2.0 – TRAINING

This is one in a series of Syntheses of Best Practices related to the effective management of road salt in winter maintenance operations. This Synthesis is provided as advice for preparing Salt Management Plans. The Synthesis is not intended to be used prescriptively but is to be used in concert with the legislation, manuals, directives and procedures of relevant jurisdictions and individual organizations. Syntheses of Best Practices have been produced on:

1. Salt Management Plans

2. Training

3. Road, Bridge and Facility Design

4. Drainage

5. Pavements and Salt Management

6. Vegetation Management

7. Design and Operation of Maintenance Yards

8. Snow Storage and Disposal

9. Winter Maintenance Equipment and Technologies

10. Salt Use on Private Roads, Parking Lots and Walkways

11. Successes in Road Salt Management: Case Studies

For more detailed information, please refer to TAC's Salt Management Guide - 2013.

CONTENTS

INTRODUCTION

Human behaviour is predicated upon attitudes, which in turn are based on knowledge and experience. A successful salt management strategy requires changes in procedures, practices and equipment. Success also requires acceptance of the new approaches by managers, supervisors and operators. Any changes in approach will require changes in behaviour. Each organization should therefore include a comprehensive training program that demonstrates the purpose and value of new procedures and ensures that personnel are prepared and competent to carry out their duties.

The purpose of this Synthesis of Best Practices is to provide the reader with information that will assist in assessing, developing and implementing a successful salt management training program.

It is important that managers understand:

1. What should be included in a salt management training program (i.e. the learning goals), and

2. The concepts of adult learning and what methods of training are the most successful in maximizing learning.

This synthesis deals specifically with salt management training and presents both the learning goals and information on adult learning. Although the learning goals are specific to road salt management, the adult learning principles apply to all types of training. Salt management training is part of an organization's overall training program, which includes safety.

RELATIONSHIP TO SALT MANAGEMENT

Training is important to effective salt management because changing salt management practices requires learning new ideas, technology and skills. Equally important is the need to change perceptions about salt use and often to change the value system, which supports the local work ethic.

SALT MANAGEMENT TRAINING

The following presents a standard set of salt management learning goals, followed by a thorough discussion of adult learning principles.

Salt Management Learning Goals

Table 1 presents the salt management learning goals that should be covered in any salt management training program.

Although everyone involved in snow and ice control should have some knowledge of all of the learning goals, the program administrator will need to determine the level of detail that is presented to the managers, supervisors and operators.

It is not likely that all staff will need the same level of training. The amount of training and the level of detail of training that is required by specific personnel will vary. For example, managers may not need to know how to calibrate a spreader or to operate a plow in order to carry out their responsibilities. They should however understand the importance of an effective calibration program and what equipment is needed to optimize salt use.

Operators that do not make salt application decisions may not have to understand much about the decision-support systems.

However, they need to understand salt application policies, the chemistry and application of salt, the environmental issues, good housekeeping practices at maintenance yards, record keeping, equipment operation and relevant decision-support information.

Workers at snow disposal sites that do not operate spreaders will need to be trained in snow disposal site operating procedures, the chemistry of salt, environmental issues and relevant equipment operations, but may not need a detailed understanding of decision-support systems for snow and ice-control.

Table 1 is a tool to help design a training curriculum. It is intended to focus on the basic learning goals. Some organizations may need to undertake additional advanced or specialized training on such topics as material selection; calibration, operation and repair of equipment etc.

Each organization will need to determine the level of detail to which each person is trained in each subject area. The differences in organizational size, weather conditions, available resources, technology, duties and responsibilities will all factor into determining what each organization teaches its staff.

TABLE 1: LEARNING GOALS

SALT MANAGEMENT POLICY
Understand the definition and importance of Level of Service and that the goal is to achieve the prescribed level of service.
Understand the organization's Operating Policies and their application to winter operations.
Understand the organization's Salt Management Policy.

