

Green Purchasing Best Practices: Deicers



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HIGHLIGHTS

- Snow and ice control products are purchased by many government agencies (particularly transportation departments) either as a separate commodity or part of a snow and ice control service agreement.
- Road salt is by far the most commonly used deicing product. It causes significant damage to plants, wildlife, roads, bridges, and vehicles.
- Less corrosive deicers and preventive treatments (such as beet juice) are widely available and are highly effective at reducing or completely eliminating the need for road salt. Their higher upfront cost can be offset by lower road maintenance costs as well as avoided environmental impacts.
- The best way to reduce the environmental impacts of deicing chemicals is to [minimize the need for them overall](#).

WHY BUY GREEN DEICERS?

- These alternative products can help states and local governments reduce the use of road salt, which is corrosive and can increase the salt concentration of water supplies and soil.

Variety and Quality

- Many types of environmentally preferable deicers are available, including agricultural products (such as de-sugared beet juice), acetates, and less-corrosive chloride compounds.
- These alternatives have been successfully utilized by state departments of transportation for many years.
- Some types of snow and ice control products (particularly those sold in small containers) are certified by US EPA's Design for the Environment (DfE) Program. Other products (including bulk deicing chemicals used on major roadways) are included on the Pacific Northwest Snow Fighters (PNS) Qualified Products List (QPL).

Environmental and Health Benefits

- Alternatives to road salt (and other chlorides) are less damaging to vegetation, soil, fish and water supplies. (Rising salinity in drinking water supplies is also harmful to humans who drink it.)
- Avoiding road salt can also prevent accidents, which can occur when wildlife is attracted to salty roadways.

Economic Benefits

- Alternatives to road salt reduce (or avoid altogether) the corrosive effects to roads, bridges and vehicles.
- They also prevent the need to remediate soil, vegetation and water supplies, which can become salty when sodium chloride is washed into water supplies or storm drains.
- Applying products such as de-sugared beet juice to roadways can reduce the need to plow snow as often.
- Purchasing some environmentally preferable snow and ice control can earn "green" building credits under LEED.

BEFORE BIDDING

Building a Stakeholder Team

- Convene a Snow and Ice Contract Development Team including high-use agencies (such as departments of transportation and parks departments) as well as environmental program staff.

Which Products Are Needed?

- Consider creating a "green" bid list comprised of environmentally preferable snow and ice control products that contract users can utilize whenever it is practical to do so – particularly in ecologically sensitive areas.

What Products Are Out There?

Survey the market. Ask vendors – informally or through a request for information (RFI) – to identify all of the environmentally preferable deicing products they offer meeting your criteria. Green deicers fall into three categories:

- Agricultural-based Products (Such as Beet Juice)
- Acetates (Such as Calcium Magnesium Acetate)
- Less Corrosive Chloride Compounds

Are There Useful Cooperative Purchasing Contracts?

- [WSCA-NAPSO](#) cooperative contracts with Grainger and Fastenal offer deicers that are DFE-recognized.
- The Oregon-Washington Green Janitorial Supplies Contract offers deicers that are DFE-recognized.

Are There Useful Model Specifications From Other States?

- Ohio has developed a contract for "natural" (agricultural-based) deicing chemicals.
- Many states reference the PNS specifications in their bid solicitation for environmentally preferable deicers.

GREEN CERTIFICATIONS AND STANDARDS FOR DEICERS

- Pacific Northwest Snow Fighters Specification and Qualified Products List (QPL)
- US EPA's Design for Environment (DfE) Program Recognition
- The U.S. Department of Agriculture (USDA) Biobased Product Certification

BID SPECIFICATIONS

Recommended Minimum Requirements

- ***Bulk snow and ice control products***
 - Product must be on Pacific Northwest Snow Fighters QPL (or meet all of the PNS specifications)
- ***Packaged snow and ice control products (solid and liquid formulations)***
 - No sodium chloride-containing products
 - Product must be on EITHER the PNS QPL or EPA's Design for Environment (DfE) list.

Bid Strategies

- Create an Environmentally Preferable Bid List that allows a wide range of less-corrosive snow and ice control products to be offered, since they are likely to be needed for different temperature ranges. This should include several chloride-free products, including at least one agricultural-based product.
- A "Brown List" would largely include any sodium chloride-containing product or any product that is not on the PNS QPL (or, for packaged deicers any product that is not on the QPL or US EPA DfE list).
- Ask for both bulk and bagged products, as they fill different needs.
- Consider line-item awards to increase the number of products offered
- Consider issuing an RFP so you can reward vendors offering more green products and services on your contract.

ONCE THE BIDS ARE IN

Best Ways to Award

- Consider choosing multiple vendors based on best line-item prices, product category or region.
- Multiple awards (particularly for different types of deicing chemicals) can increase product selection, which may be important to enable contract users to find products that meet their needs. The same vendors that offer road salt may not offer environmentally preferable products in this category.

Verifying Compliance

- Check products to ensure that they are on approved products lists that are referenced in your specification (e.g., the Pacific Northwest Snow Fighters (PNS) Qualified Products List (QPL) or EPA's Design for Environment recognized list).
- Check MSDS to ensure that the product does not contain sodium chloride (in cases where it is prohibited).

Evaluating Performance and Price

- Compare prices of equivalent products. Organize bid information to facilitate an apples-to-apples price comparison of various types of deicing products.
- Use a best value calculation to factor in the concentration of active ingredient in the formulation.
- Both the PNS and DfE standards consider product performance. Nevertheless, if possible, products should be pilot tested in advance, or as part, of the bid evaluation process and factored into the decision to award.

VENDOR EVALUATION

- Consider giving points to bidders offering the widest variety of environmentally preferable snow and ice control products that meet your specifications, full disclosure of chemicals ingredients, sustainable sourcing, manufacturing and transportation methods, and/or other services related to this product category. To collect this information, consider using our Model Vendor Questionnaire, which is attached as [Appendix A](#).
- For service agreements, vendors can be rewarded for their experience implementing strategies to prevent the use of chemical snow and ice control products as well as utilizing environmentally preferable products.

MAXIMIZE GREEN IMPACT

- Preventive practices such as monitoring road and air temperatures, removing snow mechanically, and applying non-chloride coatings to roadways prior to a major snowfall can help reduce the need for road salt further.
- Create environmentally preferable deicing products lists and encourage end-users to pilot test and utilize these products first, whenever it is practical to do so to ensure that they work in their weather conditions.
- Make your contract a cooperative purchasing agreement so other states/public entities can use it.
- Publish your specifications and/or a case study on your contract to encourage other states to follow suit.
- Require service contractors working on state roads, parking lots, etc. to use products meeting your specifications.
- Use the least toxic snow and ice control products in ecologically sensitive areas.
- Help contract users access new equipment in order to transition to environmentally preferable deicers.

