

Country Roads & City Streets

WV Transportation Technology Transfer Center

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ABRASIVES IN SNOW AND ICE CONTROL

By: Ron Eck, PE

Gritty materials, generally referred to as “abrasives,” have long been applied to snow- and ice-covered roads to improve traction. As the costs of these materials increase, it is important that they be selected and used appropriately. In this article, capabilities and limitations of abrasives are identified, selection criteria are outlined and characteristics of commonly used abrasives in West Virginia are reviewed.

Abrasives are usually mixed with salt or other chemicals to prevent stockpiles from freezing, to keep truck or hopper loads flowable and to “stick” the abrasives to the snow/ice surface. In addition to providing better traction, abrasives have a number of other advantages/capabilities, namely:

- Helpful in very cold weather when temperatures are too low for chemicals to be effective
- Easily noticed (improved public relations)
- Can be used on unpaved roads
- Relatively low-cost
- Can be mixed with salt or pre-wetted
- Easy to apply

While they are an important tool in snowfighting, it must be recognized that abrasives are not snow and ice control chemicals and will neither prevent the build-up of “pack” or break the bond

between ice and the pavement. They have a number of other limitations or disadvantages, including:

- Scattered by traffic action or covered by snowfall
- Possible damage to windshields and vehicles
- Tracking into homes/businesses
- Air and water pollution
- Surface drainage channels become clogged by the accumulation of solids and sewer capacities can be reduced. Clean-up is a time-consuming and costly activity.

When using abrasives, it is important that the material have the appropriate characteristics to be effective. Desirable characteristics of abrasives include:

- Resistance to crushing
- Angular shape
- Dark color
- Uniform particle size



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Country Roads and City Streets is a quarterly publication of the West Virginia Transportation Technology Transfer Center (T² Center). The purpose of this newsletter is to provide information that is beneficial to highway construction and maintenance personnel.

The material and opinions contained in this newsletter are those of the West Virginia Transportation Technology Transfer Center, and do not necessarily reflect the views of the Federal Highway Administration or the WV Department of Transportation. Material contained in *Country Roads and City Streets* is a combination of original and borrowed material. Every effort has been made to ensure the integrity and accuracy of this material. However, the WV T² Center does not assume responsibility for any incorrect material.

Abrasive materials should meet the following requirements:

- Be insoluble so they do not dissolve completely, thereby no longer providing traction
- Be hard so they resist crushing
- Be no smaller than coarse sand nor larger than small pebbles. Most states use a maximum particle size of about 3/8-inch. Fine materials make the surface more slippery and silt-size particles contribute to air pollution.
- Have sharp edges to dig into the ice
- Be dark in color to absorb heat (take advantage of solar radiation)

AASHTO's *Guide for Snow and Ice Control* (1999) notes that it is important to remember that specifications for procurement of abrasives must satisfy a number of criteria such as delivery costs, material supply and demand, effectiveness and quality. Each variable should be assessed to achieve a balance of the constraints. Abrasives are frequently obtained from local sources to minimize delivery costs. This approach is acceptable as long as sacrifices are not made in the effectiveness or quality of the abrasives.

The most commonly used abrasives in West Virginia are bottom ash, cinders, limestone, sand and sawdust. Relevant properties of each are identified below.

Bottom Ash

- Produced at coal-fired power plants burning pulverized coal
- Gray to black color
- Angular
- Porous surface texture

Cinders

- Produced at boilerhouses burning non-pulverized coal
- Highly variable
- Gray to black color
- Sharper than sand
- Less dense than bottom ash
- Porous surface texture
- Good melting/embedding action

Limestone

- Quarried rock, crushed to desired gradation
- Light gray color
- Quite angular
- More dense than cinders or bottom ash

Sand

- Naturally obtained from river bottoms or produced by crushing
- Uniform cubical shape
- Light color
- More dense than cinders or bottom ash

Sawdust

- Obtained from sawmills in areas with significant timber/logging industries
- Lightweight
- Absorbent
- Most effective when mixed with other abrasives

Abrasive application rates vary widely depending on location and agency. Published literature says anywhere from 0.5 to 2 tons per lane mile is considered effective. It is generally agreed that a rate less than 0.5 ton per lane mile is not effective

Storage

Abrasives must be kept dry if stored at below-freezing temperatures. Any moisture can freeze into hard lumps. Mixing salt or liquid calcium chloride in the abrasive as it is stockpiled is the common method of "freeze-proofing." Some sources recommend treating stockpiles with 50 to 100 pounds of salt per cubic yard of abrasive to prevent freezing. The chemical should be added as early as possible in the stockpiling operation and mixed thoroughly.

