ICE SLICER

Deicing Solutions for the Modern Roadway, Economy, and Environment

REDMOND™

ENVIROTECH SERVICES®

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THE NEED FOR DEICING SOLUTIONS

Keeping arterial roadways open during the winter has far reaching effects on the an area's health and economy.

COST OF LOST COMMERCIAL SHIPPING*

"Each year trucking companies or **CVOs lose an estimated 32.6 billion vehicle hours** due to weather-related congestion in 281 of the nation's metropolitan areas. Nearly 12 percent of total estimated truck delay is due to weather in the 20 cities with the greatest volume of truck traffic. The estimated cost of weather-related delay to trucking companies ranges from **2.2 billion dollars** to **3.5 billion dollars** annually."

COST OF LOST WORK/PRODUCTIVITY †

WTI has reported that hourly workers account for "almost two-thirds of direct economic losses" during a snow-related shutdown. WTI also cited that:

"approximately $1.4 billion dollars would be lost in wages alone if all of the snowbelt states were immobilized for just one day due to a winter weather event. Since then that number has climbed closer to $2.6 billion according to IHS Global Insight (Booz Allen Hamilton, 1999; IHS Global Insight, 2014)."

COST OF ACCIDENTS †

"the average roadway fatality costs about **$1.32 million in associated economic costs** and the average crash with a critically injured survivor costs about $1.5 million, based on a 2002 National Highway Traffic Safety Administration calculation adjusted for today's dollars."

The Western Transportation Institute (WTI), out of Montana State University, has conducted many studies into winter shutdown economics. They have found that:

"the common winter maintenance practice of deicing has been shown to reduce crash frequency by 88.3 percent, and to decrease the average cost of each crash by 10 percent."

COST OF LOST RETAIL †

WTI stated that "the one day loss of retail sales was found to be $870 million (IHS Global Insight, 2014)."

** Federal Highway Administration*

† Western Transportation Institute

TYPES OF WINTER ROAD TREATMENTS

Road crews have 3 categories of treatments available to try and keep roads open and safe.

INSOLUBLE AGGREGATES

Coarse, insoluble solids sometimes applied to increase traction (i.e. sand, gravel, and a variety of geo-synthetics)

PROS
- Inexpensive
- Increase traction

CONS
- Do not melt ice and snow
- Build up over the winter and clog drainage and waterways
- Need to be cleaned up after storms
- Increase air particulate pollution
- Damage windshields and other property

LIQUID ANTI-ICERS

Liquid solutions used to pre-treat surfaces to prevent ice from forming and bonding to the pavement

PROS
- Covers well with no bounce and scatter
- Begins working immediately

CONS
- Only preventative, not effective after snow accumulates
- More difficult to store/transport
- Requires extra training
- Runs off sloped surfaces
- Do not increase traction
- Hard to tell which roads have been treated
- Can be washed away by rain

GRANULAR DEICERS

Solid granules of freeze point depressants that form brine to melt ice and snow and prevent re-freezing cycles

PROS
- Works on bare pavement or where snow/ice accumulates
- Increases traction
- Easier to store, transport, and apply without special training or vehicles
- Easy to see where applied
- Does not dilute quickly, keeps working to prevent refreezing

CONS
- Lighter granules can bounce and scatter
- Can clump in storage
- Easy to over-apply

FINDING A VERSATILE DEICING SOLUTION

Balancing deicing performance, environmental impact, and budget are a challenge for all road agencies.

PERFORMANCE

Underperforming products have to be applied in greater quanities, reducing value and increasing environmental impact.

ENVIRONMENT

Every substance applied to roadways affects infrastructure, local ecology, and the wider environment.

Infrastructure
Concrete and metal surfaces on and near the roadside are vulnerable to exposure to abrasives and deicing/anti-icing ingredients.

Local Ecology
Plants, animals, soil, waterways, and air quality are affected by leaching substances and particle pollution.

Wider Environment
Runoff collection basins are subject to toxic algae blooms, reduced dissolved oxygen and other ecological disasters.