WHAT'S ON THE HORIZON?

- Look for new environmentally preferable snow and ice control products and best practices to test/utilize.
- New products for additional applications such as airplane deicing and vehicular antifreeze are being developed.

Green Purchasing Best Practices: Deicers

The purpose of this assessment is to identify opportunities and strategies for procuring snow and ice control products available on the market today that offer environmental, health and economic benefits. This assessment covers deicing products that are designed for use on roadways (which are typically bought in bulk) and walkways (which are typically bought pre-packaged in small quantities). These products are used both for *anti-icing* (to prevent ice from building up on roadways in the first place) and *deicing* (to melt and release ice from roadway surfaces once it has already formed). (In this report, we refer to snow and ice control products generally as deicers for simplicity.) Purchasing specifications, an assessment of cost and performance issues, and a list of recommended best practices for reducing the amount of conventional deicing chemicals (particularly road salt) are also presented.

WHY BUY GREEN DEICERS?

Every year, transportation agencies apply considerable amounts of snow and ice control products to roadways and sidewalks. The most commonly used product is sodium chloride (NaCl, or road salt). Nationwide, annual road salt use has gradually increased over the last two decades, and studies show usage fluctuates between 10 and 20 million tons per year, depending on the severity of the winter.¹ To varying degrees, transportation agencies in many states are testing and utilizing environmentally friendly alternatives to road salt, and in some ecologically sensitive areas, its use has been prohibited altogether.

Despite its environmental drawbacks, road salt is the most widely used deicing chemical because it is effective and affordable. However, there are several ways to reduce salt's negative impacts, including:

- *Prevention:* Many states have adopted best practices for their snow and ice control operations, which include mechanical controls, pre-wetting salt, and taking steps to mitigate the negative effects of road salt after it has been applied (such as replanting damaged vegetation, and collecting residual salt and sand to prevent it from entering water supplies).
- *Use of Corrosion Inhibitors:* Even if road salt is needed, a corrosion-inhibiting compound can be added to reduce its negative impacts on the ecosystem and transportation infrastructure.
- *Use of Safer Alternatives:* This can involve testing and utilizing, where practical, salt-free deicing chemicals. This sometimes results in the elimination of road salt (and other chloride-based products), particularly in biologically and structurally sensitive areas such as in parks and on bridges.

Environmental and Health Benefits of Greener Alternatives

Although road salt is an effective deicing material, it has numerous negative environmental and health impacts. Excess salt can saturate and destroy a soil's natural structure, resulting in more erosion and sediment transport to surrounding water bodies. High concentrations of salt can damage and kill vegetation. It poses the greatest danger to fresh water ecosystems and fish. A report by the US

¹ Chesapeake Stormwater Network, *Winter, Road Salt and the Chesapeake Bay*, <http://chesapeakestormwater.net/2009/01/winter-road-salt-and-the-chesapeake-bay/>

Department of Agriculture Forest Service found chloride concentrations “increasing at a rate that threatens the availability of fresh water in the northeastern United States.” The researchers attributed this problem to the use of deicers, which are “salinizing fresh waters, degrading habitats for aquatic organisms, and impacting large supplies of drinking water for humans throughout the region.” They also warned that “if salinity were to continue to increase at its present rate due to changes in impervious surface coverage and current management practices, many surface waters in the northeastern United States would not be potable for human consumption and would become toxic to freshwater life within the next century.”² Studies have found similar results in the Pacific Northwest, even in salt water environments, where increasing salinity has been found to reduce the germination rates of plants in tidal wetlands.³ Elevated salt levels in fresh water supplies can also impact human health. As excess salt seeps into groundwater and flows into rivers, streams and reservoirs from runoff, it not only affects the taste of drinking water, it can contribute to hypertension (high blood pressure) in humans.

In addition, because sodium chloride is salty, it attracts wildlife to highways and other roadways, which increases the incidence of accidents.

Economic Benefits

Although acetate and agricultural-based deicers have considerably higher upfront costs, the benefits of being non-corrosive and not adding salt to the environment have the potential for significant long-term cost savings. There is an obvious economic benefit associated with reducing damage to roads, bridges, and vehicles. According to the Minnesota Pollution Control Agency, a ton of road salt, which costs \$50/ton, can cause more than \$1,450 in corrosion damage to bridges.⁴ The cost of installing corrosion protection measures in new bridges and repairing old bridges in the Snowbelt states is estimated between \$250 - \$650 million annually.⁵ The US Federal Highway Administration estimates that nationally the cost in damage to infrastructure from deicing and other winter maintenance operations is nearly \$5 billion a year.⁶ Deicer corrosion cost per vehicle is estimated at an average of \$32/year according to PNS.⁷

Salt is also highly corrosive and damaging to highway infrastructure, particularly the exposed rebar on bridges, as well as vehicles. Additionally, by increasing the number of freeze/thaw cycles, salt can prematurely age concrete and asphalt as well, causing cracks and potholes.

There is an economic benefit gained from protecting vegetation, soil and water quality from the effects that road salt can cause. Once water supplies, in particular, become damaged, they are very costly, if not impossible, to repair. According to the Pacific Northwest Snow Fighters, the indirect costs of using road

² Sujay S. Kaushal, Institute for Ecosystem Studies, US Department of Agriculture, Forest Service, Northeast Research Station, “Increased Salinization of Fresh Water in the Northeastern United States, Proceedings of the National Academy of Sciences, September 20, 2005; <http://www.pnas.org/content/102/38/13517.full.pdf>.

³ Janousek, Christopher, et al. Western Ecology Division, US Environmental Protection Agency, Inter-specific variation in salinity effects on germination in Pacific Northwest tidal wetland plants, November 2013; www.sciencedirect.com/science/article/pii/S0304377013000983

⁴ Minnesota Pollution Control Agency et al., *Winter Parking Lot and Sidewalk Maintenance Manual*, last updated June 2008; http://www.michiganltap.org/sites/ltap/files/workshops/materials/3%20Shi%20-Environmental_0.pdf

⁵ Pacific Northwest Snow Fighters Association, PNS Inhibitor Research.

⁶ Minnesota Pollution Control Agency et al., *Winter Parking Lot and Sidewalk Maintenance Manual*, op. cit.

⁷ Pacific Northwest Snow Fighters Association, PNS Inhibitor Research.

salt, such as damage to wildlife, vegetation and waterways are estimated to be more than 10 times the cost of corrosion maintenance, repair and rehabilitation.⁸

Another economic benefit of using alternatives – in addition to, or instead of road salt – is that it can lower labor costs. Applying products such as beet juice to roadways can reduce the need to plow snow as often because it prevents ice from adhering to the pavement by lowering its freezing point. For example, the New York State Thruway Authority “regularly considers new innovative snow and ice removal techniques, and in recent years began utilizing an anti-icing mix of sugar beet juice and brine used to pre-treat the roadway, which helps prevent the formation of ice and can reduce the need for overtime staffing.”⁹ This method reduces the amount of salt that is added to the road, but does not eliminate it altogether since the brine contains some sodium chloride.