It is clear that abrasives are an important tool in winter maintenance operations and are part of most agencies' storm-fighting arsenal. However, because of their costs and impacts, acquisition and use of these materials must not be taken lightly.

SALT INSTITUTE'S EXCELLENCE IN STORAGE AWARD - INFORMATION FOR 2005

Proper storage of highway deicing salt has been an integral part of the Salt Institute's Sensible Salting Program since it began in 1972. Principles of proper storage are outlined in the Institute's *Salt Storage Handbook*.

Proper storage includes environmental considerations in location, design and operation of all facilities which store salt (including storage of abrasives into which salt is mixed to prevent freezing). But proper storage also includes consideration of employee and community safety, good housekeeping practices and provision to store sufficient salt to meet winter's snow and ice emergency needs, without re-supply problems. Proper storage means agencies can ensure having dry, free-flowing salt at their immediate disposal to meet their critical snowfighting responsibilities at all times.

To encourage proper storage practices, the Salt Institute annually confers its *Excellence in Storage Award* to recognize agencies with outstanding storage facilities and programs. If you feel that you have an excellent storage facility, you are invited to complete and submit the application form postmarked not later than May 1, 2005.

Winter maintenance agencies have come a long way since those years when outside, uncovered salt storage was commonplace. Every year, more agencies construct new or add more permanent salt storage facilities with impermeable pads, and appropriate run-off collection or disposal. These costs are no longer seen as "frills," but sound and necessary investments. The objective of the *Excellence in Storage Award* program is to encourage construction of sound storage facilities, exemplary operating practices to minimize environmental concerns, to promote the safety

of workers, and effective procurement planning to avoid service interruptions when winter storms make re-supply difficult.

The *Excellence in Storage Award* is given to all facilities utilizing excellent housekeeping and operating practices. A plaque honoring their achievement is accompanied by recognition baseball caps presented at the International Public Works Congress and

Equipment Show in Minneapolis, MN, September 11-14, 2005. A separate contest is conducted each year.

To apply for the *Excellence in Storage Award*, the facility manager should 1. Complete the application form; 2. Have it signed by the immediate supervisor; 3. Return the application with good quality current photographs of the facility, with digital photos being preferred; 4. Include all supporting documents; and 5. Send the completed application and supporting materials to the Salt Institute. Please answer **ALL** questions and provide only the supporting documents requested. Ap-

plications will be judged by a blue-ribbon evaluation committee. A Salt Institute representative will make on-site facility visits to some qualifying agencies.

Completed applications should be sent to: Salt Institute, 700 North Fairfax Street, Suite 600, Alexandria, VA 22314. Please put to the attention of Excellence in Storage Award. This application form can be downloaded from the Salt Institute's website at <http://www.saltinstitute.org> or contact the WV T² Center to have a hard copy mailed to you.

The WV T² Center encourages you to strive for excellence in your salt storage facilities and submit your application for this award.



UPCOMING COURSE - DESIGNING PEDESTRIAN FACILITIES FOR ACCESS

One-Day Workshop (7 PDH's) * 8:15 AM to 4:15 PM
Wednesday, November 3, 2004
Flameway Building, Jackson's Mill, Weston, WV

Course Description

Sidewalks, like roadways, should be designed to serve all users. To meet the needs of all sidewalk users, designers and builders need a clear understanding of the wide range of abilities that occur within the population. Pedestrian facility design and operation must comply with the accessibility standards in the *Architectural Barriers Act (ABA) of 1968*, the *Rehabilitation Act of 1973 (Section 504)* and the *Americans with Disabilities Act (ADA) of 1990*. Title II of the ADA, which covers state and local governments, also addresses "communications and information access," requiring effective communications with persons with disabilities. In the sidewalk/street crossing environment, this includes accessible pedestrian signals, markings and signs. The latest version of the *Manual on Uniform Traffic Control Devices* contains standards on accessible pedestrian signals (APS) that have audible, visual and vibrotactile features. Temporary and alternate pedestrian routes where sidewalks are obstructed by work zones must meet accessibility standards as well. This workshop focuses on these and other emerging accessibility issues and the design parameters that affect sidewalk and street crossing design and operation.

