INTRODUCTION

A Road Maintenance Yard is the location from which a road authority stages its road maintenance operations. It is referred to by a variety of other names including: patrol yards, camps and depots. It is likely that a road maintainer will work out of several different road maintenance yards throughout his or her career. Often in the past, these yards have been located and designed on the basis of some historic rationale. The yard layout is not often questioned and is not always understood.

This Chapter of the Syntheses of Best Practices is intended to present the salt management and environmental considerations that should be taken into account when designing, operating and maintaining road maintenance yards. There are many other considerations, particularly related to safety, that are unrelated to salt management that are not addressed in this document, but that should be taken into account when designing and operating maintenance yards.

The role of a maintenance yard can vary from being the central location for road operations (including administration functions) to simply serving winter operations only. The practices described in this chapter apply to both.

This Synthesis of Best Practices includes:

- planning;
- site selection;
- designing a functional facility;
- salt storage;
- site drainage;
- site operation and maintenance;
- monitoring;
- record keeping; and
- training

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**RELATIONSHIP TO SALT MANAGEMENT**

In general, maintenance yards are constructed for multiple purposes including the delivery of winter road maintenance services.

For winter operations, there is a strong need to focus on salt loss, whether in the form of salt dust, brine runoff or simple wastage of road salts through improper handling practices. Lost salt will dissolve and can infiltrate into the soils below and adjacent to the site. Components of road salt entering the groundwater can travel great distances and affect wells, vegetation and surface water where the groundwater emerges as springs or discharges into streams.

There are cases where road authorities have had to replace salt impacted wells and the resultant corroded appliances of affected homeowners.

In addition, salt impacted runoff can affect vegetation and agricultural operations on, and adjacent to the yard.

Good yard design and salt handling practices are essential to preventing unnecessary salt loss and the resultant environmental impacts.

**The Yard In Action**

The yard layout should be designed to be efficient in all activities. Considering the cycle of handling road salts in the yard may reveal potential enhancements that can be made to improve yard efficiency and reduce salt loss.

The typical salt handling cycle (Figure 1) flows from delivery, to stockpiling, to loading on the spreader and then to exiting the yard. Upon return, the spreader off-loads unspent salt (preferably indoors), and the equipment is then washed to remove remaining salt residue. Each area affected by these activities can provide an opportunity for improvement.

Typically, a delivery transport trailer end dumps or offloads the salt via a longitudinal conveyor. Preferably, the storage facility has been designed and constructed to allow the salt to be unloaded directly inside. If unloaded outside, the salt must be reloaded into a pile under cover.

Ideally, the salt should not be “double handled.” In some cases salt is blown into storage facilities using a closed pipe system to eliminate double handling. Whether mechanically piled or blown, each handling can cause particle breakdown, segregation and loss. While handling can serve to break up any chunks that may be present, the gradation will usually vary and this effort is inefficient. It also allows for a greater wind-blown loss of salt and the loss of salt fines that are remaining on the outdoor surface.

Spreaders are usually loaded using a front-end loader. Ramps at the yards were once common to facilitate loading by short loaders with small buckets. Ramps are prone to tipping and spillage accidents. Larger loaders and bucket sizes have increased the speed of the operation, however spillage at the time of loading is made worse by overloading. This spillage can occur either at the yard exit or before the spreader reaches the designated location, and to the operator yielding to the temptation of spreading the entire load rather than spinning off a potential surplus.

Where liquid melting agents are used, spillage of liquids can occur during production, delivery and transfer to spreaders.

It is not always necessary to spread the full load of material. Operators should be instructed to spread only what is needed to achieve the prescribed level of service. Unused materials must be returned and offloaded to the storage facility.

To minimize corrosion, spreaders are often washed following a storm. The wash water is likely contaminated with dirt, oil, grease, and salt (chlorides). If not properly handled, this wash water can harm groundwater quality, receiving streams, ponds and lakes and adjacent vegetation or agricultural operations.

To summarize, salt is lost to the environment in a variety of ways during the salt handling process. These include:

- Spillage of solid salt during delivery, mixing of sand/salt blends, stockpiling and loading/overloading of spreaders;
7.0 DESIGN AND OPERATION OF ROAD MAINTENANCE YARDS

- salt being dissolved from uncovered stockpiles of salt and sand/salt blends;
- spillage of liquid deicing chemicals during production, delivery, transfer to spreaders or tank/line failures;
- vehicle washing; and
- blowing salt dust from exposed piles.