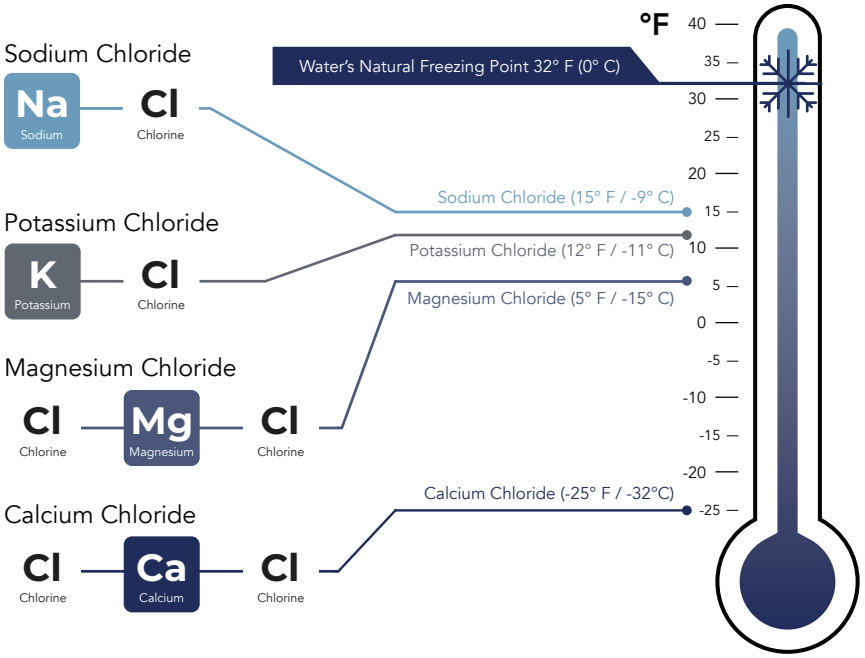
ECONOMICAL VALUE

Tight road maintence budgets sometimes require crews to compromise on performance or environmental protection.

WHAT IS ICE SLICER?
CHEMICAL PROPERTIES

COMPLEX CHLORIDES™ WITH MINERALS

A complex chloride is a naturally derived, homogenous blend of the 4 main chloride salts. Solid complex chlorides™ are mined from ancient sea deposits and also contain other naturally occurring minerals.

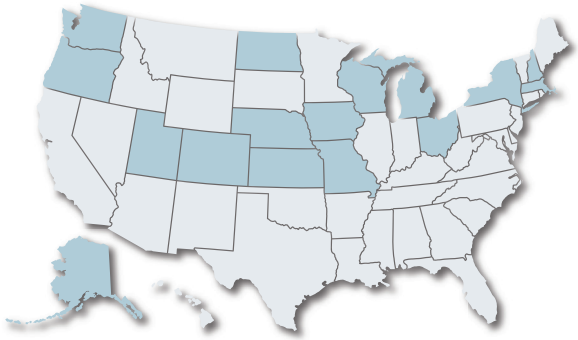


Ice Slicer is at least **90% complex chlorides** (sodium, potassium, magnesium, and calcium chlorides) and **10% insoluble minerals** (over 60 naturally occurring trace minerals)

COMPLEX CHLORIDES™ ARE NATURE'S VERSATILE DEICER

A survey on *"the unique synergy of complex chlorides and mineral products"* was conducted covering:

31 road agencies and winter maintenance experts across **16 states**



Survey Results†:

- *Improved performance:*
  The top five primary benefits for using solid complex chloride/mineral products listed by respondents include:
  1. "Lowering the freezing point of water" (20.7% of respondents)
  2. "Prevention of ice formation" (17.2%)
  3. "Improving the product longevity on the road" (13.8%)
  4. "Preventing refreeze" (13.8%)
  5. "Weakening of ice bond to pavement" (13.8%)

- *Reduced highway infrastructure damage*
- *Reduced environmental damage*
- *Cost savings*
  Reduction in the volume of the material (using less product)

† Western Transportation Institute

WHAT IS ICE SLICER?
PHYSICAL PROPERTIES

COLOR

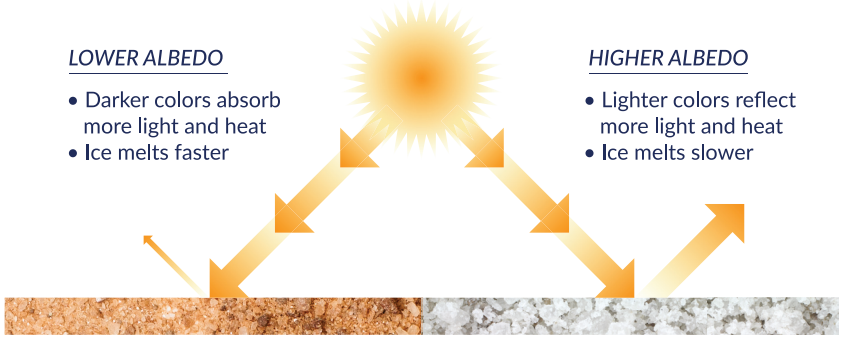
Ice Slicer's unique mineral content of over 60 trace minerals gives it a signature reddish color.