Availability of Environmentally Preferable Snow and Ice Control Products

The most effective way to reduce the environmental impacts of deicing chemicals is to reduce the amount are needed overall. To view strategies for reducing use of deicing chemicals, and for best mitigating their effects, [click here](#).

When snow and ice control products must be purchased, there are a wide variety of environmentally preferable alternatives available on the market today. The two main categories of alternative deicing products are chlorides (other than sodium chloride) and organic-based deicers (which include acetates and agricultural-based products). These alternative deicers often perform as well as, or better than, ordinary road salt or can be used to increase the effectiveness of road salt. However, it is important to note that each also has its own set of environmental and fiscal impacts.

To reduce or eliminate the use of sodium chloride from winter maintenance operations generally requires the use of one or more alternative deicing products, which can be used either instead of or in conjunction with a chloride-based deicing chemical for different applications. Below is an overview of these alternatives.

Acetate-based Deicers

Acetate-based deicers (such as calcium-magnesium acetate) are organic (carbon-based) and are usually biodegradable. This is an improvement over chloride-based products, which remain in the environment for a long period of time. Benefits of acetate-based deicers include the following:

- They are non-corrosive (so they do not damage roads, bridges and vehicles)
- They cause minimal damage to roadside vegetation
- They do not attract wildlife because they do not have a salty taste
- They have a lower freezing point than sodium chloride, so they make plowing and shoveling easier in colder temperatures.

Like chloride-based deicers, acetates also have their downsides:

⁸ Pacific Northwest Snow Fighters Association, PNS Inhibitor Research.

⁹ Andrew M. Cuomo, Governor of New York, “Governor Cuomo Issues Winter Weather Warning to Motorists in Advance of First Major Storm of the Season,” *News Release*, <https://www.governor.ny.gov/press/11262013-winter-weather-warning>.

- Compared to road salt and other chloride-based deicers, acetates are expensive (and in some cases, *very* expensive)
- Like sodium chloride, they can cause oxygen depletion in soil and water.
- They can also contribute to eutrophication (e.g., algae blooms) in water bodies.

Agricultural-based Deicers

There is a growing number of plant-based snow and ice control products that can be used to slow down the formation of ice, prevent the ice from bonding to pavement, or to make road salt (or other conventional deicing chemicals) more effective (by pre-wetting it). Most of these products are derived from corn, beets or various grains. Benefits of agricultural-based deicers include the following:

- They are not corrosive to concrete and metal. They can also serve as a corrosion inhibitor for chloride-based deicers.
- They cause minimal damage to roadside vegetation.
- They often are made from agricultural by-products (such as corn cobs) that would otherwise be managed as waste.
- They can result in reduced application rates, which lower labor, fuel and other operational costs.

Disadvantages associated with agricultural-based deicing products include the following:

- Like acetates, they are costly.
- They are not effective alone at melting ice, so they need to be used in conjunction with other deicing products (often as a roadway pre-treatment or a wetting-solution for other solid deicers).
- They can contribute to eutrophication and oxygen depletion in water supplies.

Chloride-based Deicers Other Than Sodium Chloride

Calcium chloride, Magnesium chloride, and Potassium chloride are effective deicing chemicals and provide benefits over Sodium chloride, which includes:

- They are less corrosive than sodium chloride.¹⁰
- They have a lower eutectic temperature¹¹ than sodium chloride, which means they help prevent ice from forming on the road surface.
- They are less expensive than non-chloride based deicing chemicals (such as acetates or agricultural-based chemicals).
- They can prevent air pollution by reducing the need for abrasives.¹²
- They are less likely to attract wildlife to the roadside than sodium chloride.¹³

¹⁰ Many calcium and magnesium chloride deicing products (as well as some sodium chloride products) on the market today contain a corrosion inhibitor. Consult each product's MSDS to verify.

¹¹ Eutectic temperature is the temperature at which a solution will freeze based on its chemical concentration. The greater the difference between ambient and eutectic temperatures results, the higher the rate that snow and ice will melt.

¹² Abrasives, such as sand, are often used in conjunction with a deicing chemical (such as road salt) to provide extra traction on roadways. Abrasives negatively impact ambient air quality and can damage vehicles when they drive over them. Documented pollution from particles less than 10 microns (PM10) has led to concern about the impact of winter abrasive use on air quality. By using products that are more effective at melting ice, the need for abrasives is reduced, thereby avoiding air quality impacts from their use.

¹³ Studies indicate wildlife are attracted to the sodium from road salt, which increases the incidence motor vehicle-related accidents and related injuries and deaths.

There are disadvantages to these other chloride-based deicers, which are similar for sodium chloride:

- They can damage roadside vegetation.
- They can add chlorides to water.
- They can contribute heavy metals to water bodies and groundwater (unless there are heavy metal restrictions included in the bid specification and evaluation process).

BEFORE BIDDING

Building a Stakeholder Team

The most important first step is to convene a Snow and Ice Control Products Contract Development Team, including high-use agencies such as transportation departments (in charge of maintaining highways, roads and bridges), airports, and parks departments as well as environmental program staff, particularly those with expertise in water quality. Work with your Team to research and develop technical and environmental specifications for your bid. Each agency may have specific needs based on their equipment, maintenance objectives, and areas where the products will be applied; they will often have knowledge about the types of products and requirements necessary.

It is important to work with your state's environmental agencies, particularly your state's pollution prevention staff as well as local watershed/water quality districts to determine the most stringent standards in force in your state as well as environmental problems they are trying to avoid or mitigate. This information can be very important for determining the minimum qualifications for products offered on the contract.

Local governments should also be consulted, especially if they have historically used the state contract, although they may not all have the same deicing needs. Some communities with wildlife habitats or drinking water reservoirs may be interested in including deicing products on the contract that are more environmentally friendly in order to protect these sensitive environments. They also may have positive or negative experiences to share with the Contract Development Team about their use of various types (or even specific brands) of snow and ice control products. They may also be able to recommend vendors to which the bid solicitation should be sent.

Which Products are Needed?

The primary role of the Contract Development Team is to identify the needs of state agencies (particularly the department of transportation) and other high-use contract users and negotiate price agreements for an array of environmentally preferable snow and ice control products that they can choose from as different needs arise. Since each of the different types of environmentally preferable deicers available on the market has different advantages and disadvantages (in terms of environmental impacts, performance and cost), it is probably most helpful to create a menu of green options for contract users to use. Consider creating a bid list comprised of environmentally preferable snow and ice control products such as agricultural-based pre-storm coatings (such as those made from beet juice), calcium magnesium acetate, and a corrosion-inhibited chloride product (for roadway applications).