Guiding Principles

When planning, designing and operating a winter maintenance yard, the following guiding principles should apply.

- Locate and operate storage sites to minimize impacts to the natural environment and control nuisance effects, including noise, dust, litter and visual intrusion on adjacent landowners;
- Place stockpiles inside storage structures;
- Use low permeable surfaces to minimize infiltration;
- Collect and reuse or properly manage salt impacted site drainage and vehicle washwater to comply with local water quality regulations and protect surface and groundwater resources;
- Promote indoor operations where possible;
- Handle materials and clean up spilled salt to minimize salt loss to the environment;
- Collect and dispose of onsite contaminants and wastes in accordance with local waste management legislation; and
- Control emissions (drainage, noise, dust, litter, fumes) to prevent off-site environmental impacts.

SALT MANAGEMENT PRACTICES

Planning

While summer activities may dictate the core staff complement needs, winter route times and service levels are the determining factor in establishing the numbers of staff and equipment that must be allocated and housed. Recently, the number of maintenance yards in use has been scrutinized through benchmark comparisons for in-house services as well as through the evaluation of alternative service delivery models, with a view to consolidation. Whether consolidating or constructing at new locations, there is more to consider than simply efficiency improvements. The re-evaluation of yard needs provides an opportunity to achieve the most functional design with positive environmental returns.

A general yard location is dependent upon:

- Control of emissions (drainage, noise, dust, litter, fumes) to prevent off-site environmental impacts.
- the needs of the road authority;
- optimization of route times calculated to meet a required level of service;
- equipment abilities and capacities;
- the time and distance assumptions which are somewhat dependent upon loader and spreader capacities; and
- environmental considerations.

The supervisor of winter operations may not be able to make immediate changes to the winter equipment fleet. However, over time, as the winter fleet is improved, there will be more efficient use of resources. This will help to maximize the effectiveness of salt used, and to optimize the number of maintenance yards needed.

Site Selection

Next to the proximity to the road network to be serviced, it is important to assess site physiography and topography when choosing a new site. Ground conditions (soils or rock) and the lay-of-the-land complement the drainage management objectives.

For example, unlike granular bases, clay bases will prevent rapid infiltration of salt laden water. Conversely, highly permeable soils almost always allow the surface water to reach the ground water table. This may not be a serious concern if there is relatively quick outlet to a tolerant watercourse, but this can generate considerable liability if the groundwater impacted by salt becomes a well water source.

A site that has natural surface drainage will limit the impact on groundwater. Underlying soil and rock characteristics, groundwater characteristics and use, and proximity to, and sensitivity of surface water should be understood to evaluate potential impacts from the presence of salt. It is also important when selecting a site for a maintenance yard to understand the long-term land use plans around the potential site. If a development based on groundwater sources for its water supply is to be located down gradient from the maintenance yard then the road authority could face a future liability due to salt impacts to the groundwater.

A properly conducted environmental impact assessment, emphasizing the risks associated with salt loss pathways, will help to ensure that an appropriate site is selected.
selected and that the proper considerations go into facility design.

When planning and designing road maintenance yards salt vulnerable areas must be taken into account. These vulnerable areas should be avoided to the extent possible. Where they cannot be avoided, specific measures should be included in the design to protect vulnerable areas.

Salt vulnerable areas could include:

- areas draining into bodies of water with low dilution, low volume or salt sensitive species;
- areas adjacent to salt sensitive vegetation and agricultural operations;
- areas draining into a source of drinking water (surface water and groundwater); and
- areas associated with groundwater recharge zones or shallow water table, with medium to high permeability soils.

The assessment of alternative sites should consider the potential chloride loadings to salt vulnerable areas and whether or not these loadings could have any adverse effects. Sites that have the potential to adversely affect vulnerable areas even after applying best management practices should be eliminated from further consideration.

**Design**

Maintenance yards are multi-functional facilities. A maintenance yard can be an evolving design. All functions conducted at the yard must be considered in designing the most suitable layout and features for the yard. The designers should consult with the people who will work at the facility when laying out the flow of the yard. The yard should be laid out to permit vehicles involved in the salt-cycle to move efficiently and safely about the site. The design should be flexible enough to allow the yard to be expanded as service delivery areas increase, or to be retrofitted to satisfy the latest method or policy change.

A yard which has ample size and access, and which has managed drainage is a facility which:

- is safe to operate from;
- is cost effective to use;
- facilitates the management of site drainage and vehicle wash water;
- protects salt vulnerable areas; and
- generates limited liability.

