

TRANSITION PLAN LEAD STATE TEAM ANTI-ICING / ROAD WEATHER INFORMATION SYSTEMS

Background

As part of the Strategic Highway Research Program anti-icing techniques and Road Weather Information System (RWIS) technology were identified as areas within highway operations, winter maintenance, that showed promise for use. As a result two SHRP projects were developed. Project H-207 examined the emerging technology of Road Weather Information Systems (RWIS) and project H-208 considered the development of anti-icing technologies. At the conclusion of the SHRP, the work conducted by the Anti-icing project team and the participating states was expanded and continued under the Federal Highway Administration (FHWA) Test and Evaluation Project 28 for an additional two years. The result of this work produced the Manual of Practice for an Effective Anti-icing Program: A Guide for Highway Winter Maintenance Personnel¹.

Based on the success of these programs during SHRP and subsequent studies, Anti-icing / RWIS was identified as a technology area by the AASHTO Task Force on SHRP Implementation to be included in the Lead State Program for continued implementation efforts.

Professional staff of states, agencies, and private industry involved in early implementation efforts were identified to form the core of the Lead State Team for Anti-icing / RWIS Technology Group. These agencies were:

State Agencies

- New York Department of Transportation
- Pennsylvania Department of Transportation
- Minnesota Department of Transportation
- Iowa Department of Transportation
- Colorado Department of Transportation
- Nevada Department of Transportation
- Washington State Department of Transportation
- Missouri Department of Transportation (Team Facilitation)

Federal Highway Administration

- Iowa Division
- Kentucky Division
- Regional Office in Baltimore
- Office of Technology Applications

Private Industry

- Surface Systems, Inc.

¹ Publication Number FHWA-RD-95-202, June 1996

Vaisala, Inc.
Spray Center Electronics
University of Iowa

While this team was one of the largest of the Lead State teams, it has been very successful at advancing the implementation efforts in this technology area. The strength of the team was due in large part to their energy and enthusiasm for the technology. Team membership cut across institutional boundaries to include both snow and ice practitioners and managers from traditional and non-traditional professions.

Accomplishments

Beginning with the first Annual Lead State Workshop in 1996, there have been four consistent themes the Team believed important to the implementation of this technology. These themes were articulated through the establishment of the goals and associated strategies. These four themes are:

- Document implementation experiences, tools, and techniques. These experiences become the basis for determination of the benefits and costs associated with technology.
- Continue the use, refinement, and expansion of Anti-icing and RWIS technology within the Lead States.
- Enhance the ability to communicate internally and externally. Through communication at the grass roots level, technology transfer and assistance can be achieved
- The development of programs to transfer the knowledge and to provide technical assistance through one on one encounters and training opportunities.

The complete set of accomplishments is listed in the Proceedings of each Annual Meeting and attached as an appendix to this report. Some of the more notable accomplishments of the Team are listed:

- Completion of the Teams Anti-icing/RWIS Marketing Plan including video, ice scrapers, and brochures. Team members have become a regular participant at trade shows, symposiums, workshops, and conferences.
- Integration between RWIS vendors has begun. Many new developments have taken place in the field of snow and ice control equipment including solid spreaders and brine making and application equipment.
- Communication has become enhanced through the utilization of the Web Site and the Snow and Ice "List-serv". Last reports indicate the web site has been averaging 600 hits per month.
- RWIS equipment has become integrated into the ITS community through winter weather information to motorists and as a platform for rural ITS applications.

- Advancements in RWIS equipment and anti-icing technology has taken the technology to the next level with automatic fixed broadcast systems for specialized locations such as bridge decks.
- Private industry and a non-traditional partner, the insurance industry, has realized the benefits of RWIS technology and Anti-icing strategies and begun funding specialized projects particularly in British Columbia, Canada.
- Close ties have been forged between the Team and other snow and ice control groups influencing the development and application of this technology: SICOP, AURORA, PNS, and involvement on several NCHRP project panels.

Work In Progress

The work underway at the time of transition involves two discrete projects and two continual projects.

- Benefit/Cost analysis
- Training
- Web site maintenance
- Outreach

A project looking at the documentation of the benefits and costs associated with the technology has been funded through NCHRP Project 20-7. A project team has been formed and a contractor selected to perform this work. Because the technology area is broad and there are many opportunities to realize benefits, this study will focus on case studies for particular installations.

The project attempting to develop a formal training program for RWIS / Anti-icing is moving forward in such a way as to leverage the talents and resources of several agencies and groups. Through SICOP and the Winter Maintenance Policy Coordinating Committee (WMPCC), a technical working group has been formed to spearhead the development of a computer based training program for this technology. All indications are that the AURORA Group will participate along with individual state and local units of government to fund this project.

Ongoing projects include the maintenance of the Web Site, maintenance of the snow and ice "List-Serv", and outreach efforts all appear to have financial support for the short term. The mechanism for outreach has taken shape in the form of regional user group meetings. In order to overcome difficulties associated with out of state travel, many of these meetings are conducted at common state lines or where three states come together. In other instances, the FHWA has sponsored exchanges and scanning trips where travel has been funded at the Division level. Lastly, the web site and e-mail has been utilized to exchange information and "trouble shoot" application of the technology between users.

- a. Any remaining marketing materials and promotional items can be transferred to the maintenance committee for their use in furthering the marketing effort. Limited financial resources MAY be available if we have anything left by then from the marketing grant.
- b. We have the RWIS exhibit/display system and possibly some financial resources that may still be available for transfer to continue information transfer through participation in conferences/workshops. Andy Mergenmeier has these items.
- c. The market penetration survey report/results will be available. The latest report and the original baseline report may be valuable information for the subcommittee. The data could be used as a basis or further studies.

Lead State Positive Lessons Learned

The success of this Team has been in large part due to the fact that the team members were dedicated stakeholders in both their own agencies snow and ice program and in the advancement of new promising technologies. The second major contributor to the success of the team was the multi-disciplinary make up of the team membership. Team membership cut across many layers of agency management and included professionals from areas not normally associated with winter maintenance.

Lead State Challenges to Overcome

Through the course of the Lead State efforts there was several obstacles to overcome. The most common theme deals with the uncertain availability of financial support to accomplish strategies and goals associated with implementation. Along with the uncertainties of funding came the availability of staff hours to conduct the required work. Major implementation efforts, such as the benefit – cost work, formal training program, and marketing plan, required a level of effort beyond the individual volunteer level. As it turned out many of our Team members were working on these tasks as part of their regular duties and their agencies willing to share their efforts with the Team.

While the ultimate funding of the Teams implementation strategies were obtained, there was always a hunt for funds. This could have been overcome if there was an identified source of funds, as we discovered late in the game by utilizing NCHRP, and SICOP.

Transition

This teams activity will be transitioned into the AASHTO Sub-committee for Maintenance, and more particular that sub-committee's task force for snow and ice. The leadership and primary support for the teams continued implementation activities will be coordinated through the AASHTO Winter Maintenance Policy and Coordinating Committee (WMPCC) and the associated SICOP. Additional Support will be derived through the Transportation

Research Board Sub-committee on Winter Maintenance (A3C09) with liaisons with APWA and NACE.

To this end, the WMPCC – SICOP who's membership included representation from each AASHTO region, APWA, NACE, Pacific Northwest Snowfighters (PNS), and AURORA has been modified to include the Lead State Team Leader, an AASHTO – Sub-committee on Maintenance Task Force on Snow and Ice member, and the Chairman of the TRB Sub-committee on Winter Maintenance (A3C09). This robust team now includes membership from each of the major groups playing a significant role in the implementation of new technology in snow and ice control.

The opportunity for implementation successes under this plan for transition is high as the SICOP has a mechanism for funding implementation projects.

Anti-Icing / Roadway Weather Information Systems Lead State Team for SHRP Technology Implementation

Mission

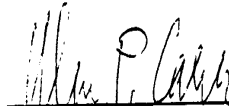
To provide leadership and technical assistance to promote implementation of evolving technologies, tools and techniques for snow and ice control.


