

**SALT &****Highway Deicing™**

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## FEELING A BIT UNDER THE WEATHER? GET “SMART”!

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**E**veryone talks about the weather. “Smart highways” aim to do something about it.

Weather plays a significant role in the everyday lives of people who need to travel, and often creates dangerous travel conditions that affect transportation systems and user safety. To reduce the risk of injury or death to the traveling public and reduce the negative economic consequences of adverse weather to goods movement, many roadway managers have turned toward advanced technology to improve roadway operations. These technologies have proven particularly valuable in addressing weather-related challenges. The *National ITS Program Plan: A Ten-year Vision*<sup>1</sup> stated the following about the impact of weather on transportation:

*Weather is a common threat to the performance of all transportation modes. While the weather information currently provided by both the National Weather Service and private sector providers is well developed, it is not sufficient to aid in effective operations of the surface*



*transportation system. Significant benefits result when the operators are provided with tailored weather products, i.e., pertinent information about the impacts of weather on the system and the tools and techniques to deal with them. The Weather and ITS community can work together to achieve goals such as: (1) Improving weather information and applications available in the Operation, Maintenance and Management of our roadways; and (2) providing better information to travelers during storms or weather-related events or evacuations.*

### WEATHER AND ITS IN OPERATIONS

A great deal of information is required to successfully operate transportation systems, whether roadways, transit systems, or commercial fleets. One of the major goals of ITS over the past ten years has been to increase the amount of information available to operators in operating and managing these systems.

The Office of the Federal Coordinator for Meteorology has developed a useful tool in its *Weather Information for Surface Transportation: National Needs Assessment* report.<sup>2</sup> This report documents weather requirements; its appendices spell out the road weather information requirements, providing a template for ITS planning.

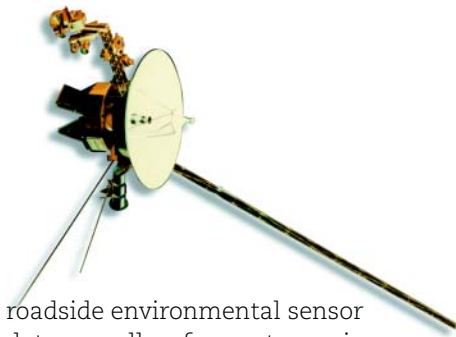
The Maintenance Decision Support System (MDSS) project is a multi-year effort to prototype and field test advanced decision support software for winter road maintenance.<sup>3</sup> The MDSS relies on

—see **UNDER THE WEATHER**,  
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<sup>1</sup> ITS Program Plan: <http://www.itsa.org> under “Publications.”

<sup>2</sup> WIST Report: [http://www.ofcm.gov/wist\\_report/wist-report.htm](http://www.ofcm.gov/wist_report/wist-report.htm)

<sup>3</sup> MDSS: [http://www.rap.ucar.edu/projects/rdwx\\_mdss/](http://www.rap.ucar.edu/projects/rdwx_mdss/)



roadside environmental sensor data as well as forecasts coming from external weather sources and data from snowplows equipped with automatic vehicle location and GPS. It is currently in operational testing in Iowa.

The Intelligent Vehicle Initiative has also focused on winter maintenance in its “specialty vehicle” program automating elements of snow plow operations for both safety and data gathering.

ITS also includes the deployment of 511 telephone travel information services<sup>4</sup> in many areas of the United States that provide travelers with weather-related road conditions. A number of states have also made RWIS<sup>5</sup> information available on web sites.

The ITS standards program<sup>6</sup> has produced a number of weather-related standards, including the Environmental Sensor Station standard for RWIS, weather elements in the Advanced Traveler Information Systems standards, as well as a number of other standards.

There are many examples of the use of ITS to improve transportation system operation under adverse weather conditions, including closed-circuit television (CCTV), road weather information systems

(RWIS), 511 (the national traveler information number), road closure notification/diversion coordination, dynamic message sign (DMS) advisories, variable speed limit (VSL) technologies and enforcement, in-vehicle devices, sensor/detection systems and other field devices, signal control systems, lane closure/direction change systems, smart work zones, and highway advisory radio (HAR).