Practical considerations must include:

- providing indoor storage for all salt and sand/salt blends, preferably large enough to allow indoor delivery and spreader loading;
- noting the prevailing winter wind direction and positioning building and doors with regard to sheltering loading operations, minimizing snow drifting around doorways, and keeping precipitation out of the storage areas;
- providing proper lighting to help ensure safe and accurate salt loading operations when visibility is reduced during a storm event, especially at night;
- properly spacing buildings and material storage facilities (e.g. liquid storage tanks) in order to maneuver vehicles promptly and safely;
- properly locating the office building with a viewing window suitable for observing the loading area (to confirm numbers of trucks, sizes of loads, and general yard activity);
- constructing storage facilities on low permeability pads to limit infiltration of salt laden drainage;
- constructing the loading pad of asphaltic concrete or other low permeability material at the entrance of the facility;
- directing drainage away from storage facilities and providing for the interception and management of salt impacted drainage;
- locating parking, fuelling and loading/unloading areas as well as paved pathways to permit efficient vehicle movements and limit backing operations;
- locating catch basins properly, with hook-ups to avoid directing salt-laden runoff through storm sewers into salt vulnerable watercourses, or directly into the ground through poorly sealed sumps;
- identifying snow storage around the yard perimeter to lessen the impacts of salt-laden melt water (see the Snow Storage and Disposal Synthesis of Best Practices); and
- locating the water well for the maintenance yard up-gradient to prevent it from being impacted by site operations.

**Storage**

Solid salt stockpiles must not be exposed to rain or snow. Dissolved salt does not “disappear”, but rather enters the groundwater and creates problems offsite.
Therefore, proper storage of salt and sand/salt blends requires that they be covered to protect them from the elements.

There are a variety of types of covers available. They range from temporary seasonal tarps to sheds, to large domes, barns or silos. Salt should never be stored outside.

In some cases, sand/salt stockpiles have been stored outside on low permeable asphalt or concrete pads and covered with tarps. Tarps are not recommended. It is very difficult to maintain tarps and keep the pile covered. Where they are used, tarps that have deteriorated must be repaired or replaced. Where covering the pile is not feasible, a system should be in place to prevent salt loss and environmental impact.

Sand/salt blend should be stored in structures, or on pads using containment. In British Columbia some yards are designed with a 12 mil plastic liner under sand piles to contain and collect drainage.

Structure designs range from the domes, to rectangular sheds or barns, to high arch structures, to elevated silos. Storage structures can be made of different materials including wood, steel, aluminum, fiberglass or fabric. The trend is to enclose the base of the pile and support the structure on a concrete wall, with or without a footing. These walls need to be designed to withstand the strain of materials and loaders pushing against them. They must also be free of gaps that would allow salt or salt impacted drainage to escape. Some combination of covers may also be possible, such as a canopy attached to a dome, or adjacent to a tarped pile in order to protect both the working face of the pile and to work under cover from the elements.

The roof and exterior of the storage structures should be constructed of waterproof material such that precipitation and moisture are prevented from entering the building.

The quantity of material to be housed depends on expected needs, the reliability of the material source, and the delivery frequency possible during the winter season. The volume housed must include a contingency quantity to ensure that the supply will not run out in times of need.

Consideration should be given to the multiple function of storing sand with salt or other winter operations materials. Some structures provide a more efficient capacity than others depending on the intended methods of putting up the piles as well as in using the materials.

Spillage during stockpiling and spreader loading is the main sources of salt loss. The extent, to which these activities can be carried out under cover, minimizes salt loss. However, there are special considerations that have to be taken into account when selecting the storage facility design to permit indoor activities. The two most significant ones are ventilation and door/roof clearances.

Even the door location and size is important. The door should be high enough to allow a transport trailer to end dump inside the structure. On rectangular structures, end doors are advantageous.

The entrance to the storage structure should have a door, curtain or a sufficient overhang to minimize precipitation entering the structure.

Where possible, the storage facility should be generally oriented such that the door is facing away from the prevailing winter wind direction. This will reduce the amount of precipitation entering the structure. Operational access and egress to the structures must also be considered in entranceway layout.

As well, many road authorities like to have their salt at one end of the structure and their blended sand at the other end with space to allow a pug mill and conveyor for creating the blend. This configuration warrants side doors to allow spreaders to drive through the structure and be loaded with different materials from either end.

Good ventilation is required when vehicles will be operating inside.