PRINCIPLES OF ICE FORMATION
Understand slippery pavement conditions are a result of water being lowered below its freezing point on the pavement surface.
Understand the sources of moisture on the pavement include dew, rain, snow and drainage.
Understand dew point and what conditions will lead to dew forming on the pavement surface. Also understand what conditions will lead to frost and black ice forming on the pavement surface.
Understand the importance of pavement temperature in making snow and ice control decisions.
Understand why bridges freeze first.
Understand that shaded and low areas can be colder and therefore freeze.

SCIENCE OF FREEZE POINT DEPRESSANTS
Understand the concept of a freeze point depressant.
Understand that chemicals are used to prevent or break the bond between snow and ice and the pavement.
Know the chemical composition of rock salt, and other chemicals used by your organization.
Understand that brine rather than the solid chemical melts the snow and ice.
Understand the phase diagram for the chemicals that are used in your organization.
Understand the criteria for the selection of de-icing chemicals.
Understand the relationship between chemical concentrations and freeze point.
Understand that dry chemicals and pre-wet chemicals take time to work.
Understand the testing requirements and risks associated with the introduction of new snow and ice control chemicals.
Understand the principle of refreeze.

MATERIAL USE
Understand the role of traffic and crossfall of the pavement in forming and distributing brine.
Understand when to windrow and when to spin a pre-wetted solid.
Understand how to treat special areas such as bridges and culverts, super-elevations, intersections, hills (crests, sags, inclines), bus stops, high wind conditions.
Understand that chemical should not be applied to dry pavement where drifting snow is not sticking unless it is necessary as part of storm response strategy.
Understand when to use and not use specific chemicals, taking into account pavement temperatures, forecasts, time of day, humidity, traffic volumes etc.).

TABLE 1: LEARNING GOALS (cont'd)

BRINE PRODUCTION AND USE
Understand the procedure for making snow and ice control liquids from solid chemicals.
Understand the importance of quality control and chemical concentration.
PRE-WETTING/PRE-TREATMENT
Understand the benefits of pre-wetting/pre-treating chemicals and abrasives.
Understand the difference between proactive anti-icing and reactive de-icing.
Understand how dry materials are pre-wetted.
Understand that salt and sand can bounce or be blown off the pavement and this product loss can be reduced by pre-wetting/pre-treating.
DIRECT LIQUID APPLICATION (DLA)
Understand the concepts of direct liquid application.
Understand the benefits of a proactive anti-icing approach.
Understand how to fill spreaders with liquid chemicals.
Understand the health, safety and environmental precautions needed for handling liquid chemicals.
Understand how to measure brine concentrations.
PLOWING
Understand that timing of plowing operations so that chemicals are not plowed off the pavement prematurely.
Understand the importance of timely plowing.
Understand how to efficiently plow each beat/route/site.
ROAD SALT AND THE ENVIRONMENT
Understand that chlorides are mobile in the environment.
Understand that high salt levels can harm public drinking water supplies.
Understand that road salt may attract some wildlife to the pavement, potentially increasing the hazard of animal/vehicle collisions.
Understand that high salt levels can harm adjacent vegetation and agricultural crops.
Understand that high salt levels can harm animals including fish living in streams, wetlands and lakes.
Understand that it is desirable to only use enough chemical to achieve the prescribed level of service.
STORAGE FACILITIES
Understand that all salt and sand/salt blends should be covered and stored on an impermeable pad to minimize salt loss.
Understand that salt spillage is wasteful and can be wasteful and harmful to the environment.
Understand how to handle salt to prevent the wasteful release of salt to the environment.
Understand that timely facility maintenance and repairs are necessary to control salt loss.
Understand the salt cleanup procedures that must be followed.

TABLE 1: LEARNING GOALS (cont'd)

SNOW DISPOSAL
Understand how to manage the snow pile to facilitate melting.
Understand the measures to be used to control nuisance effects (noise, dust, litter).
Understand how to monitor and record chloride, metal, pH, TPH and suspended solids in meltwater discharges.
Understand how the snow disposal system has to be managed to be cost-effective and to reduce environmental and social impacts.

