No matter how beloved a tree may be, those with significant defects such as the extent of decay in this bur oak, and those located in high use areas such as this college campus are unacceptable risks and must be removed promptly. Photo by Gary Johnson

speed. Assessing tree risks is a different story, though, requiring a new skill-set of evaluation practices and protocol, as well as a basic understanding of tree biology and biomechanics.

A Step-by-Step Protocol

Step One. Know the Language: *Risk*. A level of risk is arrived at after considering how likely damage or injury may occur due to the hazardous tree (or part of the tree) and how severe the damage or injury may be. For instance, a tree may be large, weakened by decay and teetering on the brink of being vertical, yet located in the middle of a wooded area that people rarely frequent, no structures are

Big trees and public spaces don't always spell danger. Trees that are well-maintained reduce tree risks to acceptable levels. Photo by Sue Granger.

nearby, and the only thing that will suffer damage would be the tree next to it. This would be an example of a high risk of failure but a low risk of damage or injury. Therefore, in the perspective of risk assessment for public spaces, this would be considered a low risk.

Target. The relative ranking of risks allows the property manager to prioritize actions, maximize the effectiveness of budgets, whether generous or limited, and create an environment with acceptable risks for the greatest number of visitors or participants. Anything in the park or public area that could be damaged or injured by the hazardous tree is considered a "target." As opposed to a shooting range, this kind of target is not considered the ultimate recipient of unwanted lead. The more targets that exist near the tree being evaluated, the more valuable the target is, the more consequential the risk. Applying this to the scenario above, if the same tree with the same defects or hazardous condition was located in the middle of a popular playground, the risk would now rise to the highest level and generally be considered unacceptable.

Defect. A defect is a character trait of a tree that is not just abnormal (e.g., a dead branch), but holds some potential for damaging or injuring targets. If that damage potential is considered benign (a small dead branch on a crab apple tree), then it's of no concern for safety. If however, the defect has a history of leading to failures (e.g., extensive decay in large branches and tree trunks), then the tree defect is considered a hazard.

Hazardous. Finally, if the odds are that the tree defect is likely to cause failure and the failure is likely to result in significant damage or injury, the tree is considered hazardous. When a tree has been evaluated and deemed hazardous, and if that tree is in a situation where there could be significant damage or injury to one or more targets, then action must be taken.

Step Two. Institute a monitoring program.

For your own (legal) protection and for the (ethical) protection of your clients, the next step is the development and implementation of a logical monitoring program that assesses the trees in the park, campus or golf course on a regular and reasonable basis. Since you will be dealing with a living, sometime unpredictable biological system (tree), unpredictable weather events and varying numbers of users, there is no absolutely perfect protocol. However, there are professional standards and examples from other communities that can guide you through the process.

The recently published "Tree Risk Assessment: Best Management Practices," is a companion publication to the "ANSI A300 Part9: Tree, Shrub, and Other Woody Plant Management – Standard Practices (Tree Risk Assessment a. Tree Structure Assessment." A lot of words for a recommended tree risk assessment protocol. This Best Management Practices (BMP) perspective offers an industry standard for monitoring techniques and timing as well as guidance on tree

defects and hazards of note. It is available through the International Society of Arboriculture at www.isa-arbor.com, and is worth the investment.

The frequency (aka, *inspection interval*) and the depth of monitoring are functions of budget potential, the levels of assessed risks and the goals of the property managers. In most situations, a public space will have varied levels of risks; therefore, the frequency of monitoring the trees in that area varies with the potential for injury or damage. The higher the potential risk assessment for an area of a park usually means a higher frequency of monitoring and often a more in-depth examination of the trees.

The depth of monitoring examinations ranges from “limited visual assessments” to “basic” to “advanced.” Price tags increase with each higher level of examination due to increased labor costs and equipment required to assess the defects/hazards. Due to those realistic monetary constraints, it will be imperative that a “risk zone map” of the public space or spaces be constructed as a guide for determining which areas warrant the most frequent, most detailed inspections. It should be obvious that open public spaces around heavily-used community parks with extensive infrastructure deserve more attention than meandering informal walking paths that are lightly used.

Accept it as Management

There is often a “push-back” when it involves risk assessment and management, especially with trees. Most of that push-back is due to a lack of knowledge, experience or understanding of the power of prevention. No property manager wants users to be exposed to unnecessary dangers, and that’s an ethical as well as an issue of legal responsibility. Parks and properties that are perceived to be safe are always more likely to be popular and used. The BMPs for Tree Risk Assessment are excellent guides and foundations for a risk management program that is reasonable and attainable for all public spaces.

As with all management programs, documentation is critical. Document the frequency and level of risk assessment by date and personnel conducting the assessment as well as the assessment notes. If trees are deemed as unacceptable risks, promptly remove or correct the defects and document the dates and actions. For those in-house personnel who may be conducting the assessments, document their level of training and credentials.

When good trees go bad! Defects such as larger, dead branches are hazardous when they are located near areas or people that can be harmed as a result of their failure. Photo by Jeff Hahn.

Dr. Gary Johnson:

Professor, and Extension Professor of Urban and Community Forestry

University of Minnesota, Department of Forest Resources

Areas of Expertise:

Urban Forest Health

Stress Disorders: Deicing Salt Damage; Urbanized Soils.