This darker hue decreases Ice Slicer's albedo factor (amount of solar energy reflected) and helps it capture more solar energy to speed up brining.

This color is natural occurring throughout Ice Slicer so brining performance lasts longer than dye coated granules.

SOLAR REFLECTION VS. ABSORPTION

ALBEDO: how much light is reflected by a surface (varies depending upon color)

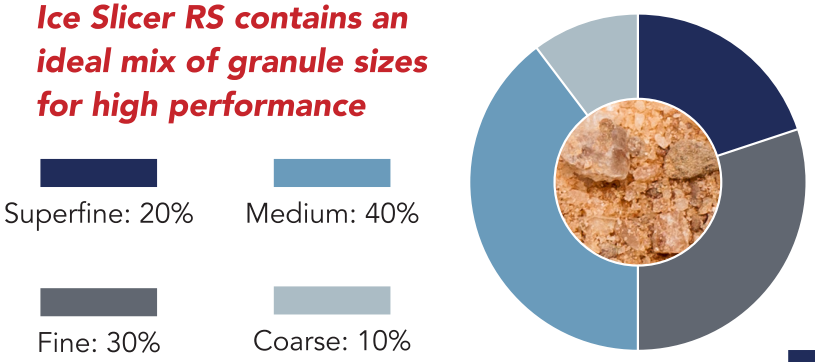


GRADATION

As a naturally mined mineral product, Ice Slicer contains a mix of granule sizes. Smaller granules brine quickly to kickstart melting. Larger granules penetrate ice and snow and extend brining to reduce re-freezing cycles.

Each granule has a coarse texture that reduces bounce and scatter and improves friction without the need for additional abrasives.

Ice Slicer RS contains an ideal mix of granule sizes for high performance



INDEPENDENT STUDIES
FRICTION PERFORMANCE (MONTANA)

Highway I-90, Montana (11/24/23)
Application: 200 lbs/Lane Mile

ICE SLICER

I-90 West

- *Application time- 5:00 am*
- *Air temp- 18° F*
- *Surface temp- 24° F*
- *Snowing 1/2" per hour*
- *Light traffic*