We believe that the above mission statement along with the attached goals, strategies, and action plan, developed by our Team, constitute a practical, achievable program to further the adoption of SHRP technologies; and we are committed to executing this program:


Team Members

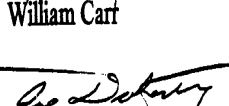
AASHTO Conference of Lead States for Implementation of SHRP Technologies;
September 18-19, 1996

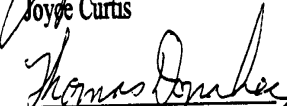

Chuck Bosch

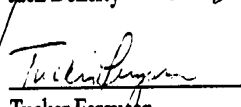

William Carr

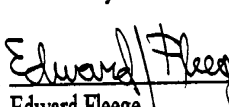

Joyce Curtis



Jack Doherty

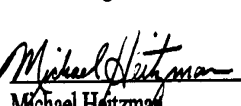

Joe Doherty

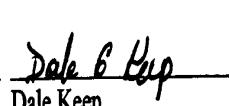

Thomas Donahay

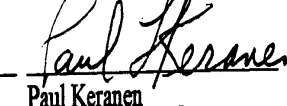

Tucker Ferguson



Edward Fleege



Dena Gray-Fisher

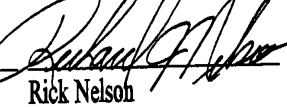

Michael Heitzman



Dale Keep

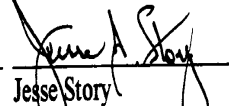

Paul Keranen

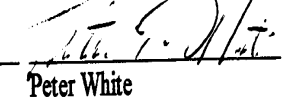

Wayne Lupton



Salim Nassif


Rick Nelson


Randy Stanczak


Jesse Story


Peter White


Linda Moen, Facilitator

Anti-Icing / Roadway Weather Information Systems Lead State Team for SHRP Technology Implementation

In support of the mission defined above; the following goals, strategies, and action plan were defined by the Anti-Icing / Roadway Weather Information Systems (RWIS) Lead State Team at the St. Louis Conference on September 18-19, 1996. These materials are subject to refinement as the Team continues its work.

Goals / Strategies / Action

- A. Continue Anti-Icing / RWIS Use, Expansion, and Refinement in Lead States
 - 1 - Network (Share information among Lead States)
 - 2 - Disseminate Manual of Practice and Ensure Use
 - 3 - Partner with Industry (Keep Up with New Tools and Technology)
 - 4 - Participate in Demonstration / Research Projects on New Technologies in This Field

- B. Ensure the Documentation and Aggregation of Experiences with Technologies, Tools, and Techniques
 - 1 - Establish a process to document and aggregate experiences
 - 2 - Develop baseline report
 - 3 - Establish a mechanism for periodic review and validation of process

- C. Develop Programs to Transfer the Knowledge and To Provide Technical Assistance
 - 1 - Education: Public awareness, Training
 - 2 - Technical Assistance
 - 3 - Promotion: National & regional conferences, State / local presentations
 - 4 - Clearinghouse
 - 5 - Marketing: Program development, Administration buy-in

- D. Get Support of Private Industry
 - 1 - Identify and convey our needs
 - 2 - Explore and develop partnership opportunities
 - 3 - Invite participation at showcases, workshops and conferences
 - 4 - Offer training for private contractors and other public agencies

(See following pages for details of Strategies and Action Plan defined as of 9/96)

ANTI-ICING/ROADWAY WEATHER INFORMATION SYSTEMS
Lead State Team for SHRP Technology Implementation
September 18-19, 1996, St. Louis, Missouri

MISSION STATEMENT

To provide leadership and technical assistance to promote implementation of evolving technologies, tools and techniques for snow and ice control.

Goal #1 - Continue Anti-icing/RWIS use, expansion and refinement in Lead States.

Strategy: 1.1 - Network (Share information among Lead States).

The importance of continued development and discussion among the Lead States as well as drawing in the experience of others is important to maintain momentum of implementation.

Resource Needs:

Potential for U. of Iowa Network and 5 days/quarter (staff time) input from team.

Action:

Discussion Group to be on line by 03/15/97.

- 1) Identify location for Internet discussion group.
- 2) Establish discussion group.
- 3) Advertise location of discussion group.

Target Date - 03/15/97

Estimated Cost - 20K

Person Responsible:

William Carr, Director, Office of Technology Applications,
Washington DOT, PO Box 47350, Olympia, WA 911504,
Phone: 360-705-7802, Fax: 360-705-6823,
Internet: bcarr@wsdot.wa.gov

Strategy: 1.2

Disseminate Manual of Practice and ensure use.

General distribution often does not get the documents into the correct hands of implementation. This distribution would target the users at the field level.

Resource Needs:

Additional copies of manual, mailing list, postage.

Excerpt: Proceedings-- First Lead State Conference - 1996

Action:

Redistribute to the appropriate users in Lead States.

Target Date - 12/15/96

Estimated Cost - 20K

Person Responsible:

Salim Nassif, FHWA, HNG-21, 400 Seventh Street, SW,
Washington, DC 20590, Phone, 202-366-6026,
Fax: 202-366-9981, Internet None

Strategy: 1.3

Partner with Industry (Keep up with new tools and technology).

Resource Needs:

As required.

Action:

See Goal #4 for Activities (Partner with Industry)

Target Date - On going.

Estimated Cost - Unknown

Person Responsible:

Edward Fleege, RWIS project Administrator, Minnesota DOT,
1123 Mesaba Avenue, Duluth, MN 55811,
Phone: 218-723-4960 Ext. 3540, Fax. 218-723-4874
Internet.- edfleegfleege@dot.state.mn.us

Strategy: 1.4

Participate in demonstration/research Projects On new technologies in this field.
This strategy calls for the continued development of the Technology and Techniques. This includes local projects and joint projects among a number of agencies.

Resource Needs:

5 days/quarter

Action:

- 1) Identify potential demonstration/research projects.
- 2) Encourage potential demonstration/research projects.
- 3) Ensure follow-up and Documentation.
- 4) Distribute results.

Target Date - On Going (as required)

Estimated Costs -10K

Excerpt: Proceedings-- First Lead State Conference - 1996

Persons Responsible:

Richard J. Nelson, P.E., District Engineer, Nevada DOT,
310 Galletti Way, Sparks. NV 89431. Phone: 702-688-1250,
Fax 702-698-1189, Internet: None

William Carr Director, Office of Technology Applications.
Washington DOT, PO Box 47350, Olympia, WA 98504
Phone. 360-705-7802, Fax: 360-705-6823,
Internet: bcarr@wsdot.wa.gov

Goal #2 -Ensure the documentation and aggregation of experiences with technologies, tools and techniques.

Strategy: 2.1

Establish a process to document and aggregate

Resource Needs:

Focus, FHWA, Team expertise and Data Staff

Action:

Coordinate Communications and Marketing efforts by.

1. Develop Survey to determine current practice and distribute
2. Design a Date Base format for the Web Site
3. Ask for input and acknowledge receipt
4. Data entry
5. Maintain
6. Distribute Results

Target Date- 06/1 5/97

Estimated Cost - IOK-20K

Person Responsible:

William Carr, Director, Office of Technology Applications
Washington DOT, PO Box 47350, Olympia, WA 98504
Phone: 360-705-7802, Fax: 360-705-6923
Internet: bcarr@wsdot.wa.gov

Strategy- 2.2

Develop Baseline Report

Resource Needs:

Staff – University

Excerpt: Proceedings-- First Lead State Conference - 1996

Action:

1. Develop Survey to obtain existing conditions (list of current practice nationwide, find out what's available).
2. Send out survey to appropriate personnel.
3. & 4. Collect Data and Enter Data.
5. Distribute results.

Target Date: 01/01/98

Estimated Cost - 5K

Person Responsible:

Thomas Donahey, Director, Maintenance Programs, Iowa DOT
800 Lincoln Way, Ames, IA 50010, Phone: 515-239-1388
Fax, 515-239-1005, Internet: tdonahey@iadot.e-mail.com

Strategy. 2.3

Establish a mechanism for periodic review and validation of process.

Resource Needs:

(Potentially) Source of meeting funds from FHWA (\$ 1,000 per person for meeting).

Action:

1. Establish initial and ongoing review time frames (First review 01/01/00).
2. Establish Review Criteria and Guidelines.
3. Evaluate need for sporadic meetings

Target Date - 01/01/00

Estimated Cost - 1 5K

Person Responsible:

Richard J. Nelson, P.E., District Engineer, Nevada DOT
310 Galletti Way. Sparks, NV 89431, Phone: 702-698-1250
Fax: 702-688-1189, Internet- None

Goal #3 - Develop programs to transfer the knowledge and to provide technical assistance.

Strategy: 3.1

Education - public awareness and training.

Resource Needs:

\$50K per state times 7 states. Two trainings in each state per year \$10K per year per state.

