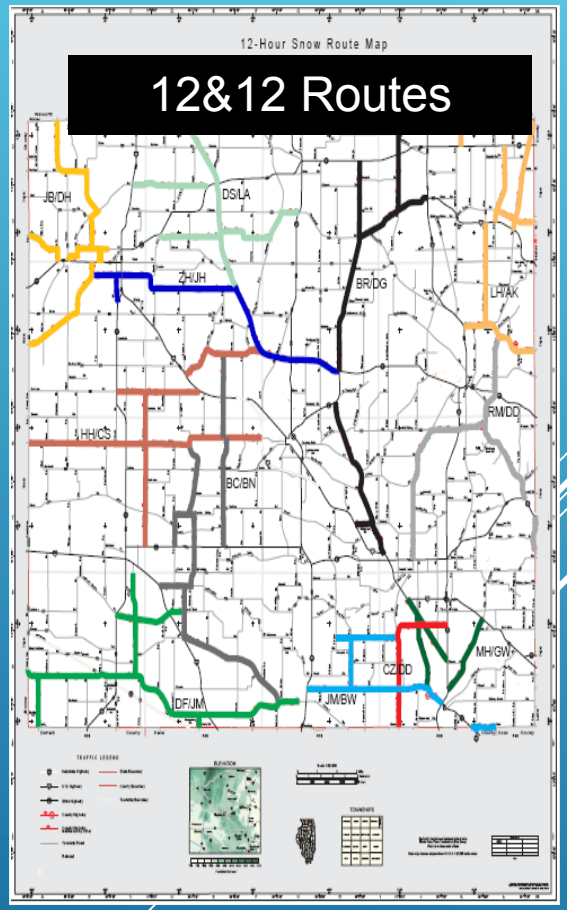
GPS

Telematics

Route Planning

- Ground to Cover
- Time to complete one round
- Distance From Materials
- Event Duration
- CDL and Labor Laws
- Maps for Operators

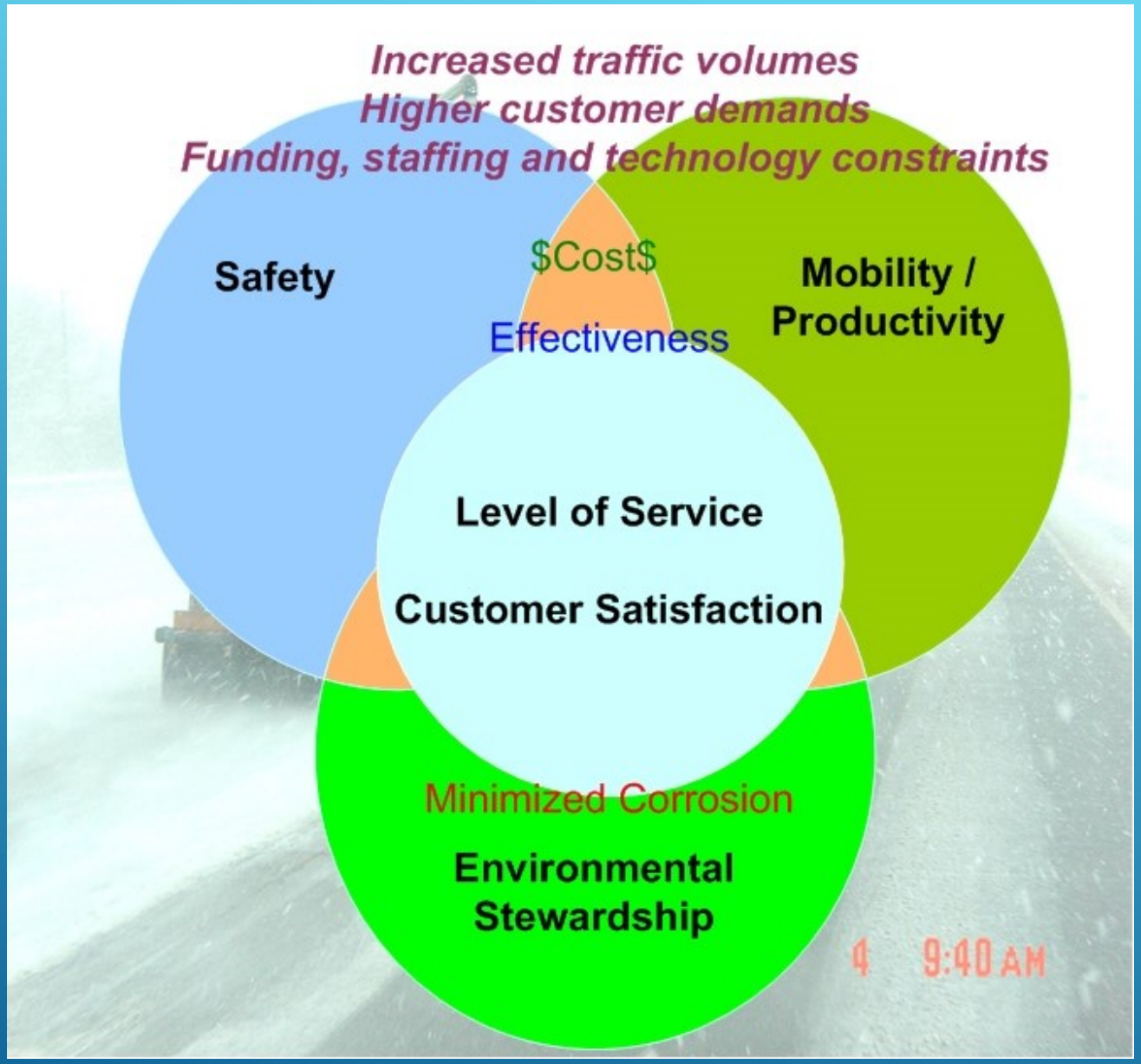




LEVEL OF SERVICE

"Desired, usually achievable condition of pavement surface at different times during and after typical winter events."

- Varies according to priority classification
- Dependent upon available resources
- Core of winter operations planning
- Be descriptive; illustrations helpful


Increased traffic volumes
Higher customer demands
Funding, staffing and technology constraints
Safety
$Cost$
Mobility / Productivity
Effectiveness
Level of Service
Customer Satisfaction
Minimized Corrosion
Environmental Stewardship
4 9:40 AM

HOW CLEAN IS CLEAN ENOUGH?

PARKING LOTS BEFORE THE WINTER

- Develop a plan
- Outline the areas the customer wants cleared including entrances
- Discuss when the lot needs to be cleared (evening or daytime)
- Identify all specialized surfaces: pervious asphalt, concrete and pavement
- Identify areas where snow can be stored on-site

Parking Lot Condition Goals

Snow Removal

- To maximize the operation while protecting against hazardous conditions.
- Based on your unique needs such as site location, climate, and budget, your parking lot can be plowed per snowfall occurrence or seasonally (based on an average yearly snowfall depth, pre-determined for that region).
- In climates where snowfall is not as prevalent, it may be necessary to negotiate a contract for ice events only.

Tips

- Apply deicer before predicted snowfall occurrences to entrances and exits first and then to drive lanes and aisles.
- Apply ice-melting compounds like potassium chloride, calcium chloride, or rock salt early and often during snow and ice storms (grit and sand may also be used to increase traction and reduce the amount of de-icing chemical required).
- Remove snow early if a large amount is predicted. If allowed to accumulate, snow becomes heavier and more time consuming to plow.
- Plow your lot vertically with a rubber-edged plow blade. This practice helps reduce the overall time it takes to plow and minimizes damage to the surface, bumper blocks, and other structures.
- Snow should be moved away from the lot toward the site perimeter or, ideally, placed in a parking stall that is directly adjacent to a drainage inlet.

COMMUNICATION / CUSTOMERS

- Parking Regulations & Lot Locations
- Snow Emergency Routes
- Snow Removal Procedures (Loading and Hauling)
- Abandoned Vehicles
- Discourage Driving During Events
- Damage Caused by Plows

TRAINING

Everyone in the Organization is Trained on Your Policy

CONTRACTS

TYPES OF CONTRACTS

- SEASONAL
- PER OCCURRENCE
- HOURLY
- Variations of all the above

PER OCCURRENCE/SEASONAL SNOW PROPOSAL

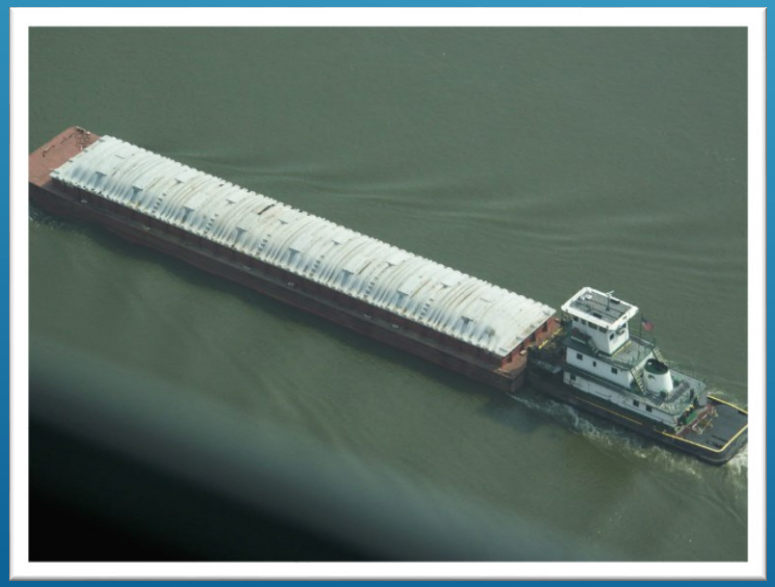
- Effective Date & Length of Contract
- Scope of Services
  - Triggers i.e. Zero Tolerance 1” 2” plus
  - Access to premises
  - Location of services
  - Removal of snow
    - Anti/Ice Before Storm
    - 1" and under treat chemically
    - 1" and over plow and treat chemically
    - Chemicals (type)
    - Icy conditions
    - Hours of operations
    - Obstructions
    - Extreme Conditions (Blizzard Contingency)
    - Excavation Services (location of dump site)

PER OCCURRENCE/SEASONAL SNOW PROPOSAL

- Turf Repair
- Property Damage
- Limitation of Liability
  - Pavement, curbs, trees, & shrubs
- Indemnification
- Owner Obligation
  - Access to premises
  - Incidents on premises
  - Terms & Conditions

MATERIALS

Salt is heavy and moves cheapest by water



MATERIAL STORAGE

SALT

HANDLING MATERIALS

- Safe handling means:
  - **Read the labels**
  - **Review SDS (safety data sheet)**
  - **Wear proper personal protective equipment**
  - **Follow manufacturer's directions**

Use Common Sense!

LIQUID STORAGE

Secondary Containment

EPA: Tank Systems

The EPA specifies under 40 CFR part 264.193(b) that secondary containment systems are required to prevent any migration of wastes to soil, ground water, or surface water during the use of the tank system.

EPA regional offices can refer you to state agencies that can explain state codes. Another source for secondary containment requirements is your local fire marshal.

WHY STORE SALT PROPERLY?

- Prevent formation of lumpy salt that is difficult to handle with loaders and to move through spreaders,
- Eliminate the possibility of contaminating streams and wells with salt runoff,
- Eliminate salt loss through dissolving and runoff.

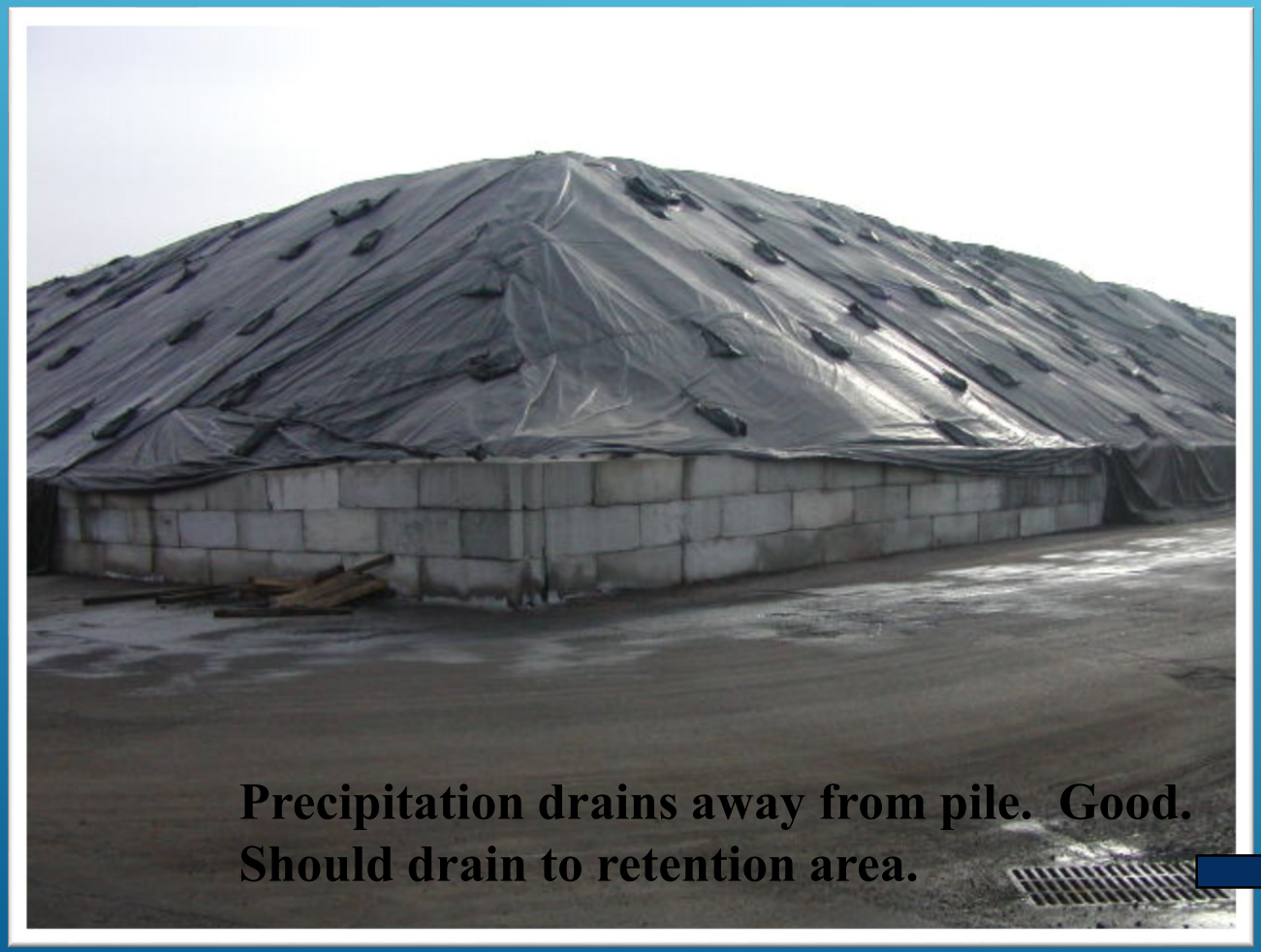
Salt Delivery – Chunks of salt due to bad storage

Good Salt Storage

- Inside storage
- Sufficient capacity
- Outside piles covered
- Impermeable pads
- Good housekeeping

Outside Storage Piles

Open on corner = Saturated Heavy Salt For You



Looks like impermeable asphalt. Good

SITE SELECTION

- **S**afety
  - Good visibility for operators
- **A**ccessibility
  - Easy access for equipment and trucks
- **L**egality
  - Zoning and discharge permits
- **T**idiness
  - Good housekeeping
- **E**conomy (location, location, location)
  - Avoid long hauls
- **D**rainage
  - Away from the pile

Not So Good Coverage On This End

Looks like an impermeable underneath stockpile.