The floor of the structure provides both the operating surface and the barrier to infiltration of salt impacted water into the ground. Since indoor operations will place significant stresses on the floor, the floor must be designed properly. The floors of all structures should have low permeability and be constructed of quality strength asphalt or concrete that is sloped away from the centre of the storage area for drainage purposes. Both asphalt and concrete are somewhat permeable and should be sealed to minimize infiltration.

In evaluating the costs of the various storage alternatives, of special note is the comparison of the actual, realistic in-use capacity that is expected in service, rather than simply the theoretical capacity. For example, a conical structure with a given design capacity will be greatly underutilized if the material stored is in two piles, one on either side. Further, life cycle costs for repairs and intermittent refurbishing may demonstrate a less expensive net present value than that often presumed from an initial low bid. This caveat is mentioned.
to generate interest in what may be a more functional facility at an appropriate cost over the longer term. In other words, the added cost to build a more functional facility can be recovered through the savings resulting from having a more efficient operation.

Other considerations include:

- adequate lighting;
- ample ventilation, either powered or natural; and
- accommodations for the method of “putting up the pile” e.g. baffles for minimizing loss when blowing in salt, adequate height for trailer dump or conveyors (either permanent or portable), protection for the use of loaders or excavators, subsurface hoppers, etc.

**Liquid Storage Facilities:**

- Designers should consult with local environmental regulatory authorities regarding siting and containment requirements for storage facilities.
- The required storage capacity will depend on the security of supply, production/delivery times and rate of use.
- Storage capacity can be reduced by using an “on demand” system.
- Where supplier-owned storage containers are used, arrangements need to be made for the delivery of full containers and removal of empties during yard operations.
- Supplier-owned storage containers should be treated the same as other brine storage containers (i.e. protected from vehicle impacts and provided with spill containment were appropriate).
- Where practical, secondary containment should be provided through double walled tanks or containment dykes. Typically, containment capacity is 110-125% of the capacity of the largest tank.
- Crash protection should be provided to prevent vehicles from impacting the production and storage facilities.
- Sufficient water supply is often a constraint when designing a brine production facility. The designer must ensure that sufficient water capacity is available to produce brine at the required rate for the maintenance operation.
- Water supply lines may need to be heat traced to prevent them from freezing.

- The freeze point of the liquid being stored and the lowest possible winter temperatures must be taken into account when determining the need to heat the production and storage tanks and piping.

- Emergency power supplies may be needed to ensure that liquid supplies are available in the event of a power failure.

- Designers must take into account the desired fill time for spreaders when selecting pump and line sizes. Pumps and lines that are too small will prolong the time it takes to refill onboard tanks.

- Production and storage tanks must be designed with a clean-out or flushing capability to remove settled impurities.

- Some liquids may require periodic circulation to prevent settlement of impurities, additives or product separation.

**Site Drainage:**

- The site should be graded to direct drainage away from the storage areas and to the extent possible, away from any down gradient groundwater well locations or salt vulnerable areas.

- Snow plowed from the site should be directed to areas where the melt water will be directed away from groundwater wells, storage area and salt vulnerable areas.

- Salt-laden water should be collected and properly managed. The water can either be used in brine production or sent for disposal at sewage treatment facilities where permitted.

**Operation/Maintenance**

In addition to proper design, good operating practices are important to minimizing material wastage and environmental impacts. Road authorities must review all aspects of their operations (delivery, storage, handing, site drainage, brine operations, vehicle washing etc.) to determine where salt loss is occurring and to develop procedures to minimize or eliminate these losses. The following practices should be followed.

**Salt Handling:**

- Where practical to do so, spreaders should be loaded inside the storage structure. Where inside loading is not possible, other systems are needed to recover salt spills that occur during loading.

- When loading spreaders outside of the storage structure, care should be taken to minimize spillage of salt onto the loading pad.
Overloaded spreaders are prone to spilling salt during operations. Therefore, spreaders should not be loaded beyond their capacity and, where feasible, should be covered with tarps when loaded with salt or sand. When loading spreaders a maximum height above the grate should be approximately 30 cm to avoid lumps falling off into traffic and spillage. A rake down rack is often used.

A primary source of salt entering the groundwater is salt spillage that is either plowed or washed from the maintenance yard. Care to minimize spillage and practices to clean up spilled salt can reduce costly losses.