Excerpt: Proceedings-- First Lead State Conference - 1996

Action:

- 1) Contact PA Officers in Lead States and inventory what exists.
- 2) Share inventory for customizing.
- 3) Identify generic promotional package.
- 4) Encourage states to utilize anti-icing/RWIS, etc.

Target Date - 09/99

Estimated Cost - 350K + 70K

Persons Responsible:

ALL LEAD STATES

Strategy: 3.2

Technical Assistance

Resource Needs:

Staff, Travel Expense - 10 states times 1 person weeks/state = 10 person weeks/year
\$1,00 per person.

Action:

Identify persons in each state who are experts "Speakers' Bureau". Mostly in place by Region.

- 1) Based on results obtained from Goal 2's established list of experts.
- 2) Distribute list of experiences by agencies.
- 3) Coordinate requests for technical assistance with Regional experts.

Persons Responsible:

ALL LEAD STATES with the coordinator being:

Richard J. Nelson, P.E., District Engineer, Nevada DOT
310 Galletti Way, Sparks, NV 89431, Phone: 702-688-1250
fax 702-688-1189, Internet None

Strategy. 3.3

Promotion - National/Regional conferences State/Local Presentations

Resource Needs:

Staff attending conferences. etc.

Action:

List events and encourage attendance.

- 1) Aggregate list of conferences and venues to promote RWIS/Anti-icing.
- 2) Distribute list to Lead States.
- 3) Encourage attendance.

Excerpt: Proceedings-- First Lead State Conference - 1996

Target Date - On going

Estimated Cost - 20K

Person Responsible:

Richard J. Nelson, P.E. District Engineer, Nevada DOT
310 Galletti Way, Sparks, NV 89431, Phone: 702-688-1250
Fax: 702-688-1189, Internet: None

Strategy: 3.4

Clearinghouse

Resource Needs:

Human Resources - T2/LTAP Centers

Action:

T2/LTAP have broad access to states and agencies. Use standard structure and format for all existing and new clearinghouses. Consideration given to central clearinghouse for all SHRP.

Target Date - 09/97

Estimated Cost - Unknown

Persons Responsible:

Richard J. Nelson, P.E., District Engineer, Nevada DOT
310 Galletti Way, Sparks, NV 8943 1. Phone: 702-688- 1250
Fax: 702-688-1189, Internet: None

William Carr, Director, Office of Technology Applications
Washington DOT, PO Box 47350, Olympia, WA 98504
Phone; 360-705-7802, Fax 360-705-6823,
Internet: bcarr@wsdat.wa.gov

Strategy 3..5

Marketing - Program Development & Administration Buy-in

Resource Needs:

Assist other States

Action:

- 1) Develop Marketing Strategies
- 2) Solicit Funds from FHWA
- 3) Produce Materials
- 4) Disseminate

Target Date - 09/99

Estimated Cost - 250K

Excerpt: Proceedings-- First Lead State Conference - 1996

Persons Responsible:
ALL LEAD STATES

Goal #4 - Get support of private industry.

Strategy: 4.1
Identify and convey our needs.

Resource Needs- 5 staff days + 15 staff days.

Action: Each Lead State -

1. Lists equipment, expertise, materials required, Rate availability and effectiveness of each. Target Date - 01/97
2. Compile survey *results*, *rank areas* of concern, distribute to venders.

Target Date - 04/97

Estimated Cost - Unknown

Person Responsible:

Edward Fleege, RWIS Project Administrator, Minnesota DOT
1123 Mesaba Avenue, Duluth, MN 55811
Phone: 218-723-4960 Ext 3540, Fax: 218-723-4874
Internet.- edfleege@dot.state.mn.us

Strategy- 4.2
Explore and develop partnership opportunities

Resource Needs:
15 staff days

Action: Each Lead State –

1. Request "interest" proposals for *partnership and* send out information from 4.1 to venders. Target Date - 04/97
2. Compile results of "interest" survey, distribute to Lead States and track matches between venders/Lead States.

Target Date - 07/97

Estimated Cost - Unknown

Person Responsible:

Edward Fleege, RWIS project Administrator, Minnesota DOT
1123 Mesaba Avenue, Duluth, MN 55811
Phone: 218-723-4960 Ext. 3540, Fax: 218-723-4874
Internet: edfleege@dot.state.mm.us

Excerpt: Proceedings-- First Lead State Conference - 1996

Strategy: 4.3

Invite participation at showcases, workshops and conferences.

Resource Needs:

Unknown

Action:

- 1) Add listings to *Internet* (showcases, workshops, conferences. Target Date - 9/97
- 2) Include a 'Poll' of expected attendance at each event. Target Date - On going

Estimated Cost - Unknown

Persons Responsible:

Edward Fleege, RWIS Project Administrator, Minnesota DOT
1123 Mesaba Avenue, Duluth, MN 55811
Phone: 218-723-4960 Ext. 3540, Fax: 218-7234874
Internet: edfleege@dot.state.mn.us

Richard J. Nelson, P.E., District Engineer, Nevada DOT
310 Galletti Way, Sparks, NV 89431, Phone: 702-688-1250
Fax; 702-688-1189, Internet: None

Strategy: 4.4

Training private contractors and other public agencies.

Resource Needs:

Staff time as required

Action:

Refer to VA DOT for background.

- 1) Include a training component *in* all sample specs.
2. Expand existing FHWA outreach to match Lead State "experts" with interested players.

Target Date - On going

Estimated Cost - 50K/Year

Person Responsible:

Tucker Ferguson, Chief, Program Services Section
Pennsylvania DOT, Rm 1005, Transportation and Safety Bldg.
Harrisburg, PA 17120, Phone: 717-787-6263
Fax 717-787-7839, Internet: None

Anti-icing / Roadway Weather Information Systems (RWIS) Technology Implementation

1. **Anti-icing/RWIS Technology Lead States Team.** In 1996, with the objective of implementing SHRP technology on Anti-icing/RWIS, the AASHTO Task Force on SHRP Implementation selected and established a Lead Team of technologists. These technologists were selected on the basis of their expertise and commitment to apply the SHRP technology in the field. The team included representatives from Pennsylvania, New York, Minnesota, Iowa, Colorado, Nevada and Washington, FHWA industry and academic world. All together the team has twenty members. The listing of these members appears in Appendix 1.

2. **Anti-icing and RWIS Team's Accomplishments 1996-97.** Since it was founded in 1996, the team reported the following state by state work accomplishments at the second lead states conference held in September 1997:

2.1 Pennsylvania

- Internal Implementation within the state continues
- Training sessions on new technology were held for the management/operations and three state regions
- APWA Presentation - spreading information to locals
- SICOP
- Winter new technology video
- Three year implementation plan for zero velocity spreaders - funds committed for 200-vehicles

2.2 Colorado

- HITEC
- SICOP
- National RWIS protocol development
- FHWA outreach group
- Training for University of Wisconsin for locals SSI training - information on lead states
- FHWA model deployment - information to everyone - kiosks, web sites, port of entries
- RFP for developing methods of getting RWIS information across state boundaries Arizona supervisor exchange (like MinnDOT with foreign countries)
- Integrating traffic into RWIS, i.e. to change signal timing in reaction to weather conditions
- Video paging with pavement temperature, etc. for making field application decisions
- Variable message signs/condition alert
- Vendor sensor evaluation - using Windows NT format

- Server with web browser up for public access

2.3 Washington

- Information sharing seminars nationwide for cities, counties, states
- SICOP
- Web site development - to be FHWA housed (and maintained)
- University of Utah - automated de-icing SHRP presentations
- De-icing chemical specification for a four-state region - being adopted by other states addressing environmental issues, product quality
- HITEC - technology CERF -research
- EVTEC - product

2.4 New York

- Internal development
- Bid for RWIS
- Thermal Mapping contract
- Regional conference to get locals involved
- Cornell local roads program planned
- Zero velocity spreaders - 2 state plus 10 on New York Thruway
- Web sit internal person designated
- "MAGIC" analysis
- GPS/AVL vehicle tracking
- Testing and evaluation of plow
- DTN in most maintenance centers
- Technology transfer on winter maintenance to locals

2.5 Minnesota

- Infrared systems for pavement temperature
- Decreased salt use in a winter when other agencies increase use
- Monitoring spreader rates
- Working on RWIS implementation
- Partnership with states on international RWIS development
- Micro and Macro-forecasting with Sweden
- Sensor Evaluation Manual
- Concept vehicle for winter maintenance
- Friction devices to measure friction on pavement surface (road condition)
- HITEC anti-icing/de-icing chemicals evaluation

