

# INTERCHANGE

Volume 14, Number 1

Winter 2000

## Winter Wonderland

### Salt and the Environment - The Facts

#### Salt: Our #1 Deicer

Salt has been, is, and probably will be for the foreseeable future, the number one deicer in the annual battle against snow and ice control. Snow and ice are a major threat to safe travel on our streets, roads, and highways; traffic accidents sharply increase under winter storm conditions. Municipalities must provide a transportation system that insures mobility and safety. In the winter-time, salt provides the reliable and economic means to accomplish safe road travel.

Many salt alternatives have been deployed, used and tested. Because of the adverse environmental effects associated with salt use, many materials are still being explored. So far the results have not proven effective and economical in battling ice. To balance the needs of winter mobility and safety with environmental concerns, our most promising approach for salt use is to avoid salt abuse.

#### Environmental Concerns

Let's look at some of the major problem areas that can confront us:

#### Corrosions

Salt is a corrosive substance. Although this is a major problem, there

are essential lifesaving aspects of sensible salting for snow and ice control. Various materials and techniques have been and are being developed to lessen the corrosion problem. Vehicle manufacturers have addressed the problem through improved vehicle design and the use of new noncorrosive materials including improved paints and anti-rust coatings. Anti-corrosion warranties increase in length every year. Older vehicles can also be treated with anti-corrosion coatings. Washing vehicles thoroughly once a week during the winter weather also mitigates rust problems.

Bridges (both concrete and steel) can also receive protective coatings. Deck designs now specify thicker

construction with air-entrained, high density concrete over reinforcing steel. The rebars are epoxy coated for added protection. To stop corrosion, cathodic protection systems can be used on older bridges. Again, proper maintenance is important. Protecting exposed steel surfaces with coating systems, sealing deck cracks and joints, and checking and cleaning drain systems are all part of good maintenance. Flushing the bridge deck and structure in the spring can also decrease the salt residual and prevent deterioration.

Concerning roads, the National Asphalt Pavement Association has determined that salt has no effect on asphalt. Still, sealing joints and

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LTAP Local Technical Assistance Program

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<http://baystate.ecs.umass.edu>

# Winter Storm Checklist

## Carry a Winter Storm Survival Kit

- ❄ Blankets/sleeping bags
- ❄ High-calorie, non-perishable food
- ❄ Flashlight with extra batteries
- ❄ First Aid Kit
- ❄ Knife
- ❄ Extra clothing to keep dry
- ❄ A large empty can with plastic cover, and tissues and paper towels for sanitary purposes
- ❄ A smaller can and waterproof matches to melt snow for drinking water
- ❄ Sack of sand (or cat litter)
- ❄ Shovel
- ❄ Windshield scraper and brush
- ❄ Tool kit
- ❄ Tow rope
- ❄ Booster cables
- ❄ Water container
- ❄ Compass and road maps

## Tips

- ➔ Keep your gas tank near full to prevent ice in the



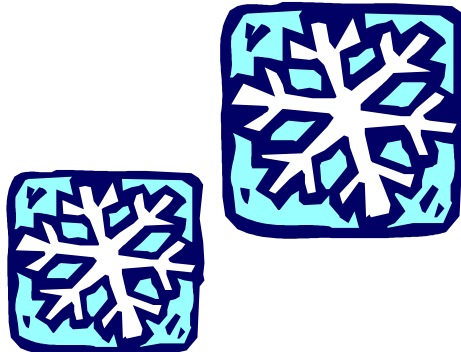
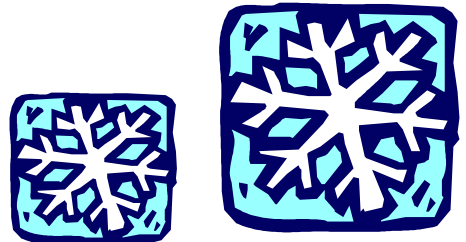
tank and fuel lines which could leave you stranded

- ➔ Try not to travel alone. Let someone know your primary and alternate routes and anticipated timetable
- ➔ Plan your travel and check the latest travel reports on current conditions
- ➔ Fully check and winterize your vehicle before the winter season begins

