



STATE OF NEW YORK DEPARTMENT OF HEALTH

FATALITY ASSESSMENT AND CONTROL EVALUATION

Contractor Run Over by Front-end Loader at City Salt Stockyard Case Report: 04NY002

SUMMARY

On January 13th, 2004 a 42 year-old male machine operator, who was hired by a liquid deicer distributing company as a subcontractor, sustained fatal injuries as a result of being run over by a front-end loader. On the day of the incident, the victim was providing customer service at a municipal rock salt stockyard that belonged to a city Department of General Services (DGS). The service included delivering the deicer to the site and operating a conveyer mixing system (a stacking conveyer or a “stacker”) to treat the salt with the deicer. Four DGS equipment operators (EOs), who worked from 7:30 a.m. to 3:00 p.m., operated front-end loaders to feed salt into the stacking conveyer and transport the treated salt into a storage shed. Witnesses reported seeing the victim walking in and around the loader working area throughout the day, performing conveyer maintenance and talking with the EOs. At 3:00 p.m., two EOs left for the day and a fifth EO (Operator A) took over one of the loaders and continued transporting the treated salt into the shed. The victim was last seen by Operator A standing between the two salt piles approximately 15 minutes before the incident. At approximately 3:50 p.m., Operator A began backing the loader out of the shed. The backup alarm and strobe warning lights on the loader were working, but the two exterior side-rearview mirrors had been broken off. Operator A stated that he looked back, left and right before backing and did not see the victim in his path. As he backed along the side of the treated salt pile, he felt the loader rocking as if it ran over a pile of salt. He immediately stopped the loader and saw the victim under the left front tire. He pulled the loader forward to get the tire off the victim, got out of the cab, and called 911 on his cell phone. EMS responded to the site in five minutes. The victim was transported to a local hospital where he was pronounced dead.

New York State Fatality Assessment and Control Evaluation (NYS FACE) investigators concluded that to help prevent similar incidents from occurring, employers should:

- *Design and implement measures for personnel on foot to communicate with mobile equipment operators and provide immediate employee training in communication procedures;*
- *Repair damaged equipment in a timely manner;*
- *Consider using additional backup safety devices on heavy equipment to warn operators when someone is in their blind spot;*
- *Develop and enforce a policy that requires all employees and on-site contractors to wear high visibility safety vests;*

- *Develop a standard procedure to inform on-site contractors of potential safety hazards and precautionary measures;*
- *Establish a safety and health management system that is responsible for implementing a comprehensive occupational safety and health program;*

Additionally, distributing companies should:

- *Develop effective measures and provide training to ensure the safety of workers and subcontractors who provide services at clients' sites;*
- *Modify equipment to reduce maintenance during operation so operators can avoid entering loader working areas.*

INTRODUCTION

On January 13th, 2004, at approximately 3:50 p.m., a 42 year-old male machine operator, who was hired as a subcontractor by a liquid deicer distributing company, sustained fatal injuries as a result of being run over by a front-end loader. The incident occurred at a municipal rock salt stockyard that belonged to a city Department of General Services (DGS); a DGS employee operated the loader. New York State Fatality Assessment and Control Evaluation (NYS FACE) staff learned of the incident on January 14th from a newspaper article. On January 15th, a NYS FACE investigator traveled to the incident site, surveyed the accident scene, observed the equipment that was involved in the incident, and interviewed the DGS employees who worked at the salt yard during the incident. The owner of the deicer distributing company was contacted several days later. NYS FACE staff also received investigative information from area offices of the federal Occupational Safety and Health Administration (OSHA) and the New York State Public Employee Safety and Health Bureau (PESH). Because the incident involved employees in the private and public sectors, both OSHA and PESH investigated the incident. Additional information was obtained from the reports of the city police investigator and the coroner's office.