2.6 Iowa

Excerpt: Proceedings –Third State Conference – 1998

- SHRP showcase in Fall -96
- Planning Iowa State city/county conference
- Winter maintenance multi-state conference
- Concept Vehicle conference - three states
- Regional HEEP conference
- Sharing technology/RWIS information with cities/counties
- Video [HITEC Highways)
- Winter Road Service Guide
- DTN to Internet on Iowa DOT site
- Press conferences
- Illinois information sharing
- Articles in Better Roads, TRNews, etc.
- Flyers on concept vehicle, etc.
- Baseline report - 11 question survey -43 responses asked what chemical is used, applicators/applications, anti-icing?
- This will be compiled and distributed to team

2.7 Nevada

- Lead state presentations at regional AASHTO meetings
- System integration
- ITS/RWIS/Advisory Radio link
- FHWA winter weather workshop
- Performance based training on decision making with RWIS information
- Anti-Icing/RWIS Lead State Team meeting at SICOP conference
- RWIS presentation to acting FHWA administrator and Nevada congress
- ITS scanning tour for region

2.8 FHWA

- Support with funding
- AVL on winter maintenance
- Zero Velocity spreaders
- Technical Assistance - especially in Washington, D.C.
- Winter Maintenance symposium
- General **SHRP** conference planned
- Bridge anti-Icing networking
- "Penguin" rating on level of storm for public education, giving estimates of delay, etc.
- Distributed manual of practice to MANY, also on the Internet
- Held discussions at national and local conferences, etc.
- Signed agreements with states to fund implementation of products
- Hosted 12 workshops

3. Team's Original Mission and Goals (1996)

3.1 Mission 1996. To provide leadership and technical assistance to promote implementation of evolving technologies, tools and techniques for snow and ice control.

3.2 Goals 1996.

3.2.1 Continue Anti-icing/RWIS Use, Expansion, and Refinement in Lead States

3.2.2. Ensure the Documentation and Aggregation of Experiences with Technologies, Tools, and Techniques

3.2.3 Develop Programs to Transfer the Knowledge and To Provide Technical Assistance

3.2.4 Get Support of Private Industry

4. Teams Mission Goals Strategies and Action Plans (1997).

4.1 Mission Statement as Retained. The mission of the team continues to remain the same as it was in 1996. As was reported, it (Mission) states, "To provide leadership and technical assistance to promote implementation of evolving technologies, tools and techniques for snow and ice control.

4.2 Goals as Refined

A. Goal - 1. Document the costs and benefits of anti-icing/RWIS vs traditional snow and ice control methods and report the data

B. Goal - 2. Enhance external and internal two-way communications to expand implementation of technologies to better serve our customers.

C. Goal - 3. Develop a plan to coordinate training of agencies and industry in proper implementation and operation of winter maintenance technologies and strategies.

D. Goal - 4. Continue to develop, deploy and advance RWIS/anti-icing technologies.

4.3 Goals and Corresponding Strategy and Action Plans

4.3.1 Strategy for assembling cost/benefit information - Acquire available cost/benefit reports on RWIS/anti-icing case studies

Action Plan

Excerpt: Proceedings –Third State Conference – 1998

- Review SHRP/FHWA assessment study on RWIS and anti-icing
- Conduct literature search of published reports
- Solicit information from state maintenance engineers on RWIS/anti-icing studies conducted Evaluate information collected in literature search
- Identify areas of similarity in reports
- Inquire about reports that are vague
- Evaluate role of winter indices for the season comparability
- Select parameters/methodology/to form basis of B/C analysis
- Develop guidelines for conducting a B/C analysis
- Define all terms to be used in methodology
- Identify direct and indirect cost factors, which need to be considered
- Identify direct benefits and indirect benefits which needs to be considered
- Present methodology for comparing benefits vs costs

4.3.2 Strategy on Enhancing Internal and External Communication

- Establish and maintain a winter maintenance web site that is a useful source of pertinent and timely information

Action Plan for the Strategy

- Get web site operational by November 1997 (Carr/Nixon)
- Develop enhancement and maintenance protocols for web site by November (1997) (Carr/Nixon)
- Plan for web site in anticipation of sunset
- Identify web site manager and resources to support that position by November 1997
- Create and implement proactive marketing approaches
- Showcases and workshops
- Materials (videos, brochures, etc.)
- Web site
- Intranets
- E-mail for "push/slam" marketing
- More outreach and partnering via e-mail
- Identify key projects and organizations with initial list by November 1 007 and on-going regular additions
- Create a pool of internal personnel resources assigned to market winter maintenance technologies
- Get on the agenda of other conferences as keynote speaker addressing issue of winter maintenance technologies
- Review geographical coverage of national winter maintenance conferences to help insure participation by interested organizations
- Improve communication among anti-icing lead state members
- Each member commits to establishing e-mail mail lists of anti-icing lead state

Excerpt: Proceedings –Third State Conference – 1998

- members by 9/12/97
- Commit to monthly brief communication via e-mail among lead states (10th of each month)
- Activities, upcoming conferences, printed materials, new product, case study information
- Publish quarterly report on web site (due by 15th of following month)
- Attend mid-year meeting in conjunction with another major conference

4.3.3 Strategy on Training

- Implement external communication methods with groups and individuals with interest and expertise in snow and ice control.

Action Plan for the Strategy

- Provide mentoring (initial guidance and consultation) to interested agencies
- Define responsibility of mentor
- Identify mentors from Lead State team
- Develop resource materials package for mentors' use
- Publish list of mentors
- Identify a pool of national experts to assist agency implementation and operation
- Compile list
- Review experts' qualifications
- Distribute list
- Maintain list
- Provide resources (experts, materials, and funding) to train the trainers
- Compile list of trainers
- Coordinate resources for use by interest agencies
- Provide training materials
- Inventory available materials
- Publish list of materials
- Identify deficiencies and encourage development by technical experts
- Distribute materials to requesting agencies

4.3.4 Strategy on developing and deploying anti-icing/RWIS technology

Identify and convey our needs for
-future development
-implementations of current practices

Action Plan for the Strategy on Technology Development and Deployment

- Conduct annual survey of users to determine the progress and needs of the agencies in regard to RWIS and anti-icing (Iowa)

Excerpt: Proceedings –Third State Conference – 1998

- Compile survey results, rank areas of concern, distribute to vendors, users, and agencies
- Establish and evaluate the performance of standard procedures for testing RWIS sensors, related software and models
 - Prototype testing and evaluation
 - Evaluation of manufacturers' equipment
 - Develop criteria to compare different manufacturers' sensors and techniques

Anti-icing and Roadway Weather Information Systems (RWIS) Technology Implementation

1.0 Anti-icing and RWIS Technology Implementation. The Anti-icing and RWIS Team as established in 1996 includes representatives from the AASHTO states member department and additional representatives from the Federal Highway Administration, academia, and industry. The participating member departments are: Nevada, New York, Pennsylvania, Iowa, Washington, Minnesota and Colorado. A complete listing of participating members appears in Appendix 3.

2.0 Team' s Accomplishments 1998-99. The Team reported the following state by state accomplishments:

2.1 Iowa

- An increased effort has been made in the past two years to market snow and ice operations in the state. This included:
 - Snow and ice brochures
 - Media packets for distribution
 - Internet web site
 - News releases (snow fence, anti-icing, RWIS, winter driving safety)
- A winter expo has been held the past two years where city, county and state officials joined together to plan and implement a training/equipment display for over 1100 city, county and state snowfighters and supervisors.
- RWIS data was placed on the department' s Internet web site last year with plans to expand the information in the coming winter. The information was also e-mailed and faxed to the media.
- The department worked with the Iowa State Patrol to implement a toll free road reporting system.
- Increased efforts have been made to increase snow and ice training to all employees.
- Forty-one anti-icing slip-in units were purchased to supplement existing units. Division goal to anti-ice entire interstate system during the winter of 1998-99.
- Two groups (40 trainers) have been trained to provide peer-to-peer training for RWIS and anti-icing.
- One garage will pilot AVL/GPS on all snowplows this winter with ability to collect material use, pavement temperatures, air temperature, plow position, vehicle speed and vehicle location, transmitted through a digital radio system.
- Just completing a 6-video set containing:
 - Introduction to winter operations
 - Equipment inspection

Excerpt: Proceedings –Third State Conference – 1998

- Weather and RWIS.
- Anti-icing
- Proper plowing techniques
- Preparing for winter
- Eighteen RWIS sites were installed this year and the remaining 32 sites were updated to conform with NTCP/IP-ESS protocol.
- Worked with National Weather Service local office to provide real-time alerts to motorists through weather information systems (DTN) in all Iowa rest areas.
- All garages have laptops and desktop PC' s for access to DTN weather system and RWIS data.
- Agreement between SSI, DTN and DOT to provide RWIS data to any government entity in the state for a fee that is shared by the three parties.
- Worked with MN, IL, NE, WI to develop color standards for reporting winter road conditions for the traveling public.

