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Indiana DOT Invests in Improved Salt Storage

The Indiana Department of Transportation has been storing salt in storage structures for the past 40 years and all salt has been under roof since the mid- to late 1970s in INDOT facilities around the Hoosier State. But a new round of construction was launched in 2003 featuring standardized Cover-all structures using concrete, steel and textile materials. Eight are in operation already, replacing the last generation of structures which ranged from two bay sand/salt mixing sheds to shingled salt domes. INDOT also operates five modern steel storage structures. The structures and INDOTs salt management program have won nine Salt Institute Excellence in Storage Awards.

In the 1990s, INDOT became concerned that its outdoor loading practices were an unnecessary environmental risk and operational problem. As an interim step, in 2000, INDOT began constructing load-out additions to its existing salt domes. Current INDOT salt storage structures handle salt capacities ranging from 600 tons to 13,500 tons with the Cover-all buildings representing the larger capacities. Using the standard Cover-all building easily enables INDOT salt storage operations to contain the salt and minimize any environmental effects associated with salt. INDOT intends to add a minimum of two Coverall buildings per year to ensure all future salt is unloaded, stored and loaded in an efficient and environmentally secure manner.

Upgraded salt storage has been a staged, systematic program using objective criteria. These include the age of the existing structure, its location with regard to proximity to wellhead protection areas and Interstate highways, whether the current structure includes a covered/secured load out structure and capacity-related considerations such as its capacity-to-use history and the number of salt routes it supplies.

INDOT determined to use a standard Cover-all building for cost efficiency. Each facility includes a vehicle wash facility and a storage building for all trucks and salt spreaders. The steel-fabric structure is installed on top of 8-foot concrete walls. Each standard structure is 120 feet wide, but in varying lengths to be determined by annual salt usage for each individual location. Each building includes a salt storage area and a 120 x 50 foot area for drive-through capability and salt brine operations with secondary containment. The secondary containment area is used for tanks to make brine and storage tanks for reclaimed wash water,

salt brine and liquid calcium chloride. Floor drains and a sump capture any spillage and recycle it to the brine maker.

With salt loaded to 7-feet, each standard building contains enough salt to meet the current annual 5-year salt usage average. The standard size can be varied based on a 5-year average use, with the objective being to store a full average season's supplies for salt routes serviced by the storage facility. The five year annual average use is utilized to provide protection from potential supply disruptions in times of seasonal demand.

Each facility, once completed, will have an on-site, separate vehicle wash facility with an underbody wash system and a catwalk system. These use high pressure car wash-type wands with two wands on each side positioned at the floor level and two additional wands on each side positioned at the platform level. The wash facility also employs a high pressure under-body pressure washer to reduce the adverse effects of salt on the underside of the department's fleet of salt trucks. The under body wash system produces 300 psi and 30 gallons per minute. The system is comprised of two 15 gallon per minute stainless steel spinners. The system has a 500 gallon above ground storage tank fed by a 2" fresh water lines and the washbay pit holds 1500 gallons of water. The wash facility also employs dual catwalks that allow for a more thorough washing with the wash bay manual pressure washer. The wash bay also employs beams that allow for the demounting of the salt spreader box and a more thorough cleaning of the vehicle and spreader. All wash bay water goes through a Highland above-ground oil/water separator which can produce a maximum of 28 gallons per minute of 10 ppm or less oil/grease water. The clean water is drained from the oil/water separator into an underground sump pit with a duplex grinder pump system. Each pump is rated at 3-5 hp capable of delivering 50 gpm. The clean wash water is pumped to the salt building to be stored in a standard above-ground 10,000 gallon tank in the secondary containment area and used as feed water for making salt brine. Supplied/ city water is utilized for the brine process only if there is a shortage of wash water.

Excess wash water is stored in the 10,000 gallon tank until it is needed in the brine making process. A level sensor in the 10,000 gallon storage tank tells the pumps in the pit when to stop once the level in the tank reaches 80% or so capacity. If truck washing continues when the tank is full, the clean water is discharged to the sanitary sewer system.

INDOT has moved aggressively towards use of salt brine as an anti icing agent sprayed on roadways ahead of a winter event or sprayed on top of spreader loads as a prewetting agent for spreaders without injection tanks. Brine is also used to fill the injection tanks of spreaders which pre-wet at the spinner. In general, brine is utilized in situations where temperatures are 15 degree Fahrenheit or higher.

