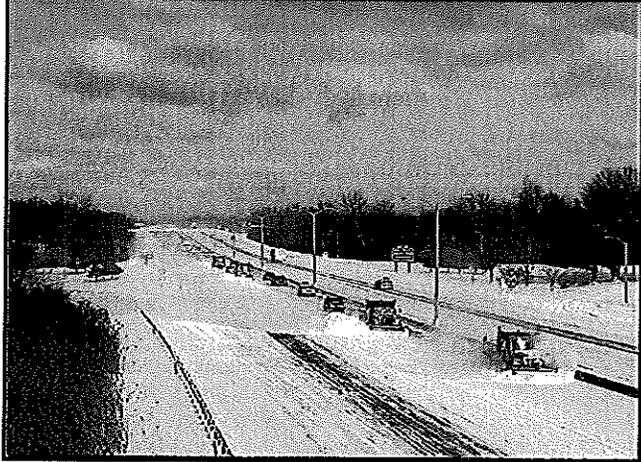
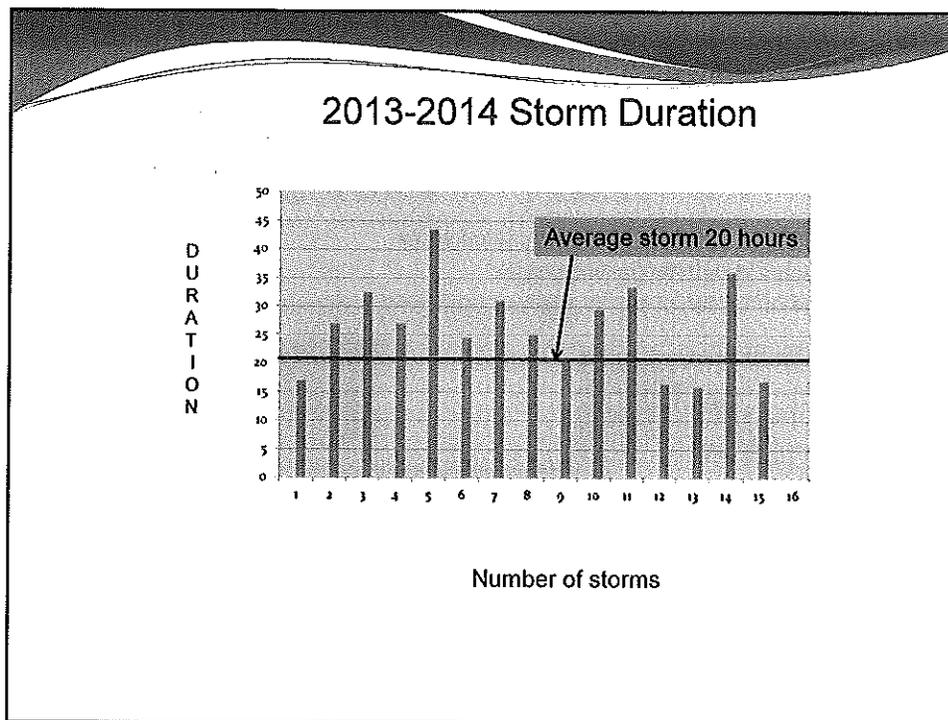


# Department of Transportation Snow and Ice Program



5700 two lane miles of roads  
1400 employees



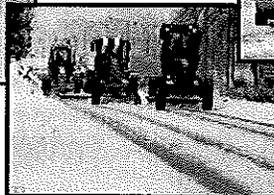
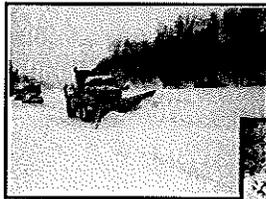


2013-2014	Storm Hours	Number of Storms	Salt (tons)	Total Cost (Million)
Budget	520	12	169,500	29.657
Actual (YTD)	737	15	199,700	38.631
Increase	42 %	25%	18%	30%

2013-2014 Winter season has experienced below average temperatures

## Prior to 2006 CTDOT Deicing Program

- Use of salt and sand on accumulated snow
- Resulted in substantial snow pack
- Large quantities of salt to address snow pack required

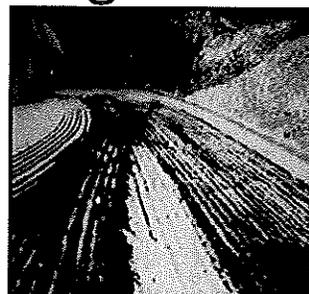
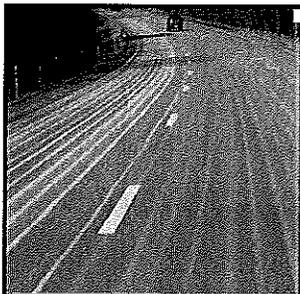


## Disadvantages of Sand

- No melting ability with out salt
- More costly than salt applications
- Can cause damage to vehicles
- Clogs drainage systems
- Silling of waterways
- \$8-\$10M per year of clean-up costs