The liquid deicer distributing company that subcontracted the victim employs four management personnel and controls approximately 75 subcontractors who work in company tank farms, distribute liquid deicing products, and provide on-site customer service to municipalities in the United States. The deicing liquid is a mixture of magnesium chloride and condensed molasses solubles. When mixed with salt, the deicer enhances the efficiency of road salt applications by eliminating lumps and prevents salt stockpiles from freezing. A stacking conveyer is used to mix the deicer into salt. The company's services include delivery of the deicer and on-site operation of the mixing equipment. At the time of the incident, the company had no written program to address employee or subcontractor safety issues when working at a client's site.

The victim had been hired as a subcontractor during the five winters prior to the incident. The only training the victim received from the company was instructions for setting up and operating the conveyer mixing equipment. According to the owner of the company, the victim was provided with safety glasses, hearing protection, gloves, boots and a high visibility safety vest. The victim usually worked alone. This was the third winter that the victim had serviced this particular city DGS.

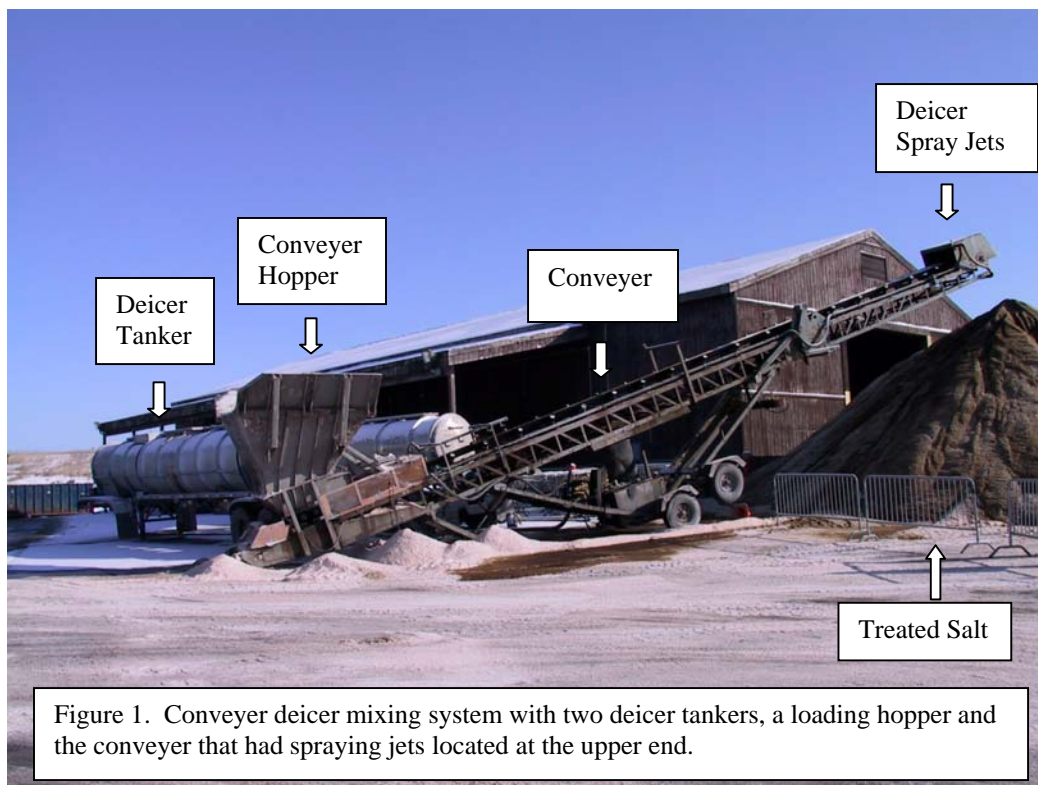
The city DGS where the incident occurred had approximately 100 employees and was in charge of maintaining the city streets. The equipment used for street maintenance included graders, dump trucks, backhoes, and front-end loaders. At the time of the incident, the DGS did not have a

designated person to address department safety and health issues. There was no policy addressing the safety of DGS employees or contractors who have to walk in or around moving mobile equipment within a work area. The DGS' insurance carrier provided a training session on snowplowing safety for the EOs in December 2003. During the training, the workers watched a 30-minute video that included safety while backing vehicles. This was the only documented employee training provided by DGS during the previous five years. The operator of the front-end loader that was involved in the fatal incident was unable to attend the training on that day and a make-up session was not provided.