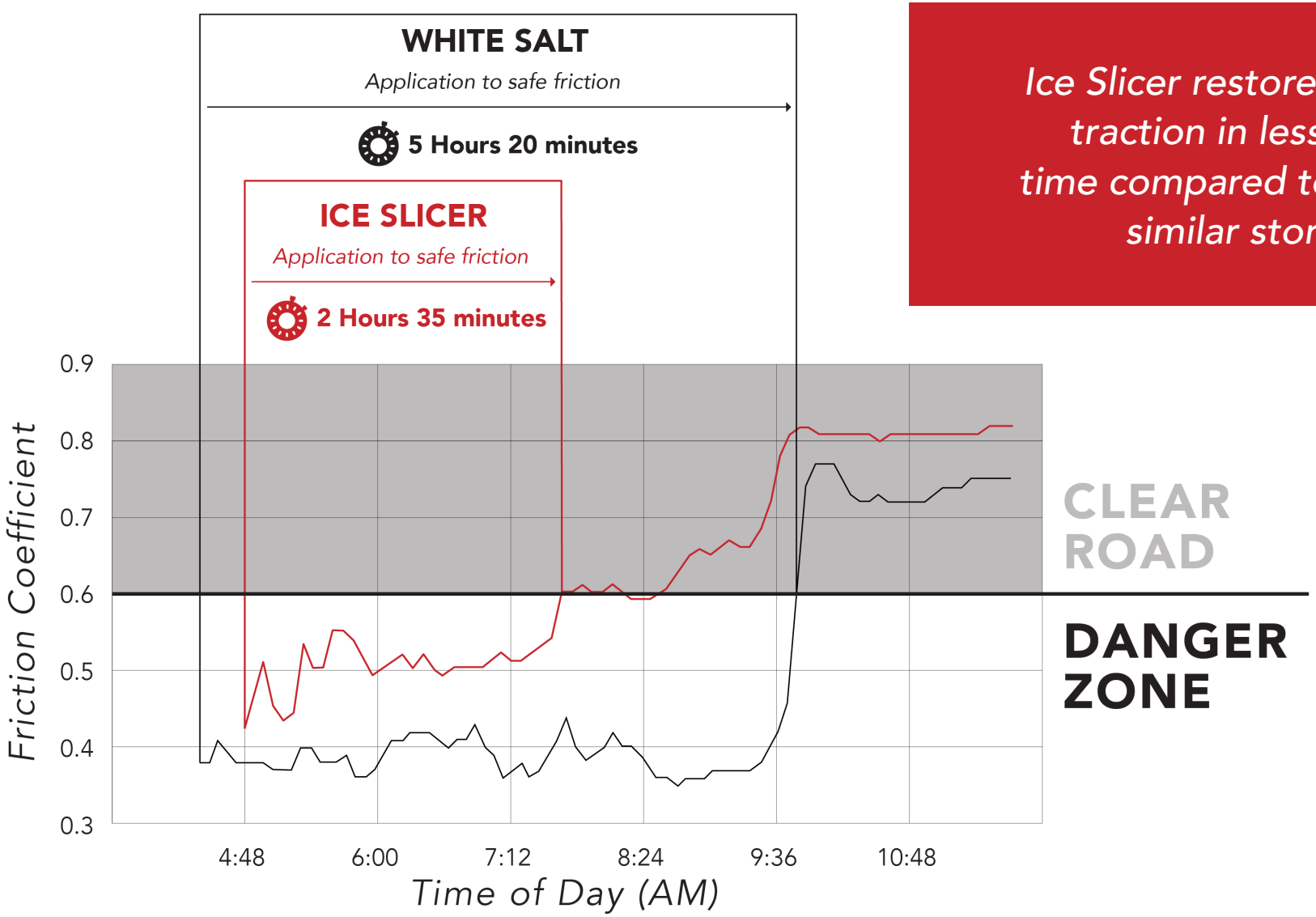
WHITE SALT

I-90 East

- *Application time- 4:30 am*
- *Air temp- 18° F*
- *Surface temp- 23° F*
- *Snowing 1/2" per hour*
- *Light traffic*

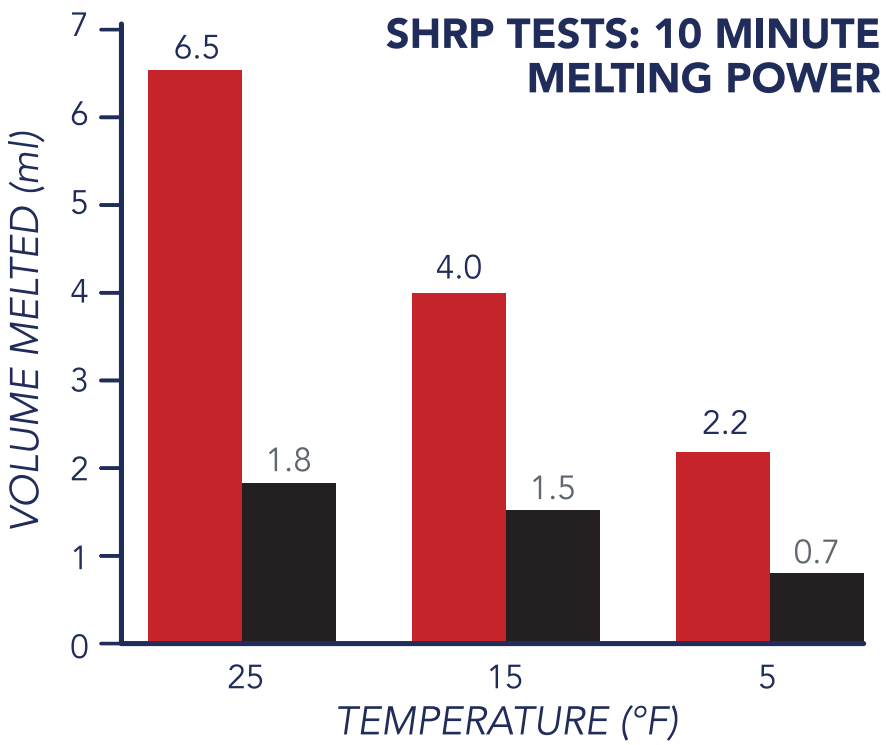
FRICTION PERFORMANCE TEST RESULTS

Sources: Montana DOT, Vaisala Data, EnviroTech Services Inc.