## Plowing Don'ts

1. Don't: Plow too fast
2. Don't: Throw snow over bridges onto traffic below

3. Don't: Leave snow along the centerline, in intersections, on railroad tracks, or in places where it can melt back onto pavement
4. Don't: Assume traffic knows what you are going to do
5. Don't: Plow a false shoulder
6. Don't: Plow off gravel
7. Don't: Plow off salt before it works
8. Don't: Plow against flow of traffic if it can be avoided



## UPCOMING BAYSTATE WORKSHOPS

### Liability

- 3/21/00 Hotel Northampton, Northampton  
4/27/00 Holiday Inn, Taunton  
5/16/00 Devens Conference Center, Ayer

### Public Works Education Conference

- 5/03/00 Crowne Plaza Hotel, Worcester

### MHA Annual Meeting

- 5/04/00 Crowne Plaza Hotel, Worcester

# Watch What You Eat on Snowplowing Nights

Road crews often battle snow and sleet throughout the night, but usually for only a night or two. That means they are also battling sleepiness since their bodies are adjusted to the usual daytime shift. Sleepiness can be dangerous. At least 10,000 accidental deaths a year are sleep-related and 200,000 traffic accidents annually are due to driver fatigue.

Recent research on sleep deprivation shows that what you eat before and during the nighttime work can affect sleepiness. Since the body slows down at night, it does not want to digest a donut, a "Big Mac," or most other fast foods. Greasy, heavy, protein foods bring on sleep.



Drivers can still enjoy eating, though. Take light, well-balanced meals and eat snacks that are compatible with slower, nighttime digestion.

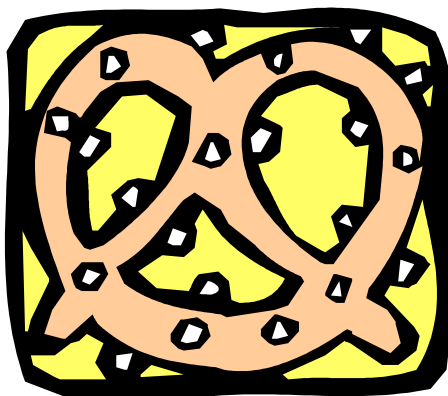
## Main meal before night work (5:00-7:00 p.m.)

→ Eat light protein foods like chicken, turkey, fish, or cooked beans and peas. Vegetables. Fruits, breads, pasta and potatoes are good, as are low-fat milk, cheeses, and yogurt. If

you're planning to sleep before work, make this a lighter and smaller meal.

## Meals during breaks

→ Eat soup and salad, soup and a light sandwich, or light protein foods and vegetables.



## Snacks before and during work

→ Good snacks include low-fat dairy products, fresh and dried fruit, popcorn, cereal, plain cookies, pretzels, and baked crackers.

## Avoid caffeine and nicotine

→ Coffee and tea contain caffeine; smoking and chewing tobacco contain nicotine. These are stimulants at first but soon become depressants. They make the heart beat slower.

## Do not consume alcohol before or during snowplowing operations.

*Previous two articles reprinted with permission of the Wisconsin Transportation Information Center, from Crossroads, Winter 1997*

? *Whatever happened to the "Stop, Look and Walk" stencils that were once painted at every crosswalk in Northampton?*

**ANSWER:** Interestingly, "Whatever happened to Stop, Look and Walk?" was the very title of a grant that Northampton Police Sgt. Andrew Trushaw wrote to secure \$7,500 in funding for a new pedestrian safety program now under way.

Trushaw, 45, said he remembers the stencils as a boy growing up in Northampton, but hasn't seen them in use for at least 15 years.

He said that today, better ways of providing pedestrian safety have replaced the painting of the three cautionary words on roadways.

Nonetheless, the stop, look and walk maxim is on new signs purchased with the \$7,500 grant, awarded by the Governor's Highway Safety Bureau.

The words are on three-foot high signs that sit in the middle of busy streets and face pedestrians. The side facing drivers warns motorists to yield to pedestrians. Pedestrians get that age-old reminder to look before crossing.

"I think the new signs are better because people are looking up -- they are not looking at their feet," Trushaw said.

The signs are also made of reflective material, providing better visibility. The stencils, he said, were time consuming to paint and faded quickly.

*Reprinted with permission from Now You Know, Daily Hampshire Gazette, Northampton, MA*

# WINTER VEHICLE CHECKS

While pre-trip inspections are necessary in all seasons, some items require extra attention in winter.