### **BUFFALO, NEW YORK**

Let’s see how notoriously snow-impacted Buffalo, NY, has turned to ITS solutions. The Niagara International Transportation Technology Coalition (NITTEC) is an organization of fourteen agencies in Western New York and Southern Ontario, Canada, whose mission, in part, is to improve regional and international transportation mobility. NITTEC provides real time traffic and roadway information, as well as information on driving conditions to improve traffic flows, user safety, system reliability and emergency response using CCTV, DMS, HAR, a skyway closure system and more. It gathers data from RWIS road sensor installations, gathers real-time vehicle travel time information and coordinates the entire operation in a 24/7 Traffic Operations Center that collects and analyzes real-time traffic information for the purpose of distribution to NITTEC Stakeholders and the public.

### **DELAWARE DOT**

While Delaware is a relatively small state, much of it lies at low elevations, and many of its citizens live within a short distance of several significant bodies of water. In addition, Delaware is an East Coast state, bringing additional challenges from intense winter storms, significant snowfalls, and tropical storms. Monitoring air and road surface temperature conditions, as well as precipitation,

is critical for deciding when and where the Delaware Department of Transportation (DelDOT) should mobilize road crews, and is also critical information that can prove vital to public safety and law enforcement. For example, monitoring air temperature and atmospheric humidity can indicate the likelihood of fog, particularly when coupled with GIS information. Also, the ability to link weather conditions to the potential for flooding is an important tool for transportation officials and emergency planners.

As for most states, it is critical that weather conditions are continuously and accurately monitored and reported to provide real-time weather information to support decision-making by both road operators and the traveling public, particularly commercial vehicles. Only three locations in Delaware take professional, hourly measurements of critical weather variables as part of the US National Weather Service (NWS) network. The Delaware Emergency Management Agency (DEMA) and the Delaware Department of Natural Resources and Environmental Control (DNREC), as well as DelDOT, also measure certain weather variables, but their observations are not coordinated, or easily available to decision-makers.

Therefore, Delaware created its Delaware Environmental Observing System (DEOS) as a tool for decision-makers. DEOS integrates about 30 new meteorological observation sites with existing ones, focusing on providing real-time meteorological and hydrological variables via the internet, integrates these observations with NWS radar estimates of precipitation, including recalibration and interpolation of data into a hi-resolution spatial grid. It presents the results both digitally and graphically and provides decision support in two

<sup>4</sup> 511 Deployment Coalition: <http://www.deploy511.org>

<sup>5</sup> Aurora Program (RWIS): <http://www.aurora-program.org/>

<sup>6</sup> ITS Architecture: <http://www.itsers.com/itsarch/>  
ITS Standards: <http://www.its-standards.net/>

environmentally-sensitive areas: flooding under storm and surge, and estimates of nitrogen/phosphorous runoff.

## THE FUTURE

A number of projects, initiatives, and ideas revolving around new data sources and more integrated information networks for transportation have been proposed over the past few years. For example, with the introduction of better road weather information into Traffic Operations Centers, ITS will also help managers develop better weather-responsive traffic management strategies. Future projects, including the Vehicle Infrastructure Integration (VII) initiative, the Infostructure,<sup>7</sup> and the Integrated Network of Transportation Information (INTI), hold great promise in providing better weather information via ITS applications in the not too distant future.

The FHWA's Road Weather Management Program<sup>8</sup> is working on a number of initiatives that promote the application of ITS solutions to the weather problems. In particular, the FHWA is promoting the use of sensor and communications standards for RWIS observations, defining the best methods for data sharing and processing, and improving the integration of the information into the decision-making process of road users and operators.

The American Meteorological Society's ITS and Surface Transportation Committee and ITS America's Weather Information Applications Special Interest Group has been working together for over 3 years to better integrate the road

weather and ITS communities. The groups have worked together on elements of incorporating weather information into 511, how weather fits into the ITS architecture, weather standards, the MDSS and more.

ITS America expects to play an important role in closing the gap between weather information and effective action on specific, surface transportation environmental threats, and the use of technology in all seasons and under all conditions to improve surface transportation safety and reliable operations.