RECORD KEEPING
Understand the importance of timely and accurate records.
Understand the importance of good records for mounting a due diligence defence in the event of a lawsuit.
Understand how to complete your organization's activity/ storm reports.
Understand the importance of recording actions and inactions and the rationale for each.
Understand the importance of knowing your beat/route/site and what it takes to properly maintain it to the prescribed LOS.

SPREADERS
Understand the concept of putting out the right material, in the right amount, at the right time, in the right place and leaving it there long enough to do the job.
Understand how the electronic controller and gate settings on each spreader must be set to achieve the specified application rates.
Understand how to calibrate each spreader to ensure that the right amount of material is being spread.

DRIFT CONTROL
Understand the role and effective placement of snow drift control devices (structural snow fences, snow ridging, agricultural stubble, living snow fences).

WEATHER FORECASTS
Understand the kinds and sources of weather information.
Understand how to read a weather forecast.
Understand what can affect local weather conditions and why weather might vary from one location to another.
Understand lake effect snowfalls where relevant.
Understand that wind chill does not significantly affect absolute pavement temperatures but does affect the rate of cooling.
Understand the concept of Dew Point and Frost Point.

WIND
Understand that a wind of 15 km/hr is needed to drift snow.
Understand how wind changes can signal an approaching or passing storm.

TABLE 1: LEARNING GOALS (cont'd)

WEATHER TRACKING AND DECISION-MAKING
Understand how to monitor weather conditions and anticipate changes.
Understand how to read a radar image and use the information in decision-making.
Understand how weather forecasts can be used in making snow and ice control decisions.

PAVEMENT TEMPERATURES
Understand the importance of considering pavement temperatures when planning and executing operations.
Understand the concept of heat balance and how it can affect pavement temperatures.
Understand how to read a pavement condition forecast.
Understand how pavement condition forecasts and real time information can be used in making snow and ice control decisions

RWIS AND IRTS
Understand the components and purpose of RWIS installations.
Understand how to read and interpret RWIS data.
Understand how to properly mount a truck-mounted IRT so as to avoid erroneous readings.
Understand that IRT's are for measuring temperature trends not exact temperatures.
Understand why odd readings might be obtained (e.g. interference, out of calibration, acclimatization, buried utilities, shading etc).
Understand precautions about handling and using IRT's.
Understand public comments and complaints from an automated telephone weather and traveller information service number (e.g., 511)

When to Train

Organizations should carry out an annual training program for all of their staff to ensure that the appropriate learning goals are taught, reinforced and tested. This should be scheduled for each fall, close enough to the onset of the snow and ice control season to include seasonal and contracted personnel. Throughout the winter season, the level of comprehension of the learning goals and compliance with expected behaviour should be monitored. Periodic refresher sessions should be held to correct unacceptable behaviour and reinforce expectations.

Certification

Some organizations have included testing and a minimum passing grade in their training programs. In the absence of any industry certification standards this type of internal agency certification may be advantageous to those organizations wanting to provide an assurance of minimum competency levels. Any in-house certification should be reviewed with the agency's risk management advisors and labour relations advisors prior to being initiated.

Adult Learning Theory

Managing the learning environment is critical to the success of the knowledge transfer. Being able to recognize the impediments to learning and mitigating their impacts will positively impact the outcome of any training session.

Teaching adult learners new concepts or technologies requires a different approach to teaching than it does for children. The study of how adults learn takes into consideration that adults bring to the learning process their own experience and 'frame of reference' from which they relate and gauge the value of all new things.

Whereas children have little life experience to rely on to challenge new concepts, adults expect to be able to test new concepts against what they already know. Children are dependent on others and adults are largely self-directed. Children expect to have questions answered by outside sources in contrast to adults who expect to be able to answer at least part of their questions from their own experience.

Adult learners gather useful information into their experience bank to which all future learning events will be compared and to which a new concept will be put into context with the other data in their experience bank.

When designing training programs the trainer has to incorporate these concepts of adult learning theory into the lesson plan to successfully provide the knowledge transfer.