## Coolant Level and Anti-freeze Amount

Make sure the cooling system is full and there is enough antifreeze in the system to protect against freezing. This can be checked with special coolant tester.

## Defrosting and Heating Equipment

Make sure the defrosters and heaters work and that you know how to operate them. If you expect to use other heaters (e.g. for taillights, mirrors, battery boxes, and fuel tanks), check their operation as well.

## Wipers and Washers

Make sure the windshield wiper blades are in good condition. Check that the wiper blades press against the window hard enough to wipe the windshield clean; otherwise they may not sweep off snow properly. Make sure the windshield washer works and there is washing fluid in the washer reservoir. Use windshield washer antifreeze to prevent freezing of the washing liquid. If you can't see well enough while driving (for example, if your wipers fail), stop safely and fix the problem.

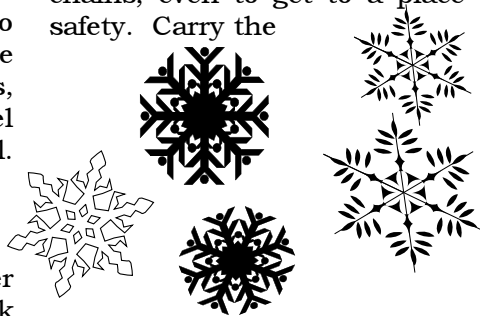
## Tires

Make sure you have enough tread on your tires. The drive tires must provide traction to push the equipment over wet pavement and through snow. The steering tires

must have traction to steer the vehicle. Enough tread is especially important in winter conditions. You should have at least 4/32-inch tread depth in every major groove on front wheels and at least 2/32-inch tread on other wheels. More would be better. Use a gauge to determine if you have enough tread for safe driving. Check air pressure in all tires.

## Tire Chains

You may find yourself in conditions where you can't drive without chains, even to get to a place of safety. Carry the



right number of chains and extra cross links. Make sure they will fit your driver tires. Check the chains for broken hooks, worn or broken cross links, and bent or broken side chains. Learn how to put the chains on before you need to do it in the snow and ice.

## Lights and Reflectors

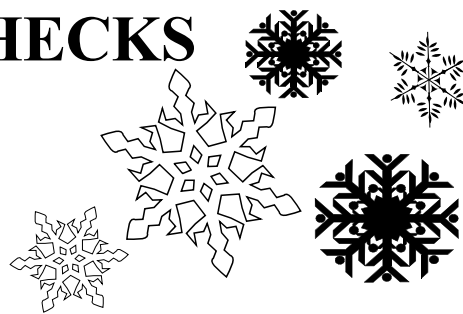
Make sure the lights and reflectors, which are especially important in bad weather, are clean. Check from time to time during bad weather to make sure they are clean, not covered with snow, and are working properly.

## Windows and Mirrors

Remove all ice and snow from handholds, steps, and deck plates, which you must use to enter the cab or move about the vehicle. This will reduce the danger of slipping.

## Radiator Shutters and Winterfront

Remove ice from the radiator shutters. Make sure the winterfront is



not closed too tightly. If the shutters freeze shut or the winterfront is closed too much, the engine may over heat and stop.

## Exhaust System

Exhaust system leaks are especially dangerous when cab ventilation may be poor. Loose connections could permit poisonous carbon monoxide to leak into your vehicle. Carbon monoxide gas will cause you to be sleepy. In large amounts, it can kill you. Check the exhaust system for loose parts and for sounds and signs of leaks.

## Snowplows

Check left and right-blade lights, augur light, and beacon or strobe lights. Reverse the blade to check for loose bolts on plow assembly and leaks in plow hydraulic line. Raise the plow to check evenness of raise. Lower the plow to check clearance. Check wheels and shoes.

## Spreaders

Start the hopper box and check the chain and the spinner. Check left and right augurs or chutes. Check calibration chart.

## Safety Equipment

Check seat belts, first aid kit, fire extinguisher, flares, flashlight, blanket, and candle (for emergency warmth in unheated cab). Test radio. Check backup alarm and caution sign.