IMPROPER STORAGE

Don't follow these examples.

INSIDE STORAGE

Village of Spring Grove

McHenry County DOT

Village of Algonquin

City of Crystal Lake

Covered, impermeable surface,

so water drains away

Alternative: Consider Regional Storage

- Stores surplus materials for multiple entities
- Utilize joint bidding for salt for lower pricing/delivery fees
- Increased storage capacity would protect from dramatic swings in salt prices due to unforeseeable and extreme climatic events
- Creates efficiency in operations

CONVEYORS

Pit Style: Above or Below Ground

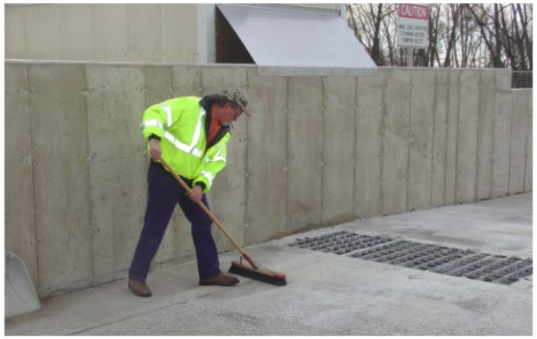
Fluff Salt And Fill Dome Evenly

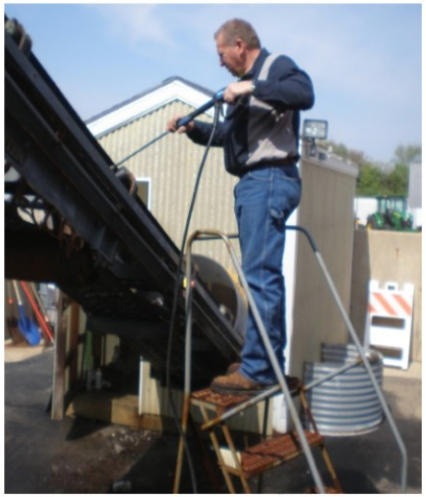
FILLING OPERATIONS

Filling and working inside your domes or barns with equipment should be done as safely as possible.

GOOD HOUSEKEEPING

Be Diligent





CHECK YOUR STORAGE FACILITIES ANNUALLY !

DON’T DO THIS!!!

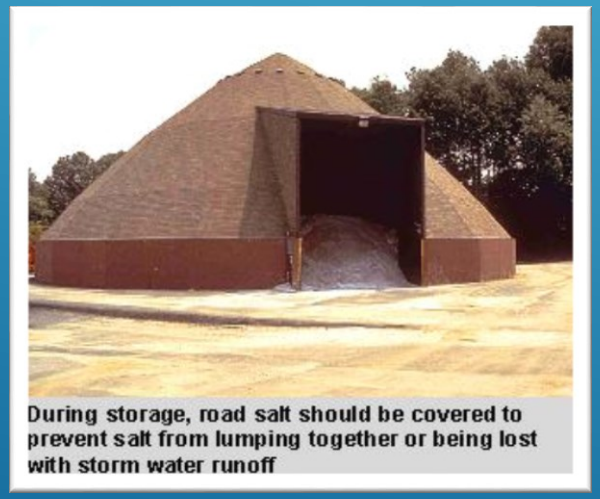
- Storage areas are #1 risk for ground water contamination
- If your pile contaminates the ground water you will be held responsible
- Snow piles should be placed downhill of salt piles.

INDUSTRY NEEDS TO CHANGE

Summer in Chicago

Even the Great Lakes aren't available for shipping all through the winter.

PRIVATE SIDE
BEST PRACTICES FOR SALT STORAGE



During storage, road salt should be covered to prevent salt from lumping together or being lost with storm water runoff

- Indoors if possible
- Domes
- Hoop Huts
- Blocks with cover

RIGHT HERE IN MCHENRY COUNTY!

Not Good

GETTING READY FOR WINTER

- Snow fences reduce the need for additional road salting
- Blowing snow is a big cause of ice on roads, because it melts onto surfaces that have been cleared, stealing the solar heat surfaces may have absorbed during the day
- Road surfaces protected by snow fences routinely stay about 15 degrees warmer than unprotected roads

SNOW FENCE WHY??

LIVING SNOW FENCE

Corn needs to be planted parallel to the road to serve as a fence. A typical corn row snow fence is 1000 feet long and 16 rows wide covering an average of 1.0 acre. The fence is set about 140 feet from the road right-of-way.

Here is an example of how payments will be calculated.

1000 feet of 16 rows of corn (30 inch row spacing) is about 1 acre in total area. Using the base price of corn of $4.00/bu. and an average yield of 175 bu./acre, an acre of corn would be worth $700.00. Now add a $1.50 per bushel premium as an incentive for the farmer, that same acre of corn is now worth $962.50. (a 27% increase) After March 15th the farmer is allowed to harvest any remaining corn for themselves which could yield additional which translates to additional income for the farmer.

How Much Does A Farmer Get Paid?

Payment is calculated by the higher of the per bushel price set by the Illinois Farm Bureau (www.ilfb.org) or the Commodity Credit Corporation through the Farm Service Agency which is a division of the U.S. Department of Agriculture (www.usda.gov) at the time of entering into the contract with the County. An example would be:

1000 feet of 16 rows of corn (30 inch row spacing) = ~ 1 acres in total area.

At $5.00 per bushel and an average yield of 175 bu./acre, one acre of corn would be worth $875*.

A 10% premium (or in this case 50 cents per bushel) as an incentive for the farmer would be added.

Grand Total per acre: $962.50*.

If desired, corn may be handpicked in the fall. After March 15, the farmer is allowed to harvest any remaining corn for themselves which could yield an additional 50 to 60 bushels.

In Cooperation With:

McHenry County Farm Bureau

McHenry-Lake County SWCD

Division of Transportation

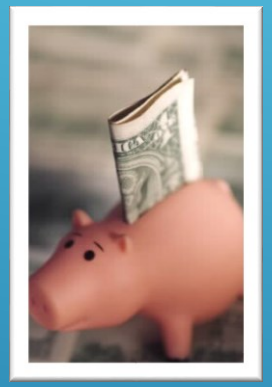
MCHENRY COUNTY DIVISION OF TRANSPORTATION

For more information, contact:
Ed Markison, Assistant Maintenance Superintendent
16111 Nelson Road
Woodstock, IL 60098
ECMarkison@co.mchenry.il.us
815-334-4973

MCHENRY COUNTY LIVING SNOW FENCE PROGRAM

McHenry County Division of Transportation

Living Snow Fence



CALIBRATION

Matt

CALIBRATION

It’s easy to do!
Think “Pounds per minute”

YOU WILL NEED

- Tarp
- Scale
- Bucket
- Stop watch
- Chalk/Marker
- Calculator
- Chart

CALIBRATION CHART (US)

Agency:

Location:

Truck No: Spreader No:

Date: By:

Gate Opening (inches)

(Hopper Type Spreaders)

DISCHARGE RATE (pounds discharged per mile)

	A	B	C	TRAVEL SPEED AND COMPUTATION MULTIPLIER ( )								
Control Setting	Shaft RPM (Loaded)	Discharge per Revolution (pounds)	Discharge per Minute (lb) (A x B)	5 mph (x 12.00)	10 mph (x 6.00)	15 mph (x 4.00)	20 mph (x 3.00)	25 mph (x 2.40)	30 mph (x 2.00)	35 mph (x 1.71)	40 mph (x 1.50)	45 mph (x 1.33)
1			-	-	-	-	-	-	-	-	-	-
2			-	-	-	-	-	-	-	-	-	-
3			-	-	-	-	-	-	-	-	-	-
4			-	-	-	-	-	-	-	-	-	-
5			-	-	-	-	-	-	-	-	-	-
6			-	-	-	-	-	-	-	-	-	-
7			-	-	-	-	-	-	-	-	-	-
8			-	-	-	-	-	-	-	-	-	-
9			-	-	-	-	-	-	-	-	-	-
10			-	-	-	-	-	-	-	-	-	-
11			-	-	-	-	-	-	-	-	-	-

THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) **ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED**

Public Pg.A-5

Private Pg.34

CALIBRATION PROCESS

With the truck off, remove the spinner

Warm up the hydraulics by running the auger

CALIBRATION PROCESS

Load the truck with material

Charge the Auger

CALIBRATION PROCESS

Mark the Auger

CALIBRATION CHART (US)

Agency:	MCDOT		
Location:	Woodstock		
Truck No:	21	Spreader No:	35
Date:	10/1/14	By:	Grant

Gate Opening _____ (inches)
(Hopper Type Spreaders)

DISCHARGE RATE (pounds discharged per mile)

	A	B	C	TRAVEL SPEED AND COMPUTATION MULTIPLIER ( )								
Control Setting	Shaft RPM (Loaded)	Discharge per Revolution (pounds)	Discharge per Minute (lb) (A x B)	5 mph (x 12.00)	10 mph (x 6.00)	15 mph (x 4.00)	20 mph (x 3.00)	25 mph (x 2.40)	30 mph (x 2.00)	35 mph (x 1.71)	40 mph (x 1.50)	45 mph (x 1.33)
1			-	-	-	-	-	-	-	-	-	-
2			-	-	-	-	-	-	-	-	-	-
3			-	-	-	-	-	-	-	-	-	-
4			-	-	-	-	-	-	-	-	-	-
5			-	-	-	-	-	-	-	-	-	-
6			-	-	-	-	-	-	-	-	-	-
7			-	-	-	-	-	-	-	-	-	-
8			-	-	-	-	-	-	-	-	-	-
9			-	-	-	-	-	-	-	-	-	-
10			-	-	-	-	-	-	-	-	-	-
11			-	-	-	-	-	-	-	-	-	-

THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) **ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED**

Begin Documentation

CALIBRATION PROCESS

Count and record the revolutions per minute at each setting

CALIBRATION CHART (US)

Agency:	MCDOT		
Location:	Woodstock		
Truck No:	21	Spreader No:	35
Date:	10/1/14	By:	Grant

Gate Opening _____ (inches)
(Hopper Type Spreaders)

DISCHARGE RATE (pounds discharged per mile)

	A	B	C	TRAVEL SPEED AND COMPUTATION MULTIPLIER ( )								
Control Setting	Shaft RPM (Loaded)	Discharge per Revolution (pounds)	Discharge per Minute (lb) (A x B)	5 mph (x 12.00)	10 mph (x 6.00)	15 mph (x 4.00)	20 mph (x 3.00)	25 mph (x 2.40)	30 mph (x 2.00)	35 mph (x 1.71)	40 mph (x 1.50)	45 mph (x 1.33)
1	30		-	-	-	-	-	-	-	-	-	-
2			-	-	-	-	-	-	-	-	-	-
3			-	-	-	-	-	-	-	-	-	-
4			-	-	-	-	-	-	-	-	-	-
5			-	-	-	-	-	-	-	-	-	-
6			-	-	-	-	-	-	-	-	-	-
7			-	-	-	-	-	-	-	-	-	-
8			-	-	-	-	-	-	-	-	-	-
9			-	-	-	-	-	-	-	-	-	-
10			-	-	-	-	-	-	-	-	-	-
11			-	-	-	-	-	-	-	-	-	-

THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) **ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED**

CALIBRATION PROCESS

Collect and weigh the salt for one revolution

(Take the average of multiple revolutions for consistency)

CALIBRATION CHART (US)

Agency:	MCDOT		
Location:	Woodstock		
Truck No:	21	Spreader No:	35
Date:	10/1/14	By:	Grant

Gate Opening _____ (inches)
(Hopper Type Spreaders)

	A	B	C	DISCHARGE RATE (pounds discharged per mile)								
				TRAVEL SPEED AND COMPUTATION MULTIPLIER ( )								
Control Setting	Shaft RPM (Loaded)	Discharge per Revolution (pounds)	Discharge per Minute (lb) (A x B)	5 mph (x 12.00)	10 mph (x 6.00)	15 mph (x 4.00)	20 mph (x 3.00)	25 mph (x 2.40)	30 mph (x 2.00)	35 mph (x 1.71)	40 mph (x 1.50)	45 mph (x 1.33)
1			-	-	-	-	-	-	-	-	-	-
2	30	7	-	-	-	-	-	-	-	-	-	-
3			-	-	-	-	-	-	-	-	-	-
4			-	-	-	-	-	-	-	-	-	-
5			-	-	-	-	-	-	-	-	-	-
6			-	-	-	-	-	-	-	-	-	-
7			-	-	-	-	-	-	-	-	-	-
8			-	-	-	-	-	-	-	-	-	-
9			-	-	-	-	-	-	-	-	-	-
10			-	-	-	-	-	-	-	-	-	-
11			-	-	-	-	-	-	-	-	-	-

THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) **ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED**

SPREADER CALIBRATION PROCEDURE

Calibration is simply calculating the pounds per mile discharged for each control setting at various travel speeds by first counting the number of auger or conveyor shaft revolutions per minute, measuring the weight of salt discharged in one revolution, then multiply the two to obtain discharge per minute, and finally multiplying the discharge per minute by the time it takes to travel 1 mile. Most spreaders have multiple gate openings; so you must calibrate for specific gate openings.