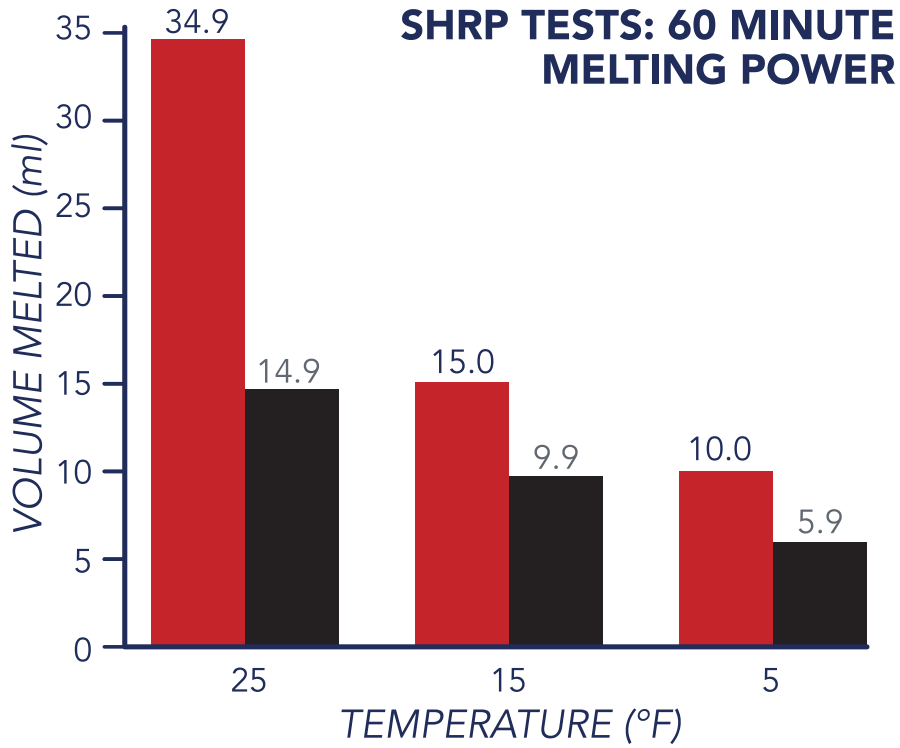


Ice Slicer restored safe driving traction in less than half the time compared to white salt in similar storm conditions.