## A FEW CONCLUSIONS

Adopting ITS as a new tool for roadway managers requires regional cooperation and coordination. Managers considering ITS solutions should make sure that area jurisdictions have compatible equipment, can share data, and have similar operating standards and procedures. Use technology to make sure the right equipment and the right people are at the right place at the right time and for the right reasons. Deploy systems so that they can prove their benefit in specific, quantifiable ways. Evaluate their effectiveness – from both a cost and benefit perspective – to demonstrate value to the traveling public and to relevant stakeholders, including elected/appointed officials. Seek both short- and long-term wins from technology deployment. In the short-term, deploy some high-

visibility (or high-impact) technologies that require a minimum of ramp-up. But also plan for the long-term, 10-20 years into the future – what is your jurisdiction going to look like then? What will its needs be? How might you meet those needs with technology?

## Q&A

### Q. How much does a snowstorm cost?

A. This winter's first snowstorm in the East the first week of December 2003, cost New York City about \$14 million and Boston about \$3 million. But that was just for public agency snowfighting costs. Another way to look at the cost is what would be the impact on the economy if effective snowfighting didn't keep roadways open and safe? There are no comprehensive studies, but a 1998 study by a company now known as Global Insight, Inc., found that the costs of lost wages, lost retail sales and lost local, state and federal taxes alone dwarf the snowfighting "cost." The survey was state-by-state and province-by-province in Canada so direct comparisons are not possible. But a one-day blizzard that shut down New Jersey, for example, would have cost \$45 million just for lost wages, sales and taxes; in New York State, the cost would have been \$89 million. To that needs to be added a lot of other costs imposed by lost mobility and safety on winter highways.



<sup>7</sup> "Weather in the Infostructure." <http://www.its.dot.gov/511/PDF/wethinfo.pdf>

<sup>8</sup> Road Weather Management Program: <http://www.fhwa.dot.gov/weather/>

**Q. The Salt Institute continues to promote snowfighter training, but you no longer offer Sensible Salting Seminars. How do I get my workers trained?**

**A.** Snowfighter training is as important as ever. The Salt Institute continues to invest heavily in customer education; we've just changed our strategy. In the U.S., the Salt Institute has entered into a strategic partnership with the National LTAP Association, the organization representing 56 transportation technology transfer programs. This partnership has produced a series of new training materials for use by LTAP center trainers and by agency trainers themselves. In Canada, the Salt Institute is working with the Transportation Association of Canada and with the Ontario Good Roads Association. With Salt Institute support, TAC is developing a Road Salt Management Learning Guide to implement a new salt management Code of Practice. The Institute is also supporting OGRA's train-the-trainer program and a series of operator

and supervisor workshops by OGRA instructors for public works agency personnel. In October 2003, the Institute also sponsored a train-the-trainer program for the Canadian Public Works Association's Atlantic Chapter.

**Q. Many agencies have switched from using sand and gravel to applying straight salt, particularly to provide safe roadways in frost conditions. We've used salt pre-wet with liquid sodium chloride. Now we're reading a lot about pre-storm brine application. Are there guidelines of when to use brine and when to use pre-wet salt pre-wet salt versus brine?**

**A.** The Salt Institute provides anti-icing information at (<http://www.saltinstitute.org/anti-icing.html>). The Federal Highway has useful guidelines <http://www.fhwa.dot.gov/reports/mopeap/mop0296a.htm> and the Iowa DOT has an excellent video on the subject. In 2003, the Danish Road Directorate and Environmental Protection Agency produced a joint study comparing pre-wet salt with liquid brine. Their conclusion: For frost, using brine instead of pre-wet salt can maintain safe roads with a 30% savings in salt usage. In snow situations, where most of the salt is being used, there were not salt savings in applying salt brine. Let us know if you want the study; we can email it you. ■

You just enjoyed another electronic **Salt and Highway Deicing** Newsletter! It helps you make better decisions in your winter maintenance responsibilities and gives even more information by active links to [www.saltinstitute.org](http://www.saltinstitute.org) [www.saltinstitute.org](http://www.saltinstitute.org) with specific pages to further snowfighter information. Feel free to forward this newsletter to other interested persons so they can also enjoy this informative free quarterly. Please sign up at: <http://www.saltinstitute.org/subscribe/index.html>



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