

SALT &

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IS YOUR SALT STORAGE SAFE AND SECURE?

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The City of Ottawa is the first municipality to design and implement an integrated end-to-end salt handling program using the latest technology and processes.

Amalgamation of eleven municipalities and one Regional Government into a single city back in 2001 created special challenges for the newly formed City of Ottawa, Ontario's snowfighting operations. A major challenge for the city's new Surface Operations Branch was how to secure 33 urban and rural salt storage sites that had been operated by twelve operating groups. The facilities were spread throughout the enlarged city's 2,750 square



kilometres, a landmass equivalent to one half the size of Prince Edward Island.

The city uses about 160,000 tonnes of salt and a \$62 million budget to maintain 4,800 kilometres of paved roads, 134 kilometres of bus-dedicated rapid transit and

multi-lane freeway, 1,900 kilometres of sidewalks, 6,000 bus stops, 10 hectares of Park and Ride lots and city parking lots.

Along with a variety of operational practices the Surface Operations Branch also inherited a broad spectrum of salt management and monitoring techniques. Some areas did not track salt material usage or storage inventories

at all. Others used sophisticated automated reporting practices to document usage and storage management practices. The agency has consolidated and customized salt storage and usage to ensure all

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Three of the past four winters have been severe and North American salt usage has hit all-time highs. Heightened demand contributed to higher prices. The tight supplies and enhanced value, in turn has led agencies to re-examine their policies to reduce the risk of illicit or illegal activities. Areas of concern for snowfighting managers include the following:

- control over salt ordering
- lack of monitoring for salt delivery quantities
- poor invoice control, no designated sign off protocol, no inspection of delivery transports
- remote storage locations
- lack of security, open access, no video monitoring
- private contractors illegally removing salt from city storage domes
- contractors working in collusion with salt delivery drivers or city staff to redirect shipments
- improper documentation of salt usage

operational groups are complying with best management practices in accordance with the city's Salt Management Plan.

With an inventory worth millions of dollars, proper security, inventory control, protocols for salt handling and monitoring procedures were required to safeguard the material and budget. Aided by the Corporate Security Division, the Surface Operations Branch conducted an in-depth review of practices to identify gaps in security and develop a plan to ensure proper control techniques.

The first phase of the review identified numerous potential problems, including the following:

- Isolated location of salt storage facilities
- Control of access and egress from storage sites
- Salt transport company delivery procedures
- Procedures to conduct spot weighing tests of salt transport loads to ensure invoice amounts match shipping quantities
- Confirmation of salt delivery quantities upon receipt
- Inventory controls and salt tracking practices
- Education and training for staff dealing with salt handling
- Need for remote video monitoring of salt storage facilities
- Surveillance of salt handling operations to identify potential illegal activities such as theft or illegal sales

CONSOLIDATION

A number of salt storage sites were located in remote rural areas to

allow trucks to refill without the need to deadhead back to a Work Centre. The isolation of some of the salt domes combined with limited site security made it easy for people to enter the compound and remove salt.



In response, the agency consolidated facilities, constructed new salt sheds located at operational centers and discontinued remote sites. All salt storage is now located at operational centres with on-site staff. The construction of new storage facilities also enabled upgrading structures to current standards.

ACCESS

The security review indicated that a number of sites had inadequate controls to monitor traffic entering and exiting from the work centres. Manual gates were left open and vehicles could leave the yard without being seen. This lack of visibility created opportunities for activities that could potentially contribute to inaccuracies in documenting salt delivery quantities. This situation allowed unauthorized equipment to enter the yard and remove material without being seen.

Surface Operations installed fences, automated control gates and remote video monitoring at 12 salt storage sites. The new guillotine style gates were manufactured so

that the gate could be opened and closed vertically. This style eased operations and eliminated the need for a run out area if the gate had to swing or roll open. The new gates were programmed to stay open during periods when staff

was on site during the day and to close automatically at the end of the shift. Security personnel can override the controls when a storm event occurs to allow trucks to enter and exit the yard. The new gates are equipped with a card activation system that allows staff with the required clearance to open the gate. Surface operations personnel are issued identification cards programmed to allow access to certain facilities. This control system provides after-hours

access to authorized people and records the name, date and time for all card access entries to the site. Salt deliveries are now restricted to the times when the yard is accessible and trucks are required to check in with the supervisor before dumping their load.

All installations included a remote video camera system and audio capability to allow for monitoring and control from a central security desk that was staffed on a 24 hour, seven day per week basis. The camera equipment provided a constant feed to the Security Desk so the site could be monitored. Audio capability was provided at the gate entrance to allow people to contact the Security Desk to request that the gate be opened.