INDEPENDENT STUDIES
BRINING POWER

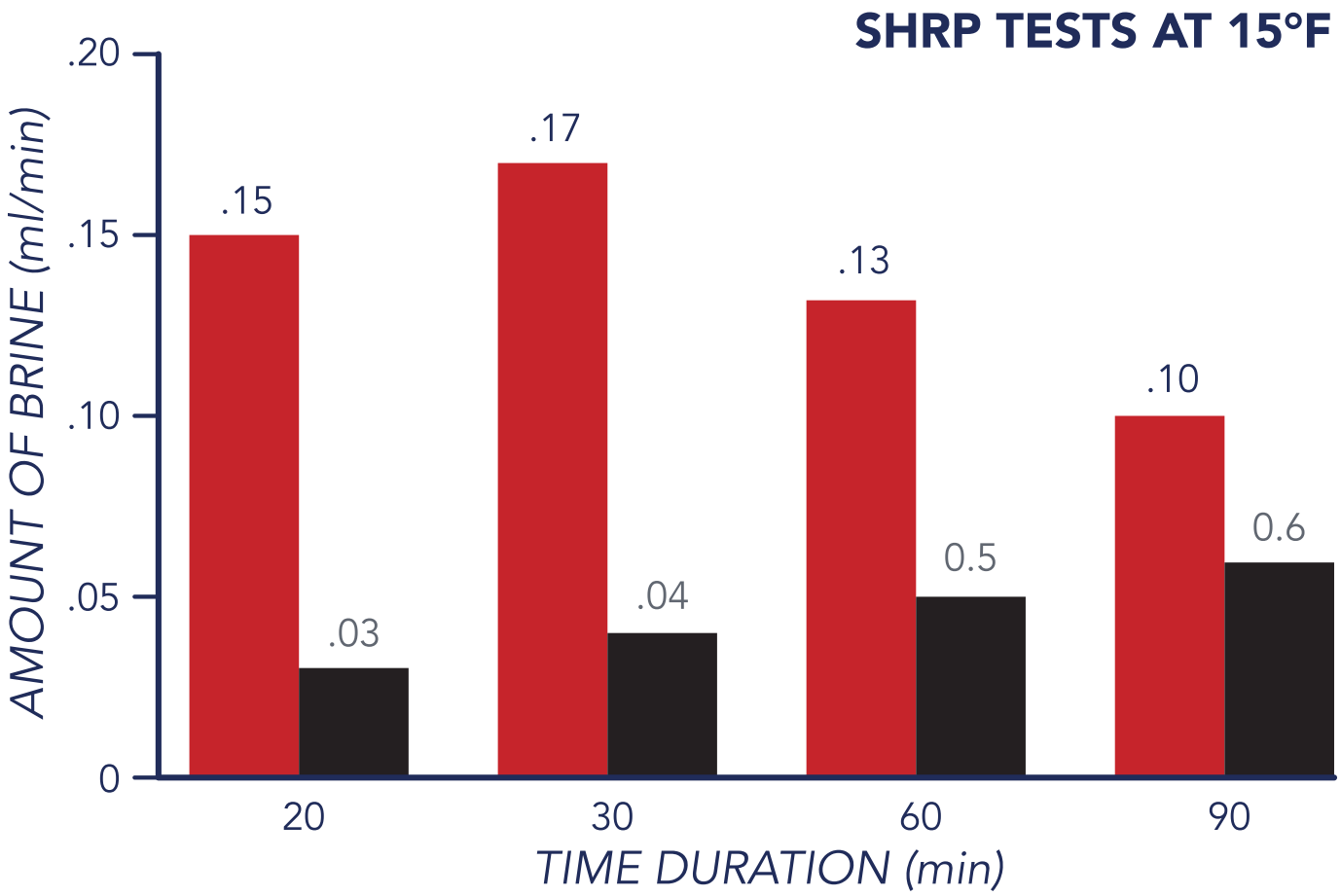


Ice Slicer was over 3x more effective than white salt 10 minutes after application



Ice Slicer was up to 2x as effective as white salt 60 minutes after application

INDEPENDENT STUDIES
BRINING POWER



Ice Slicer created up to 5x as much brine as white salt and maintained higher brine levels in 15° F conditions for up to 90 minutes.

INDEPENDENT STUDIES
DEICING COMPOUNDS AFFECT ON BIOCHEMICAL OXYGEN DEMAND

Biochemical Oxygen Demand (BOD) is one of the most helpful metrics for measuring the affect of deicing compounds on the environment. As roadway runoff flows into local waterways, excess organic materials cause a microorganism feeding frenzy. This feast uses up dissolved oxygen, harms aquatic life, and causes toxic algae blooms and aquatic dead zones.

Studies show that chloride based deicers have the least effect on BOD levels

CHLORIDES

"Chloride deicers, such as sodium chloride (e.g., rock salt and Ice Slicer)...have ***very low biochemical oxygen demand levels***"*

ACETATES

"Acetate can ***increase the biochemical oxygen demand (BOD)*** of streams, causing the ***depletion of dissolved oxygen***."†

GLYCOLS

"Ethylene glycol is ***toxic to aquatic and mammalian organisms***...propylene glycol will ***remain in the environment*** longer than ethylene glycol and will ***consume more oxygen*** while it is being broken down."‡

AGRICULTURAL BYPRODUCTS

"These products often contain high levels of organic materials which ***exert a high biochemical oxygen demand*** (BOD) when broken down by microorganisms in an aquatic environment."§

** Idaho Department of Transportation*
† United States Geological Survey
‡ Federal Aviation Authority
§ Michigan Department of Environmental Quality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