



# STATE OF NEW YORK DEPARTMENT OF HEALTH

## FATALITY ASSESSMENT AND CONTROL EVALUATION

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### City Employee Killed when Clothing became Entangled around an Unguarded PTO Shaft on a Salt Truck Case Report: 05NY007

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#### SUMMARY

On January 26<sup>th</sup>, 2005 a 43-year-old male sanitation worker, employed by a city Department of Public Works (DPW), was killed when his sweatshirt became entangled around an unguarded Power Take Off (PTO) shaft on a salt truck. The truck had a broken bed chain (a conveyer belt used to transport salt to the rear of the truck) and had been in for service six days prior to the incident. The DPW mechanical crew repaired the bed chain and returned the truck to service but did not reinstall a shaft guard that covered the PTO shaft. At the time of the incident, the victim was alone operating the salt truck in the city's salt shed. There were no witnesses to the incident. It appeared that sometime between 3:50 p.m. and 4:10 p.m., when the victim walked to the rear of the truck to check the salt spreader, his orange safety sweatshirt was caught by the rotating shaft stub. At approximately 4:10 p.m., the victim was found by a co-worker. The salt spreader was still running and it appeared the victim had been strangled by the sweatshirt that had been tightened by the rotating shaft stub. The co-worker immediately turned off the machine and called two other workers for help. They freed the victim and placed a call to a DPW dispatcher. The fire department, police department, and ambulance service arrived within minutes. The victim was transported to a hospital where he was pronounced dead.

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

- ***Require maintenance staff to inspect and certify each piece of equipment before releasing it back into service after maintenance or repair;***
- ***Require operators or other competent persons to perform daily safety checks on mobile equipment prior to operating the equipment;***
- ***Develop a standard salt truck operating procedure that requires operators to turn off the machine while cleaning and unclogging the bed chain and;***
- ***Establish a safety and health management system that is responsible for implementing a comprehensive occupational safety and health program.***

## **INTRODUCTION**

On January 26<sup>th</sup>, 2005 at approximately 4:10 p.m., a 43-year-old male sanitation worker was killed when his sweatshirt became entangled around an unguarded Power Take Off (PTO) shaft on a salt truck. The victim was employed by a city Department of Public Works (DPW). New York State Fatality Assessment and Control Evaluation (NY FACE) staff learned of the incident on January 27<sup>th</sup> from a newspaper article. On January 28<sup>th</sup>, a NY FACE investigator traveled to the incident site, surveyed the scene, and observed the equipment that was involved in the incident. Additional information was obtained from the reports of the city police investigator, the coroner's office, and the New York State Department of Labor, Public Employee Safety and Health Bureau (PESH) who also investigated the case.

The city DPW where the incident occurred employs approximately 98 union workers and is responsible for maintaining and repairing the city's infrastructure. The DPW also oversees the design, construction, renovation, and alteration of all city-owned property; manages solid waste collection, transfer, disposal, and recycling; cleans city streets; and performs snow and ice removal during winter months. At the time of the incident, the DPW did not have a designated person to implement and maintain safety and health programs, nor did it have a system to address occupational hazards encountered by workers. Employees did not receive regular training. The only form of training was hands-on instruction; no training records were maintained. According to the DPW representatives, the DPW operators were supposed to conduct daily truck inspections and fill out inspection sheets; however, daily inspections were rarely performed. Workers were provided with high-visibility orange sweatshirts to be worn when working on city streets.

The victim was hired in February 2004 as a sanitation worker. His job duties included collecting, transferring, disposing and recycling of solid waste, cleaning city streets, performing snow and ice removal, and salting the streets during winter months. According to the DPW representative, the victim had on-the-job training with an experienced equipment operator with him for at least 36 hours. This was the DPW's first work-related fatal injury.

## **INVESTIGATION**

The DPW had two salt trucks, both purchased new in 1993. Each truck had a snow plow in front, a seven cubic-yard salt tank in the back (Photo 1), and a salt spreader at the rear end of the truck. There was a conveyer bed chain on the bottom of the salt tank to transport the salt to the spreader (Photo 2). The conveyer chain was driven by a hydraulic motor through a PTO shaft or a worm gear assembly (Photo 3). The PTO shaft operated between 800 and 1200 RPM with a torque of 1150 inch-pounds. The shaft stub was one inch in diameter and two inches long. Under normal circumstances, the stub was enclosed and guarded by a metal cap (the shaft guard) that was secured to the gear casing with two screws (Photo 4). The PTO assembly was located on the driver's side of the truck towards the back end, approximately five feet and three inches above ground level.