Diseases of Trees and Shrubs.

Risk Assessment and Management.

Tree Preservation During Construction Activities.

Dysfunctional Root Systems, including Stem Girdling Roots.

Nursery Tree Production.


Wishing you Peace & Prosperity

Keeping It Clear!!!

By Ken Rost of Frost Services

Traditions are great for family get-togethers and meals that help feed the bear inside us. But the practice of spreading salt for ice melt might be a tradition that needs to be pondered. We all want to keep our traffic areas safe to minimize accidents and falls and salt has been a traditional tool to help minimize the labor. But when it seems like salt isn't getting the job done, our tendency is to add more. More is good, right?

What if there is a better way? This question has sparked innovation and new methods have been developed in the business of keeping our traffic areas clear of snow and ice. These new products and methods will likely become new traditions very soon.

When we have just one option, a decision is easy. That's tradition. When we have many options, the decisions about what ice melt to use get complicated. In this article, we will summarize common ice melt options available today and the methods for using them that might deviate from tradition.

Keep in mind that the process of melting snow and ice is an exercise in physics and chemistry. In a laboratory we can control variables and determine a temperature when a product ceases to melt ice. This is how phase change melting points are determined. However, in real world applications, many variables will alter the laboratory determined temperature. Moisture level, sunlight, air temp and surface temp are the main variables that affect melting temps. If we include these variables in our evaluation, we come up with an effective temperature. Effective temperature is simply a relative temperature determined through practical use of the product. We'll use effective temperature to compare ice melt materials.

Dry Salt (NaCl) – Effective Temperature = 150F

Traditional salt is relatively inexpensive but it has a limited effective temperature. It is very corrosive and even within the category of 'salt' there are differences. Mined salt is taken from deposits left years ago during the formation of earth. It often contains other minerals and possibly inert materials that don't help melt snow and ice. Solar salt is harvested from lake beds and other areas where salt water has been evaporated. Solar salt tends to be more pure NaCl and is more consistent in its effective melting temperature. Here's a chemistry reminder, dry salt doesn't melt anything. Only when salt goes into solution does it start to melt surrounding snow or ice. In order to get the process started, many salt products are 'pre-wetted' with a de-icing liquid. This method will speed up the melting process by about 20 minutes and usually lowers the effective temperature by 5-100F. Automatic pre-wetting systems are common on DOT trucks that apply dry salt.

Dry Calcium Chloride ($CaCl_2$) – Effective temperature= -150F

The effective temperature of dry calcium chloride is much lower than traditional salt which makes it a better choice for the colder periods of winter. The cost of calcium chloride is higher than salt but theoretically lower amounts can be used. Being a dry product, the rules about effectiveness when dissolved in a liquid state apply to calcium chloride also.

Liquid Calcium Chloride ($CaCl_2$) – Effective temperature = -200F

Liquid Magnesium Chloride ($MgCl_2$) – Effective temperature = -100F

Liquid chlorides are the most common liquids that are used to pre-wet salt as described above. They are also emerging as effective liquid products that can be directly applied to surfaces. They can both prevent snow and ice adhesion to pavement, and melt existing snow and ice. Liquid chlorides are corrosive and more expensive than salt on a volume basis, but their effective temperatures are substantially lower than salt. This means that small amounts of liquid chloride products can be used


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to achieve good results. Liquid chlorides are hygroscopic which means that they 'collect' moisture. Their molecules seek out water and bind with H2O molecules. The result is a liquid solution on the surface with a much lower freezing point. The benefit is that snow or ice won't adhere to pavement. It creates a non-stick surface much like a coated frying pan.

This is where a change in method comes in. Instead of plowing and spreading dry salt afterward to melt remaining snow, liquid chlorides can be applied before the snow fall. After plowing, the liquid chloride remains in the pavement and an application of salt will usually be unnecessary.

*L*et's use two sidewalks as a theoretical example of how liquid chlorides work. We'll apply the liquid to one of the sidewalks about 6-8 hours before a 6" snowfall. The first thing we'll notice is that there is 6" of snow on the untreated sidewalk and 5" on the treated sidewalk. The liquid chlorides will initially consume about 1" of the snowfall. Then let's have heavy traffic on both sidewalks for a couple of hours. After the traffic we'll get around to plowing. The untreated sidewalk will be difficult to clear and will undoubtedly have snow and ice bonded to the surface. The treated sidewalk will clear off easily and any remaining snow will be dissolved by residual chloride.

If we spread dry salt on the untreated sidewalk, we may not get it cleared off for days depending on sunlight, air temp, etc. Pre-applying the liquid chloride bought us time so that we didn't need to plow immediately after the snowfall or before the traffic to prevent adhesion to the pavement.

Acetates (KAc) –Effective Temperature = -200F

*A*cetates are a non-chloride type of liquid that have low effective temperatures and are non-corrosive. They are approved by the FAA for airport runway de-icing and are commonly used on automated bridge de-icing systems. The cost of acetate liquids is substantially higher than chloride liquids because they cost more to produce. The methods for using acetates are the same as for liquid chlorides.