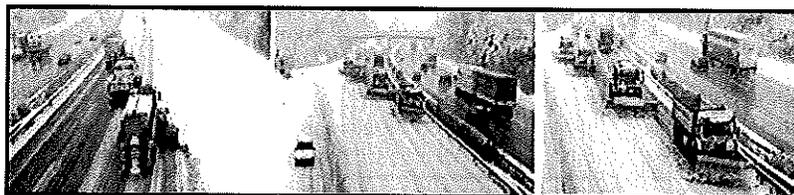
## Current CTDOT Program Pre-treating



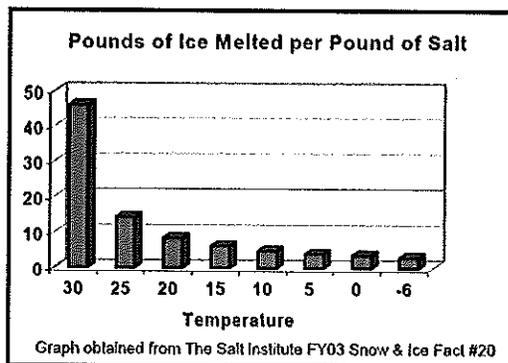
- Sodium Chloride Brine
- Significantly reduced accidents on major river crossings
- Keeps snow and ice from bonding to pavement
- Provides plow drivers more time at the onset of a storm
- Reduces salt use
- Bare pavement sooner after storm
- Reduces overall cost of snow operation

## Current CTDOT Program

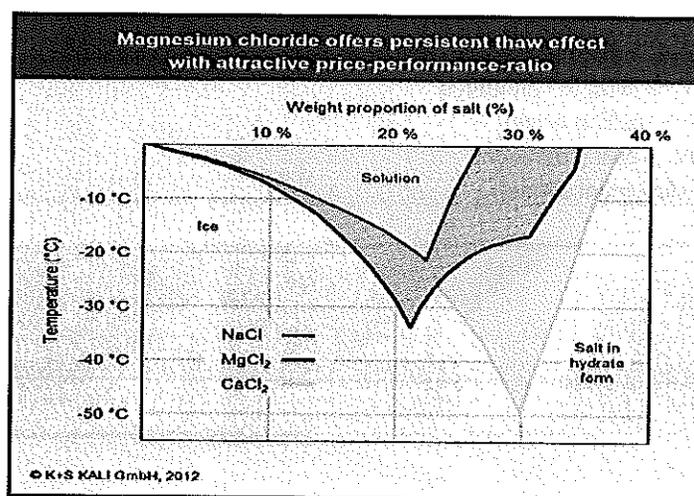
- Use of salt and magnesium chloride to prevent snow from bonding to road
- Lower working temperatures
- Quicker melting action
- Shorter plowing duration
- Bare pavement sooner



## Salt Performance



## Magnesium Chloride Performance



## Material Per Lane Mile



200 lbs of Salt



1 gallon of Magnesium Chloride  
(3.88 pounds)

## Prewetting Salt With Magnesium Chloride

- Pre-wetting applies liquids onto salt as it is applied
- Common pre-wetting liquids include: salt brine, liquid calcium chloride, and liquid magnesium chloride.
- CTDOT currently uses magnesium chloride
  - Keeps solid materials on the pavement
  - Gets the salt acting more quickly
  - Melts snow and ice at lower working temperatures
  - Melts snow and ice with less salt



## CTDOT Material Application

- CTDOT Materials (5 yr average)
  - Salt – 163,000 tons
    - 12.45 Tons/lane mile
  - Sodium Chloride Brine – 46 gallons/ lane mile (0.09 T)
  - Magnesium Chloride – 44 gallons/ lane mile (0.09 Tons)
  - Total cost for materials - \$11.6 million
- Massachusetts
  - Salt – 33.33 Tons/lane mile
  - Nearly 3 times the amount of salt as CTDOT
- Maine
  - 2% of all material used has corrosion inhibitor

## Deicers and Corrosion

**Is any particular deicer more destructive than others?  
What does research tell us?**

- Magnesium Chloride ( $MgCl_2$ )
- Calcium Chloride ( $CaCl_2$ )
- Sodium Chloride ( $NaCl$ )

**All of these chlorides are detrimental to vehicles and  
infrastructure**

## Strategies for Dealing with Corrosion

- Preventative – primers, coatings
- Reactive – washing
- Corrosion inhibitors mixed with salt and magnesium chloride (Application Vehicles Only)

## Products with Corrosion Inhibitors

- Cargill's Clearlane
- Innovative's Magic Salt
- Sears Ice-B-Gone
- Manufacturer's claim some evidence of reduced corrosion on the *application* vehicles only.

## Organic Corrosion Inhibitors

- **Use of beet and sugar cane products mixed with salt**
  - Organic rust inhibitors can impact water quality
  - Starve water of oxygen
  - Detrimental to aquatic life

## What Does the Research Show?

- Sample relevant research
  - National Cooperative Highway Research Program (NCHRP) – 2007
  - The Iowa Highway Research Board
  - Ontario Ministry of Transportation – 2009
  - University of Maine February 2010
- Findings
  - Inhibitors have differing performance for different chlorides and metals
  - Design changes on equipment have potential for reducing corrosion
  - Lab results show some improvements, but more field testing is required on all kinds of metals
  - More research is needed to identify most effective inhibitors

## Future of Program

- Continuous Improvement/Best Practice
  - Networking with other State DOT's
  - CONEG
  - NASTO
- Research
  - NCHRP
  - CT T2 Center
  - Clear Roads
- DOT/DEEP Inhibitor Evaluation
- Emerging Technology
  - Corrosion resistant chemicals