Stockpiles frequently have portions that have become frozen. These frozen blocks need to be properly managed and should not be placed into spreaders. These blocks should be pushed into the corner of the storage facility and allowed to thaw and dry. Once they have thawed and dried, the material should be broken up and reintroduced to the pile. Where brine production is ongoing, blocks of pure salt can be put into the brine production tank.

Deliveries of salt should be arranged such that material is placed within the covered storage facility as soon as possible upon delivery. Deliveries should be scheduled for periods of good weather.

All deliveries should be covered when being transported to the maintenance yard.

Spreaders should be properly calibrated and periodically checked to ensure continued calibration. They should be recalibrated following any servicing of the salt delivery system.

Some road authorities benchmark their beats to establish the amount of material that would be placed under specified application rates. At the end of a run, the total material placed can be compared to the benchmark to see if the projected amount was put down. If there is a discrepancy than the reasons can be investigated.

Salt and sand/salt mixtures that are spilled outside of storage facilities or within, or adjacent to maintenance yards should be collected and returned to the storage facility as soon as possible following the completion of the storm event.

Spilled materials should be swept up and returned to the pile. Some yards use mechanical sweepers.

Excess salt and sand remaining in the spreader following a storm should be returned to the storage facility and deposited within or as close to the entrance of the salt storage facility as possible. Where materials are off-loaded outside of the storage facility, they must be placed into the storage facility as soon as possible.

Vehicle Washing:

Spreaders should be washed at a location where the wash water can be properly diluted, disposed, or treated. Prior to washing, the spreaders should be swept to remove as much of the residual solids as possible and thereby minimize the amount of dissolved salt and solids in the wash water.

Where possible, vehicles should be washed indoors rather than outdoors to contain the wash water. Where only outdoor washing is possible, it should be done where all wash water can be contained and directed through positive drainage to a water management system. It is preferable to direct wash water to a storage facility where it can be reused for brine production or sent for disposal. Careful consideration must be given to the ultimate receiver of the wash water.

All vehicle wash water should be directed through an oil/grit separator.

Sand/Salt Mixing:

Sand and salt mixtures should be mixed inside, or on a low permeable pad located as close to the salt storage area as possible.

Mixing should be done during good weather. This will reduce salt loss due to precipitation and wind, and minimize the moisture content of the sand/salt mix.

Mixing should be done using a pug mill or some other method to achieve a homogeneous engineered blend. This reduces the amount of salt needed to prevent freezing of the pile.

Sand should be as dry as possible, thereby reducing the amount of salt required to prevent freezing.

After the sand and salt have been mixed, the mix should be loaded into a storage facility as soon as possible. The mixing area should then be swept and the sweepings returned to the storage facility.

Road authorities that purchase pre-mixed should check deliveries to validate that the percentage mix is as specified. Too high a percentage of salt is wasteful and too low a percentage may result in the pile freezing.
**Salt Brine Production & Storage:**

- Where regulations permit, consideration should be given to using wash water or salt laden drainage water for brine production.
- Where possible, clumps of salt or wet salt can be placed into the brine production plant rather than placing this material in the salt storage facility.
- Where salt brine storage tanks are used, these tanks should be placed above ground, protected from potential impacts by vehicles and periodically inspected for leaks. Secondary containment should be provided where a tank failure could result in environmental damage. Containment may be provided by double-walled tanks or dyking systems. Provincial regulatory agencies should be consulted to determine the containment and handling requirements.
- Periodic inspection of tanks, pumps and pipes/hoses should be carried out and any leaks should be repaired immediately.
- Brine production and storage facilities may need to be flushed periodically to remove sediments. The materials produced from this flushing activity are mostly sand and gravel and can be mixed with the abrasive pile.

**Solid Material Storage Facilities**

- Any roof leaks, tears, or damage should be temporarily repaired during winter to reduce the entrance of precipitation, with permanent repairs being completed prior to the next winter season. At no time should leaks be allowed to persist when materials are being stored inside.
- The floors should be inspected annually for cracks and repaired/resealed as required.

**SALT VULNERABLE AREAS**

To the extent possible, maintenance yards should be planned and located away from salt vulnerable areas. This requires sufficient investigations of potential sites to identify salt vulnerable areas and to factor them into the site evaluation process. Where salt vulnerable areas cannot be avoided, special design measures must be taken to prevent salt impacts.

