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MAMARONECK UNION FREE SCHOOL DISTRICT
1000 WEST BOSTON POST ROAD
MAMARONECK, NY 10543-3398

GUIDELINES AND PROCEDURES DOCUMENT FOR THE SPREADING AND STORAGE OF SALT AND DE-ICING MATERIALS

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1.0 INTRODUCTION

The removal of snow and ice is absolutely essential during the winter months to provide safer travel and walking conditions on roads, parking lots, walkways and other impervious surfaces.

Snow removal and de-icing is generally accomplished through the application of salt and temperature suppressant chemicals, or anti-caking agents, as well as abrasives such as sand, grit and cinders.

The most commonly used de-icing agent is salt, or sodium chloride, which is readily available and inexpensive. Sodium chloride effectively depresses the freezing point of water to melt the ice.

Abrasives such as sand and grit provide for temporary traction and safer driving and walking conditions. However the use of salt, de-icing chemicals and abrasives has a significant negative impact on our drinking water supplies and watershed ecosystems.

2.0 GUIDELINES AND PROCEDURES DOCUMENT

This Guidelines and Procedures Document has been prepared to specifically encourage and motivate the District's operational staff, as well as third party contracted entities, to embrace the following two (2) goals:

- First, the goal of winter snow removal/de-icing program should be to provide safe road/walkway conditions, without losing sight of the potential negative impacts to the environment due to misuse and/or excessive use of salt and de-icing materials
- Second, where possible and where appropriate, the District should adopt the Best Management Practices (BMPs) outlined

hereinafter in this document, specifically as they relate to the spreading and storage of salt and de-icing materials

3.0 ENVIRONMENTAL IMPACTS OF SNOW & ICE CONTROL

Negative impacts from the excessive use of salt, de-icing agents and abrasives include:

- **Surface water degradation**: stormwater runoff to surface waters and nearby streams is a common path for road salts and chemical agents to enter our water supplies
- **Groundwater degradation**: percolation and infiltration of stormwater runoff into the groundwater releases road salts into the groundwater, which in turn is a major contributor to our streams and surface water supplies
- **Vegetation**: elevated sodium and chloride levels in soils create osmotic imbalances in plants which inhibit water absorption and reduce root growth. Salt also disrupts the uptake of plant nutrients, causing injury to flowering and seed germination
- **Buffer zones**: degradation of soils and vegetation in buffer zones between roads and watercourses compromises the retention and processing of pollutants transported in stormwater runoff
- **Wildlife and birds**: damage to vegetation degrades wildlife and bird habitats by destroying food resources, habitat corridors, shelter and breeding or nesting sites
- **Human health impacts**: the major concern of salt's impact on human health is excess dietary sodium (Na), associated with hypertension. Additionally, the chloride levels (Cl) from salt also have an adverse impact on our surface water and groundwater quality. The current standard for drinking water for chlorides for human consumption is 250 mg/l. Other constituents sometimes added to road salt (as anti-caking agents or to lower the temperature at which deicing salt continues to act effectively) may also be of concern. For example, the groundwater quality standard for cyanide of 0.2 mg/l may also be exceeded by certain de-icing

chemical compounds (e.g. ferric ferrocyanide, sodium ferrocyanide) used to minimize caking

- **Infrastructure impacts:** the corrosivity of road salts on concrete and metals have a significant and costly impact on our roads, bridges, sidewalks and motor vehicles. Chloride ions in salt increase conductivity of water, which induces and accelerates corrosion in concrete, car frames and bumpers. Road salt not only jeopardizes the structural integrity of bridges by corroding reinforcing rods, but also causes reinforcing steel in parking garages to rust. Similarly salt eats away at cement causing the concrete sidewalks to crack and fragment

4.0 BMPs FOR SALT SPREADING

Summarized below are examples of Best Management Practices (BMPs) that should be adopted for salt spreading:

- Place barriers along streams or direct drainage swales to route sanding/anti-icing material away from watercourses
- Reduce plowing speed in sensitive areas
- Stop sidecast sweeping within 50 feet of structures over water
- Reduce quantity of sand applied where appropriate
- Providing timely road and parking lot clean-up of excess salt, sand and de-icing chemicals is necessary to control salt loss
- Return unused salt and de-icing materials to covered storage facilities
- Keep accurate records of salt and de-icing materials to monitor usage and reduce quantities utilized

5.0 BMPs FOR STORAGE FACILITIES

The identifiable threat to water quality posed by improper storage is considered more significant than the threat from spreading. Storage typically involves stockpiling large amounts of the material at one defined location where, if it is not properly protected from precipitation and surface runoff, high concentrations of dissolved material leaching

from the storage pile can subsequently be transported to underlying groundwater or nearby surface waters.

The design of storage facilities for salt and de-icing chemicals should include the following Best Management Practices:

Facility Siting

- Avoid locating the facility above aquifers or highly permeable soils
- Maintain a reasonable separation (e.g. several hundred feet or more) from streams, lakes, or ponds
- Do not locate storage facilities within wellhead protection areas for community water supplies or close to existing private water supply wells

Storage Facility Design

- The stored material should be kept dry and out of the weather, ideally through use of a covered/roofed storage structure (shelter)
- The storage facility should be large enough to hold the maximum amount of chemicals required without overflowing and to permit easy movement of vehicles for loading and unloading
- The storage facility (including areas used in loading and unloading) should be paved, and be constructed of material which is not adversely affected by the salt
- Materials such as asphalt are much too permeable to be used
- The elevation of the storage facility should be sufficiently above the exterior yard area to prevent inflow of rainwater into the facility
- Temporary covers of a waterproof material are adequate to cover non-working piles, however, because of problems such as freezing, tearing or blowing away, they should not be considered as a permanent solution for covering a working pile
- Drain pipes, curbing, and catchment basins to collect brine runoff from the pile should be considered

6.0 ROAD SALT ALTERNATIVES

It has been reported by the Salt Institute that the most commonly used salts for de-icing are sodium chloride (NaCl) and calcium chloride (CaCl). Viable road salt alternatives include Calcium Magnesium Acetate (CMA) and Potassium Acetate (KA).