Adult Learning Concepts

Although most people learn in the same way, several concepts that take the maturity of the learner into consideration should be recognized:

- Adults are problem-centred rather than content-centred.
- Adults live in a "here and now" world and must perceive the need to learn.
- Adults need to know "What's-In-It-For-Me" (WIIFM).
- Adults are concerned with immediate problems.
- Everyone learns more through active participation.
- Everyone retains more when all senses are used in learning.
- Everyone's perceptions vary so material should be presented in different ways.
- Everyone learns from doing the tasks.
- Everyone needs to integrate new concepts immediately.
- Everyone learns from testing so evaluation should be a mutual activity between learner and trainer.
- Everyone needs to be given feedback on how they are doing throughout the process.

Adult Retention Rates

It is also important when designing a lesson plan to use those teaching methods that generate the highest rates of retention in adult learners. In general terms adults retain:

- 10% of what they read
- 20% of what they hear

- 30% of what they see
- 50% of what they see and hear
- 70% of what they talk over with others
- 80% of what they use and do in real life, and
- 95% of what they teach someone else to do.

Instruction methods should include a combination of verbal and visual aids, group discussion and practical application. Learners who participate in a teaching process where the lesson plan is designed to use these components will experience the greatest rates of retention.

Components of Instruction

The trainer's role in providing the training extends beyond introducing new material and testing for the knowledge transfer. The training session has many elements that the trainer can be expected to manage throughout the session. The elements include the following:

- gain control and attention
- inform learners of expected outcomes
- review known related material
- present new material
- reinforce new learning
- probe for learning transfer
- test for retention
- provide feedback & appraise performance, and
- compare against expected outcomes.

Needs Assessment

Training needs vary among employees. New staff will need the full training program. However determining where the knowledge deficiencies exist for others in the organization is much more complex. There is no one method to collect the information. One approach would be to design a test and have the operators complete it to the best of their abilities. However the analysis of the test may not necessarily reveal the true state of their knowledge. The results could be affected by the individual's comfort level with being examined and the true needs deficiencies can be skewed. The testing might reveal some individuals who know the theoretical, but have a 'practical' deficiency.

One solution is to try to gather information from many sources. It may be possible to collect data from work management software, if available, that can provide reports by individual operators. There may be merit in interviewing the operators and asking them where they think they need additional training. It is also possible to have the supervisor rate each individual's knowledge based on their observed level of performance as a comparison to stated expectations. Each of these will aid in identifying the deficiencies.

There is a caveat to this approach to training however. Certainly it is more efficient to train only those who need to be trained. However, in many work environments, training is viewed as a break from the day-to-day tasks. If only the knowledge deficient is given the time off to be trained, then the operators who know the work will not get the same break. This may result in de-motivating operators who feel they are being penalized for being proficient.

The solution is to train everyone equally or, where possible, involve the proficient in training the deficient.

Training Design

Planning a training session involves three key components:

- Establishing learning objectives
- Identifying the learning components you want to cover
- Assembling methods and activities into a lesson plan

Learning Objectives

These are the instruction objectives that the trainer will want the learner to know, feel or be able to do at the end of the lesson. It describes the intended outcome of instruction in observable and measurable terms. It describes what the learner will be doing when they are demonstrating achievement of the task. Or more simply put it will answer the questions: Where are we going? How are we going to get there? How will we know when we are there?

The lesson plan will, produce new knowledge, produce new attitudes or produce new skills. Understanding what the learning goals are designed to achieve is critical to lesson planning for adult learners.

Much of what we hope to achieve in salt management training is a change in attitude and habits. It is more than just a process of imparting knowledge. The attitude and behaviour of the individual worker is what we need to change. The physical skills are not significantly different from the skills that currently exist so the concentration will be in teaching new attitudes and new knowledge. For example: understanding that there are situations where using more salt will not necessarily make the conditions better.

Learning Components

These are lists of what items will be covered during the training session. The trainer should take into consideration the arrangement of the learning tasks so that the process builds in a logical sequence. Typically the tasks should be arranged from the known to the unknown, the simple to the complex, the concrete to the abstract and the general to the specific. For example: understand the function of brine prior to learning about pre-wetting.