Equipment needed:

CALIBRATION PROCESS

Calculate Pound Per Minute

RPM
X
Weight

At setting 2: 30rpm x 7 lbs = 210lbs per min

CALIBRATION CHART (US)

Agency:	MCDOT		
Location:	Woodstock		
Truck No:	21	Spreader No:	35
Date:	10/1/14	By:	Grant

Gate Opening _____ (inches)
(Hopper Type Spreaders)

DISCHARGE RATE (pounds discharged per mile)

	A	B	C	TRAVEL SPEED AND COMPUTATION MULTIPLIER ( )								
Control Setting	Shaft RPM (Loaded)	Discharge per Revolution (pounds)	Discharge per Minute (lb) (A x B)	5 mph (x 12.00)	10 mph (x 6.00)	15 mph (x 4.00)	20 mph (x 3.00)	25 mph (x 2.40)	30 mph (x 2.00)	35 mph (x 1.71)	40 mph (x 1.50)	45 mph (x 1.33)
1			-	-	-	-	-	-	-	-	-	-
2	30	7	210	-	-	-	630	-	-	-	-	-
3			-	-	-	-	-	-	-	-	-	-
4			-	-	-	-	-	-	-	-	-	-
5			-	-	-	-	-	-	-	-	-	-
6			-	-	-	-	-	-	-	-	-	-
7			-	-	-	-	-	-	-	-	-	-
8			-	-	-	-	-	-	-	-	-	-
9			-	-	-	-	-	-	-	-	-	-
10			-	-	-	-	-	-	-	-	-	-
11			-	-	-	-	-	-	-	-	-	-

Exercise

Using the chart determine the Discharge Rate (Pounds per Lane Mile)
at Control Setting 2
at 20mph

THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) **ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED**

SPREADER CALIBRATION PROCEDURE

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Equipment needed:

CALIBRATION CHART (US)

Agency:	MCDOT		
Location:	Woodstock		
Truck No:	21	Spreader No:	35
Date:	10/1/14	By:	Grant

Gate Opening _____ (inches)
(Hopper Type Spreaders)

	A	B	C	DISCHARGE RATE (pounds discharged per mile)								
				TRAVEL SPEED AND COMPUTATION MULTIPLIER ( )								
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1			-	-	-	-	-	-	-	-	-	-
2	30	7	210	2520	1260	840	630	504	420	359	315	279
3			-	-	-	-	-	-	-	-	-	-
4			-	-	-	-	-	-	-	-	-	-
5			-	-	-	-	-	-	-	-	-	-
6			-	-	-	-	-	-	-	-	-	-
7			-	-	-	-	-	-	-	-	-	-
8			-	-	-	-	-	-	-	-	-	-
9			-	-	-	-	-	-	-	-	-	-
10			-	-	-	-	-	-	-	-	-	-
11			-	-	-	-	-	-	-	-	-	-

Is this spreader control system manual or automatic?
How can you tell?

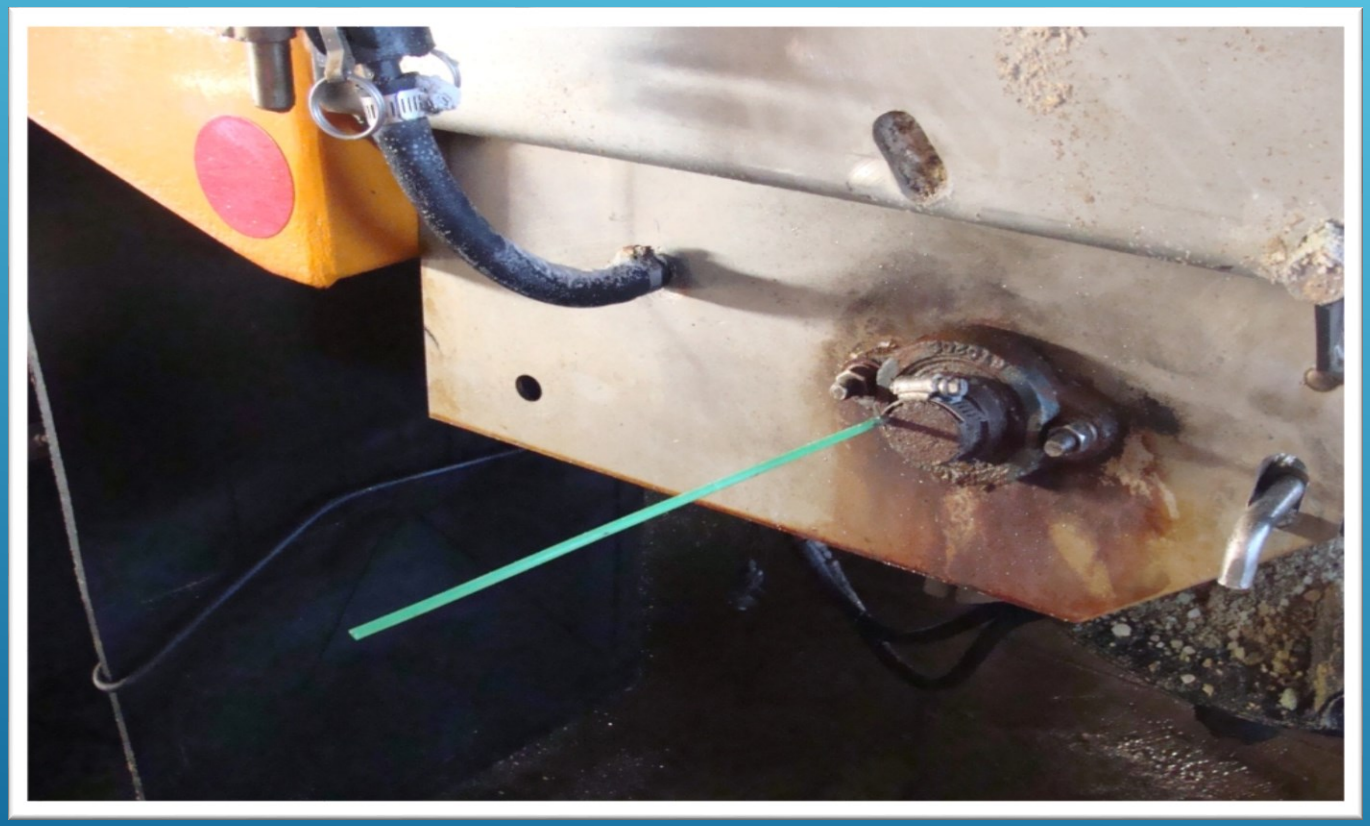
THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) **ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED**

SPREADER CALIBRATION PROCEDURE

Calibration is simply calculating the pounds per mile discharged for each control setting at various travel speeds by first counting the number of auger or conveyor shaft revolutions per minute, measuring the weight of salt discharged in one revolution, then multiply the two to obtain discharge per minute, and finally multiplying the discharge per minute by the time it takes to travel 1 mile. Most spreaders have multiple gate openings; so you must calibrate for specific gate openings.

Equipment needed:

A LITTLE RATE REFERENCE TRICK FOR OPERATORS



MANUAL VS. GROUNDSPEED CONTROLS

NOW THAT WE'RE PREPARED FOR WINTER TO START, WHAT TYPES OF CONDITIONS DO WE FACE HERE IN ILLINOIS?

DO YOU KNOW WHAT TO DO

IN EACH OF THESE CONDITIONS?

ICE STORMS

FREEZING RAIN

VAISALA

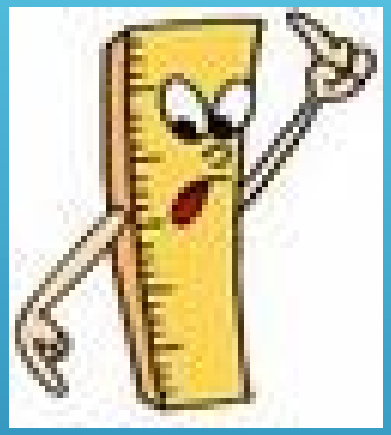
Observations for Miller Road Bridge
10-Jan-2014 02:00 PM → 10-Jan-2014 10:00 PM

Generation date 24-Sep-2014 10:28 AM
Time zone: America/Chicago

Timestamp	Surface Temperature (°F) WB DEPARTURE PL	Surface State WB BRDG DECK PL	Surface State WB DEPARTURE PL	Air Temperature (°F) Atmospheric site	Dew Point Temperature (°F) Atmospheric site	Level of grip Atmospheric site	Level of grip WB BRDG DECK PL	Relative Humidity (%) Atmospheric site	Rain State Atmospheric site	Rain Intensity (in/h) Atmospheric site	Wind Speed (mph) Atmospheric site	Wind Direction Atmospheric site
10-Jan-2014 02:31 PM	31.6	wet	wet	34	33.1	0.79	0.78	97	light	0	6	SE
10-Jan-2014 03:03 PM	31.8	wet	wet	34.3	33.4	0.78	0.7	97	light	0.04	5.8	SE
10-Jan-2014 03:32 PM	31.8	wet	wet	34.5	33.8	0.79	0.76	97	light	0.02	5.1	SE
10-Jan-2014 04:29 PM	32.7	wet	wet	35.2	34.7	0.77	0.64	98	l.snow	0.03	3.4	E
10-Jan-2014 05:01 PM	32.4	wet	wet	35.2	34.7	0.78	0.72	98	light	0.03	5.4	SE
10-Jan-2014 05:34 PM	32.5	wet	wet	35.6	35.2	0.77	0.66	98	light	0.07	6.5	SE
10-Jan-2014 06:06 PM	34.2	wet	wet	37.2	36.9	0.78	0.69	98	light	0.02	8.9	S
10-Jan-2014 06:39 PM	34	wet	wet	38.3	37.8	0.77	0.64	98	light	0.03	9.6	S
10-Jan-2014 07:05 PM	34.9	wet	wet	39.2	38.8	0.78	0.67	98	light	0.03	13	SE
10-Jan-2014 07:30 PM	34.5	wet	wet	39.2	38.7	0.78	0.68	98	light	0.02	10.5	S
10-Jan-2014 07:56 PM	34.2	wet	wet	39.2	38.5	0.79	0.68	97	light	0	10.7	S
10-Jan-2014 08:30 PM	33.1	wet	wet	39	38.3	0.79	0.77	96	medium	0.02	10.5	S
10-Jan-2014 09:03 PM	33.3	wet	wet	38.8	37.9	0.78	0.67	97	light	0.02	7.6	S
10-Jan-2014 09:30 PM	34	wet	wet	38.8	38.1	0.77	0.66	97	medium	0.09	6	S

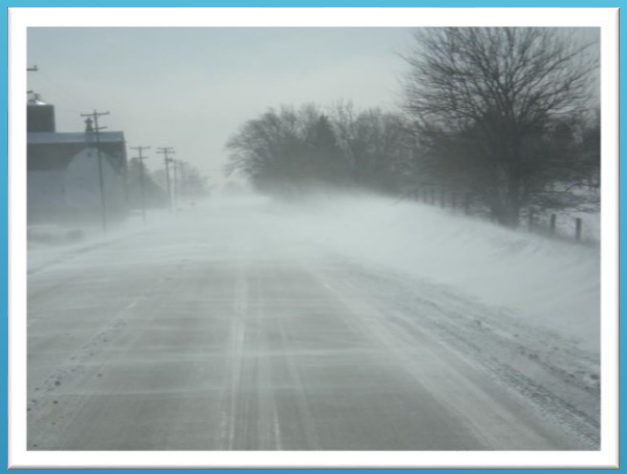
Forecast was for freezing rain to begin at approximately 3:00 p.m. and change to rain. What made this event different was this followed an extreme cold period and because of the depth of the frost, it continued to freeze the rain to the surface of the road after pavement temperatures rose above 32F.

LARGE SNOW FALL AMOUNTS



COLD

BLOWING SNOW



One of our most common problems

DRIFTING

ROAD CLOSED
DO NOT BLOCK
GATE.
ROAD CLOSED
DUE TO
HEAVY DRIFTING

SNOW
ROAD
CLOSED

BLIZZARDS

BEFORE THE STORM

Brine Making, Blending & Anti-icing

Bob

Salt Brine and Liquid Chemicals

New Practices for Future Plowing

FIGHT SLIPPERY ROADS WITH CHEESE BRINE

2015

FOX6 NOW.COM NEWS POLITICS DOSE OF REALITY SPORTS WAKEUP REAL MKE CONTESTS LINKS EVENTS WEATHER 66°

City of Milwaukee won't be using cheese brine on streets this winter, but why?

POSTED 6:15 PM, DECEMBER 2, 2014, BY KATIE DELONG

FACEBOOK TWITTER REDDIT LINKEDIN PINTEREST EMAI

This is an archived article and the information in the article may be outdated. Please look at the time stamp on the story to see when it was last updated.

MILWAUKEE (WITI) — The city of Milwaukee is ready for winter!

On Tuesday, December 2nd, Milwaukee Mayor Tom Barrett and Milwaukee's Department of Public Works officials announced they are done picking up leaves.

Milwaukee Department of Public Works

DPW's trucks have now been outfitted with plows and are ready to carry salt.

One change this year: The city of Milwaukee won't be using cheese brine on streets this winter.

"The city is making own salt brine for use on city streets this year, so we have in essence brought this in-house. No to cheese, yes to salt. The cheese brine was free, but it is now in short supply, plus the cost per gallon to transport the brine got too costly for the amount

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MILWAUKEE NEWS

Milwaukee's latest antidote to icy streets: Cheese brine

Substance would be mixed with traditional rock salt

By Don Walker of the Journal Sentinel

Would you like a little cheese brine to go with your rock salt on the city's roadways this winter?

The city's Department of Public Works will go ahead this winter with a pilot program to determine whether cheese brine — a liquid waste product left over from cheesemaking — can be added to rock salt and applied directly to the street.

There is one downside: The city says cheese brine has a distinctive odor.

A report prepared by the city's Department of Public Works notes that Milwaukee, like most cities, relies on rock salt as its primary de-icer on roads. Rock salt, according to the report, is plentiful, inexpensive and very effective.

But some concerns have been raised that the use of rock salt has a long-term impact on roads and the environment. In the winter of 2008, for instance, nearly 100,000 tons of rock salt was spread on the city's 1,418 miles of roads.

NewsWatch

Milwaukee man accused of executing man over $90 debt 11:31 a.m.

Ikea recalls 29 million dressers after 6 kids killed Updated: 11:12 a.m.

Convict in fatal park shooting will have chance at parole 11:08 a.m.

UW-Madison led study finds infection with Zika prevents reinfection 11:03 a.m.

Dodge County man charged with homicide in woman's overdose 10:55 a.m.

Wisconsin's appeal on abortion turned away by Supreme Court Updated: 10:47 a.m.