Topics to Be Covered Include:

- Background to the Americans with Disabilities Act (ADA)
- Characteristics of pedestrians and the pedestrian environment
- Legal requirements
- Accessible Design Elements—sidewalk corridor, frontage corridor and pedestrian zone
- Curb ramps (including detectable warnings)
- Crosswalks
- Medians and islands
- Pedestrian signs and signals
- Overpasses and underpasses
- Temporary facilities and construction sites

Who Should Attend

The primary target audience for this workshop is local, state and private sector personnel with responsibility for designing, constructing and operating pedestrian facilities. These include engineers, technicians, public works directors, street supervisors, consulting engineers and landscape architects.

Registration Information

Name: _____

Title: _____

Agency: _____

Address: _____

City: _____

State: _____ Zip: _____

Phone: _____ FAX: _____

E-Mail: _____

Please make checks payable to:
WVU National Transportation
Center

- State Public Sector - \$50 fee will be direct billed
- Local Public Sector - \$50
- Private Sector - \$100

Cancellation Policy:

No refunds will be made unless notice of cancellation is received at least **five** working days prior to the workshop date. Substitutions will be accepted for individuals within the same organization.

PROACTIVE VERSUS REACTIVE WINTER PUBLIC RELATIONS

By: *Kim Carr*

Proactive vs Reactive PR? Or, stated another way, Offensive vs Defensive? Have you ever given any thought to how you would classify your agency's winter public relations? Are you swamped every winter with calls from irate citizens wanting to know when their street is going to be plowed? Why your agency is spraying the roads with water, when you are actually using a clear anti-icing agent? Or do you go on the offensive and provide information to the public prior to the winter season?

Having a proactive public relations plan can help make the winter months safer and much more pleasant for both your agency and the public served. Having a proactive plan keeps your agency on the offensive and allows you to spend more time keeping the roadways clear and less time dealing with irate and angry citizens. The time spent prior to the winter months informing the public of your city's ordinances and winter policies is time well spent.

It's important to remember that one of your goals should be to educate the public about your agency's snow removal policies, priority districts, equipment, and anti-icing and de-icing materials used in treating the roadways and sidewalks. You do this job every day; therefore, many procedures may seem like common sense. Remember, the majority of the citizens you serve are not experts in this area and if information isn't provided, they will come to their own conclusions.

As an example, let me share the following true story. Last winter, a friend of mine was following a snow plow truck that was spraying clear, liquid salt brine on the road. Keep in mind that this individual is highly educated, having obtained a post-graduate degree. He turns to his wife and says, "Why in the world are they spraying water on the

road? That's just going to freeze!" His wife knew enough to explain that it wasn't water but a special chemical that helped keep the roads clear and helped with snow removal.

So how can you help the public understand your agency's winter maintenance policies and procedures better?

1. Use your local media. Through newspaper stories, radio announcements, and radio or television talk shows you can inform the public about new equipment, street priorities, and on-street parking policies during winter storms, proper procedures for disposing of snow from their driveways, and much more. Most importantly, remember that the media is a tool you should use before, during, and after the winter season.

2. Hold an open house. Invite the media and the public to come to your facility – and showcase your snow-fighting arsenal. Explain the abrasives and other materials that will be used. Provide written information highlighting policies and other important information such as driving tips for winter conditions and departmental contact information should they have any concerns.

3. Educate the public on their roles and responsibilities. For instance, let residents know how soon after a storm they are expected to clear the sidewalk adjoining their property. Explain the hazards of shoveling snow from driveways into the roadway.

While these three tips won't eliminate all complaints or phone calls, the more information you can provide to the public the better understanding they will have. They may not like what you have to say, but by understanding the policy and thought process they at least have the opportunity to respect the decision.

For more information on this topic, please contact Kim at the WV T² Center.

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Susan Feldman of the Salt Institute speaks to the group on the importance of sensible salt storage.

The annual 2004 Snow and Ice Control Workshop set a record number of attendees, with 130 people participating in this year's event! Held at Jackson's Mill on September 22, participants experienced a mixture of indoor presentations along with outdoor demonstrations.

Ron Eck of the WV T² Center and Terry Hough from the City of Morgantown kicked off the workshop with their session, *Abrasives: Theory and Reality*. Ron discussed the role that abrasives play in snow and ice control operations and the characteristics of common WV abrasives, while Terry discussed the practical realities that local roadway agencies may encounter.