Lesson Plan

This is a plan of the specific elements and components of the session arranged to maintain interest and solicit participation from the learners. This is where the trainer will select the teaching methods to maximize retention. Adult learners retain more of what they do than what they are told and they retain the most when they can use it in real life. For example: a lesson on spreader controls in the cab of the truck where the operator can get tactile feedback will have a greater knowledge transfer than if the same lesson where in a classroom setting.

Training Methods

Consideration should be given to the timing of the training. Since skills used in salt management are specific to winter the training is best provided before or during the winter season. In most operations there is a window of opportunity at the end of the summer maintenance season and the beginning of the winter maintenance season. Training for salt management can occur at the same time as the annual winter preparation work is scheduled. There also may be time available at the end of the winter maintenance season, just prior to the start of summer work, to review the

effectiveness of the salt management initiatives and training and get feedback from staff on what to improve upon next year.

Class management combined with module-based delivery can be used to design an efficient learning setting as well. One example is to provide for each training module to be delivered in different areas where learners move from area to area on a rotational basis. Each module is designed to be snappy enough to prevent boredom and the information is presented to a smaller group. Time can be designed into the rotation to permit learners some one-on-one time with trainers.

Training opportunities should not be limited to formal classroom settings. Trainers should be aware of the workplace schedules, inclement weather policies, shift changes and shift downtime for example and take advantage of these windows of opportunity to present training modules.

Depending on the regular duties of the staff there are also opportunities to provide training in informal tailgate sessions or in post storm debriefing sessions.

Train the Trainer

Depending on the size and available resources of the organization there are advantages in designating and training a staff member(s) to provide the salt management training.

Before appointing a staff member to become a trainer for the purposes of salt management, care should be taken to ensure that the individual has the necessary characteristics to be an effective trainer. Beyond knowing the subject matter an effective trainer will have the following characteristics and may be the person in your organization that people currently go to for advice.

- Is accessible for questions.
- Knows how to give feedback - always positive and never uses sarcasm or ridicule.
- Holds respect for his colleagues and is respected by them.
- Can summarise ideas in a clear and precise way.
- Listens to the opinions of other and seeks their recommendations.

- Facilitates ideas and the sharing of new concepts or work methods.

- Is current on new methods and procedures.

Smaller organizations can also develop joint projects with neighbouring organizations to introduce economies of scale into the delivery of the training. It may also be possible to have one individual trained to cover off more than one agency.

It may be practical to contract with outside trainers to provide this service. Sometimes organizations need the "outside expert" to introduce and gain acceptance of new concepts.

There are Train-the-Trainer programs offered by various organizations that can be used to develop in-house training.

Testing for Retention

In developing the testing program it is advisable to have each organization determine their workplace specific standard of testing and performance. The philosophy of the testing should include not just verification of the knowledge transfer but to provide a medium to assess the quality of the instruction and the analysis of the results. This will permit the trainers to modify the curriculum or identify subjects that require more training in specific areas.

The testing should be fair and adaptive so that nothing is too easy or too hard for the test writers. The test design must be representative of the subject covered and the same test should be administered for each staff member (subject to literacy or language barriers).

Evaluation

We know that it is preferable to have the adult learners involved with the evaluation process as an aid to their learning and knowledge retention. While this may be achievable in some parts of the learning components it is not possible for the entire lesson plan.

The key to designing the evaluation for the training session lies in the description of the learning objectives. If the learning objectives are well defined then what is measurable is also defined.

The trainer will have to be aware of the competency

level of the learners in designing methods of evaluation. There may be a requirement to offer oral tests to those whose writing skills prevent accurate assessment of their skills.

The trainer should take advantage of any opportunity to have immediate and automatic feedback on whether the learner's actions are consistent with the learning goals. The more immediate the feedback, the more likely the learner will begin to self evaluate. They will begin to correct themselves once they recognize the gap between the stated objectives and their knowledge.

Transfer of Training

It is estimated that 40% of skills learned in training are lost immediately, 25% remains after six months and only 15% remains after one year. The trainer can increase the level of retention by incorporating as many of the following strategies as possible into the lesson:

- Use realistic examples of how skills can be used.