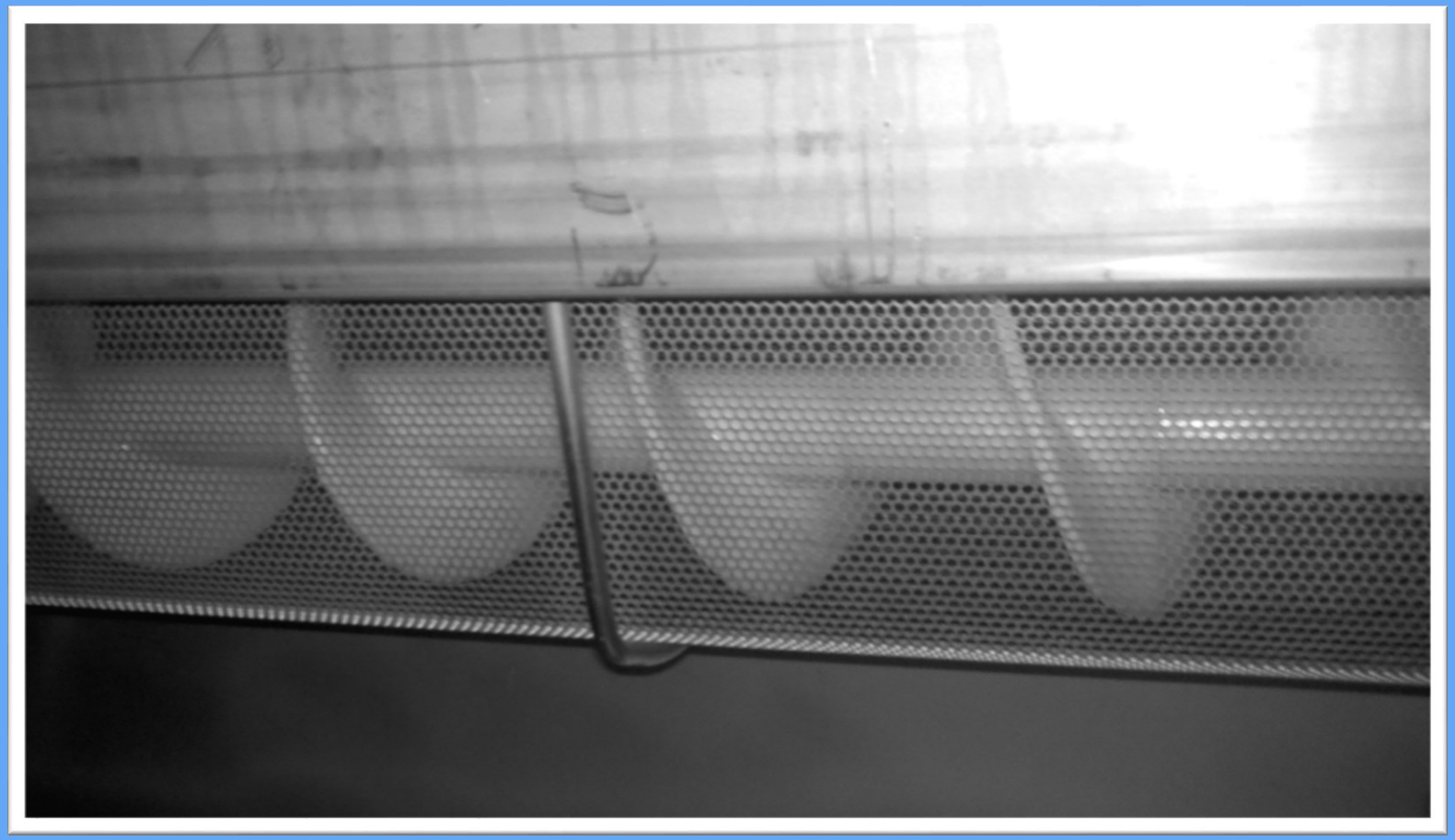
Ashent moving forward with divestiture from Johnson Controls 10:37 a.m.

Advertisement

"The city is making own salt brine for use on city streets this year, so we have in essence brought this in-house. No to cheese, yes to salt. The cheese brine was free, but it is now in short supply, plus the cost per gallon to transport the brine got too costly for the amount the city would need," Mayor Barrett said.

BRINE MAKING IS EASY AND COST EFFECTIVE

INSIDE VIEW OF MCDOT BRINE MAKER



Augers Out Deposits

Magic Number in the Brine World

23.3%

THERE ARE MANY DIFFERENT TYPES AND PRICE RANGES

TARTER

TARTER
Working Harder Since 1945

NEWEST BRINE MAKER

WHAT MAKES IT DIFFERENT? THE COFFEE POT METHOD.

- Brine is made from water dissolving the salt in the hopper
- Once it reaches it’s 23.3 percent salinity, it stops
- The brine maker automatically ships it to an on site storage tank.

MCDOT LIQUID STORAGE TANKS

MCDOT BLENDING SYSTEM

THE OPERATOR CONNECTS THE HOSE,

ENTERS HIS TRUCK NUMBER,

ENTERS AN AMOUNT

AND IT FILLS IT PRECISELY ACCORDING TO THE PREDETERMINED FORMULA

MCDOT BLENDING
COMBINING CHEMICALS IN HOUSE

Components

Salt Brine 85%

Organic 10%

Calcium Chloride 5%

MCDOT SUPERMIX COST

2012-2013	.20 Cents per Gallon
2013-2014	.21 Cents per Gallon
2014-2015	.21 Cents per Gallon
2015-2016	.22 Cents per Gallon

VARIOUS BLENDING SYSTEMS

Washington State Facility

Making Liquids Doesn't Have To Be A Multimillion Dollar Project

Anti-Icing, De-Icing What’s the difference?

Matt

Anti-Icing prevents snow from freezing and bonding to a surface.

De-Icing breaks the bond of snow that has already frozen to the surface.

Residual Using MCDOT Supermix Salt Brine Enhanced With CaCl And Ag Carbohydrate

Sugar And Salt Working Together
Sugar Sticks And Salt Melts

WHAT IT DOES

Snow Accumulation

Anti Ice

Pavement

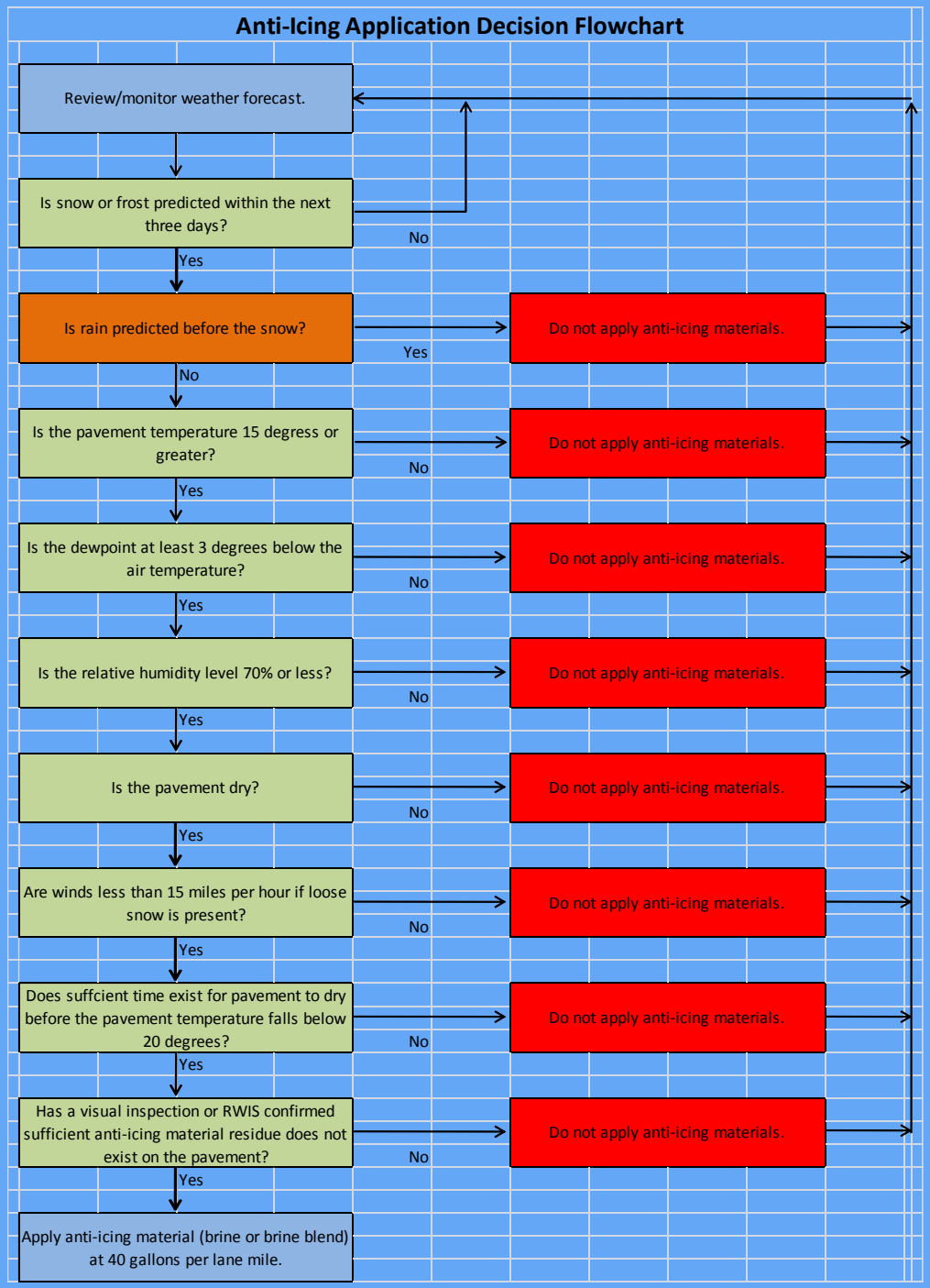
Anti-iced Brine Buffer

Pavement

Benefits

- Proactive measure
- Head start
- Increases public safety
- 1 /4 the material
- 1 /10 the overall cost
- Better for environment

!!!! Conditions must be right for anti-icing !!!!



A copy of this is in your booklet

When To Anti-Ice

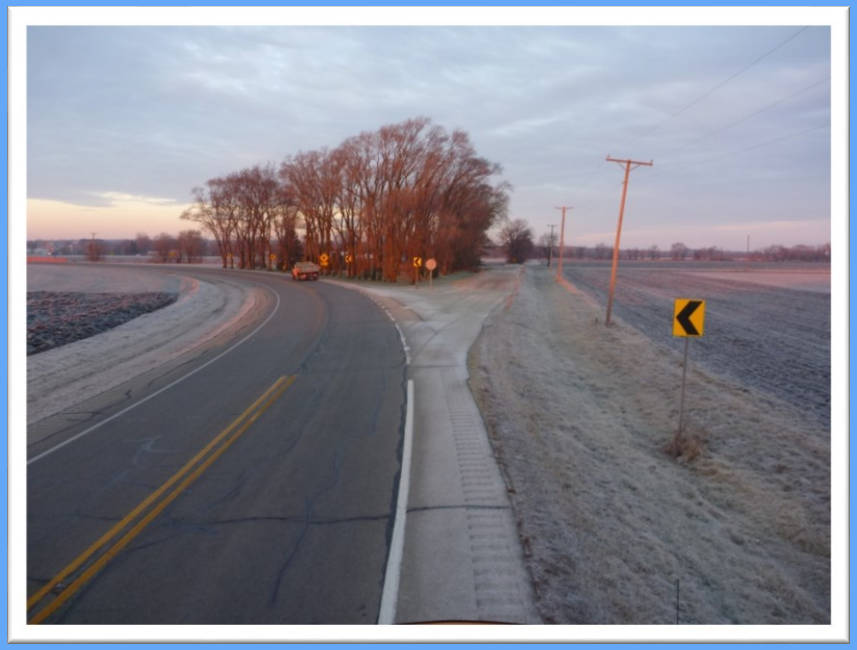
- Scheduled- Bridge decks
- Frost is predicted- Bridge decks, hills, curves, shaded areas
- Snow forecasted- As much as possible
- Weather service treatment recommendation

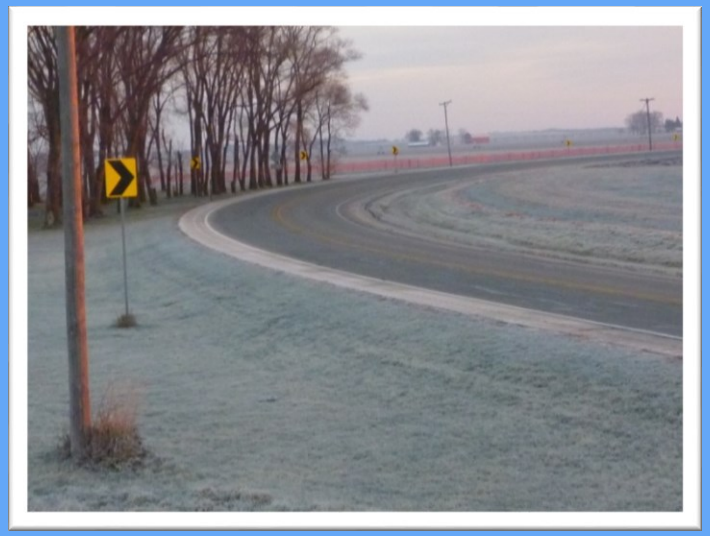
Untreated
Treated

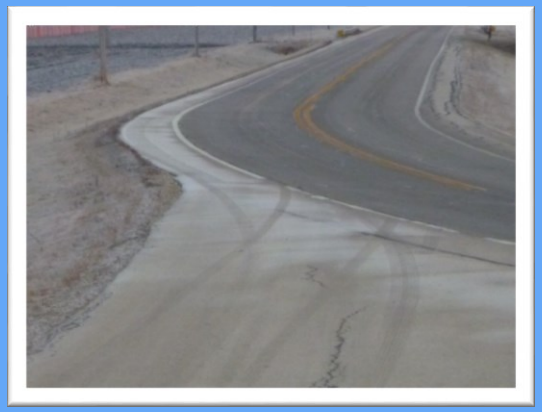
TREATED VS. UNTREATED

Treated roads = Less Work

The roads were anti-iced on Thursday, January 5, before the weekend.







Frost event January 9, 2012

Snow event January 12, 2012, the material still worked after 7 days. Note: These are low volume roads

It Doesn’t Always Work

A COLD STORM, DRY SNOW AND THE ANTI-ICING CAUSED THE SNOW TO STICK.

Not meant to melt all accumulation.
Only a head start
Chemicals will dilute with precipitation.

ANTI-ICING EQUIPMENT

1000 Gal. Tank

1800 Gal

ANTI-ICING EQUIPMENT

Roll-off Truck

STREAMER NOZZLES leave bare pavement between sprayed areas to reduce slipperiness during application

DURING THE STORM

Standard Practices

- Plowing
- Pre-treating/Pre-wetting
- Deicing
- Using Abrasives

Want Your Material To Work?