INVESTIGATION

On the morning of the incident, the victim arrived at the DGS salt yard with two tankers of deicer and the conveyer mixing system. He was to treat approximately 2,000 tons of salt that day with the assistance of four EOs. By 7:30 a.m., when the four EOs arrived at the salt yard, the conveyer mixing system was set and ready to run. Two of the EOs began working at the loading end of the conveyer to feed the untreated salt into the conveyer hopper, while the other two EOs transported the treated salt into the storage shed.

The stacking conveyer (Figure 1) was capable of processing approximately 300 tons of salt per hour. The mixing system had a set of six jets located at the top of the conveyer. The deicer was injected through the jets and sprayed onto the salt right before the salt fell off the belt. The conveyer mixer was equipped with a filtration system that was designed to prevent the jets from clogging up. The controls of the mixing system were located at the north side of the conveyer (Appendix A). When operating the conveyer, the victim stood between the deicer tankers and the conveyer where there was no loader traffic. However, according to the EOs, the spray jets kept clogging that day and the victim had to walk around the salt piles and enter the loader working area to perform maintenance.



On the day of the incident, the victim wore an earth-tone Carhart suit and a dark blue canvas jacket; he was not wearing a high visibility safety vest. He also wore a hat and a pair of wrap-around safety glasses. In order to communicate with the EOs, who had two-way radios to communicate within the cabs, the victim had to catch the EOs' attention by gesturing or making eye contact. Witnesses reported seeing the victim walking in the areas between the two salt piles, behind the loaders, and near the salt shed entrance numerous times. According to the EOs, at least four times during that day, the victim climbed up to the top of the 25-foot high treated salt pile (Figures 1 and 2) to clear the clogged jets with a wire while the conveyer was running.



The normal shift for EOs was from 7 a.m. to 3 p.m. At the end of the shift that day, there were approximately 200 tons of salt left untreated. Two of the four EOs left at 3:00 p.m. and the other two stayed to continue feeding the hopper. Another operator (Operator A) who had been working at the DGS garage that day was asked by a supervisor to work overtime to assist with transporting the treated salt. Operator A had worked for DGS since 2000 and had 25 years of experience operating heavy equipment. He occasionally worked in the salt yard. The last time he had worked a full shift in the salt yard was during the previous winter of 2002-2003.

Operator A used a 2003 John Deere TC 54H wheel loader (Figure 3) that had been purchased by the DGS the previous year. The articulated four-wheel drive loader weighed about thirteen tons. It was equipped with an audible backup alarm and strobe lights that flashed during backing. At the time of the incident, both the audible alarm and the strobe lights were working properly. The loader had a right rearview mirror inside the cabin, and originally had exterior side-rear view mirrors on both sides. The two exterior mirrors had been broken off by tree branches during a snowstorm in December 2003 and had not been replaced. On the right side, the operator had virtually no blind spot due to a right interior rear view mirror. However, with the left exterior mirror missing, the

operator's blind spot on the left side extended back from the left rear of the vehicle approximately nine feet.



Figure 3. Front-end loader that was involved in the incident.

According to DGS management, the drivers and operators were responsible for general loader maintenance including oil changes and lubrication. Loader operators were also responsible for identifying and reporting equipment damage to the fleet maintenance crew by filing a vehicle condition report (VCR). In this case, no VCR had been filed on the missing mirrors.