- Give learners real life context for the application of concepts rather than presenting theory without a practical association.

- Use rich analogies.

- Include practice of skills.

- Use clear and effective visual aids.

- Consider pre-training assignments.

- Keep skills and concepts close to the work generally done by participants in the normal jobs.

- Use post-training follow-ups.

- Encourage sharing of anecdotal experiences through discussion sessions.

This reinforces the need for refresher training. Trainers should make available easy access to reference materials to permit the learners to refresh their knowledge in a comfortable, non-threatening way. Again, periodic tailgate sessions help to reinforce the learning goals.

Situational Learning

In order for training to be effective the trainer must recognize that individuals or groups of individuals are going to differ with respect to their ability to learn,

their level of comfort and their familiarity with the learning process. Each of us brings our own frame of reference, bias and pre-conceptions to the classroom.

In some instances the learners will be very experienced in assimilating knowledge and others will have had little experience in classroom learning situations. A lesson plan designed to transfer knowledge to a room full of supervisors will not likely be very effective in a room full of equipment operators. Although the content may be similar, the transfer methods, the learning concepts, the duration and timing of the delivery will have to be modified specifically to suit the audience.

Resistance to Learning

Workplace Culture

The natural culture in the workplace may represent a challenge to the trainer and should be factored into the design of the training session. While each workplace will be different, some workplaces will have very co-operative workers eager to learn and others will have a history of reluctance to change. The attitude of the workers as a group is the issue.

In a group dynamic situation there will be informal leaders who the group relies upon to communicate and reinforce their culture.

Sometimes these informal leaders will compete for the attention of the learners and steer the group away from the established lesson plan. These leaders can be an asset or liability. It is the trainer's challenge to tap into and channel this enthusiasm to achieve the learning objectives. Where this energy cannot be used productively then the trainer must neutralise any disruptive influence these individuals have on the group.

Worker Attitude

Apart from the cultural attitudes in the workplace, each individual operator will have a perception of his/her role within the operations. Some will hold the view that acquiring knowledge of new systems or technologies is not their responsibility and they don't get paid to think about such things. They perceive their role as followers of instructions. Their 'locus of control' is 'external' and they rely on others, such as their

supervisor, to provide the appropriate conditions/features for them to carry out their work.

The challenge for the trainer is to convince these individuals that there is something in it for them (WIIFM) and to try to 'internalize' their locus of control by stressing how important each individual's contribution is to the overall success of the salt management initiative. The trainer should take the approach that when the operators are on their route they have options to consider, given the road and weather conditions, which only they as operators are in a position to make. External influences are too remote to make the best decision under the circumstance and their judgment is valued as the best available given their training, experience and local knowledge.

Labour/Management Issues

Training sessions offer an opportunity for the informal leaders to discuss other issues unrelated to the training. Unresolved issues are commonly brought up during a training session because of the nature or make up of the audience in attendance. At the onset of the session it is necessary to identify the purpose of the training and explain that issues other than what is on the lesson plan will not be discussed. In situations like this there is merit in having the trainer be someone who the learners do not view as a sounding board for labour management issues. There must be other opportunities for airing grievances or concerns for this strategy to work.

Fears of the Learner

How people react to new things varies greatly by the individual. However the trainer can anticipate that a number of the learners will have some fear that the change or introduction of new methods or technology will present some personal threat. The threat will manifest itself either in a fear of job security where the workers skills will no longer be valued or if they fail to learn the new systems they will be replaced. The trainer will have to reinforce the benefits the new systems or technology offers the workers.

Workers may also have a fear of the unknown or a fear of looking foolish in public or they may bring to the classroom the baggage left over from unpleasant schooling situations in their past.

Remember, to an adult learner, it is important to get the WIIFM (what's in it for me) issue on the table right away.

Second Language/Literacy Skills

Not everyone has the same communication skills. Some of the learners will have a first language other than English or French and some will be challenged to understand any written communication. It will be important for the trainer to identify those learners who have these learning impediments and modify the training and evaluation to accommodate their needs.