REMOTE MONITORING

Surface Operations operates with two shifts between Sunday night and Friday. The night shift works from 10:30 p.m. to 7:00 a.m. and the day shift operates between 7:00 a.m. and 3:30 p.m. If there is a storm event, the staff works on 12-hour rotations to cover the gap

between 3:30 p.m. and 10:30 p.m. There are no weekend shifts unless weather dictates a response; then the weekday operators are placed on-call and work overtime as required. Thus, there can be gaps between shifts and on weekends. The security review suggested the need for some sort of storage site monitoring to eliminate access during periods when no staff were present. Combined with the installation of new control gates, video monitoring would secure the work site against unauthorized entry by people who could damage equipment, harm personnel or conduct illegal activities.

The city installed remote video cameras to track any activity in the yard. The video is fed live to a 24-hour security desk so the operator can track activity at each of the remote sites. Corporate Security audited the procedures. It reviewed the video monitoring data and monitored delivery trucks and city equipment to identify security gaps which were then corrected.



LOGISTICS SECURITY

Ottawa's salt is delivered by water to Johnstown, Ontario, then by truck to the 33 city storage sites. The security audit identified the company stockpile-to-agency salt dome transport segment as insecure. A hauler could stop along the way to sell a partial load of salt then deliver the remainder to the city yard, a particular problem with the city's lax on-site delivery protocols. The



transport company worked closely with the agency. Surface Operations purchased portable scales for periodic and random checks of delivery trucks to verify the accuracy of the invoice quantity.

SALT DELIVERY CONFIRMATION

The security audit revealed salt deliveries were being scheduled by different staff at each location with no formal process or coordination of deliveries. Delivery invoices were signed by whoever was on-site when each load arrived, resulting in a chaotic jumble of often-illegible names and signatures, and a total lack of accountability. Some salt deliveries were taking place after regular hours and the invoices were simply left unsigned in a drop box to be retrieved the following day and processed for payment, often without anyone confirming the quantity received.

Chaos was replaced with a strict set of protocols governing salt ordering and delivery; new procedures ensure invoices accurately reflected load quantities and provide clear accountability for ordering and approving salt purchases. Working with the salt transporter, the agency identified a specific list of supervisors who were authorized to order salt. One supervisor at each location is designated the contact point to arrange delivery times; the transportation company is prohibited from accepting orders from any unauthorized person. To ensure there would be authorized

people on-site to investigate the load and sign the invoice, salt deliveries are now restricted to regular working hours (7:00 a.m. to 3:30 p.m.). Invoices are required to be signed by the supervisor or authorized yard loader operator and only after an inspection to confirm quantity information. The authorized signature form also requires a printed name and time of delivery; invoice drop boxes were removed.

INVENTORY CONTROLS

The new procedures created data that is fed into a new comprehensive salt tracking system to record salt usage and maintain an accurate account for salt inventories. Techniques used to record salt quantities include digital quantity surveys, automated downloading of salt application and manual counts of bucket loads where electronic controls are not available. At the end of each winter season the Branch conducts a quantity survey, using GPS survey equipment, to identify the amount of salt left at each storage location. This survey provides the starting balance for the following winter.

Each delivery is accompanied by an invoice showing the quantity of salt delivered in each delivery. When city operators start to draw from the storage site they record the amount of salt loaded and applied, by beat, for each shift. The salt usage is then input into the city's SAP Maintenance Management System (MMS). The information is obtained through automated tracking systems installed in most of the new salt spreading units. If the equipment is not outfitted with automated salt tracking mechanisms then the operator uses loader bucket counts to determine a cubic metre volume that is then converted to a tonnage value. Supervisors check all

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salt quantity figures entered into the MMS to confirm the accuracy of the data and compare usage rates between operators and beats to ensure compliance with predetermined spread rates.

As salt gets used during the winter the storage inventory is reduced and new deliveries are ordered. Invoices for all salt deliveries are paid through the SAP Financial Module that operates independently from the MMS. Periodically there is a reconciliation done between the starting inventory quantity combined with amount of material delivered, in comparison to the amount of salt used and an estimate of the quantity still in storage. A final adjustment is performed once the quantity survey is done at the end of the season. The continuous monitoring of salt inventories and usage provides up-to-date budget figures, allows supervisors to review salt application practices for each beat, promotes the importance of accurate salt tracking for all Surface Operations employees and generates cost savings by incorporating best practices for salt storage and usage.

STAFF EDUCATION AND TRAINING

Policies are necessary, but not sufficient to ensure a secure salt management environment. Personnel need to understand the goals and be trained in the new procedures. The city proactively trains all personnel involved with salt deliveries, storage and application. Training involves the proper handling and usage of salt, the new salt handling protocols and an understanding of the consequences of failing to comply with established practices.

CONCLUSION

With the ever increasing environmental and budgetary constraints related to salt handling and usage, public works agencies are under increasing pressure to provide safe, secure and economical handling practices. The City of Ottawa Surface Operations Branch, in conjunction with Corporate Security and its salt supply contractor, has enacted a comprehensive set of policies, procedures and practices to safe guard road salt delivery, storage and usage.

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