The loader that was operated by Operator A had been evaluated by the equipment dealer after 448 hours of service in December 2003. The dealer noted in the Comments/Summary section of the evaluation form that all operation and safety functions (of the loader) operated and performed properly. The dealer then indicated in the second page of the evaluation form that the mirrors and a broken light needed to be replaced. The broken light was replaced by the dealer at the time of the evaluation. The mirrors however were not replaced until ten days after the fatal incident. Both the DGS management representative and Operator A stated that they were not aware of the missing mirrors until the post-incident investigation.

When Operator A began working at the salt yard at approximately 3:00 p.m., the area in front of the entrance and two-thirds of the shed entrance, which was approximately 20 feet wide, were piled with treated salt. The salt pile in the pathway of the loader created a potential roll-over concern. Operator A tried to shave some of the salt off the salt pile and clear the entrance area. He backed the loader out of the shed (Figure 4), stopped the loader, set the bucket facing the shed entrance, scooped up the salt on the path, drove to the shed, and dumped the salt, then backed out again to pick up another load.

After Operator A started working, he saw the victim climb up the treated salt pile once. About 15 minutes prior to the incident, Operator A stopped his loader and talked to the victim who was

standing between the two salt piles. Operator A asked the victim to set the conveyer out-feed end further away from the shed entrance in the future so the treated salt would not obstruct the path of the loaders. After talking to the victim, Operator A watched the victim walk toward the conveyer. Operator A then started his loader to continue transporting the salt. According to the operator's estimation, he did three more runs before the incident occurred.



Figure 4. Storage shed from which front-end loader emerged, striking victim.

Just prior to the incident, one EO was working at the in-feed end of the mixer and another was fueling his loader at a gas pump at the other end of the salt yard. Neither of these EOs saw the incident. At approximately 3:50 p.m., Operator A began backing his loader out of the shed after dumping a load of salt (Appendix A). The loader backed 48 feet inside the shed to the shed entrance and then proceeded to back 41 feet outside the shed. Operator A stated that he looked back, left and right before and during backing, but did not see the victim in his path. As he backed along the side of the salt pile, Operator A felt the loader rocking as if it had run over a pile of salt. Realizing that he had just cleared the area and there should not have been any obstruction, Operator A immediately stopped the loader. He looked down at the left side and saw the victim's legs under the left front tire. It appeared that the victim was struck from behind while he was walking south around the treated salt pile. Operator A pulled the loader forward to get the front tire off the victim, set the brake on the loader, got out and called 911 on his cell phone immediately. He then ran to the other two operators to draw their attention. Both operators jumped out of their loaders, ran to the victim and stayed with him. EMT arrived on the scene within five minutes. The victim was transported to a local hospital where he was pronounced dead.

CAUSE OF DEATH

The immediate cause of death was listed on the autopsy report as exsanguination from pelvic fractures.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: *DGS facilities should design and implement measures for personnel on foot to communicate with mobile equipment operators and provide immediate employee training in communication procedures.*

Discussion: A procedure for communication between personnel on foot and mobile equipment operators should be developed and implemented. A lead equipment operator may be assigned to coordinate the communication. If a contractor or an employee has to walk in a mobile equipment work area, he or she should radio the lead person who should immediately inform and warn all other operators of the presence of pedestrians in the work area. All traffic should be stopped in the vicinity until the contractor or employee completes his or her tasks and leaves the area. Employees should receive training on the communication procedure at least annually or as necessary.

Recommendation #2: *DGS facilities should repair damaged equipment in a timely manner.*

Discussion: If a piece of equipment becomes damaged or malfunctions, it should be removed from service until it is repaired. In this case the rear view mirrors that were broken off during a December snowstorm were not replaced until January 23rd, ten days after the incident. Although the missing mirrors in this case may or may not have directly contributed to the incident, they did create a blind spot for the driver on the left side of the vehicle.