The department also employs storage buildings for all trucks and spreaders at existing upgraded and newly constructed facilities. The structure is designed with 16 x 50 foot bays that are multiplied by the number of snow trucks that are assigned to a facility. In addition, the entire structure employs secondary containment and minimal heat.

In summary, the Indiana Department of Transportation, properly, is addressing the issue of salt storage. INDOT not only complies with all state environmental regulations, but its use of salt storage buildings allows the agency to store enough snow and ice chemicals to support normal INDOT operations during an average winter season. The wash bay and storage building enable INDOT to maintain (wash) the equipment utilized during winter snow events. Storing the equipment under roof and on concrete, extends equipment life and cuts maintenance costs -- delivering improved taxpayer value and stretching constrained budget dollars.

For more information about the Indiana Department of Transportation's salt storage program please contact Steve McAvoy, Facilities Manager at smcavoy@indot.in.gov

Virginia DOT sets pace in recycling salty runoff at storage facilities

The Virginia Department of Transportation (VDOT) maintains the U.S.'s third largest state-maintained highway system and devotes a major part of its maintenance budget for snowfighting. VDOT currently stores more than the recommended 100% of average use: 350,000 tons of salt is stored at about 300 VDOT storage facilities located throughout the state. The state's average annual usage is 332,000 tons.

In addition to the structures themselves, most of the salt storage facilities have adjacent impermeable pads for truck loading and stormwater management. Pads are designed to contain any chemicals that may be spilled during the loading process; the runoff from this area is directed to and stored in the nearby stormwater pond. The pond itself is designed to be impermeable to prevent groundwater penetration by the salt-contaminated runoff.

Climate dictates that the collected runoff be managed since Virginia's climate precludes reliance on evaporation. VDOT has been forced to dispose of the salt water by discharging it to a connected publicly owned treatment works (POTW) system, hiring a contractor to pump and remove the runoff or by using it for summer dust suppression on gravel roads. Since facilities often lack POTW connections and the POTWs themselves may have difficulty with the saltwater and since hauling water is an expensive proposition, VDOT determined it needed to find an onsite management option for the collected runoff.

Following a VDOT-funded study by the Virginia Transportation Research Council (VTRC) and University of Virginia (UVA) in 2004, VDOT considered treating the runoff with ion exchange, electrodialysis or reverse osmosis water treatment technology. Only RO was deemed potentially feasible. This is the same technology used in drinking water desalination plants. After further investigation, VDOT abandoned even the RO option as cost-ineffective.

Thus, by process of elimination, VDOT turned its attention to the option of recycling the runoff into its onsite brine makers. Again, VDOT turned to VTRC and UVA and they produced a 2008 report on use of the salt-contaminated runoff for onsite brine production. The report has since published by the Transportation Research Board.

Snowfighters routinely justify using salt brine and salt-alternative liquids both to pre-wet road salt and for direct liquid application with data showing reduced overall salt usage through greater efficiency in using liquids. The VTRC/UVA study, however, excluded those savings and conducted a cost-benefit analysis comparing recycling with the option of hauling away the runoff. Using only those savings, recycling was determined feasible; it would recover all capital costs within four years and yielded a positive return within two years if the state experienced severe winters with higher-than-average salt use.

VDOT is moving strongly towards its goal of recycling its entire collected runoff, an estimated 60 million gallons. In average years, this amount will supply the entire water content for all the brine the agency will make, an added environmental and cost-savings bonus.

For further information contact: G. Michael Fitch, VTRC, Michael.Fitch@VDOT.Virginia.gov

New TRB BMPs for environmental stewardship at maintenance facilities

The Transportation Research Board has just published (November 2009) a new *Compendium of best management practices for environmental compliance and stewardship at highway transportation maintenance facilities* that includes important information for proper management of salt storage facilities.