*Reprinted with permission from Idaho T2 Center Gem State Roads, Volume IV, No. 1, January 1999.*



# SNOW ROADEOS

## **Snow Plow Rally in Plymouth**

Over fifty people attended the Snow Plow Rally at the Plymouth Airport on November 3 during very windy conditions. The judges used "human stanchions" to help hold down the barrel markers so they would not blow away; these assistants, of course, moved aside as the trucks came near. Nineteen teams competed with Wareham taking the overall prize. Sponsors for this event included Massachusetts Interlocal Insurance Assn., Plymouth County Highway Assn., and Baystate Roads Program.

## **Snow Plow Rally in Concord**

For their yard, DPW employees at Concord developed a smaller course which would be suitable for any individual towns wishing to hold a roadeo. Over 50 people participated in this challenging competition at the department of public works on November 12. The winning team at Concord was Rich Hathaway and Peter Hughes of the 14 teams who contributed to this friendly, skill-building event. A written exam and sidewalk course expanded this refresher activity.

## **Snow Plow Workshop in Lee**

At the western edge of the commonwealth, Chris Ahmadjian presented a training workshop for ten people with the assistance of Dennis Kelly, the DPW superintendent, at Lee on November 10. Promoting safe, efficient equipment operation was the objective for a team who takes care of those snowy roads in the Berkshires.



*continued from page 1*

cracks prevents melting snow from entering the road structure and prevents the structural degradation of the road. Maintaining the road surfaces - whether asphalt or concrete - includes the provision of a water-proof surface with good drainage.

## **Roadside Vegetation**

High concentrations of salt can sometimes be harmful to roadside vegetation. The degree of harm to vegetation relates to four factors: the amount of salt, type of soil, total precipitation and plant species. If salt was used effectively and conservatively, salt accumulation on roadsides would be insufficient to cause vegetation problems. A ten year study conducted in Maine by their Department of Transportation and the Maine Agricultural Experimental Station along I-95 near Bangor showed no adverse effects of salt accumulation in roadside soils.

In addition, roadside vegetation is subjected to many other problems affecting the roadside environment - compacted soils, plant and root injuries during road construction, soil moisture level changes and toxic effects of vehicle emissions. Effective salt use coupled with roadside landscape planning using salt tolerant plant species should eliminate any salt-related problems. There are numerous studies from various agencies on salt tolerance of vegetation that provide lists of recommended salt tolerant plants for roadside plantings.

## **Wildlife and Fish**

Salt is an essential nutrient for animals. It is particularly valuable in agriculture as a carrier of trace minerals needed in small quantities but unavailable in regular feed. Salt licks are widely used to give domesticated and wild animals (such as deer) access to the salt they need. Animals instinctively limit their intake of salt and cannot

be harmed by eating salted snow or rock salt pellets.

Since saltwater fish tolerate as much as 30,000 ppm (about 15 teaspoons of salt per quart of water), it is obvious that freshwater fish pose the greatest concern for salt runoff. Biologists from the Department of Energy's Oak Ridge National Laboratories have found that freshwater fish can tolerate between 7,500 and 10,000 ppm of salt. This amount is equal to three to five teaspoons of salt per quart of water - far more than any possible runoff from an effective and efficient deicing program.

## **Human Health**

Salt is an essential nutrient for humans as well as animals. During the 1960s and 1970s, salt was considered a public health hazard and concerns were raised that deicing salt washed from the roads into streams and rivers could present a health risk in our drinking water. Recent research has shown, however, that salt is not a major health hazard, as once believed.

In 1988, the national Primary Drinking Water Regulations (issued by the Federal Agency of EPA) eliminated sodium as a regulated drinking water contaminate.

Some of the sodium from deicing salt disperses into roadside soils, never reaching water supplies. Chloride, the other component of salt, is more likely to end up in the drinking water because of its high water solubility. Chloride affects taste but has no effects on health at the levels possible from road salt.

## **The Real Problems**

Almost all environmental problems associated with the use of salt for snow and ice control stem from two conditions - *excessive use and improper storage*.

Municipalities need to store salt in

bulk because adequate salt must be available to meet the anticipated winter storm needs. The potential stockpile problems result from rain and snow, causing brine runoff in sufficient quantities to harm nearby water supplies and vegetation. This problem can be eliminated through proper storage practices. Salt should be covered by a roofed structure water-proof covering.