**MONITORING**

It is important to understand how much salt is being used, where it is going and the resultant environmental impacts. Monitoring will aid in the determination of the extent of the impacts and effectiveness of the mitigation measures taken. Most activities should be focused on preventing, minimizing or mitigating the impacts. Attachment 1 provides a checklist for monitoring maintenance yards. In addition monitoring may include the following:

- Baseline condition (benchmarking) of site and surrounding area for future monitoring comparisons. For new facilities this should be completed prior to the site being commissioned.
- The amount of material used during the year should be monitored and reconciled at year-end.
- The use of weigh-in-motion (WIM) sensors at the entrance and exit to the site to confirm recorded amounts and track dispatches.
- WIM would work well in conjunction with a loader scale sensor so the operator is in control of the load and his good judgment can be confirmed.
- Road authorities should also monitor compliance with good housekeeping policies.
- Providing for an activity code in maintenance management systems specifically for yard housekeeping to maintain a focus on this important activity and not unnecessarily burden other activities.

**RECORD KEEPING**

The performance measures that should be tracked and monitored include:

- Percentage of sand/salt blends stored under cover.
- Percentage of salt stored under cover.
- Percentage of storage sites with collection and treatment of washwater and drainage.
- Inspection and repair records.
- Stockpiling records.
- Quality control records for brine concentrations.
- Levels of environmental indicators (e.g. chloride levels).
**TRAINING**

Training should focus on ensuring that those handling salt at the yard minimize the potential to waste salt and impact the environment. Prior to each winter all staff that are handling winter sand and deicing chemicals should receive training. The training program should focus on the following learning goals with respect to maintenance yards:

- Understand that all salt and sand/salt blends should be covered to minimize salt loss.
- Understand that salt spillage is wasteful and harmful to the environment.
- Understand the salt-handling activities that result in wasteful releases of salt to the environment.
- Understand how these salt-handling activities should be carried out to prevent the wasteful release of salt to the environment.
- Understand the maintenance yard salt cleanup procedures that must be followed.
- Understand that timely yard maintenance and repairs are necessary to control salt loss.
- Understand the importance of proper record keeping and how to complete the required documentation on yard maintenance and salt use.

Training should be carried out through the following methods:

- Pre-winter briefings;
- Observation and corrective action; and
- Informal briefings during the season.

**SUMMARY AND RECOMMENDATIONS**

Most winter operators have an intuitive understanding of what works well in a maintenance yard setting. The practitioner’s advice should be sought in planning changes to facilities or in designing new ones. This consultation can also provide a complementary benefit of having the workers better understand why the facility is constructed the way it is and how it is expected to meet the needs of the winter service to be delivered. In designing a new maintenance yard or designing a major refurbishing of an existing yard, many of the above ideas are worthy of consideration. Information is also available from the Salt Institute and from storage structure suppliers for further guidance.
### ATTACHMENT 1 - Maintenance Yard Inspection Checklist

<table>
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<tr>
<th>YARD:</th>
<th>DATE:</th>
<th>INSPECTOR:</th>
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#### STORAGE FACILITIES
- Inspect the roof for leaks and repair [ ]
- Inspect the floor for cracks and repair [ ]
- Inspect the walls for leaks and repair [ ]

#### SOLID SALT HANDLING
- Store salt under cover [ ]
- Deliver salt during dry weather [ ]
- Delivery trucks are tarped [ ]
- Deliver salt directly to the storage facility or place into storage immediately [ ]
- Load spreaders inside where possible [ ]
- Minimize spillage during spreader loading [ ]
- Spreaders are not overloaded [ ]
- Spilled salt is cleaned up quickly [ ]
- Excess salt is returned to storage [ ]

#### LIQUID STORAGE AND HANDLING
- Liquid storage facilities have secondary containment [ ]
- Inspect storage tanks, pumps, pipes and hoses for leaks and repair [ ]
- Train personnel in proper handling of liquids [ ]
# Blended Abrasive Handling

- Store blended abrasives under cover
- Deliver abrasives during dry weather
- Mix salt and abrasives inside where possible
- Outdoor mixing only occurs during good weather
- Mix only enough salt to keep the pile from freezing
- Load spreaders inside where possible
- Minimize spillage during spreader loading
- Spreaders are not overloaded
- Spilled blended abrasives are cleaned up quickly
- Excess blended abrasives are returned to storage

## Site Drainage

- Clean drainage is directed away from storage areas
- Salt impacted drainage is collected, treated and/or sent to proper disposal
- Where collection and treatment is not practical, salt impacted drainage is directed away from salt vulnerable areas

## Vehicle Washwater

- Vehicle washwater is collected, treated and sent for proper disposal
- Vehicles are swept prior to being washed
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