2.2 Minnesota

- Integrated the outputs of Vaisala and SSI equipment for seamless displays.
- Integrated real time continuous video images into RWIS displays.
- Had a contract with University of North Dakota Aerospace Foundation to conduct site and parameter evaluation of the 76 proposed ESS sites. Outcome was recommendations and report.
- Have a contract with UND Aerospace Foundation to provide mega-scale weather forecast and pavement temperature forecasts. This includes data validation of outputs from the proposed 76 ESS sites and deliver of their SAFE program for Minnesota.
- Minnesota is a member of the NTCIP ESS working group in the development of protocols from roadside to CPU.
- Awarding contract with SSI to:
 - Install 76 ESS sites
 - Develop and provide a communication system
 - Provide Database Integration Center
 - Develop and provide training program to change decision-maker behavior
 - Integrate ESS<AWOS, ASOS, and CRIO weather stations
- Minnesota is member of AURORA which is formed to advance RWIS technology.
- Development of a fix bridge sensor system to make it operate in an automatic mode by using environmental sensors.
- Development of measuring frost depths in the group using the ESS stations.
- Working on the development of a mobile platform for RWIS.
- Evaluating various pavement sensors.

2.3 New York DOT

- Hosted final FHWA Anti-icing/RWIS workshop in Albany with participation from NWA, NYS Thruway Authority, and local municipalities.
- Administered a thermal mapping contract comparing technologies from Vaisala and MetroStar. Results currently being evaluated.
- Developed regional operations centers combining ITS/RWIS components with public safety/incident management in three urban areas.
- Conducted seven “Snow Colleges” for NYS DOT field supervisors with participation from local municipalities. RWIS/satellite weather/anti-icing topic included.
- Developed a comprehensive bid package and held a pre-bid conference for major expansion of NYS DOT’ s RWIS network. Bid finalization and letting expected October/November 1998.
- Developed contract specifications for maintenance and calibration of existing RWIS network.
- Conducted limited benefit/cost analyses of 100% liquid anti-icing units during winter (97-98).
- Conducted anti-icing/RWIS outreach to county highway superintendents and city managers.

2.4 Nevada

- Developed and deliver a “train the trainer” course for AI/RWIS decision making.
- Deliver decisions making training to all crews by November 1.
- Integrating additional equipment to RWIS system - demonstration flexibility.
- Activate variable speed limit test section controlled by RWIS RPU.
- Testing mechanical snow removal equipment.
- Deliver RWIS data to field crews by WWW.
- Additional sites installed in other districts.
- Integrating RWIS with state voice communications system.
- Presidential summit of Lake Tahoe gave the opportunity to show case RWIS technology - yielded a \$75K project to develop a bi-state RWIS system for Lake Tahoe barrier.

2.5 Washington State

- Training both within state and out-of-state continues to be successful. Dale Keep has several success stories where RWIS has been adopted by local and state agencies as a result of his training.
- WSDOT has taken the lead in developing the on-line communications tool “the web site” for the lead state technologies.
- WSDOT has helped in the transition of the anti-icing/RWIS and SICOP activities.
- WSDOT RWIS program continues to expand. Homepage is being used for

Excerpt: Proceedings –Third State Conference – 1998

real time photos of winter mountain pass conditions.

- Public outreach on RWIS/anti-icing continues to be an aspect of program.

2.6 Pennsylvania

Anti-icing:

- Conducted approximately 20 anti-icing training session to varied audiences including our county and district offices, equipment managers, MDSHA, students, and at several conferences.
- Hosted Dale Keep for 3 statewide meetings, and one of our districts invited him to present at their winter planning meeting in November 1997.
- Attended a winter wrap-up meeting in the state of Maryland, and discussed PA' s experiences with new winter technology including anti-icing, RWIS, and ZVS. This meeting prompted an invitation to conduct anti-icing sessions for their operators and foremen in August.
- Hosted an Ice Ban workshop in August.
- Intend on building 57 liquid anti-icing trucks and 150 ZVS for 98/99.

RWIS:

- Installed 20 RWIS sites across the state of Pennsylvania. Successful vendor for this contract was Nu-Metrics. Something that we added to this contract was that all sites will be equipped with traffic monitoring and video capabilities.
- Developed a contract with a computer consultant to integrate SSI, Nu-Metrics, and any other subsequent RWIS system into a single web page, where it will be available to anyone over the Internet.
- We have begun involving our Bureau of Planning and Research in our selection of RWIS sites. This bureau has over 300 traffic counter locations across the state, and may be interested in using the traffic data that our RWIS stations will be collecting in their planning and programming activities. We are also investigating partnering with our Bureau of Construction and Materials, to see if the data collected by our RWIS stations will be useful in their evaluations of pavement performance, i.e. Superpave projects vs. conventional pavements. We are still unsure whether or not the information we collect will be of value in their evaluations. We have begun to bring our traffic line painting crews into using the RWIS information in order to optimize painting efficiency. Installations are continuously coordinated with our ITS Division.
- Hosted an RWIS demonstration in July from SSI and Nu-Metrics. Representatives each took one-half day to explain the capabilities of their respective products and systems..24

Automated Bridge Anti-icing Systems:

- Developed an RFP to install 3 automated bridge anti-icing systems on bridges in western PA.

Other:

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- Attended the Minnesota Department of Transportation's Fall Maintenance Expo on October 1 and 2, with MnDOT personnel on October 3 to exchange information on our various programs.
- The January issue of Focus magazine had an article on the anti-icing training sessions that we hosted in PA back in September. As a follow-up to the article, I've had several requests for information and possible visits to other states for benefits of RWIS and anti-icing.
- We have had great success with our communications of road conditions to the traveling public with our toll-free hotline. The number is 1-888-783-6783. Unfortunately, however, it is only available to PA telephone exchanges and the area codes which border PA. If you would like to hear it, you can access it through the toll number at 717-783-5186.
- We have also expanded the phone line information on the web, where we have put the interstate road conditions. You can access this report through a link to PennDOT's homepage at www.ppt.psu.edu.
- Gave a deposition on a tort case in PA where we are being sued for not having an RWIS installed where an accident took place.
- Hosted the 3rd Annual Eastern Winter Symposium at Penn State University. There were 1696 attendees from 36 states, D.C., and Canada.

2.7 FHWA Sponsored Eastern Winter Maintenance and Equipment Expo.

- Funded Warriors to provide training and presentations on East Coast participation in Maryland Toll SHRP Conference.
- Helped fund AVL equipment in VA.
- Updated TECH brochure in Washington Metropolitan Area.
- Participated in Winter Maintenance Scanning Report in draft form.
- Participating on research and technology coordination group on new research on operation.
- Opening dialogue with National Weather Service on improving surface transportation forecasting.

2.8 University of Iowa Initiatives.

- Developed web site. Team members are invited to review and to contribute, especially in the area of test and trials.
- Maintenance of list-serv in the snow and ice community.
- Developed first offering of graduate level course in winter highway maintenance.
- Examination of laser technology (from PIARC meeting in Sweden, March '98) as means of improving vehicle/plow visualization.
- Mid October meeting in Illinois for surrounding states to discuss/push new technology.
- Team members are invited to participate in reviewing semester project

presentations in Iowa City on December 10-11, 1998.

2.9 Web Site Update.

- Lead the way. Moderate to excellent success.
- Presented plan for web sites for all Lead State activities:
 - \$35K given by NCHRP.
 - TTI to develop web site:
- *site up and gatekeeper training provided.
- *NCHRP supporting through 1/99.
- Letter drafted to solicit AASHTO support. Resolution sent forward (moot).
- NCHRP to look at all sites, extend to 7/99.
- <http://leadstates.tamu.edu>. AASHTO innovative high tech. All 7 Lead State Teams.
- Value of information is dependent on current information from practitioners.
 - need to provide links to other sources.
 - links to papers, documents, Focus, Public Roads, etc.
- Each Lead State Team has provided a gatekeeper.