At a minimum, any central statewide contract for snow and ice control products should include products that are purchased in bulk for use on major roadways as well as those that are pre-packaged for smaller applications such as steps, sidewalks, crosswalks, and parking lots.

States may decide to specify types of snow and ice control products that meet their minimum requirements or develop their own qualified products list for the solicitation based on pilot testing or prior use.

Deicers are likely to be purchased through a variety of different contracts (including service agreements as well as commodity contracts), and by a multitude of facilities, it is important to develop specifications that can be inserted into any bid solicitation for contracts that are likely to offer snow and ice control products.

In addition to centralized contracts for de-icing products that are likely to be used primarily by transportation departments, deicers are sometimes purchased through facility and grounds maintenance as well as janitorial supply contracts.

Are there any specific performance needs that products must meet?

All deicers need to perform the function they were purchased to do: melt and cut through ice. The performance of a deicer is therefore determined by its ability to melt, penetrate, undercut and disband ice and snow. The two factors that determine a product's ability to do that are the eutectic and effective temperature of the product. Roadways and substrates in moderate climates are unlikely to need a product with a eutectic temperature of -25° Fahrenheit. Conversely, a product with very low eutectic temperature will be crucial in extremely cold climate areas. Other products are designed to perform a different function – to prevent ice from forming on a surface in the first place. Both types of products are likely to be needed.

What Green Products Are Out There?

There is a wide range of environmentally preferable alternatives to road salt available. Many have been verified as environmentally preferable by third party organizations that have evaluated both environmental/health impacts as well as product performance.

- *Products on the Pacific Northwest Snow Fighters Qualified Products List:* As of December 2013, there were nearly 100 products on the PNS QPL in a wide range of categories such as corrosion inhibited sodium or calcium chloride, calcium magnesium acetate, and brines with various combinations of ingredients such as beet juice.
- *Design for the Environment–Recognized Products:* As of December 2013, nine manufacturers, offering over 20 different products were on this DfE list. A list of products that have been recognized under the EPA's DfE Program for *industrial/institutional* use can be found here: <http://www.epa.gov/dfe/pubs/projects/formulat/formpart.htm#19>. (Note: There is also a separate list of *consumer* products that have been recognized under the EPA's DfE program, although many

of the products are on both lists. The consumer product list of DfE-recognized deicers can be found here: <http://www.epa.gov/dfe/pubs/projects/formulat/formpart.htm#44.>)

Two important factors can affect the availability and cost of deicing products.

- 1) *Geographical location.* Although there are many different types of deicing products produced, they are often sourced very near their site of manufacture, making some products available only in certain regions of the country. (Note: This is most applicable to chloride products, which are often mined, and are heavy and, therefore, expensive to transport. This is less the case for products that are made of plant-based materials, many of which have national distribution.)
- 2) *Severity of the previous year's winter.* If products have been in high demand, supplies may be limited the next year, or prices may escalate, making some deicers hard to come by.

It is important to survey the market to make sure you are aware of environmentally preferable deicing products that are available in and around your state and that vendors are made aware of your bid solicitation. Ask vendors to provide a list of all of the environmentally preferable snow and ice products they offer that meet your criteria, either informally or through a Request for Information (RFI).

Are There Useful Cooperative Purchasing Contracts for Green Deicers?

Cooperative purchasing agreements offer the advantage of utilizing another multi-state contract including their negotiated prices without having to go out to bid. It is important to ask the cooperative purchasing organization (or the lead contracting agent) whether environmental specifications were included in the bid solicitation to ensure the products help you achieve your environmental goals. With respect to deicers, there are several cooperative contracts that offer environmentally preferable products. See examples below.

Oregon-Washington Green Janitorial Supplies Contract

In 2013, Oregon and Washington jointly negotiated contracts for green janitorial supplies that offer bagged deicing chemicals that are recognized by the US EPA's Design for the Environment Program. Municipalities, school districts and other public entities in these states can utilize these price agreements by signing up through each state's cooperative purchasing program. Moreover, any public entity in the country can also use these price agreements by signing a participating addendum with the lead state (Oregon). For more information, contact Pam Johnson, *CPPB, OPBC, OCAC*, State Procurement Analyst, Department of Administrative Services, DAS-EGS Procurement Services; (503) 378-4731; pam.johnson@state.or.us.

Western States Contracting Alliance (WSCA) – NASPO Cooperative Purchasing Organization

WSCA-NASPO has negotiated Facilities Maintenance, Repair and Operations (MRO) contracts with Grainger and Fastenal, which offer packaged deicers that are on the DfE's list of recognized products, although the eco-labeling is inconsistent. (In some cases the vendors do not indicate on their website that the product carries this eco-label, even though the product can be found on the DfE list.)_WSCA-NASPO does not offer national price agreements for bulk snow and ice control products.

Are There Useful Model Specifications from Other States?

Yes, several states have developed specifications for specific types of environmentally preferable snow and ice removal products (mostly deicers). One example is presented below:

Ohio's Model Specifications for Natural/Agricultural-Based Deicing Liquid

This specification is used by the State of Ohio's Department of Transportation to develop a contract for agricultural-based (called natural) deicing liquids:

- *A "natural" deicing liquid is defined as: a natural, agricultural, renewable resource that is derived from the sugar beet plant or approved equal that is less corrosive than traditional chlorides and that is less harmful to the environment.*
- *The product must demonstrate pasting limits that the Pacific Northwest Snow fighters require for deicers to be used in their states.*
- *The deicer must have a freeze point of at least 35 degrees Fahrenheit below zero.*
- *The deicer must be biodegradable and nontoxic to humans, animals, and aquatic life.*
- *The product must be acceptable for use as an inhibitor for salt brines and thus be able to be blended with all salt solutions without stratifications at any time.*
- *The product must be able to be used as an admix for salt stockpile mixing to prevent freezing of the pile, without leaching.*
- *The material must have a minimum viscosity of 30 cp at 30 degrees Fahrenheit and a minimum concentration of 55% anti-icing solids and 20% higher sugar level.*
- *The product must have less than 3% chloride and any chloride present must be naturally occurring in the product, not added to the deicer.*
- *The product should improve the ice melting ability and help prevent ice hard pack from bonding to the road surface.*

The text of this specification can be found here:

<http://www.dot.state.oh.us/Divisions/Operations/Maintenance/SnowandIce/Snow%20and%20Ice%20Best%20Practices/Agricultural%20De-icer%20Contract%20124-11.pdf>

GREEN CERTIFICATIONS AND STANDARDS FOR SNOW AND ICE CONTROL PRODUCTS

Multiple-Attribute Certifications and Standards

Pacific Northwest Snow Fighters' Specification

The [Pacific Northwest Snow Fighters \(PNS\)](#) is an association of transportation agencies within the states of Idaho, Montana, Oregon, and Washington, and the province of British Columbia. The PNS has developed a list of physical, environmental, and corrosion-related specifications for snow and ice control materials to guide transportation agencies in the selection of chemical products for snow and ice control.