Get It Wet!

Why Pre-wet?

- Minimizes scatter during application
- Keeps 20 to 30 percent more material on the road
- Jumpstarts brine process
- Sticks sand to snow surface
- Reduces working temperature of salt
- Reduces Environmental impacts
- Saves money

Pre-treating and Pre-wetting

- TREATED SALT
  USES LIQUIDS TO REDUCE SCATTER
  DEPRESSES THE WORKING TEMP AND BEGINS THE BRINE PROCESS

(You can buy pre-treated salt , have it delivered and be ready to go)

LIQUID PRE-TREATING

Is completed prior to Stockpiling.

Salt: 6-10gal / ton or 30 ltrs /ton

Sand: 4-6gal/ton or 16 lltrs/ton

MCHENRY COUNTY DOT PURCHASES PRE-TREATED SALT

SPECIFICATIONS

ENHANCED (TREATED) AASHTO SPECIFICATION M143, SODIUM CHLORIDE TYPE 1, GRADE 1, ENHANCED WITH EITHER COMPASS MINERAL'S "THAWROX" OR CARGILL'S "CLEARLANE" MATERIALS OR APPROVED EQUIVALENT

PLAIN BULK ROCK SALT (UNTREATED) - AASHTO SPECIFICATION M143, SODIUM CHLORIDE TYPE 1, GRADE 1

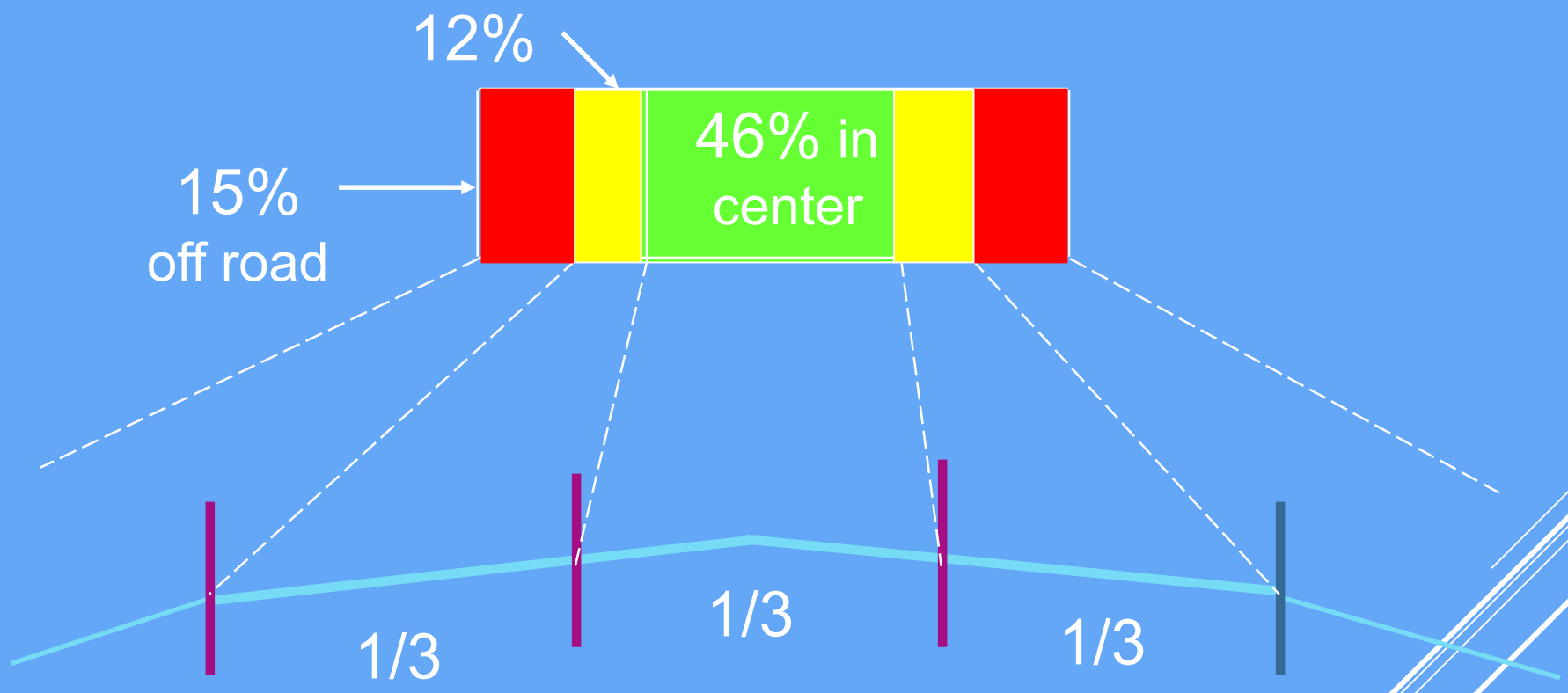
YOU ARE ALREADY USING LIQUIDS

Until It's In Solution

Salt Doesn't Melt Anything

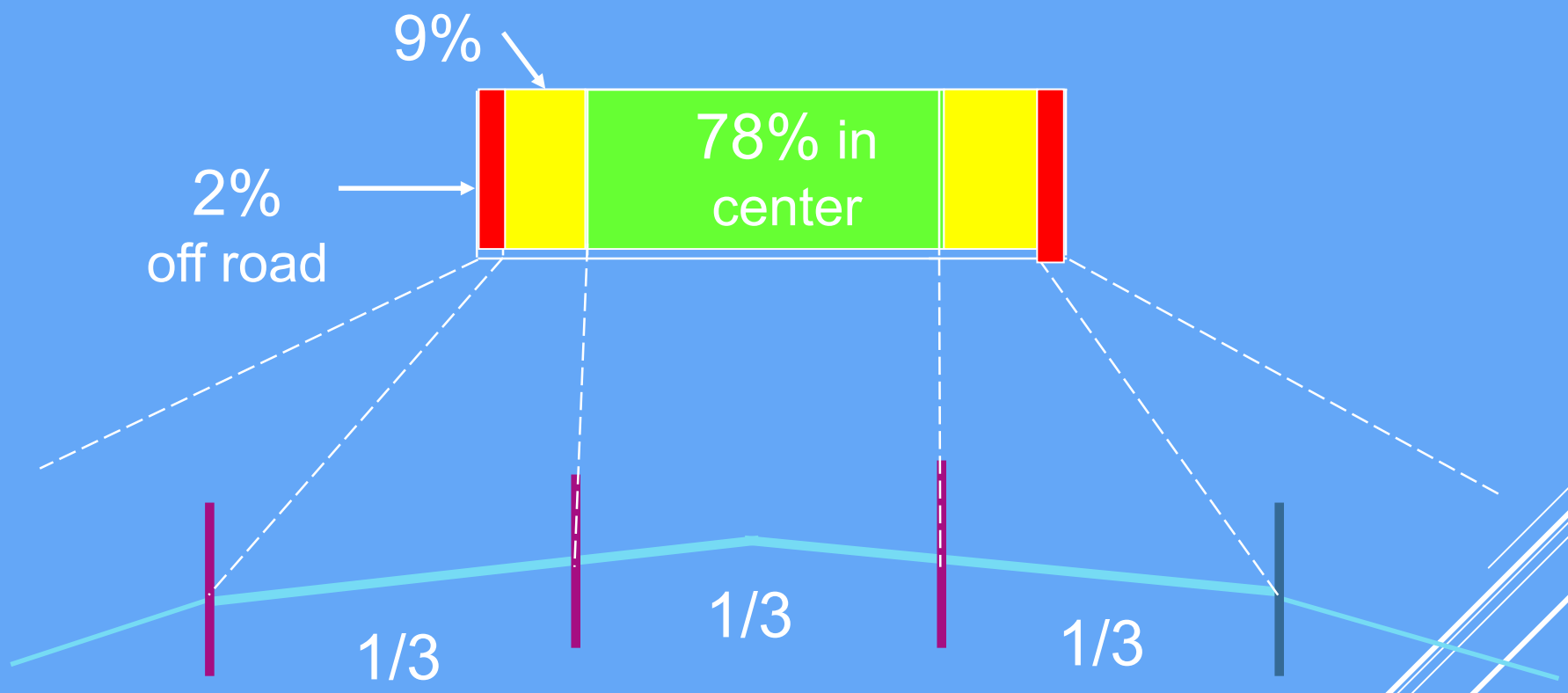
DIFFERENT TYPES OF PRE-WET UNITS

TYPICAL SCATTER PATTERN OF ROAD SALT



100% Salt Spread in Center 1/3 of Road

TYPICAL SCATTER OF PRE-WET ROAD SALT



100% <u>Prewetted</u> Salt Spread in Center 1/3 of Road

26% Salt Saved

What does that mean to you?

If your methods are working without pre-wetting, you can turn your Application rates down **26%.**

SAVING BOTH TIME AND MATERIAL

50lbs less salt =
More than10,000 gal of water protected.

Projected Results

Average potential reduction in salt application rates:

62% for parking lot/sidewalk

36% for roads

Pounds of Ice Melted Per Pound of Salt

Pavement Temp. °F	One Pound of Salt (NaCl) melts	Melt Times
30	46.3 lbs of ice	5 min.
25	14.4 lbs of ice	10 min.
20	8.6 lbs of ice	20 min.
15	6.3 lbs of ice	1 hour
10	4.9 lbs of ice	Dry salt is ineffective and will blow away before it melts anything.
5	4.1 lbs of ice	
0	3.7 lbs of ice	
-6	3.2 lbs of ice	

It is not cost-efficient to apply salt (sodium chloride) at pavement temperatures less than 15° F.

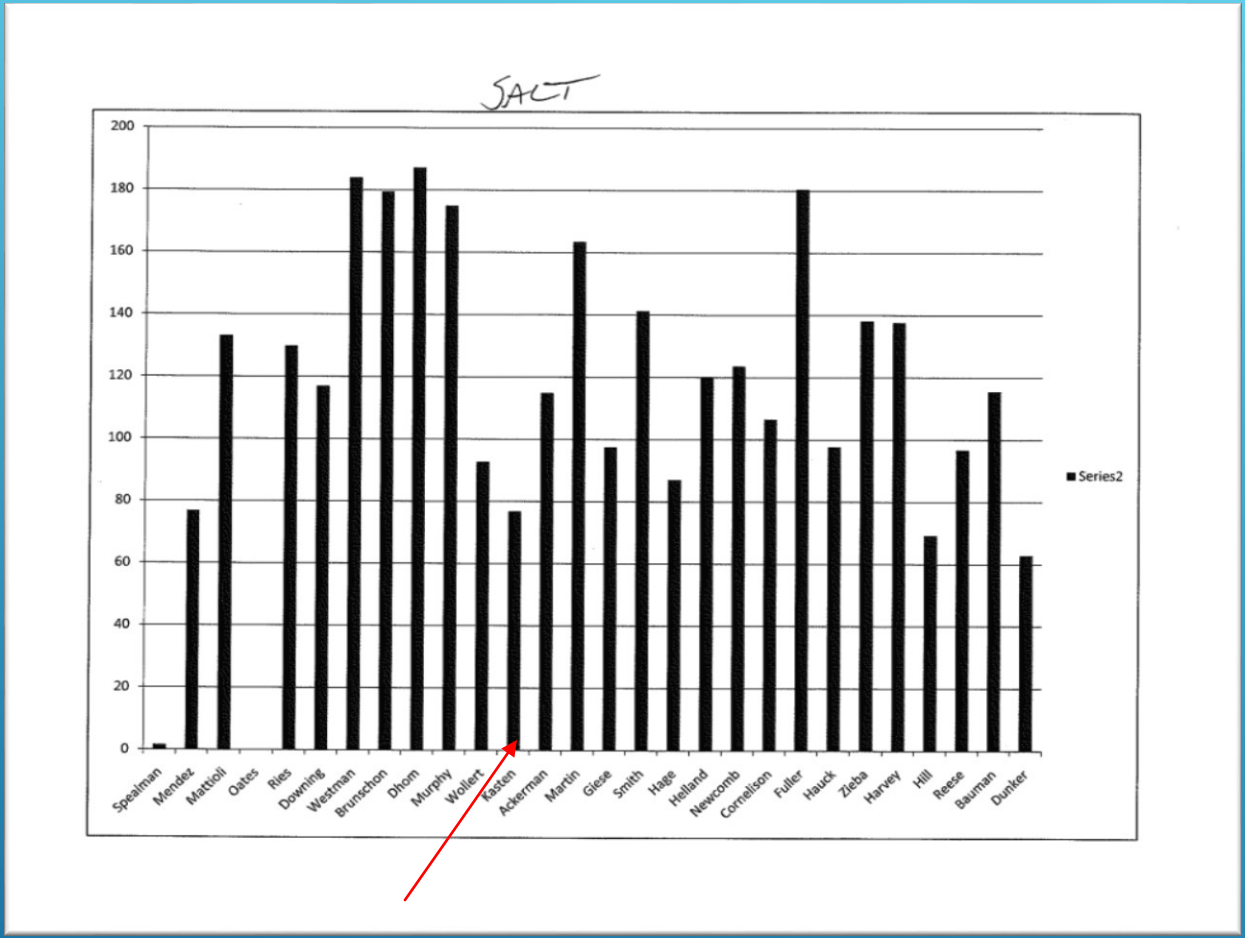
PRE-WETTING Is Done As Material Is Applied To The Roadway

What is the optimum amount?