2.10 Additional Team Accomplishments.

- Web site complete with rollout scheduled for TRB.
- Marketing plan funded with rollout scheduled for TRB (video, display, literature).
- FOCUS and other articles published.
- Sphere of influence concept working.
- Regular communications via e-mail sustained.
- Over 80 individual accomplishments in technology development, deployment and implementation.

3.0 Impact on Technology Transfer.

The following items suggest that the level of acceptance of technology has been increasing:

- Maryland highly supported by Pennsylvania in RWIS and materials use. Pennsylvania supports partnering regionally.
- Virginia using AVL and other innovative equipment.
- Nevada DOT/CALTRANS RWIS Project
 - accepting tech joint approach.
 - bi-state commission Tahoe Regional Planning Agency and cities and counties.
- Washington DOT - Alaska initiated RWIS.
- Focus articles are producing positive results.
- New York organized meeting with Connecticut and New Jersey and SSI.
- Washington DOT measures impact by:
 - hits on web.

Excerpt: Proceedings –Third State Conference – 1998

- actual usage of technology.
- developed marketing plan and expect unveiling in 1/99.
- Lead States accelerated acceptance of technology in Lead States, and expanded area of influence at local level and with states not in the Lead States Program.
- Benchmark - Iowa Survey 1997.
- Technology has grown from experimental to state of practice
- used across states.
- growing installation/implementation.
- RWIS accepted more widely than anti-icing.
- expanded within states to counties, towns and villages.
- States willing to make RWIS data available for usage.
- Survey
- may not have been as accurate as we had hoped.
- SICOP borne out of Lead State effort.
- potential for follow up survey.
- Lead State and SICOP have strong cooperation (lovefest).
- States willingness to commit money.
- Winter Maintenance recognized by leadership of AASHTO/TRB.

4.0 Lessons Learned.

- Program funding uncertain; funding source should be secure.
- Participants in Lead States Teams and Steering Committee must have high levels of commitment to the technology and process.
- Networking provides great opportunities.
- Sphere of influence concept should be continued for expanding implementation to other agencies.
- Regular communication is required between team members and with Steering Committee.

5.0 Goals and Action Plans set forth in 1998-99.

5.1 Goal 1:

Document the costs and benefits of anti-icing/RWIS vs. traditional snow and ice control method and report the data.

Action Plan:

- Survey states - how did they justify the implementation of anti-icing/RWIS technologies.
- Review FHWA/ SHRP assessment study and other studies.
- Solicit states for case studies and evaluate against the assessment study.
- Identify direct and indirect benefits of an AI/RWIS program.
- (Decide if a consultant should be retained to accomplish this goal).
- Budget \$20K.

5.2 Goal 2:

Enhance external and internal two-way communication to expand implementation of technologies to better serve our customers.

Action Plan:

- Speakers bureau (10 events) \$15K
- TRB exhibit \$ 5K
- Other exhibitions (6) \$15K
- Mid-year jamboree \$20K
- Master conference planning -----
- Web site maintenance (1/7 of cost) \$ 5K
- “Sustaining the marketing” \$15K

5.3 Goal 3:

Promote and support education and training opportunities for agencies and industry in implementing and operation of winter maintenance technologies and strategies.

Action Plan:

- Work with communication vehicles to promote education and training opportunities.
- Update and maintain a list of resources to support education and training (FHWA/SICOP/etc.)
- Budget \$10K.

5.4 Goal 4:

Continue to develop, deploy and advance snow and ice technologies.

Action Plan:

- Conduct expanded survey and publish results on the web.
- Develop inputs for the mid-year jamboree.
 - Emerging technologies.
 - Blue sky ideas.
- Coordinating efforts with SICOP/AURORA/TRB/PIARC and others.
- Budget \$50K.

6.0 Phase-out Considerations - Sunset.

- Leverage AURORA, SICOP, and other organizations through commitments to integrate with Lead State Team members.
 - Expertise.
 - Funding.
- Need joint meetings and/or conferences to organize and coordinate continued development and implementation of the technology.
- Consider utilizing the SHRP leadership model to continue implementation

efforts.

7.0 Estimated Budget FYS 1999 and 2000.

- Goal 1: Benefits - Costs \$ 20K
- Goal 2: Communications \$ 75K
- Goal 3: Training \$ 10K
- Goal 4: Continue development and deployment of technologies \$ 50K
- Total \$155K.

Anti-icing and Roadway Weather Information Systems (RWIS) Technology Implementation

1.0 Anti-icing and RWIS Technology Implementation.

The Anti-icing and RWIS Team as established in 1996 includes representatives from the AASHTO states member department and additional representatives from the Federal Highway Administration, academia, and industry. The participating member departments are: Nevada, New York, Pennsylvania, Iowa, Washington, Minnesota and Colorado. A complete listing of participating members appears in Appendix 5.

2.0 Team's Accomplishments 1998-99. The team reported the following accomplishments:

2.1 Iowa

- 50 RWIS sites
- Anti-icing program implementation
- 4 1/2 M gallon of salt brines
- Process of completing 2 videos, finished anti-icing video last year, which has won awards for graphics
- Beginning stages of web based interactive training program to be available worldwide, FHWA as the host for site
- Fixed bridge systems
- 18 snowplows with GPS implemented last year, 60-70 more trucks this year
- Marketing aspect booklet, video, and showcase, 40 states and 10 countries have inquired, Canada, and especially China, are very interested.
- ITS plan ready taking off
- Last fall, offered graduate course in highway maintenance, Iowa cable network, 19 students, web based course

2.2 Minnesota

- Contract on automatic deicer
- 3 small bridge deicer projects
- Finally 76 RWIS sites integrating real-time and forecast sites
- Regional 36 hour forecast, site specific forecast
- 4 automatic bridge anti-icing sites, RWIS, web based information, putting in systems at local level, states restrict internet access
- Increasing anti-icing and pre-wetting in the Minneapolis-St. Paul metro area. Purchased over \$150,000 of new equipment and materials in 1999.
- Continued "Salt Solutions" program to reduce salt and sand use.
- Proceeding with automated vehicle location projects such as SAIL (7 trucks with GPS, material spreading data, etc.), Smart Plow (GPS, radar sensors, heads-up display, etc.) automated route planning, etc.
- Automated bridge deicer on 1200' bridge.

Excerpt: Proceedings –Fourth Lead State Conference – 1999

- Participation in mid-west multi-state anti-icing forum each April.
- Market Survey in 1999/2000 to measure customer satisfaction with Minnesota DOT winter maintenance performance.

2.3 New York

- Rural region awaits contract, liquid anti-icing and test sections, measure of success, participated in snow university and invited local town and county operations people a outreach, fixed based anti-icing system
- Web based systems for kiosks, RWIS, ITS traffic management
- Project being launched with State Police
- RWIS bid package ready to award
- 25 new RPUs and 25 outpost locations, make bid available to all 60 counties and local levels, pick 4 or 5 sites for automatic anti-icing bridges,
- Outreach program

2.4 Nevada

- 1st anti-icing training program for NDOT, by Bill Thimmesch/Rick Nelson
- Joint facilities starting to occur with local counties (anti-icing tanks, etc.)
- Two projects in western Nevada – I-580 freeway extension and Carson bypass
- \$300M project – I-580 freeway extension - Reno to Carson
- 9 structures, pushing for RWIS, fixed anti-icing systems
- Expanding web site, needs more coordination
- Joint projects with FHWA and Caltrans
- Expanding anti-icing operations to Reno urban area and east
- Ordering salt brine tanks
- ITS integrated with RWIS

2.5 Washington State

- Placing new RWIS sites in the regions, particularly the North Central Region to improve anti-icing forecasting needs. We now have (400) plus RWIS sights integrated together to provide us weather data. This is done through the University of Washington.
- Continuing to acquire new anti-icing equipment.
- Developing hands on operator training for improved application techniques, rates, timing, and to reduce tort claim liability potential.
- Updated snow and ice training film to provide new employees proper training on preparations for winter operations, including segment on anti-icing/de-icing
- Working to establish a snow and ice operations Level of Service that is used as a tool for budgeting and planning as part of our Maintenance Accountability Process (MAP). This will help us lever proper winter operations funding from our legislature.
- Working with British Columbia, Idaho, Montana, and Oregon, as part of “PNS” (Pacific Northwest Snowfighters) to set testing protocol’s, standards, test and then approve various anti-icers/deicers for multi-agency use. This is helping us to lower material costs because we can buy as a group and get low prices.