Calcium Chloride (CaCl)

Calcium Chloride is applied in liquid or pellet form and is effective in widespread surface melting.

- CaCl was reported to have de-iced twice as fast as road salt
- CaCl was able to penetrate ice at all tested temperatures
- CaCl can perform at temperatures below -20 degrees F.
- Environmental negative effects (surface/ groundwater water degradation, human health impacts and corrosivity) are similar to NaCl
- CaCL can also be used in liquid form and costs about $300/ton

Calcium Magnesium Acetate (CMA)

The advantages and drawbacks of CMA are described below:

- CMA works by interfering with the bond between snow particles and the road surface, unlike sodium chloride which moves downward from the surface
- CMA is relatively harmless to plants and animals, non-corrosive to metals and non-destructive to concrete and other highway materials
- CMA when applied during or after a storm, was found to be slower acting than sodium chloride
- CMA's effectiveness is also reduced when temperatures fall below 23degrees F
- When exposed to moisture, CMA can clog spreading equipment
- The weight ratio of CMA to salt is about 1.7:1 to obtain equal de-icing
- The average cost of salt is about $30/ton whereas CMA costs $700/ton

Potassium Acetate (KA)
KA is often used as a base for chloride- free liquid de-ice chemical.

- Less study information is available on KA
- KA is one of the most benign road-salt alternatives because it consists of a biodegradable acid (acetic acid)
- Like CMA, advantages of KA include low corrosion, relatively high performance and low environmental impact
- KA is stable and can be easily removed by flushing, and dilution
- KA does not impact water chemistry and does not penetrate groundwater aquifers
- KA costs about $700 to $800/ton

CMA and KA both appear to be viable road salt alternatives. No significant health, environmental or infrastructure impacts occur with the use of these alternatives. CMA is the most studied of the two alternatives; more field studies should be performed using KA.

The biggest drawback to the use of CMA and KA appears to be cost. Even though NaCl is still the cheapest de-icing chemical, research is currently being directed to finding more effective production technology to lower the cost of CMA and KA.

Costs presented above will vary significantly depending on quantity purchase, availability and location of purchase. When comparing costs one should also carefully evaluate direct application costs as well as indirect costs to the environment, human health, motor vehicles, and infrastructure.

7.0 THIRD PARTY CONTRACTED ENTITIES

The District, entering into an agreement with a third party entity to spread salt and de-icing chemicals during the winter months, should require the third party entity to comply with the following provisions:

- The District must obtain a signed certification statement from

Third Party Entities performing contracted work
- Third Party Entities must certify that they will comply with District's SPDES Permit for Stormwater Discharges

8.0 MANAGING SNOW DISPOSAL SITES

The snow disposal sites should be carefully selected to reduce environmental impacts of salt and de-icing materials contained in the snow and ice being disposed on site. Onsite snow and ice disposal sites should include the following considerations:

- The disposal site should be located where the snow and ice piles can melt readily
- The disposal site should be located where it will not impact nearby waterways during the melting of the snow and ice

9.0 OPERATIONS STAFF TRAINING

The District should ensure that a single individual is assigned responsibility for the winter operations and is accountable for its operation and environmental performance. The District should educate operations and maintenance (O & M) staff on water quality and environmental impacts of excessive applications of salt, sand and de-icing chemicals by:

- Providing annual training for all O & M staff involved in winter operations on the proper spreading techniques and storage of salt, sand and de-icing agents
- Training of O & M staff should be scheduled at the the onset of the snow and ice control season
- Training of O & M staff should address environmental impacts of salt abrasives and other chemical agents
- Training of O & M staff should include discussions on the timing of plowing operations so that chemicals are not plowed off the road prematurely

10.0 APPLICABILITY OF GUIDELINES

The application and storage of road salt can lead to water quality problems in surrounding areas. The District must ensure proper storage and application for equipment and materials. Improper storage of deicing materials can contaminate both surface water and groundwater. Reduced application or use of alternative agents, consistent with the need for safety, will reduce pollution of area waterway.

This Guidelines and Procedures Document has been prepared to ensure strict adherence to NYSDEC regulations covering the MS4 SPDES Permit for the MUFSD for facilities located at the Mamaroneck High School and the Hommocks Middle School.

The document complies with the intent of the SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s) under Permit No. GP-0-10-002 issued on May 2010.

The document is intended to be a guide to aid District in complying with the United States Environmental Protection Agency (EPA) Phase II Stormwater Regulations. The document does not constitute rule making nor is it a substitute for reading the regulations and understanding all of its requirements as it applies to your facility. Additional information on Phase II rules, including a series of fact sheets and a full copy of the revised permit regulations, may be obtained from New York State Department of Environmental Conservation (NYSDEC) website www.dec.state.ny.us/website/dow/mainpage.htm .