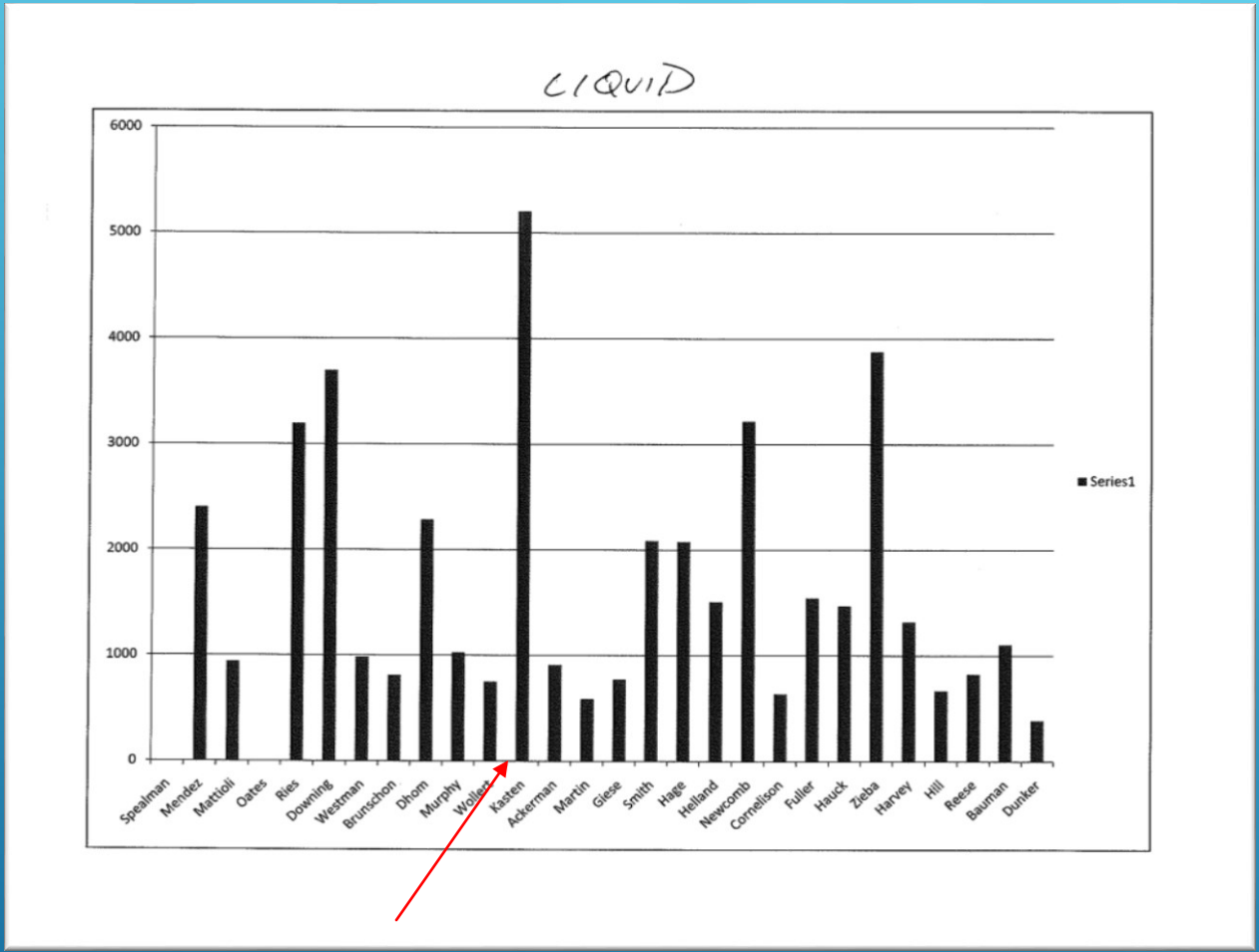
8-14 gal of Salt Brine or Enhanced Brine is common,

- but is more better?

SALT USE VS. LIQUID USE



SALT USE VS. LIQUID USE



SPINNER VS. AUGER

Many agencies have found better pre-wetting results by injecting liquid vs. spraying liquid. Spraying salt will not coat as much as applying liquid while it is being mixed.

LESS SALT MORE LIQUIDS

MCHENRY COUNTY NEWEST TRUCK WITH 970 GALLONS OF LIQUID ON BOARD

Monroe followed McHenry's design and installed two flood nozzles

430 Gallon Tank Installed Inside the Truck Body

Slurry Generator

Crushes Salt & Can Pre-wet
Up To Rates Of 90 Gallons/Ton

Crushed and pre-wet material (brown in color due to the organic added)

Why Pre-Wet Sand

PLOWING

Vince / Bob

STANDARD PRACTICES

Loading/Hauling Salt

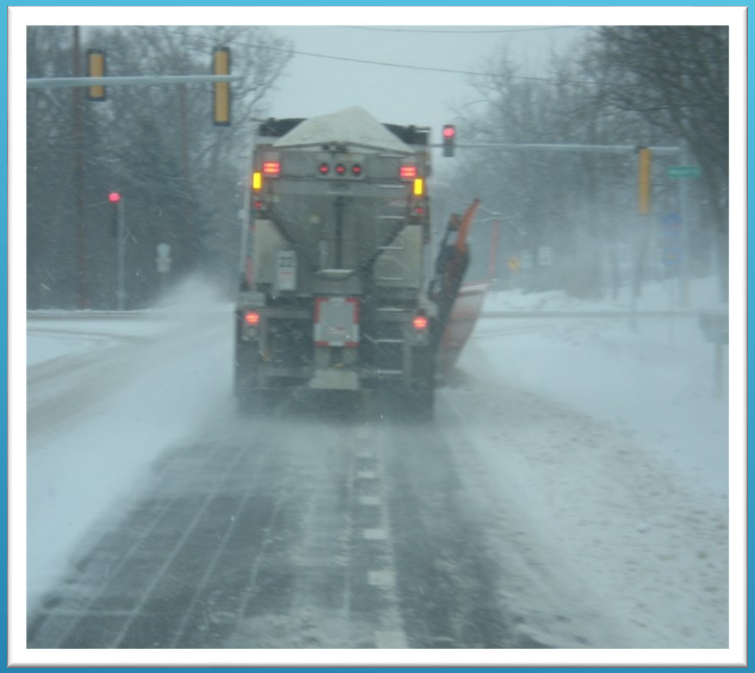
- Load on Level Surface
- Keep Staff Clear of Loading Area
- Keep Surface Clear of Spilled Materials
- Clear Excess Material From Exterior of Dump Body
- Avoid Spills From Overloading, Take Turns Slow

STANDARD PRACTICES

Public Safety/ Operator Safety

- CDL Laws pre and post-trip inspections
- Be sure you are okay to operate
- Flow with traffic
- Be courteous and alert
- Raise box when it is safe
- Communicate

MECHANICAL REMOVAL IS THE FIRST LINE OF DEFENSE



GOOD PLOWING TECHNIQUES WILL REDUCE CHEMICAL NEEDS

SNOW PLOWING

- Avoid creating windrows on pavement to the extent possible
- Be aware of your snow cast and area of impact
- If plowing a grid system, utilize right turns to the extent possible
- Plow snow in the direction of traffic
- Extra caution in low visibility situations

TANDEM PLOWING

MISSOURI DOT

SNOW PLOWING SPEED

- Character of snow
- Roadside conditions
- Wind conditions
- Traffic conditions
- Pavement conditions
- Highway geometry & pavement obstructions

Standard Practices: Snow Cloud

Slow Down

OPERATIONAL SPEED FOR PLOWING

Refer To Your Own Municipal Standards

Speed depends on:

- Type of equipment
- Weather conditions
  - Character of snow
  - Wind conditions
- Type of road
  - Right of way features
  - Roadside conditions
  - Pavement conditions
  - Highway geometry & pavement obstructions
- Traffic conditions

Again, different agencies not matter if they are public or private all use different means to clear snow.

SPECIAL SNOW OPERATIONS

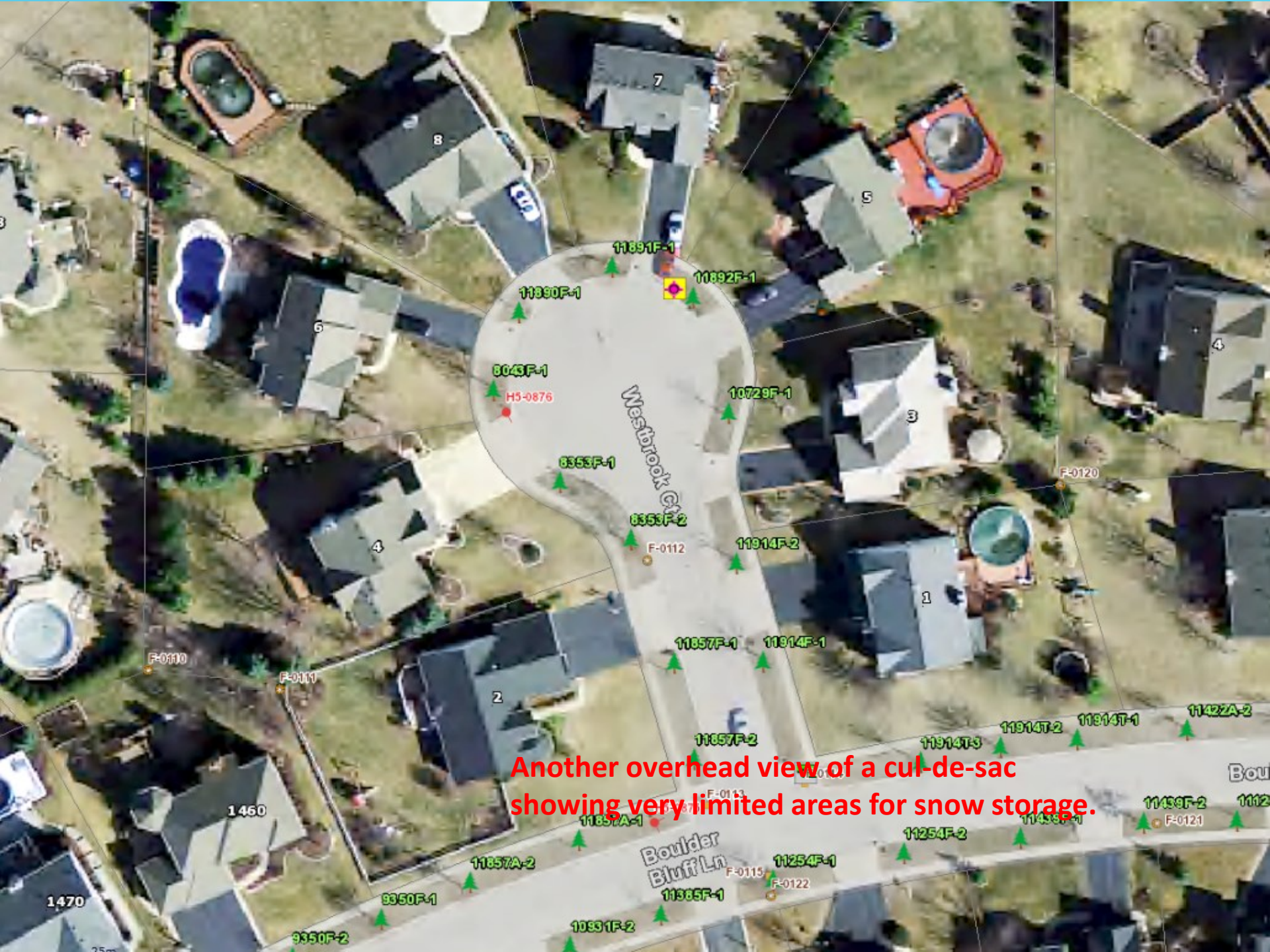
In addition to all of the obstacles created by motoring public during an event, there a number of other inconveniences we face. Such as….

- Ramps and intersections
- Cul-de-sacs and dead ends
- Shoulders
- Railroad crossings
  - Light rail: no mag chloride
  - Round about

CUL-DE-SAC CHALLENGES

- Residents want the same treatment as the residents that live in the local streets.
- Very time consuming to clear.
- Many obstacles to go around.
- Hard on equipment.
- Salt is not very affective do to the low volume of traffic.

This is an overhead view of a cul-de-sac showing very limited areas for snow storage.
E-2482
E-2485
Stonegate Rd
Rochester Ct
4977F-1
10984A-1
10984F-1
4977F-2
12603I-1
1791F-1
12603I-2
12603I-3
H5-0522
4707F-2
E-2484
E-2483
4707F-1
2
4
1
10m

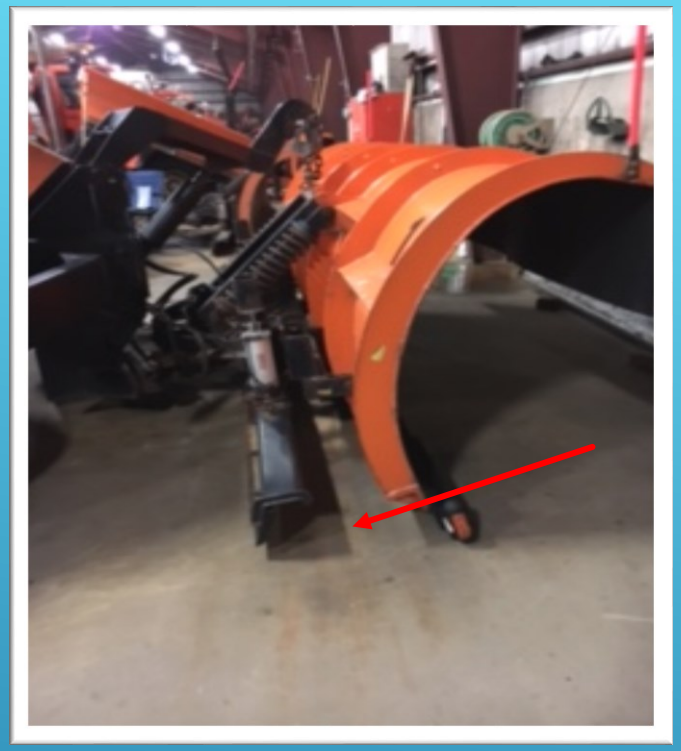


Another overhead view of a cul-de-sac showing very limited areas for snow storage.

MCHENRY COUNTY'S ROUND-ABOUT'S

- **Round-about's are another area that require increase attention for plowing and treating**
- **McHenry County has two round-about's, we plow them from the inside out moving the snow all in one direction to the outside curb line. McHenry County has seven (7) trucks with reversible plows with squeegee blades**
- **This aides in the clean-up process after**
- **a storm and also removing the slushy sloppy snow off the roadway**

Like the cul-de-sacs, round-abouts have limited areas for snow storage



Squeegee Blades

SQUEEGEE VIDEO

SQUEEGEE BLADES

BRIDGE PLOWING SPECIAL OPERATIONS

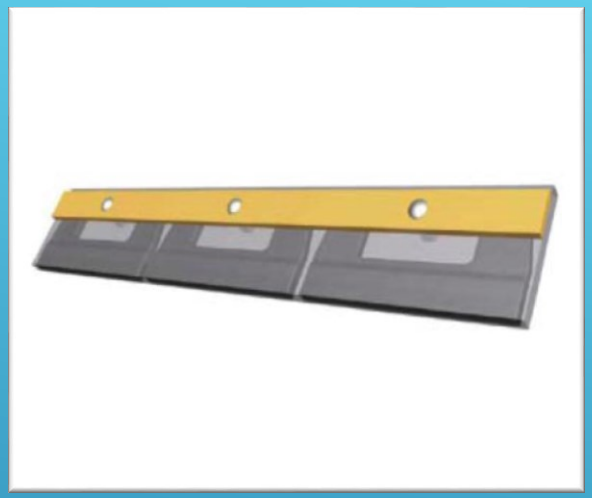
- May have to carry snow over bridges
- Snow could hit motorists below
- Keep plowed snow out of waterways
- May need to share windrow storage with sidewalk snow
- May require follow-up removal operations

OPERATIONS: BENCHING/SHELVING

When streets narrow “Benching” or “Shelving” can add storage capacity.