Recommendation #3: *DGS facilities should consider installing additional backup safety devices on heavy equipment to warn operators when someone is in their blind spot.*

Discussion: In a busy work zone like the salt yard, workers often work in close proximity to moving heavy equipment. Being exposed on a daily basis to the noise and warning devices of backing equipment can desensitize individuals to the presence of such vehicles. There are devices available that can detect the presence of persons in the blind spots of vehicles and warn the driver. Readily available backup safety devices include: video cameras that can be mounted on the vehicles and sensor systems using ultrasonic or microwave energy to detect objects within a preset distance behind the vehicle and alert the driver. These additions should be considered especially when the standard practice has failed.

Recommendation #4: *DGS facilities should develop and enforce a policy that requires all employees and on-site contractors to wear high visibility safety vests.*

Discussion: High visibility safety vests are much easier to spot than tan or dark red uniforms in the earth-colored background of the treated salt pile. The DGS should require that all employees and on-site contractors wear high visibility safety vests while working in the salt yard.

Recommendation #5: *DGS facilities should develop a standard procedure to inform on-site contractors of potential safety hazards and precautionary measures.*

Discussion: The city DGS should develop a procedure to inform on-site contractors of the potential safety hazards associated with the tasks they perform and the precautionary measures that need to be taken during their work activities.

Recommendation #6: *DGS facilities should establish a safety and health management system that is responsible for implementing a comprehensive occupational safety and health program.*

Discussion: The DGS should assign a trained safety and health professional to oversee the development and implementation of safety and health programs. The chain-of-command should be clearly defined in the organizational chart. Routine job hazard analyses should be performed. A safety committee with both management and employee representatives may be established. The committee may conduct periodic workplace safety and health inspections, and the results should be documented and shared with the employees. An effective reporting system for identified hazards should be set up.

Recommendation #7: *Distributing companies should develop effective measures and provide training to ensure the safety of workers or subcontractors who provide services at clients' work sites.*

Discussion: Contracting companies should perform job hazard analyses on all tasks that their employees and/or subcontractors are required to perform at clients' work sites and develop controls for those hazards. In this case, the deicer distributing company should ensure that all its field employees and/or subcontractors are trained to recognize and avoid the hazards associated with walking in a work zone with moving heavy equipment. The company should ensure that the workers have a clear understanding of who is authorized to direct traffic in a work zone and how to communicate with the person in charge at a client's site.

Recommendation #8: *Distributing companies should modify equipment to reduce maintenance during operation so operators can avoid entering loader working areas.*

Discussion: On the day of the incident, the deicer spray jets that were located on top of the conveyer clogged numerous times and the victim had to perform frequent maintenance that required him to walk in an area with busy loader traffic. The victim was witnessed working on the spraying jets while the conveyer was running. The conveyer mixing system should be evaluated and the following should be considered if feasible:

- 1) Improve the filtering system to prevent the jets from clogging;
- 2) Relocate the jets so that they are easier to access from an area without loader traffic; and
- 3) Install remote controls so operators can turn off equipment while testing and working on the spray jets.

Keywords: *contractor, front-end loader*

The Fatality Assessment and Control (FACE) program is one of many workplace health and safety programs administered by the New York State Department of Health (NYS DOH). It is a research program designed to identify and study fatal occupational injuries. Under a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH), the NYS DOH FACE program collects information on occupational fatalities in New York State (excluding New York City) and targets specific types of fatalities for evaluation. NYS FACE investigators evaluate information from multiple sources. Findings are summarized in narrative reports that include recommendations for preventing similar events in the future. These recommendations are distributed to employers, workers, and other organizations interested in promoting workplace safety. The FACE program does not determine fault or legal liability associated with a fatal incident. Names of employers, victims and/or witnesses are not included in written investigative reports or other databases to protect the confidentiality of those who voluntarily participate in the program.

Additional information regarding the New York State FACE program can be obtained from:

New York State Department of Health FACE Program
Bureau of Occupational Health
Flanigan Square, Room 230
547 River Street
Troy, NY 12180

1-866-807-2130

www.health.state.ny.us/nysdoh/face/face.htm

Appendix A. Diagram of Incident