Test methods have been defined by PNS to measure physical, chemical, toxicological, and corrosion attributes and, in many cases, use or adapt existing standard test methods.

Many states, local governments, and other public entities such as airports have referenced the [Pacific Northwest Snow Fighters \(PNS\) specifications and quality testing processes](#) in their bid solicitation documents. And some require (or strongly encourage) products for their contracts to be listed on the [PNS's Qualified Product List \(QPL\)](#). The PNS has also partnered with the [Clear Roads](#) research program to coordinate ongoing materials testing, standards development, and maintenance of the PNS Qualified Product List. The Clear Roads group includes experienced winter operations professionals from 26 states. Products that meet the PNS specifications at a minimum must:

- Pass a series of tests for chemical and toxicological properties as well as friction and corrosion;
- Meet environmental and health standards (including restrictions on heavy metals and other chemicals of concern); and
- Be at least 70% less corrosive than road salt.

In addition, the PNS specification imposes limits on the following chemicals of concern: Snow and Ice control chemical constituents will not exceed the following parameters, which are listed in parts per million (ppm).¹⁴

- Arsenic 5.0
- Barium 100.0
- Cadmium 0.20
- Chromium 1.0
- Copper 1.0
- Lead 1.0
- Mercury 0.05
- Selenium 5.0
- Zinc 10.00
- Phosphorus 2500
- Cyanide 0.20

US EPA's Design for the Environment (DfE) Program: Criteria for Ice-Melt Products

The U.S. Environmental Protection Agency's Design for the Environment Program helps manufacturers formulate products that are safer for the environment than conventional products. Below is a summary of DfE's criteria for this product category.



Look for the label!

Criteria for Ice-Melt Products

An ice-melt product under DfE is, as the name implies, one that melts ice and snow at temperatures below the freezing point of water, and not simply a product that aids traction like sand. A manufacturer of a safer ice-melt product may become a DfE partner provided that they agree to certain terms in their partnership agreement and that their product has the characteristics specified below.

¹⁴ State Department of Transportation Environmentally Preferable Purchasing Guide, September 2010; [http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25\(60\)_FinalManual.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25(60)_FinalManual.pdf)

DfE ice-melt products must:

1. Pass the appropriate *DfE safer chemical criteria*.
2. Reduce sodium (Na) and chloride (Cl) use by at least 30% (under comparable use scenarios).
3. Be labeled under a DfE partnership agreement in which the product manufacturer has agreed to a customer education/training plan to ensure proper product use and application rates (and reductions in Na and Cl).
4. Not contain cyanide as an anti-caking agent.
5. Function at temperatures < 0 F.
6. Comply with Pacific NW Snow Fighters' criteria for reduction in corrosivity to steel (see http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_577.pdf: to be acceptable, a corrosion-inhibition chemical product must prove to have a percent effectiveness value of at least 70% less than Sodium Chloride).
7. Meet performance levels as evaluated under the Pacific NW Snow Fighters' criteria.

A list of products that have been recognized under the EPA's DfE Program for *industrial/institutional* use can be found here: <http://www.epa.gov/dfe/pubs/projects/formulat/formpart.htm#19>. As of December 2013, nine manufacturers, offering over 20 different products were on this DfE list. (Note: There is also a separate list of *consumer* products that have been recognized under the EPA's DfE program, although many of the products are on both lists. The consumer product list of DfE-recognized deicers can be found here: <http://www.epa.gov/dfe/pubs/projects/formulat/formpart.htm#44>.)

The DfE standard for deicing products references some of the PNS specifications (including its performance requirement) and five DfE-labeled deicing products appear on the PNS QPL. The DfE-recognized products must meet the PNS performance requirements and exceed the PNS environmental requirements. Purchasers should consider including DfE recognition as another option for meeting their minimum requirements, particularly for bagged products, which are typically used on sidewalks, steps and parking lots. There are too few DfE-labeled products to require DfE recognition as a mandatory criteria for all products because it would significantly limit competition and some transportation agencies may want to continue allowing only products on the PNS QPL to be offered – especially for highways, other roadways and bridges, where safety concerns are paramount.

Products that are recognized by US EPA's DfE Program can earn LEED credits as a "sustainable consumable".

Single-Attribute Environmental Standards and Certifications

USDA Biobased Certified

The United States Department of Agriculture (USDA) has developed minimum biobased-content standards for a wide range of products, including ice-melt products. These products typically contain corn, beets or other agricultural products.



The USDA BioPreferred Program requires the following types of snow and ice control products to have at least 93% biobased content in order to qualify for its Certified Biobased Product label:

- Chemical products (e.g., salt, fluids) that are designed to aid in the removal of snow and/or ice
- Products designed to aid in the prevention of the buildup of snow and/or ice
- Products designed for general use application by lowering the freezing point of water¹⁵

As of December 2013, over 10 snow and ice control products had earned the Certified Biobased label (or are otherwise approved for preferred federal procurement) under the USDA's BioPreferred program. Many are corn-based products that can be used as road and runway pre-coat treatments. They are often used before a storm occurs to prevent the adhesion of ice and snow to the surface, which makes plowing easier and more effective. Some products are deicers, corrosion inhibitors (that can be added to other ice-melt products), or liquid antifreeze products that can be used by roadway vehicles or airplanes. For more information, go to www.biopreferred.gov (and look at the *Biobased Certified Product Catalog*).

Because the USDA Certified Biobased standard is based on a single attribute, it is not recommended as a minimum requirement because it does not address other environmental issues (such as corrosivity) or include performance criteria. Moreover, only one of its listed products was on the PNS QPL at the time this report was written. Still, purchasing agents can consider asking vendors whether any of their products are on the USDA's certified biobased products list and give additional credit if a points-based bid evaluation process is used.

National Association of Corrosion Engineers (NACE) Corrosion Inhibition Test



The National Association of Corrosion Engineers has developed a nationally recognized test method (TM 01-69¹⁶), which is designed to verify the potential of a chemical compound to corrode metal. This test is commonly referenced in specifications to verify that a deicing compound less corrosive than rock salt. For example, the [State of Minnesota's Alternative Chemical Deicer Specifications](#)

require products to be

“at least 70% less corrosive than Sodium Chloride” and references the NACE test method TM 01-69 for verification. (MN DoT also requires all products to be on the PNS QPL.)