After a brief break we were on to our next topic, *Best Practices in Salt Storage*. Susan Feldman, Technical Director for the Salt Institute, spoke on the importance of sensible salt storage. Susan discussed salt storage, environmental aspects, and factors to consider when designing the optimum site. She also explained the *Excellence in Storage Award*, which you can read more about in this newsletter edition.

Our third workshop session, *Experience with Using Natural Brine*, gave participants an opportunity to learn from both

rookie and veteran users their experiences with using natural salt brine in their anti-icing operations. Veteran users included Terry Hough, City of Morgantown; Mike DeMary, City of Fairmont; and Kevin Queen, City of Weston. Gary Dyer of the WVDOH spoke to the group about their experiences in using brine on selected sections of the interstate. Because of flood recovery, Joe Forrester from the City of Wheeling and Wally Burkhart from the City of Shinnston were not able to participate. Both Joe and Wally used natural salt brine for the first time last winter and plan to use this resource again.

After a wonderful home-cooked lunch by the staff at Jackson's Mill, the participants were encouraged to discuss hot-topic and operator issues with an expert panel. Panelists consisted of Mike DeMary, City of Fairmont; Bill Rumble, City of Morgantown, and Larry Weaver, WVDOH. Topics discussed included methods for staying alert while plowing, dealing with aggressive drivers, plowing methods for residential streets and intersections, and educating the public on how they can help keep the roads safer this winter.

After this indoor discussion, participants went outside, where Ron Eddy from the City of Fairmont and John Corio from the WVDOH demonstrated various plowing techniques on two simulated courses. The first course was set up to simulate plowing around parked cars, while the second situation simulated plowing a four-way intersection. Mike Demary and Larry Weaver explained to the audience the techniques the drivers were using as they proceeded through the course.

We received some great feedback from the workshop evaluations and hope to make this event even better next year. Until then, happy plowing!

SCENES FROM THE OUTDOOR DEMONSTRATIONS



The WVDOH and the City of Fairmont trucks and drivers are ready to begin the demonstration.



John Corio, Larry Weaver, and Ron Eck observe as Mike DeMary explains the course and plowing techniques.



Ron Eddy, driver of the City truck is preparing to turn around to proceed back through the parked car set-up.



Close-up of Ron Eddy as he begins to enter the "parked car" portion of the course.



John Corio navigates the WVDOH snow plow truck through the intersection turn.

The West Virginia T² Center is a part of the nationwide Local Technical Assistance Program (LTAP), which is funded by the Federal Highway Administration. The Center also receives funding from the West Virginia Department of Transportation.

Mission:

The mission of the West Virginia T² Center is to foster a safe and efficient transportation system. The T² Center's mandate is to improve the transportation system by improving the professional skills of those involved in highway design, construction and maintenance, and to act as a resource for them by keeping up-to-date training libraries and constantly seeking/developing new technologies.

Overall Goal:

The Center's overall goal is to improve the transportation system by focusing on professional training, technical assistance, and information dissemination.

To achieve this goal, the WV T² Center does the following:

- Provides on-site training and demonstrations
- Publishes a quarterly newsletter
- Maintains a video and publications library
- Provides technical assistance via mail, telephone, fax, email, or site visits.

INFORMATION ON UPCOMING COURSES AND EVENTS

Designing Pedestrian Facilities for Access

November 3, 2004; 8:15 AM to 4:15 PM

Jackson's Mill, Weston, WV

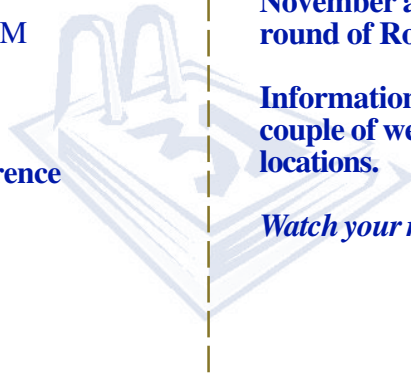
2005 Roadway Management Conference

March 30 - April 1, 2005; Hershey, PA

Mike is planning to be on the road in November and December offering another round of Roads Scholar I courses.

Information will be mailed out in the next couple of weeks detailing courses, dates, and locations.

Watch your mail for this information!



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**SNEAK PEEK FOR DECEMBER
2004 COUNTRY ROADS AND
CITY STREETS EDITION:**

Join the WV T² Center as we reflect on the past 20 years since becoming part of the National LTAP Program. Program successes, pictures from the past, and much more will be included.