Excerpt: Proceedings –Fourth Lead State Conference – 1999

- We have a PNS web site with our list of approved products for deicing/anti-icing. [www.wsdot.wa.gov/fossc/maint/pns/]
- The Insurance Corporation of British Columbia, PNS and others have established testing techniques to demonstrate how all anti-icers go through a slickness stage when they are applied as a preventive measure. Results have been posted on the PNS Website.
- On going testing to assess anti-icers/deicers and their impact on streams and rivers.
- Striving to assess our maintenance customers training needs and to develop training for them that can be provided either by our in state maintenance experts or by contract trainers. Incorporating the newest technologies into this training
- Working towards establishing in house maintenance trainers in each of our regions

2.6 Colorado

- Bridge features to automatically deice
- Major upgrade to Windows NT servers - levels of service
- Going on-line; intranet working on firewall for internet
- New equipment for spraying liquids
- Anti-icing segment and training academy for state new hires and current employees
- Outreach to Maryland, University of Wisconsin, Arizona, New Mexico and Utah

2.7 British Columbia

- Anti-icing began in British Columbia in the winter of 1995-96 as a result of the previous year's increase in snow pack days and the resulting increases in accidents in Kamloops, BC. An increase of 18% in total claims called into ICBC Kamloops translated into an estimated 3.9 million-dollar increase in claims costs in just two months.
- The Insurance Corporation of BC partnered with the City of Kamloops to begin pre-treating 161 lane Km of major arterials within the city with liquid mag chloride. The private highways contractor also partnered into the test by pre-treating 156 lane Km of highways within the city of Kamloops.
- ICBC financed the study by providing \$86,000 to assist in retrofitting trucks and purchasing of chemical.
- A study was done by G.D. Hamilton and Associates, Vancouver prior to the start up and found that 31 of all winter collisions within the city had snow, ice or slush as the major contributing factor and suggested that if we could reduce 50% of these collisions, ICBC could save \$340,000 per month in claims costs.
- At the end of the first year, 1996/97, the study found that collisions reported were down 30% but data was unreliable and recommended a second year of study.
- A survey was completed at the end of the first year of the residents in Kamloops and found that 89% of the residents were aware of the anti-icing program; 77% felt it was better than traditional sand and salt and 66% were in favor of expanding the program.

Excerpt: Proceedings –Fourth Lead State Conference – 1999

- The City of Kamloops measured their costs at the end of the first year and determined that they had achieved a 1,237 tonne reduction in sand usage, which translated into savings of \$104,500 including reduced sweeping costs {this does not include the cost of \$36,000 in liquid mag chloride}.
- The City also conducted case studies comparing traditional methods v. anti-icing and found reductions in costs of almost 35% when including costs of spring sweeping.
- The program was expanded by the city in the winter of 1997/98 to include 360 lane Km within the city and the Highway contractor withdrew from the project citing the purchase price of liquids was too high.
- At the end of this second year, the study found that there was up to a 73% decrease of collisions on treated collector and arterials while the untreated highways went up 84%. These findings were significant in respect to collision reduction for snow, slush or ice. They however did not address the number of claims that were reduced or the cost savings to ICBC. A further evaluation was carried out looking purely at claim reduction to the Kamloops office and it found that total accident claims for the entire city were reduced by 6% on snow days in comparison to the 10-year history. This meant estimated savings to ICBC of \$300,000 to \$600,000 per winter.
- ICBC commissioned a study in mid 1998 to do a worldwide search on the environmental effects of liquid deicers and salt and to report these findings as to their validity and summarize the findings. This was completed by Levelton Engineering, Vancouver along with recommendations to do further field testing specific to the BC environment including the effects on soil, vegetation, water, air quality, human and animal health. The conclusion of the report said, "A review of the information presented reveals that compared to sodium chloride, all other deicing chemicals have fewer negative impacts on the environment. None of the other deicers compared were clearly more environmentally friendly than others".
- The recommended study was commissioned and monitoring stations for all of the various environmental elements were put into place in fall of 1998 in Kamloops, Kelowna, Vernon and the District of North Vancouver. Sampling will be done 3 times per year and a final report will be done on the actual effects in spring of 2000.
- Last year we saw an expansion of anti-icing to the cities of Kelowna, Vernon and North Vancouver as well as the highway contractor from Vernon BC. The city of Kamloops expanded their treated roads to now include 465 lane Km. Results of accident/claim reductions are expected by mid November this year.
- ICBC commissioned a report on the friction values of liquid deicers on bare pavement and those on snow/ ice pavements. This was completed in January 1999 by Forensic Dynamic Engineering, Kamloops. The conclusions showed that users can expect a drop of about 18-21% from dry road conditions immediately following an application of Mag Chloride (equal or slightly less than water on the road). However when compared to an untreated road, there was improvement of 163% for snow covered, 191% improvement for compact snow and ice and 600% improvement over glare ice.
- On behalf of AASHTO, the PNS has asked Forensic to complete a study on all chemicals in a controlled indoor test facility for friction ratings on bare pavement

applications. The results of this testing should be made available in early October of this year.

- Levelton Engineering completed Regulatory reviews and toxicity testing for all chemical deicers. The results of this testing should be available in November of this year. A full toxicity report is now complete on Freezgard {chemical used in BC for the accident study} and the results were that if Freezgard is used at recommended application rates for anti-icing, it should pose very little risk to the environment. The report went on to say that the dilution factor for those types of application rates should reduce chemical concentrations to minimize any effect on the environment.
- Performance evaluations were carried out by the BC Ministry of Transportation and Highways, which suggested that the Ministry should initiate more wide spread implementation of Anti-icing and adopt the principals of pre-wetting with liquids.
- In the year of 1999/2000 expansion will continue in the province to 15 new cities and 13 more private highway contractors. This will be supported by ICBC with an estimated one million dollars in non-repayable grants to assist in purchasing equipment for both pre-wetting and anti-icing.
- ICBC is currently installing a stationary liquid automated spray system in its facility in Kamloops to maintain bare pavement on all driveways and walkways through the entire winter. It is anticipated that a similar system will be installed in a northern municipality next spring on a 4 Km / 4 lane roadway with high winter accident rates. A study will be undertaken to measure the effectiveness of the system to maintain bare pavement (average snowfall of 5 feet per year) and it's ability to reduce accidents in a normally high critical zone.
- ICBC has just completed a study on the cause of windshield damage on vehicles and found that 88% of all windshield claims are a direct result of winter maintenance. Of that 88%, 81 % occur on highways and 15 % occur within cities. The remainder was gravel roads and private facilities. We anticipate with the province wide implementation of pre-wetting and large expansion of anti-icing that windshield damage will decrease next winter by 10% or 6 million dollars. This study will be done in late summer / early fall of next year.
- Next year, we will see BC become the host of the first PNS Snow Conference to be held in Kelowna, BC June 12, 13 and 14, 2000 and hosted by ICBC. This show will highlight the newest in technology for winter maintenance professionals by providing speakers from around the world on numerous topics, a large industry trade show and an Operator Rodeo.

2.8 FHWA

- Nationally ITS embracing RWIS, weather is a component of ITS
- 2 VDOT contracts related to RWIS, a few only used them, 248 maintenance depots have internet access
- RWIS vendor report forecast accurately and information reliable back to VDOT, training for RWIS

Excerpt: Proceedings –Fourth Lead State Conference – 1999

- Coordinated the Lead States Display Booth at approximately 7 events (including state and local level road agency events).
- Coordinated approximately 10 state DOT individuals traveling to other states to provide training/technical assistance

2.9 SSI

- Working on web based project, easily accessible
- RWIS into ITS committee
- Warning signs
- Information out to the public
- Working with Minnesota for training program
- Winter expos to promote training, Kansas
- Training is the key for anti-icing
- Chemical knowledge

2.10 Weather Solutions

- Helped prepare FHWA ITS pamphlets on weather
- Worked RWIS projects with two states, Idaho and Arizona
- Through NCHRP 6-13, developing performance-based assessment for maintenance accountability
- Foretell project, developing performance-based assessment for weather services

3.0 Web Site Update - Sandy Tucker

- Messages are archived
- 600 hits a month
- Listserv
- Contact members periodically for updates
- Links from commercial web sites okay; no endorsements
- Feedback buttons and survey

4.0 Close-out Report

- Uncompleted goals and action items
- New goal & action item (as needed) or recommendation on how to handle
- Transition plan outline/timeline
- Resources needed

5.0 Integrating Task Force Expectations with Items 4 and 5

- 2 categories
- What we did and how we accomplished it?
- If we did not have a sunset date, what would we do?
- What can be done and finished?
- What is transferred to AASHTO?