BID SPECIFICATIONS

Purchasing agents that opt not to use a cooperative purchasing agreement will need to issue their own bid solicitation. The primary goal of the solicitation is to develop a contract that offers a wide range of environmentally preferable alternatives to road salt, to which contract users can have access with attractive discounts.

Here are some first steps to consider:

¹⁵ Specialized deicer products, such as those used to de-ice aircraft and airport runways, are not included in this assessment but may be purchased to maximize environmental benefits.

¹⁶ National Association of Corrosion Engineers (NACE), *Test Method 01-69 1995 (Revised 2000): Laboratory Corrosion Testing of Metals*; <http://infostore.saiglobal.com/store/details.aspx?ProductID=953316>

1. *Identify any local environmental compliance issues.* If there are water quality standards that prohibit the use of certain chemicals, use those for “product must not contain...” criteria. (Ask your environmental agencies to help you with this.)
2. *Match material to performance criteria.* Not all products perform the same functions. Work with your contract users to identify what they need the product(s) to do (e.g., melt ice on roadways versus sidewalks, prevent ice from forming to begin with, etc.). Then determine which types of products can perform those functions, building your specifications to meet your performance needs.
3. *Identify products that are sourced nearby.* The closer you are to where the material is sourced/made, the less expensive it will be. Transportation costs will likely be the most expensive component of the contract.
4. *Include a value-added clause or best-buy factor.* When evaluating the bids, it is important to recognize that the cheapest product may not necessarily be the best one for the job. When deicers are compared, product composition matters. For example, a product that has a higher concentration of the deicing component may cost more per pound than one with a lower concentration. However, the one with the higher concentration is likely to perform better and, therefore, require less of the product to be used. Make it clear in your instructions to bidders that the price evaluation will be designed to factor in the concentration of deicing chemicals in their product.

Recommended Minimum Requirements (Specifications) Specifications for Bulk Alternative Snow and Ice Control Products

The PNS specification is considered “industry standard”. It includes environmental/health and performance criteria, and many products can meet it (and are easily identifiable on the QPL). As a result, it is recommended as a minimum requirement when procuring environmentally preferable snow and ice control products. (An alternative that other states can including in their specification is that products must be on their own state’s Department of Transportation’s qualified products list, be at least 70% less corrosive than Sodium Chloride. The corrosion tests will use the National Association of Corrosion Engineers (NACE) Standard TM-01-69.)

Note: Since the QPL includes some sodium chloride products that are rendered less corrosive through the addition of a corrosion inhibitor, products should be free of sodium chloride (even if it contains a corrosion inhibitor) in order to prevent the product from contributing to the salinity of water supplies and soil or from attracting wildlife into roadways.

It is important that all bidders be directed to submit with their offer the most recent detailed product specification sheet and Material Safety Data Sheet (MSDS) for each product, including product’s corrosion inhibitor, if applicable.

Specifications for Packaged Snow and Ice Control Products

Greenwashing is prevalent for packaged deicing products, which are commonly used on sidewalks, driveways, parking lots and other relatively small surfaces. Many products that claim to be eco-friendly are often just a combination of the most common chemicals used in deicers; some are just road salt with corrosion inhibitor. To ensure the packaged snow and ice melting products are truly environmentally preferable, all products shall be:

- Sodium chloride-free

AND

- US DfE-Recognized (must be on DFE list)

OR

- On the Pacific Northwest Snow Fighters Qualified Product List (QPL)

(Alternatively, products shall be on their state Department of Transportation approved products list AND be at least 70% less corrosive than sodium chloride. The corrosion tests will use the National Association of Corrosion Engineers (NACE) Standard TM 01-69.)

Purchasing agents can either require products to be on the PNS QPL (easier for purchasing agent) or also allow bidders to also offer products that they can demonstrate to the satisfaction of the Contract Development Team also meet the PNS specifications but are not on the QPL list (more work for purchasing agent to verify compliance but may increase variety of products that can be offered).

ONCE THE BIDS ARE IN

Best Ways to Award

Consider choosing multiple vendors based on best line-item prices, product category or region. Multiple awards (particularly for different types of deicing chemicals) can increase product selection, which may be important to enable contract users to find products that meet their needs. The same vendors that offer road salt may not offer environmentally preferable products in this category.

Verifying Compliance

It is very important to ensure that vendors offer products that meet your specifications. Although multiple vendors may bid on the same type of product, for example magnesium chloride, the chemical blends comprising each product are different and oftentimes proprietary. Though you should require vendors to include the Material Safety Data Sheets (MSDS), these will typically list only the name and concentration of the active ingredients, and will not disclose other materials in the product. For that reason, states may want to require vendors to submit a product sample, and conduct laboratory tests to verify that the product meets all specifications outlined in the bid solicitation document.

If you are utilizing the Pacific Northwest Snow Fighters specifications (or simply requiring that the vendor provide you with a product that is on their Qualified Products List (QPL), you can be confident that the product is compliant and no additional testing should be needed. All you will need to do is check their CURRENT QPL to verify compliance. If your specification limited bidders to offering a subset of products on the QPL, you will need to take an additional step. For example, in the case of our recommended specifications for packaged snow and ice control products, which require the product to be on the QPL but not contain sodium chloride,, the first step will be to check for the product on the QPL and the second step will be to ensure that it is listed in a QPL category that does not include sodium chloride (such as Categories 1-3).

For bagged deicers, products that are listed on the US Environmental Protection Agency's Design for the Environment (DfE) list also meet the specifications (as long as they are free of sodium chloride). The list of DfE-recognized deicers for institutional and commercial use can be accessed at <http://www.epa.gov/dfepubs/projects/formulat/formpart.htm#19>. Next, check the product MSDS to ensure that sodium chloride is not listed as an ingredient.

Evaluating Performance

If a state is requiring products to be on the Pacific Northwest Snow Fighters Qualified Products Lists (PNS QPL) or the US EPA's Design for the Environment (DfE) recognized list, then the products are already required to meet performance standards. (Products on other state DoT approved products lists are also typically required to meet performance requirements.) If other products can be offered, purchasers should verify that they meet the same performance requirements. Either way, state agencies should consider pilot testing products on specific, common applications to ensure that they will meet your needs since products perform differently under varying temperatures and other conditions.

Deicer performance can be measured several ways, including:

- melting and penetration

- anti-bonding ability
- time until bare pavement is achieved
- persistence on the road
- relative performance as compared with other products

Evaluating Price

Deicing products are not all created equal, and lowest cost does not always equate to a product being the best deal. Because of proprietary formulations, even the same type of product from different manufacturers can differ significantly in performance and environmental impact. More concentrated products will likely cost more, but will also melt ice faster and require fewer applications, resulting in economic and environmental benefits such as reduced transportation impacts.