When dealing with these learners the trainers should try not to bring undue attention to them in a classroom setting. It is advisable to ask their supervisors prior to the training if there are learners with these challenges.

Changing Worker Value Systems

For many operators, who have been involved in winter control operations for more than the last few years, the standard of a job well done has been to see how much salt they can put down during their shift. Their value system said "More is Better" or "When In Doubt - Put It Out". Then along comes an initiative to optimize the amount of salt being used and the value system is changed to "Just the Right Amount and No More".

Changing an individual's or a workplace value system is not going to be achieved easily or with a simple directive from management. Although it is necessary to provide training, information, and the technical and environmental rationale for making the change, the worker still has to rethink his personal description of a job well done. His accomplishment targets have to be reset and to do this requires ongoing positive support and reinforcement. Once the initial training is given and the knowledge of the learner evaluated there should be secondary initiatives to reinforce the change in the value system.

Positive Messaging

The success of the training is the level of knowledge retention in the learner. Putting the key learning points in front of the learners in the workplace can enhance the level of retention and the rate of change in values. The key message of using the right material in the right

amount in the right place at the right time can be promoted in the workplace. For example the application rates or spreader control settings can be posted in an area where the learners congregate such as lunchrooms or staging areas. Similarly, reminder signs with this information can be displayed in the truck cabs adjacent to the vehicle controls.

Statistical data can be used to provide regular feedback. If work management software systems are available in the workplace then year-to-year or year-to-date comparison information of salt use or salt costs can be posted or distributed so the operators can see what impact they have on the financial side of the operations.

The salt optimization message can be reinforced through the knowledge of its impact on the environment. Even though the potential impact to humans is low and may not be a major concern in the workplace, there may be sensitivity to the salt impact on the environment. The impact of salt on aquatic life forms and the potential impacts to the food chain is a message that is likely to be taken seriously.

Informal post-storm sessions can help to reinforce the training especially if the there is an opportunity for the internal champions to relate their experience with the equipment, the conditions and the decisions they made based on what they encountered.

Continuous Learning

Researchers estimate that training provides 20% of the critical skills required to do a job and the remaining 80% is learned on the job. So regardless of the effectiveness of the lesson plan most of the learning will take place on the job outside the classroom setting or any other setting.

It becomes critical to the effectiveness of the overall operations to nurture a workplace where operators are encouraged to share information, experiment with new concepts and challenge old ideas. Management has to be alert to the discussions in the works yard to be able to assess if the attitudes are leading to the desired behaviours. If the behaviour has not changed additional or follow up re-training is required.

The need for annual training/re-training sessions is reinforced by this fact as well. The trainer can take

advantage of the knowledge and skills of some of the best operators to help in training the rookies both in the classroom and in the cab where knowledge transfer has the highest retention rates.

Training Information Resources

There are a variety of excellent training resources available through the following sources:

- Transportation Association of Canada
- Salt Institute
- AASHTO
- Provincial Road Associations
- Private Sector Training Providers
- Colleges and Universities
- APWA/CPWA, and
- Smart About Salt Council.

Trainers should assemble a bank of local case studies, local photos and examples to reinforce learning goals.

SALT VULNERABLE AREAS

Operators need to understand the salt management practices that they are expected to use to minimize salt impacts. Training programs are important to ensuring that salt is effectively managed everywhere, including in salt vulnerable areas.

MONITORING

For training, organizations should monitor the extent to which staff is performing with respect to expected learning goals. This should be done on an ongoing basis through observations of staff behaviour. Any deficiencies in behaviour should be identified and a plan developed to re-train in the appropriate areas.

RECORD KEEPING

Up-to-date files should be maintained of the training provided to each member of staff. It is advisable to include any certification and course description in the file to maintain a record of the worker's competency. The records should include the date, time, duration and subject of the training, as well as the source of the training and trainers. Records should be maintained in such a way as to allow summaries to be prepared on the percentage of staff at each level that is trained in salt management.

ACKNOWLEDGEMENTS