6.0 Brainstorming Session

- Tasks to be done
- Create and publish tests, specifications, user guides, and manuals
- Develop cost/benefit ratio study as it applies to technology and recommend panel members to NCHRP Project Manager, Amir Hanna
- Develop core training modules
- Report on numbers 4.1 and 4.2 from outline
- Prepare network directory
- Conduct survey of deployment and market penetration
- Explore development of education modules with NHI
- Propose anti-icing/RWIS technology in AASHTO Green book is in process of being rewritten
- Long and short term implementation plan
- Summarize results of accomplishments
- Promote the development of tools and instruments that accurately measure roadway conditions
- Develop performance-based specifications for equipment (pre-wetting, spreader, liquid application, automatic bridge de-icing)
- Secure funding for web site maintenance and promote continuation and use of web site
- Continue outreach/marketing effort for anti-icing/RWIS (NACE) FHWA still has money to send team members on travel to give presentations
- Develop performance measures from customer point of view
- ICBC reported reduced number of tort/damage claims from anti-icing/RWIS
- Increase integration of data collection within our DOTs and cooperation among users and common protocol
- RWIS with FAA/DOT/ DNR/Army Corp of Engineers
- Use of web
- Document/index existing studies of environmental impacts Mag chloride - causing respiratory problems
- * High altitude vegetation
- * Asphalt effects
- * Water clarity
- * Air quality
- How much salt and sand used? How much picked up? Sediment into lakes
- Develop a way to scan new products (clearinghouse)
- Develop and strengthen international exchange of information and communication
-

7.0 Plan for Monday 1-5pm Session

Last look at action items list from morning session (any missing?)

- Prioritize action items (vote or otherwise).33
- Form subgroups to tackle action items or use whole group (this team, research and AASHTO)
- Who does what? (Volunteers?)

Excerpt: Proceedings –Fourth Lead State Conference – 1999

- What resources needed?
- What schedule?
 - Detail who, how, when, and how much money
 - Document #4

8.0 Results of Last Year's Goals. All goals are continuous:

- Goal 1 - completed and ongoing
- NCHRP 20-7 approved and funded
- Goal 2 - completed (except for jamboree) and ongoing
- Goal 3 - completed and ongoing
- Goal 4 - completed (except for survey) and ongoing

9.0 Team Positives

- Lead State members became resources
- Contact and interest from other agencies
- Networking and interaction of group to see what other Lead States (and nationally) are doing
- A lot of cross-referencing and referring of other DOTs and localities to Lead State members
- Counties and media have picked up on differences in roads
- Decrease in sand in Tahoe Basin
- Other team members are resources for problems/questions
- "Lead State" gave us prestige and recognition
- Team is good
- Develop new relationships
- Nice to have private industry at the table
- Trust in expertise
- Strength in numbers
- Multi-discipline approach was appreciated
- Team has incorporated marketing into our efforts; successful research; tell people about it and not leave it on the shelf
- Team is successfully focused; ongoing discussion and understanding of the needs of the states that drive technology
- Keeping a high level of interest in transportation community on under utilized technology that has a capability in improving service to customers in a cost effective manner
- Overall outreach (videos, brochures, scrapers) to train people, states
- Membership in Lead State gives leverage in own DOTs to get resources.

10.0 Team Negatives

- No dedicated source of funding (no response to our budget)
- Lack of information; for example, not knowing status of NCHRP
- Not enough meetings
- Meetings focused on documentation rather than an exchange of information

Excerpt: Proceedings –Fourth Lead State Conference – 1999

- No funding for non-DOT members

11.0 Transition Items

- Document existing studies of environmental impacts
- Develop standard performance specifications
- Document performance measures from customer point of view
- Test, specifications, user manuals
- Increased integration of data collection within our DOTs and cooperation among users and common protocols
- Promote development of instruments that accurately measure roadway conditions

12.0 Transition Plan Outline

12.1 Experiences

- Current year accomplishments - team 9/10/99; chair compiles
- 3 year compilation (mission, objective, accomplishments) - (Haleem Tahir and Rick Nelson) - 1/30/00
- Communications/key players/organizations - (Wilfrid Nixon) - by 10/31/99

12.2 Present and Ongoing Work - Goals and Action Plans - 1999-2000

12.2.1 Goal 1: Support study to document the costs and benefits of anti-icing/RWIS vs. traditional snow and ice control method.

Action Plan:

- Recommend panel members to NCHRP 20-7
 - Joe Doherty will draft letter to Amir Hanna recommending panel members and promising team support by Friday, September 3, 1999; cost \$1
- Dennis Burkheimer
 - Larry Frevert
 - Wilfrid Nixon
 - Andy Mergenmeier
 - Dale Houdeshell (St. Peters, Missouri 314-477-6600 x302)
 - Illinois Tollway
- All team members: other support as required (data, etc.)

12.2.2 Goal 2: Enhance external and internal two-way communication to expand implementation of technologies to better serve our customers.

Action Plan:

- Speakers Bureau
- TRB Exhibit
- Other Exhibits
- Mid-year workshop/video conference –to be held 4/27/00
- Discuss transition plan at team mtg. @ TRB - January 2000

Excerpt: Proceedings –Fourth Lead State Conference – 1999

- Web site maintenance
- Sustaining the marketing - NACE, APWA, LTAP, others
- Directory of contacts
- International links: PIARC, data sharing, directory of international players, web sites - due by TRB meeting (January 9, 2000)

12.2.3 Goal 3: Promote and support education and training opportunities for agencies and industry in implementing and operation of winter maintenance technologies and strategies.

Action Plan:

- Work with communication vehicles (NHI) to promote education and training opportunities (Andy Mergenmeier, Wilfrid Nixon, Dena Gray-Fisher) - \$3K – by 10/31/99
- Directory of resources (FHWA/SICOP/AASHTO/etc) - (Rod Pletan) - \$2K - due by 11/1/99
- Initiate development of computer/web based operational training modules by key states and private sector (Dennis Burkheimer, Rick Nelson, Ed Fleege, Gordon Bell, Wilfrid Nixon, Wayne Lupton) - \$50K - by September 15, 2000

12.2.4 Goal 4: Continue to develop, deploy and advance snow and ice technologies.

Action Plan:

- Market penetration survey - (Haleem Tahir (DOTs), Dena Gray-Fisher (survey design and review), and Ken Kobetsky - (LTAPs)) - \$2K - results due by 4/15/00
- Develop agenda for mid-year workshop/video conference (Karla Snyder-Petty and Rick Nelson) - \$2K - 4/13/00
- Coordinating efforts with SICOP/AURORA/TRB/PIARC/LTAP and others - \$3K - ongoing
 - SICOP - Rod Pletan
 - LTAP - Ken Kobetsky
 - PIARC - Andy Mergenmeir
 - AURORA - Joe Doherty
 - TRB - Wilf Nixon
- AASHTO Green Book input (Andy Mergenmeir, Rick Nelson, Paul Keranen) - \$0 (Thor and Paul will send to Andy technical references by 9/15/99; Rick to send letter to Bob Walters, Arkansas DOT (AASHTO design revision chairman) by 10/15/99; copy to William Prosser (secretary)

12.2.5 Goal 5: Develop a database of existing environmental studies related to snow and ice control materials.

Action Plan:

- Jack Manicke and Joe Doherty - \$3K - due by 4/15/00

12.2.6 Goal 6: Develop detailed transition plan and future money sources

Excerpt: Proceedings –Fourth Lead State Conference – 1999

Action Plan:

- TRB meeting January 9-13, 2000 will be last review before the 1/30/00 deadline
- Long and short term implementation plan
- Summarize what's already done, accomplishments
- Report on experiences and present/on-going items (Items 4.1 and 4.2 from Task Force Expectations List)

12.3 Future Work

- Continue ongoing efforts (members will continue to be involved as resources to AASHTO)
- Document existing studies of environmental impacts
- Document performance measures from customer point of view
- Develop standard performance specifications for equipment
- Create and publish tests, specifications, and user manuals
- Increase integration of data collection within our DOTS and cooperation among users and common protocols
- Promote development of instruments that accurately measure roadway conditions

13.0 Estimated Budget FY 2000

- Goal 1: Recommend panel members to NCHRP \$1 (postage)
- Goal 2: Communications \$95K
- Goal 3: Education and training opportunities \$55K
- Goal 4: Continue development and deployment of technologies \$7K
- Goal 5: Database of existing environmental studies \$3K
- Goal 6: Develop Transition Plan \$0

Total \$160K