Below is an example from the PNS of how to factor in the concentration of active ingredients in order to facilitate an apples-to-apples price comparison among competing products of the same type.

EVALUATING PRODUCTS BASED ON THEIR CONCENTRATION OF ACTIVE INGREDIENTS (Approved Liquid Chemical Products)

Best buy based on percentage of active chemical in the product will be determined by the following formula. Bidder Quoted Concentrations (BQC) of active ingredient and price per ton will be used for calculations.

$$\frac{\text{Price per ton}}{\text{Concentration \%}} = \text{Best Buy Factor}$$

Example:

- \$60.00/27% = 222.22 best buy factor
- \$65.00/30% = 216.67 best buy factor

Additionally, there can be hidden costs associated with the cheapest products – for example, corrosion prevention and maintenance measures must be taken when using products that do not contain corrosive inhibitors, and such measures can be costly financially, as well as in time, labor, and equipment. Corrosion inhibitors should also be considered when evaluating price. Like concentration of product, the higher the corrosion-inhibiting ability of the product, the less impact to infrastructure.

VENDOR EVALUATION

States that use an RFP can award points in the bid evaluation process to bidders offering products and services that are deemed to bring value to the contract. This can include, for example, vendors that offer the widest variety of environmentally preferable snow and ice control products that meet your specifications, full disclosure of chemical ingredients, sustainable sourcing, manufacturing and transportation methods, and/or other services related to this product category. To collect this information, consider using our Model Vendor Questionnaire, which is attached as [Appendix A](#).

For service agreements, vendors can be rewarded for their experience implementing strategies to prevent the use of chemical snow and ice control products as well as utilizing environmentally preferable products.

MAXIMIZING GREEN IMPACT

The most effective way to reduce the environmental impacts of deicing chemicals and compounds is to reduce the amount of chemicals needed overall. Below are some strategies to achieve that as well as to mitigate the impacts of the deicing products that are used.

- 1) **Remove snow before it melts.** Improve mechanical removal strategies by increasing the frequency of shoveling, brushing, or plowing and increasing the amount of equipment in use. The more material that is cleared off road and walkways by mechanical means, the less will have to be cleared through chemical applications.
- 2) **Anticipate storms.** Road weather information systems¹⁷, or RWIS, use roadside sensors to collect data on air and surface temperatures, precipitation levels, and the amount of de-icing chemicals already on the road. These data are combined with weather forecasts to predict pavement temperatures, letting road agencies anticipate the exact area and time range to cover, as well as the amount of deicing chemicals to use. According to the Federal Highway Administration, the Massachusetts Highway Authority saved \$53,000 on salt and sand costs the first year alone after employing a RWIS, including \$21,000 during a single storm.¹⁸
- 3) **Employ anti-icing strategies.** Anti-icing is a pro-active road maintenance strategy intended to prevent the bond between ice and the pavement surface from forming. It involves applying ice control chemicals before or at the very beginning of a storm,¹⁹ which can decrease the amount of chemicals used throughout a storm. The EPA cites one estimate that anti-icing can reduce total deicer usage by 41 to 75 percent.²⁰ Anti-icing is often the most cost-effective winter maintenance practice. By applying a small and strategic amount of liquid or pre-wet deicer before a storm, you can prevent snow and ice from bonding to the pavement. Anti-icing requires about ¼ the material and 1/10 the overall cost of deicing. It can increase safety at the lowest cost, and is effective and cost-efficient when correctly used and approached with realistic expectations. Anti-icing prevents formation of ice from frost. It can be effective for up to several days depending on the weather conditions.²¹

¹⁷ Washington State Transportation Center, *Road Weather Information Systems: Enabling Proactive Road Maintenance Practices in Washington State*, March 2002; <http://depts.washington.edu/trac/bulkdisk/pdf/529.1.pdf>

¹⁸ U.S. Department of Transportation, Federal Highway Administration, *Clearer Roads at Less Cost: A New Technology is Helping to Keep Roads Clear During Winter Storms and Cutting the Cost of Winter Maintenance*, May 11, 2009; http://ops.fhwa.dot.gov/weather/resources/publications/tech_briefs/cs036.htm

¹⁹ Wisconsin Transportation Information Center, *Wisconsin Transportation Bulletin (No. 6): Using Salt and Sand for Winter Maintenance*, August 2005, http://epdfiles.engr.wisc.edu/pdf_web_files/tic/bulletins/Bltn_006_SaltNSand.pdf

²⁰ U.S. Environmental Protection Agency, *Source Water Protection Practices Bulletin: Managing Highway Deicing to Prevent Contamination of Drinking Water*, August 2010; http://www.epa.gov/safewater/sourcewater/pubs/fs_swpp_deicinghighway.pdf

²¹ Minnesota Pollution Control Agency et al., *Winter Parking Lot and Sidewalk Maintenance Manual*, last updated June 2008; <http://www.pca.state.mn.us/index.php/view-document.html?gid=5491>

- 4) **Take advantage of pre-wetting.** Pre-wetting road salt or other solid deicing chemicals is becoming common, either as it is loaded into the truck, or as it leaves the spreader. Wetting provides moisture to make brine, which results in faster melting of ice. In addition, pre-wetted salt is less likely to bounce or be blown off the road by traffic. Savings in lost or wasted salt of 20%-30% are possible, which can more than pay for any costs associated with pre-wetting.²²
- 5) **Make your contract a cooperative purchasing agreement so other public entities in your state – as well as other states – can use it.**
- 6) **Promote the environmentally preferable products on your contracts.** This can be accomplished by creating a list of green deicing products available from each vendor and encouraging end-users to pilot test and utilize these products first, whenever it is practical to do so. The list can be posted on your state’s EPP website and distributed through your state’s cooperative purchasing program. States can also publish their specifications or create a case study about your contract to encourage other states to follow suit.

The likelihood that all contracts through which deicers may be purchased will come up for bid at the same time is small, and so it is possible that while one contract may be offer “green” products, the others may not. For this reason, it will be very important to promote and publicize the availability of environmentally preferable deicing products on various contracts and encourage the purchase of these products over conventional road salt.

- 7) **Require green deicers to be used on service agreements.** States can require service contractors working on state roads, parking lots, etc. to use products meeting the same specifications.
- 8) **Adopt a green snow and ice removal policy and plan.** At a minimum it can commit to using less-toxic snow and ice control products in ecologically sensitive areas and to reducing the amount of salt use overall. Involve your pollution prevention and water quality experts to participate in this process.
- 9) **Help contract-users transition to using environmentally preferable deicers.** This may necessitate accessing new equipment.