Section 4.6.1 (page 57) describes Best Management Practices for "Storage and Handling of Deicing Salts and Chemicals." It references both the INDOT and VDOT examples discussed in this issue. And more. In addition to requirements to cover/tarp stockpiles and put them on pads – Sensible Salting practices advocated by the Salt Institute for more than 40 years and outlined in the Salt Institute's *Salt Storage Handbook*), the Compendium includes some other examples:

- Like INDOT, Tennessee DOT (TDOT) has installed vehicle wash water processing systems at many of its wash facilities. Their system captures and cleans wash water for reuse as salt brine make-up water. In order to ensure that the wash water is relatively free of oil and other

debris (which could clog the salt brine dispersion equipment), TDOT has installed oil/water separators and grit chambers at the wash bays. The water is also filtered through an automated, self-cleaning filtration system which uses filter paper to remove small particles. Following the filtering of the wash water, the water is pumped and stored in holding tanks and pumped or transported by truck to the brine mixing area. TDOT has installed high pressure, low volume washing facilities in order to both reduce the amount of water needed for washing and to avoid overloading the holding tanks. Moreover, the wash pads are under cover to prevent precipitation from entering the drains.

- Unlike INDOT, the “best practice” of the Ohio DOT (ODOT) is to conduct a risk assessment of the need for secondary containment for liquids (INDOT provides it at all its new facilities). ODOT’s risk assessment is based on site conditions such as rainfall, topography, and the likelihood of tanks to fail. Sites are then rated high, medium, or low and high priority sites are provided secondary containment.

- Montana’s Department of Transportation (MDT) has adopted a stockpile rating system. MDT’s criteria include proximity to neighboring wells and the presence of surface waters, such as streams and drainage areas. If risk is determined to be high, the facility will implement additional controls to prevent leaching, either by covering the piles or constructing asphalt pads on which the material can be stored. While the Salt Institute recommends covering all outside salt storage, such a rating system may be a “best practice” in prioritizing investments to that universal objective.

- Delaware DOT (DelDOT) and MassHighway require facilities to sweep up after storms to recapture salt spilled in the loading area. DelDOT requires that the facility is swept for salt debris after every snow or ice event while MassHighway requires that sand and salt which falls outside of the storage areas be swept within 48 hours.

For further information: http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2373

21 win Salt Institute Storage Excellence Award in 2009

Twenty-one salt storage facilities, operated by city and state transportation agencies in five states and one Canadian province, were previously announced as winners of the 2009 Excellence in Storage Award from Salt Institute. The award recognizes high standards of environmental consciousness and effective management of winter materials storage. Winners include the following:

City of Rockville, Rockville, MD
CT DOT, Vernon Maintenance, Vernon, CT
IN DOT, Greensburg Maintenance Unit, Greensburg, IN
IN DOT, Paoli Maintenance Unit, Paoli, IN
IN DOT, Tipton Maintenance Unit, Tipton, IN
IN DOT, Winchester Maintenance Unit, Winchester, IN
MRDC Operations Corporation, Badgad Depot, Badgad, NB
MRDC Operations Corporation, Mazerolle Depot, Mazerolle, NB
MRDC Operations Corporation, Oromocto Depot, Oromocto, NB
MRDC Operations Corporation, River Glade Depot, River Glade, NB
NB MOT, Brunway Highway Operations Inc. District 3, Hanwell, NB
Penn DOT, McAdoo Stockpile 16, Schuylkill Haven, PA
UDOT, Station 1423 Brigham City, UT
UDOT, Station 1424 Clearfield, UT
UDOT, Station 4432 Green River, UT
UDOT, Station 3437A Greendale Junction, UT
UDOT, Station 4322 Long Valley Junction, UT
UDOT, Station 4534 Meadow, UT
UDOT, Station 3445 Strawberry, UT
UDOT, Station 4431 Thompson, UT
UDOT, Station 3437 Vernal, UT

Another 113 facilities were cited for “continuing excellence” for sustaining award-winning programs recognized in the first 21 years of the program.

For more information: http://www.saltinstitute.org/Education-Center/Snowfighters-training/Salt-storage/Excellence-in-Storage-award

2010 Institute Storage Excellence Award Applications

Applications have been mailed to previous winners and are available on the Salt Institute website at http://www.saltinstitute.org/content/download/454/2868/file/E0669%20EIS%20US.pdf for the United States and for Canada http://www.saltinstitute.org/content/download/455/2872/file/E0670%20EIS%20Canada.pdf The deadline is May 1, 2010. All applications must be postmarked May 1st and or received via email at martina@saltinstitute.org by the same date.

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