PAY ATTENTION

Be very aware of your surrounding during benching operations – you don't want to damage right-a-way obstructions including signs, fire hydrants, utilities, street lights or traffic lights.

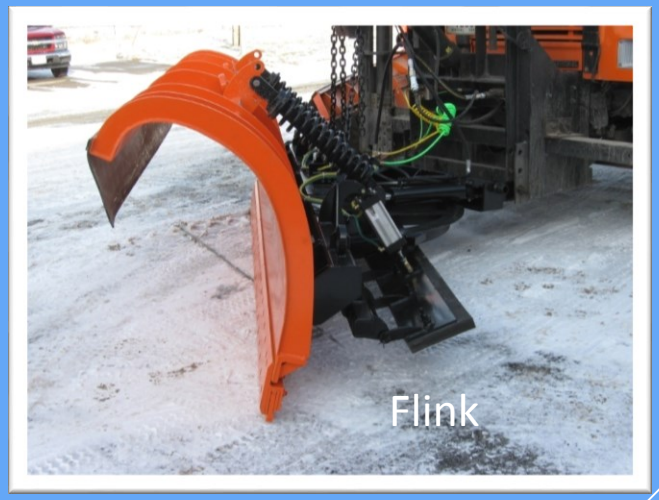


- **KUPER BLADES**

Ceramic Encased in Rubber

JOMA BLADES – RUBBER INCASED CARBIDE

PROTOTYPE PLOWS



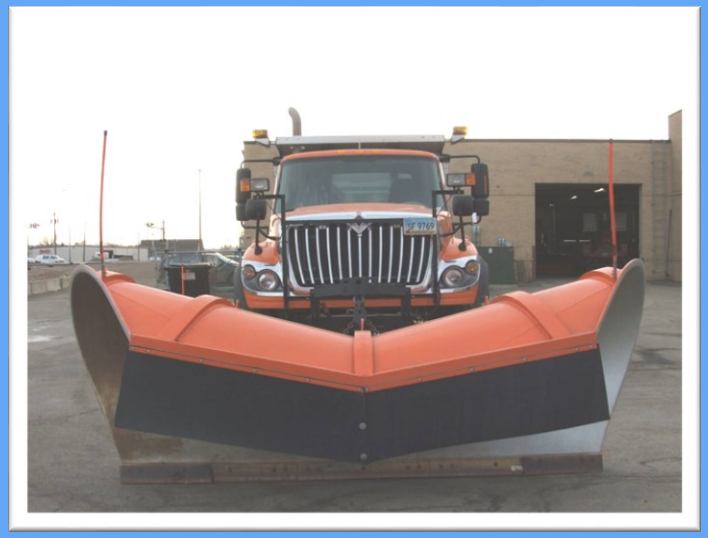
ONE WAY PLOWS

- They can move a large amount of snow but cannot be rotated
- They can be fixed angle type or adjustable angle type
- Front mounted one way plows that move snow to the right are commonly used for high speed snow removal

REVERSIBLE PLOWS

- Work well in slower speed conditions
- Since the plow shape is less efficient than a one-way plow, higher horsepower engines or slower speeds are required
- Newer models provide a taper in both directions, providing better casting of snow and allowing higher speeds while plowing

EXPRESSWAY PLOW



- **These plows are used mainly on expressways and tollways.**
- **A common complaint about these is that snow comes over the plow and limits visibility.**
- **An Advantage is High discharge on both sides for interstate routes.**
- Disadvantages = Initial comments from drivers indicate that snow comes over the middle of the plow at higher plowing speeds.

  Discharge Height = 60”

  Height at center = 36”

  Cost = $3,800 (12’)

Larger Plows

Larger plows are most often used by DOT's and municipalities.

This is McHenry County's 2017 Western Star Snow Plow Trucks, it holds 1000 gallons off liquid on board.

EXPANDABLE PLOWS

TOW PLOW

- **Tow plows are rarely seen, but can be effective on areas where snow plow operators need to clear a wide area with one pass.**

WING PLOWS

Wing plows are common and require an increased awareness by the driver for surrounding obstacles and traffic.

PRIVATE OPERATIONS

Not all that different

Matt

TYPES OF EQUIPMENT TYPICAL IN PRIVATE SECTOR

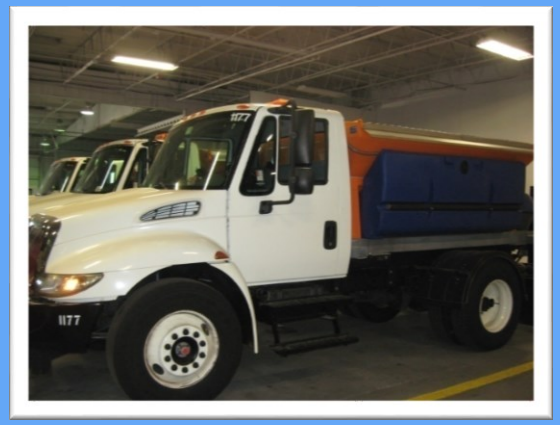
- ¾ ton Plow Trucks with 8' blades
  - Wings
  - V Plows or Expandable Plows Becoming More Popular
- Liquid Anti-Icing / Deicing Trucks
- Semi Dumps (18 wheelers)
- 3–6 yrd Front End Loaders
  14-30' Blades or Pushers
- Skid-Steers
  8-12' Blades or Pushers
- Snow Blowers
  - 100HP Snow Blower Attached to Loaders

863
PROTECH
bobcat

02/19/2005

DEERE

SnowEx
MINI PRO 575



J-1304

LIQUID APPLICATION

Dump Trucks

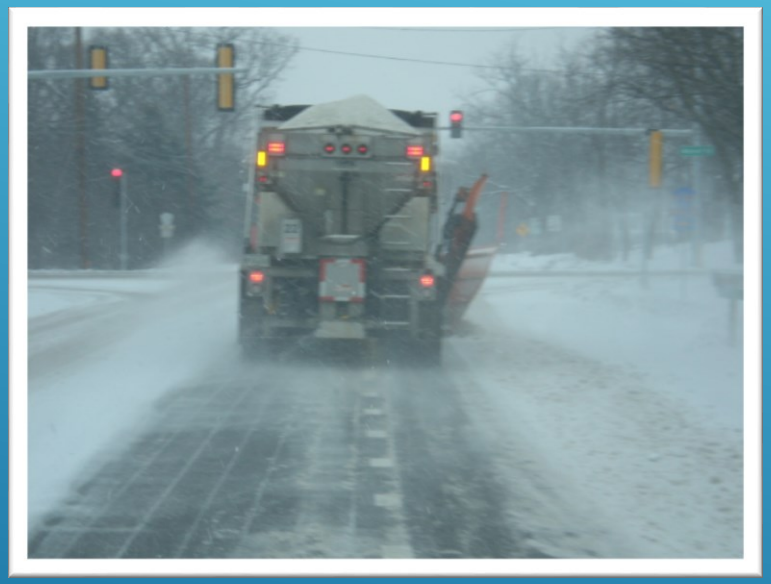
SIDEWALK EQUIPMENT

DEICING

BREAKING THE BOND

Plow First!!!

Plowing Is Still The Best Method Of Removing Snow



Do Not Try To Burn Off Snow With Chemicals

What's This Person Doing Wrong?

DEICING MATERIALS USED TODAY ARE BOTH SOLID AND LIQUID

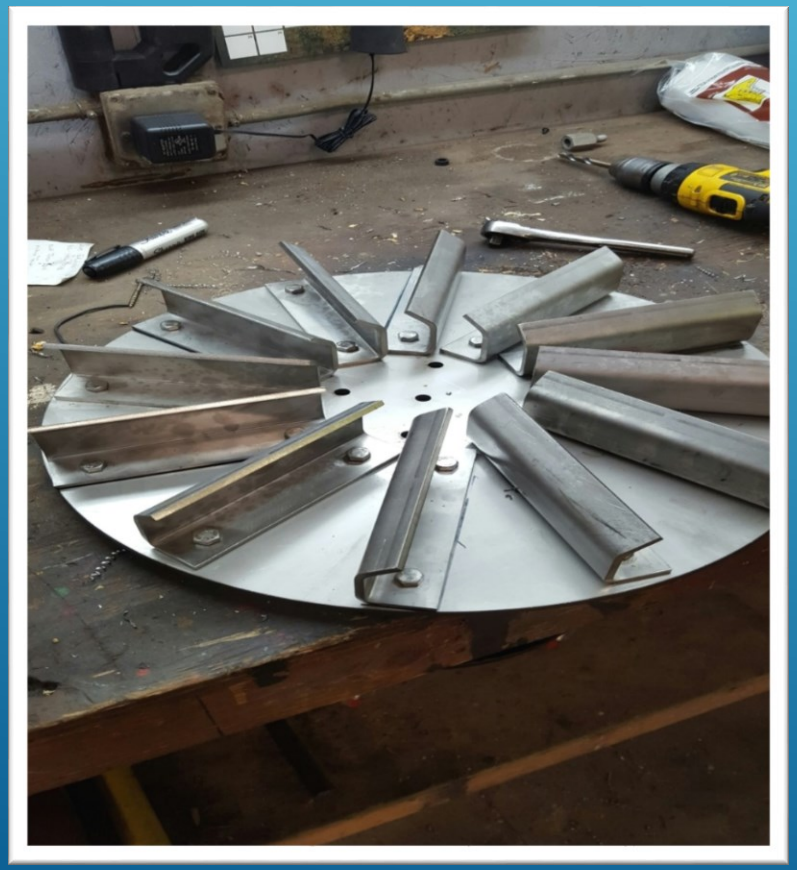
Different Types Of Delivery Methods

Normal Spinner

Modified Spinner

Spring Grove

Finished Product



Before

After

What Should Dictate How Much We Put Down?

Pavement Temp
Weather Condition
Type of Fencer
Level of Service

Follow Deicing Application Rate Guidelines

USE ONLY WHAT IS NEEDED

THE PRICE OF SALT SHOULD NOT DICTATE THE AMOUNT WE USE

Deicing Application Rate Guidelines

24' of pavement (typical two-lane road)

*Copy included in back pocket of this handbook

These rates are not fixed values, but rather the middle of a range to be selected and adjusted by an agency according to its local conditions and experience.

Pavement Temp. (°F) and Trend (↑↓)	Weather Condition	Maintenance Actions	Lbs/two-lane mile			
			Salt Pre-wetted/ Pretreated With Salt Brine	Salt Pre-wetted/ Pretreated With Other Blends	Dry Salt*	Winter Sand (abrasives)
>30° ↑	Snow	Plow treat intersections only	80	70	100-200*	Not Recommended
	Frz. rain	Apply Chemical	80-160	70-140	100-200*	Not Recommended
30° ↓	Snow	Plow & apply chemical	80-160	70-140	100-200*	Not Recom-mended
	Frz. rain	Apply Chemical	150-200	130-180	180-240*	Not Recom-mended
25-30° ↑	Snow	Plow & apply chemical	120-160	100-140	150-200*	Not Recom-mended
	Frz. rain	Apply Chemical	150-200	130-180	180-240*	Not Recom-mended
25-30° ↓	Snow	Plow & apply chemical	120-160	100-140	150-200*	Not Recom-mended
	Frz. rain	Apply Chemical	160-240	140-210	200-300*	400
20-25° ↑	Snow or frz. rain	Plow & apply chemical	160-240	140-210	200-300*	400
20-25° ↓	Snow	Plow & apply chemical	200-280	175-250	250-350*	Not Recom-mended
	Frz. rain	Apply Chemical	240-320	210-280	300-400*	400
15-20° ↑	Snow	Plow & apply chemical	200-280	175-250	250-350*	Not Recom-mended
	Frz. rain	Apply Chemical	240-320	210-280	300-400*	400
15-20° ↓	Snow or Frz. rain	Plow & apply chemical	240-320	210-280	300-400*	500 for frz. rain
0-15° ↑↓	Snow	Plow, treat with blends, sand hazardous areas	Not Recom-mended	300-400	Not Recom-mended	500-750 spot treat as needed
< 0°	Snow	Plow, treat with blends, sand hazardous areas	Not Recom-mended	400-600**	Not Recom-mended	500-750 spot treat as needed

*Dry salt is not recommended. It is likely to blow off the road before it melts ice.
**A blend of 6-8 gal/ton $MgCL^2$ or $CaCl^2$ added to NaCl can melt ice as low as –10°.

Public Pg.18
Private Pg.31

Table 1: Application Rates Used by Iowa Department of Transportation

Salt Application Rate Guidelines							
Prewetted salt @ 12' side lane (assume 2-hr route)							
Surface Temperature	(Fahrenheit)	32-30	29-27	26-24	23-21	20-18	17-15
lbs of salt to be applied per lane mile	Heavy Frost, Mist, Light Snow	50	75	95	120	140	170
	Drizzle, Medium Snow ½" per hour	75	100	120	145	165	200
	Light Rain, Heavy Snow 1" per hour	100	140	182	250	300	350
Prewetted salt @ 12' wide lane (assume 3-hr route)							
Surface Temperature	(Fahrenheit)	32-30	29-27	26-24	23-21	20-18	17-15
lbs of salt to be applied per lane mile	Heavy Frost, Mist, Light Snow	75	115	145	180	210	255
	Drizzle, Medium Snow ½" per hour	115	150	180	220	250	300
	Light Rain, Heavy Snow 1" per hour	150	210	275	375	450	525

IN MOST CASES 300 LBS OR LESS PER LANE MILE OF GRANULAR SALT IS ALL THAT IS NEEDED

TURN SPINNER SPEED TO LOWEST SETTING EXCEPT FOR INTERSECTIONS.

APPLICATION RATES – PRIVATE

- Depends on snow
  - Water Content
- Depends on Temperature
  - 5 times more Effective at 30 vs. 20 degrees
- Depends on residual chemical
  - Or pre-treat
- MOSTLY Service level??