²² Wisconsin Transportation Information Center, *Wisconsin Transportation Bulletin (No. 6): Using Salt and Sand for Winter Maintenance*, August 2005, http://epdfiles.engr.wisc.edu/pdf_web_files/tic/bulletins/Bltn_006_SaltNSand.pdf

10) Cover solid deicer piles to reduce runoff. According to the Chesapeake Bay Stormwater Network, “The highest chloride levels are recorded in melt-water runoff near salt depots, major highways, snow piles in parking lots, street runoff and urban streams.”

WHAT'S ON THE HORIZON?

There is no silver-bullet when it comes to deicers – they all have advantages and disadvantages. The deicers market is very slow to progress, although promising new chemical products and non-chemical strategies have been developed. Yet, many transportation agencies are continually testing new products and methods to lower the costs and minimize the environmental impacts of their snow and ice control operations. For example, a pilot test in Japan is using geothermal energy to warm roads in order to prevent de-icing.²³

Some of the more recent research has focused on improving the longevity of corrosion inhibitors in deicing products in order to reduce their negative impacts on transportation infrastructure. The Pacific Northwest Snow Fighters have conducted research seeking to determine how long corrosion inhibitors remain effective on roadways and what impacts long-term storage has on inhibitor longevity and effectiveness.²⁴ The result of this research could influence the development of new standards addressing the longevity of corrosion inhibitors in deicer products as well as new specifications for performance-based deicers.

Experts from the Western Transportation Institute stated that the deicer industry progresses “an inch every ten years” with regards to new product developments. It is more likely that existing products will see improvements in toxicity and corrosion, but it is unlikely that an entirely new product lacking toxicity and corrosion impacts will emerge any time soon. For now, agencies must choose the proverbial “least bad” choice for each type of application.

Recognizing this, many transportation agencies are taking a more proactive approach to deicing and utilizing technological advances such as RWIS, improving application techniques, and better implementation of best practices. The key is a holistic approach to winter maintenance, developing the best methodology for each area.

²³ Western Transportation Institute, Clear Roads Research for Winter Highway Maintenance, *Snow Removal at Extreme Temperatures*, March 2013, <http://www.clearroads.org/downloads/Snow-Removal-Extreme-Temps-Final-Report.pdf>

²⁴ Washington State Department of Transportation, *Investigating Longevity of Corrosion Inhibitors and Performance of Deicer Products Under Storage or After Pavement Application*, June 2011; <http://www.wsdot.wa.gov/research/reports/fullreports/759.1.pdf>

Credits

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APPENDIX A: Sample Sustainability Questionnaire for Vendors of Snow and Ice Control Products

Please check and complete relevant items in this survey questionnaire
Return with Bid/Proposal

VENDOR NAME _____ Date _____
Website _____
Address _____

Contact Name _____ Title _____
Contact Phone _____ Email _____
Types of Snow and Ice Control Products Offered _____
Brands Offered (if applicable) _____

Please check off applicable items if the answer is "yes," and provide supporting documentation as appropriate.

Internal Operations and Policies

1. Has your company implemented any of the following environmental policy initiatives for your facilities? (Please attach relevant policies or links)
- Environmental or Sustainability Policy
 - Climate Action Plan/Energy Policy
 - Zero Waste Policy or Plan
 - Toxics Reduction Strategy or Policy
 - Water Reduction Strategy or Policy
 - Green Transportation Plan for employees
 - Sustainable Purchasing Policy - Please describe representative products bought for your facilities and list sustainability attributes - e.g., recycled materials, ENERGY STAR-rated, Green Seal or EcoLogo-certified, EPEAT.
- _____

2. Does your company meet an environmental management standard (e.g., ISO 14001, EMAS)? (Please describe and document) _____
3. Has your company received any environmental and/or sustainability awards in the past five years? (Please describe) _____
4. Is your company certified as a Green Business? (Please list certifying agency and provide documentation) _____
5. Does your company hold other environmental certifications? (Please list and document) _____
6. Does your company require sustainability principles in managing its supply chain? (Please describe in detail) _____

7. Has your company ever been cited for non-compliance of an environmental or safety issue (please describe date, reason, outcome) _____

Sustainable Facilities

- 1. Have any buildings that you own or lease been LEED certified by the U.S. Green Building Council?
Describe: _____

- 2. Does your company create or purchase renewable energy in its operations?
 On-site Off-site Holds Green-E certification
_____ Percentage of overall energy derived from renewable sources
Purchases renewable energy credits (RECs)
(Please provide documentation)

Sustainable Packaging

- 1. Does your company provide reusable shipping containers?
 Always On request No
- 2. Do the boxes or bags used for order deliveries meet or exceed the U.S. EPA minimum of 25% postconsumer recycled content?
- 3. Does your company employ shipping-container take-back services or carton return? (Please describe)

- 4. Has your company made efforts to eliminate difficult-to-recycle packaging materials? Please describe any sustainable packaging initiatives your company has implemented.

Sustainable Shipping Practices

- 1. Is your company an EPA SmartWay Partner or are products shipped via any EPA SmartWay Partners?

- 2. Are any of your company's passenger vehicles and light-duty trucks EPA SmartWay certified?

Percentage _____
- 3. Do your fleet vehicles utilize alternative fuels (e.g., Ethanol, E85, Biodiesel, Natural Gas)

- 4. Are any products offered manufactured in the state or within a 100-mile radius of the state? Please include percentage if possible.

- 5. Does your company minimize shipping energy and environmental impacts in other ways? (Please describe)

Sustainability Reporting

- 1. Does your company produce a public sustainability or environmental report about its policies and operations? Please provide a copy or link and indicate compliance with any international standards (e.g., Global Reporting Initiative, Carbon Disclosure Project, ISO 14000)

- 2. Does your company identify “green” products on order lists or software? If so, what criteria define “green”?

- 3. Can you produce purchase reports for customers that sort and identify products by their individual certifications and attributes (e.g., products that are on the Pacific Northwest Snow Fighters Qualified Products List, products that are “recognized” by the US EPA’s Design for Environment Program, or that are USDA Biobased Certified)?

Products with Additional Sustainability Attributes

- 1. Have any of your products earned certifications that are beyond those required in the minimum requirements (e.g., USDA Biobased Certified): _____
- 2. Do any of your offered products meet more than one of the three required sustainability specification options (e.g., on the PNS QPL and DfE Recognized)?

- 3. Are any of your products manufactured, provided by or sourced from Disadvantaged Businesses Enterprises, such as minority- or women- owned enterprises? Please describe.

- 4. Please provide a full list of products that you offer that meet the minimum or exceed the environmental specifications in the RFP.

-
-
- Other environmental or sustainability achievements and practices: Please describe.