Salt should be stored on an impermeable pad, not on the ground. Asphalt pads are recommended. Concrete pads should consist of high quality, air-entrained concrete treated with linseed oil or asphalt coating. Additionally, any potential runoff from the stockpile should be contained by an adequate drainage design.

You may also want to consider prewetting salt with a chemical such as calcium chloride and/or magnesium chloride. This technique reduces the amount of salt needed to get the results you want. Prewetting can also save you money.

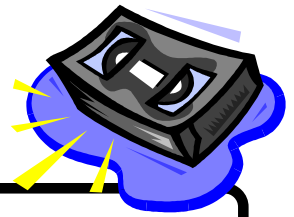
Much of the proceeding information is found in the "Salt Storage Handbook" and the "SnowFighter's Handbook", obtained from the Salt Institute. This organization provides a valuable resource on any salt issue and welcomes requests for their materials and information. The Salt Institute can be reached at: Salt Institute, 700 North Fairfax Street, Fairfax Plaza, Suite 600, Alexandria, Virginia, 22314-2040, Telephone Number: (703) 549-4648.

Effective salt use and proper salt storage will eliminate major environmental problems and at the same time still provide for a safe transportation system.

*Reprinted with permission from Alan Gesford, LTAP Transportation Engineer, The Pennsylvania Local Roads Program, Moving Forward, Volume 14, Number 4, Winter 1996.*



# Publications and Videos



## **FREE PUBLICATIONS**

Ice Breakers Workshop Handouts (Speakers Chip Aries & Paul Brown)

Planning and Financing Capital Improvement Programs, APWA presentation, 1996

TRA-44      Roadway Deliniation Practices Handbook, 1994

D&C-37A      Development of a Procedure to Rate the Application of Pavement Maintenance Treatments, Specifications for Chip Seals, Slurry Seals, & Crack Sealing, 1992

D&C-37B      Development of a Procedure to Rate the Application of Pavement Maintenance Treatments, Rating Tree Procedure for Chip Seals & Crack Sealing, 1992

COM-10      Road Surface Management Systems (with disks), 1998

D&C-27      Local Low Volume Roads & Streets, 1992

S&I-48      Manual of Practice for Effective Anti-Icing Programs, 1996

UNS-18      Field Guide for Unpaved Rural Roads, 1997

ASP-32      Asphalt Pavement Repair - Manuals of Practice, 1993

TRA-59      Work Zone Safety - Construction, Maintenance & Utility Operation, 1997

T&P-24      Partnering Concepts, NHI Course 13444, 1995

PLA-46      Standardized Scope of Work & Manhour Estimate, MHD, 1991

PLA-48      Future of Transportation Starts Here, ITS, 1998

COC-38      Concrete in New England, MACAPA

D&C-27      Local Low Volume Roads & Streets, 1992

D&C-15      Comparison of Three Compactors Used in Pothole Repair, 1984

MAI-24      Inspector's Job Guide & Highway Maintenance Tables, 1997

## **COMPLIMENTARY VIDEOS**

DC-158      Utility Cut Repair: Doing it Right

DC-159      Utility Cuts in Paved Roads

ST-166      Making Roads Safer



**Please FAX your requests by code number to Baystate Roads at 413-545-6471 or call 413-545-2604.**

*Congratulations to the newest Baystate Roads Scholars on your fine achievement. Keep saving those certificates and you, too, could be listed here!*



**Malcolm Gibson**  
**Medfield DPW**

**William Decelles**  
**Lanesborough DPW**

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The Baystate Roads Program, which publishes *Mass Interchange* each quarter, is a Technology Transfer (T2) Center created under the Federal Highway Administration's (FHWA) Local Technical Assistance Program (LTAP). FHWA is joined by the Massachusetts Highway Department, the Department of Civil and Environmental Engineering at the University of Massachusetts/Amherst, and local public works departments in an effort to share and apply the best in transportation technologies.

In addition to publishing *Mass Interchange*, the Baystate Roads Program facilitates information exchange by conducting workshops, providing reports and publications and videotapes on request, and offering one-to-one technical assistance on specific roadway issues. Because the program relies on input from many sources, inquiries, articles, and ideas are encouraged.

### LTAP Local Technical Assistance Program

To contact the Baystate Roads Program call (413) 545-2604 or FAX 413-545-6471.

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