FACTORS TO CONSIDER DURING EVENT

- Services being provided
  - Pre-Treating
  - Plowing or Shoveling
- Customer Expectations
  - Scope of Work
  - Hours of operation, Priority Areas
  - Appearance of Property
- Forecast
  - Type of event
  - Temperature
- Factors that Affect Ground Temp
  - Air Temp, Sun/ Shade, Surface Type

Pavement Temp , Trend	Weather Condition	Maintenance Actions	Salt Pre Wetted w/ Brine	Salt Pre/ Treated with Other Blends	Dry Salt	Winter Sand
>30 Rising	Snow	Plow, Treat intersections	0.75	0.5	0.75	N/A
	Frz. Rain	Apply Chemical	1.25	1	1.5	N/A
30 Falling	Snow	Plow and Apply Chemical	1.25	1	1.5	N/A
	Frz. Rain	Apply Chemical	1.5	1.25	1.75	N/A
25-30 Rising	Snow	Plow and Apply Chemical	1.25	1	1.5	N/A
	Frz. Rain	Apply Chemical	1.5	1.25	1.75	N/A
25-30 Falling	Snow	Plow and Apply Chemical	1.25	1	1.5	N/A
	Frz. Rain	Apply Chemical	1.75	1.5	2.25	3.25
20-25 Rising	Snow	Plow and Apply Chemical	1.75	1.5	2.25	N/A
	Frz. Rain	Apply Chemical	1.75	1.5	2.25	3.25
20-25 Falling	Snow	Plow and Apply Chemical	2	2	2.75	N/A
	Frz. Rain	Apply Chemical	2.5	2	3	3.25
15-20 Rising	Snow	Plow and Apply Chemical	2	2	2.75	N/A
	Frz. Rain	Apply Chemical	2.5	2	3	3.25
15-20 Falling	Snow	Plow and Apply Chemical	2.5	2	3	N/A
	Frz. Rain	Apply Chemical	2.5	2	3	3.25
0-15	Snow	Plow Treat with Blends	N/A	3	N/A	5.0 spot
<0	Snow	Plow Treat with Blends	N/A	4.5	N/A	5.0 spot

LIQUID DEICERS

CAN WE USE DIRECT APPLICATION OF LIQUIDS FOR DEICING?

Matt / Bob

It Can Be The Best Method In The Right Situation: Parking Lots

EXCELLENT FOR TREATING FROST

Instant Results With Minimal Material

Warm Pavement Temperatures

Slushy Roadways

Conditions must be correct for using liquids in deicing.

Warm pavement temperatures, low or no additional snowfall, short route cycle times, no blowing snow.

Examples

Examples

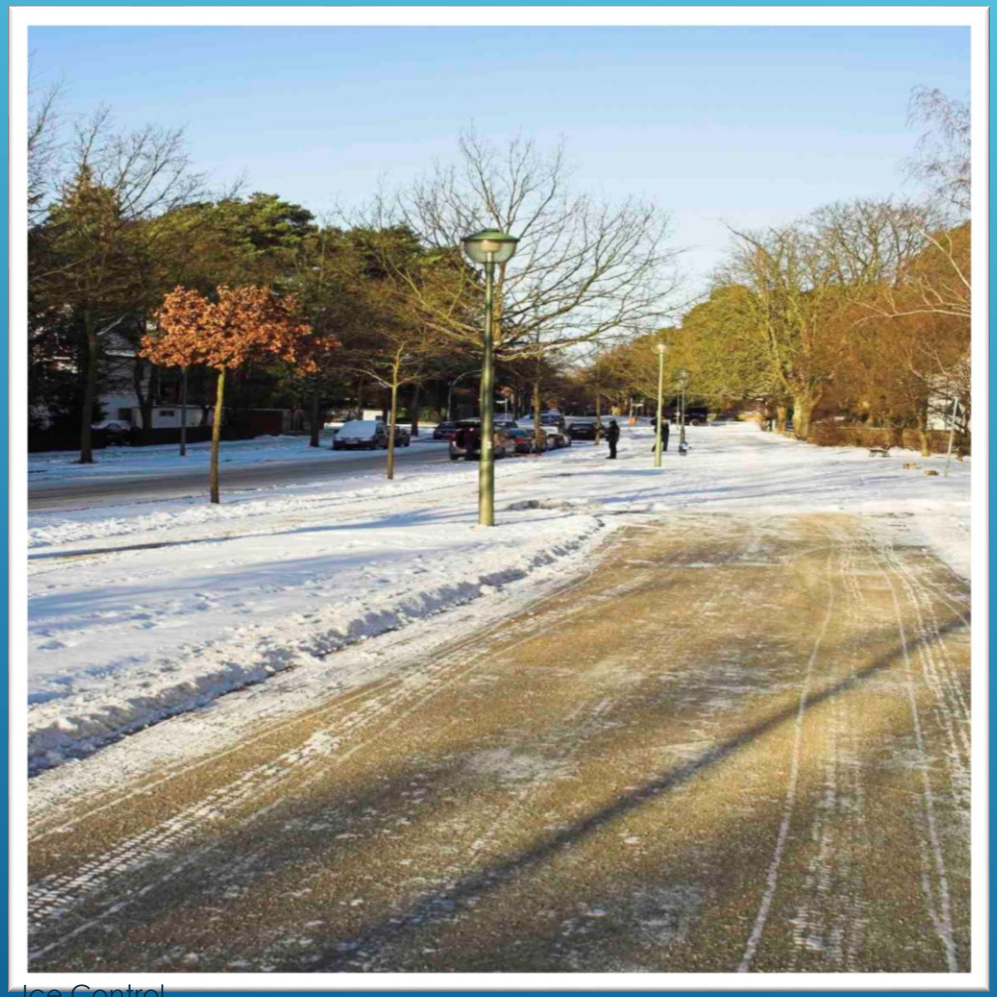
It May Not Be A Good Idea In a Situation Like This

Using Abrasives

Why Isn't It Melting?

Vince

Benefit - Traction



Ice Control

Must Be Spread ON TOP of Residual snow/ice

Sand has no melting power!!!

DISCUSSION

- Should not be mixed with salt
- 50/50 Mix is always half wrong

WHY ?

What is the true cost?

Environmental Effects

Where does it go?

Into the air?

Into the water?

Environmental Effects - Siltation

WHAT IS THE TRUE COST OF USING SAND?

STREET SWEEPING

HAULING AND PROPER DISPOSAL

In Extreme Cold, on Steep Grades and on Gravels Roads it Can be a Great Tool for Traction

FINAL SWEEP, CLEAN IT UP AND GET IT UNDER COVER

Not Clean Enough

After the Storm

- Clean-up, Street Sweeping, Storage
- Maintenance
- Documentation
- Fine Tuning Your Program
- End of Season Meeting
- Restorations and Other Repair

WHAT IS YOUR POLICY ON REPAIRS/RESTORATIONS

MAILBOXES

RIGHT-OF-WAY

Equipment

Record Your Performance

- Salt Usage ,Overall Per Lane Mile
- Liquid Usage
- Hold Post Storm Meetings

Appendix

Snow and Ice Report:

Operator Information		
Date:	Operator:	Truck #:
Starting Mileage:	Ending Mileage:	Total Mileage:
Start Time: _____ Circle One AM / PM	End Time: _____ Circle One AM/PM	

Storm Intensity / Rating (Circle One)						Temp:
Light	Medium	Heavy	Sleet	Ice	Rain	
Rate the Storm: 1=Easy to 10= Difficult _____			Reason:			

Actions Taken (Circle One)					
Plow	Spread	Plow & Spread	Clean Up	Drifting	Other:
Route # Covered:			Other Routes Covered		
Other drivers on your route? Circle One Yes / No			If yes, who?		

Products:				
Salt	Tons Used:		Buckets Used:	
	Did you pick up at another location? Circle One Yes / No		If yes, where?	
	How much did you pick up?	Tons: _____		Buckets: _____
Liquids	Liquids Used? _____ _____ _____ _____		Gallons: _____ _____ _____ _____	
Fuel	Did you get fuel from another location? Circle one: Yes / No		If yes, where?	
Damage:	Note any damage observed to property:			

A-6

Public Pg.A-6
Private Pg.37

SPLIT FOR CALIBRATION

Application Rate Exercise

What Do You Do?

Just started to snow. 2” Predicted. Air Temp 30 deg. Pavement temp 30 deg. and falling. You have salt pre-wetting with salt brine. Because of rush hour, your route cycle time is 3 hours.

Salt Application Rate Guidelines

Prewetted salt @ 12' side lane (assume 2-hr route)

Surface Temperature	(Fahrenheit)	32-30	29-27	26-24	23-21	20-18	17-15
lbs of salt to be applied per lane mile	Heavy Frost, Mist, Light Snow	50	75	95	120	140	170
	Drizzle, Medium Snow ½" per hour	75	100	120	145	165	200
	Light Rain, Heavy Snow 1" per hour	100	140	182	250	300	350

Prewetted salt @ 12' wide lane (assume 3-hr route)

Surface Temperature	(Fahrenheit)	32-30	29-27	26-24	23-21	20-18	17-15
lbs of salt to be applied per lane mile	Heavy Frost, Mist, Light Snow	75	115	145	180	210	255
	Drizzle, Medium Snow ½" per hour	115	150	180	220	250	300
	Light Rain, Heavy Snow 1" per hour	150	210	275	375	450	525

What Do You Do?

Not snowing. Winds at 30 mph. 0 degrees. You have salt that you are prewetting, with a blend.
Pavement temp is 10 degrees.

Deicing Application Rate Guidelines

24' of pavement (typical two-lane road)

'hese rates are not fixed values, but rather the middle of a range to be selected and adjusted ›y an agency according to its local conditions and experience.

			Lbs/ two-lane mile			
Pavement Temp. (°F) and Trend (↑↓)	Weather Condition	Maintenance Actions	Salt Prewetted/ Pretreated With Salt Brine	Salt Prewetted/ Pretreated With Other Blends	Dry Salt*	Winter Sand (abrasives)
>30° ↑	Snow	Plow, treat intersections only	80	70	100*	Not recommended
	Frz. rain	Apply chemical	80 – 160	70 – 140	100 – 200*	Not recommended
30° ↓	Snow	Plow & apply chemical	80 – 160	70 – 140	100 – 200*	Not recommended
	Frz. rain	Apply chemical	150 – 200	130 – 180	180 – 240*	Not recommended
25 - 30° ↑	Snow	Plow & apply chemical	120 – 160	100 – 140	150 – 200*	Not recommended
	Frz. rain	Apply chemical	150 – 200	130 – 180	180 – 240*	Not recommended
25 - 30° ↓	Snow	Plow & apply chemical	120 – 160	100 – 140	150 – 200*	Not recommended
	Frz. rain	Apply chemical	160 – 240	140 – 210	200 – 300*	400
20 - 25° ↑	Snow or frz. rain	Plow & apply chemical	160 – 240	140 – 210	200 – 300*	400
20 - 25° ↓	Snow	Plow & apply chemical	200 – 280	175 – 250	250 – 350*	Not recommended
	Frz. rain	Apply chemical	240 – 320	210 – 280	300 – 400*	400
15 - 20° ↑	Snow	Plow & apply chemical	200 – 280	175 – 250	250 – 350*	Not recommended
	Frz. rain	Apply chemical	240 – 320	210 – 280	300 – 400*	400
15 - 20° ↓	Snow or Frz. rain	Plow & apply chemical	240 – 320	210 – 280	300 – 400*	500 for frz. rain
0 to 15° ↑↓	Snow	Plow, treat with blends, sand hazardous areas	Not recommended	300 – 400	Not recommended	500 – 750 spot treat as needed
< 0°	Snow	Plow, treat with blends, sand hazardous areas	Not recommended	400 – 600**	Not recommended	500 – 750 spot treat as needed

Dry salt is not recommended. It is likely to blow off the road before it melts ice.

*A blend of 6 – 8 gal/ton $MgCl_2$ or $CaCl_2$ added to NaCl can melt ice as low as -10°.

Rain is freezing to the road. Air Temp 34deg. Pavement temp 23deg rising. You have salt pre-wet with an enhanced salt brine.
What do you do?

Deicing Application Rate Guidelines

24′ of pavement (typical two-lane road)

These rates are not fixed values, but rather the middle of a range to be selected and adjusted by an agency according to its local conditions and experience.

			Lbs/ two-lane mile			
Pavement Temp. (˚F) and Trend (↑↓)	Weather Condition	Maintenance Actions	Salt Prewetted/ Pretreated With Salt Brine	Salt Prewetted/ Pretreated With Other Blends	Dry Salt*	Winter Sand (abrasives)
>30° ↑	Snow	Plow, treat intersections only	80	70	100*	Not recommended
	Frz. rain	Apply chemical	80 – 160	70 – 140	100 – 200*	Not recommended
30° ↓	Snow	Plow & apply chemical	80 – 160	70 – 140	100 – 200*	Not recommended
	Frz. rain	Apply chemical	150 – 200	130 – 180	180 – 240*	Not recommended
25 - 30˚ ↑	Snow	Plow & apply chemical	120 – 160	100 – 140	150 – 200*	Not recommended
	Frz. rain	Apply chemical	150 – 200	130 – 180	180 – 240*	Not recommended
25 - 30˚ ↓	Snow	Plow & apply chemical	120 – 160	100 – 140	150 – 200*	Not recommended
	Frz. rain	Apply chemical	160 – 240	140 – 210	200 – 300*	400
20 - 25˚ ↑	Snow or frz. rain	Plow & apply chemical	160 – 240	140 – 210	200 – 300*	400
20 - 25˚ ↓	Snow	Plow & apply chemical	200 – 280	175 – 250	250 – 350*	Not recommended
	Frz. rain	Apply chemical	240 – 320	210 – 280	300 – 400*	400
15 - 20° ↑	Snow	Plow & apply chemical	200 – 280	175 – 250	250 – 350*	Not recommended
	Frz. rain	Apply chemical	240 – 320	210 – 280	300 – 400*	400
15 - 20° ↓	Snow or Frz. rain	Plow & apply chemical	240 – 320	210 – 280	300 – 400*	500 for frz. rain
0 to 15˚ ↑↓	Snow	Plow, treat with blends, sand hazardous areas	Not recommended	300 – 400	Not recommended	500 – 750 spot treat as needed
< 0˚	Snow	Plow, treat with blends, sand hazardous areas	Not recommended	400 – 600**	Not recommended	500 – 750 spot treat as needed

*Dry salt is not recommended. It is likely to blow off the road before it melts ice.

**A blend of 6 – 8 gal/ton $MgCl_2$ or $CaCl_2$ added to NaCl can melt ice as low as -10˚.

WHAT COULD THE FUTURE HOLD??

Solar Roadways are systems of specially engineered solar panels that can be walked and driven upon. The panels typically contain LED lights to create line and signage without paint and contain heating elements to prevent snow and ice accumulation. Could this really happen on our highways? Would we be able to charge electric vehicles with clean energy from the sun? Driveways and parking lots are already being constructed, the future is fast approaching.

DISCUSSION

- Break into smaller groups
- Choose a discussion leader and a scribe to take notes
- List 3 challenges your agency faces in winter maintenance.
- List 3 things you feel your agency does well.

WRAP UP

Test

Your opinion is important to us – please complete the evaluation form.

Thank you for attending the Certificate workshop !

TEST