Six days prior to the incident, the truck that was involved in the incident had a broken bed chain. The truck was initially placed in "the pit", a garage that was not regularly used. The maintenance crew began repairing it by taking the bed chain and the PTO assembly apart. The next day, the maintenance crew had to move the truck to the main maintenance garage to complete the repair.

All of the removed truck parts were transferred to the other garage except for the shaft guard and the attachment screws and washers. These parts were left on a bench and covered with a piece of

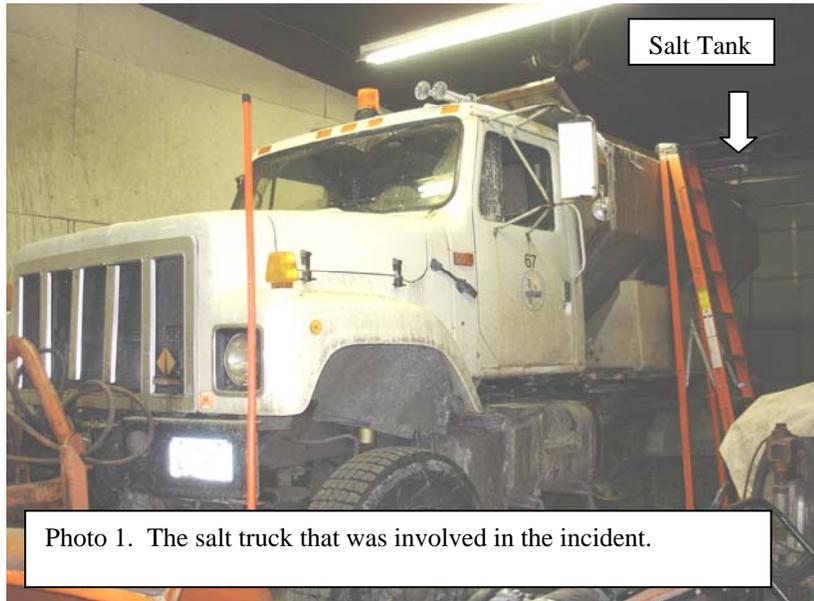


Photo 1. The salt truck that was involved in the incident.

paper towel in the garage pit. The truck was put back into service that Friday without the shaft guard. Between that Friday and the next Wednesday, the day of the incident, the truck had been operated by numerous workers in addition to the victim.

The weekend before the incident, the city had been hit by a major winter storm and had received approximately 10 inches of snow. At the time of the incident, the DPW staff were still engaged in snow removal following the storm. On the day of the incident, the victim reported to work at 6:00 a.m. His job assignment that day was picking up special trash for recycling. By 8:30 a.m. he had finished his routes. He then joined the snow removal team driving the salt truck to clear the snow and salt the roads.

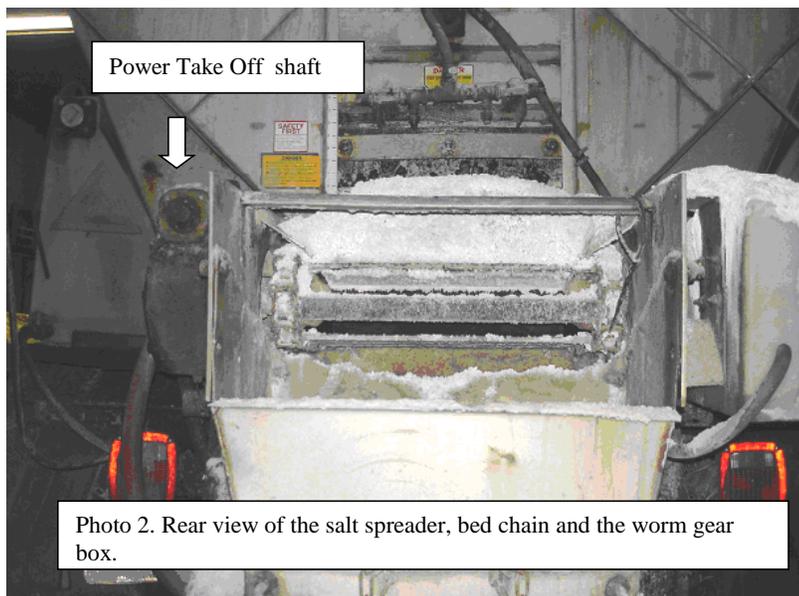


Photo 2. Rear view of the salt spreader, bed chain and the worm gear box.

The victim finished plowing and salting the roads and returned to the salt shed at approximately 3:30 p.m. He was seen by one of the workers who was at the salt shed as he backed his truck into the shed to empty the salt. The salt tank had to be emptied at the end of each day so the salt would not freeze and obstruct the bed chain. The salt often stuck to the bed chain and had to be dislodged while the truck was being emptied. This was frequently done by an operator using a stick and without turning off the machine.

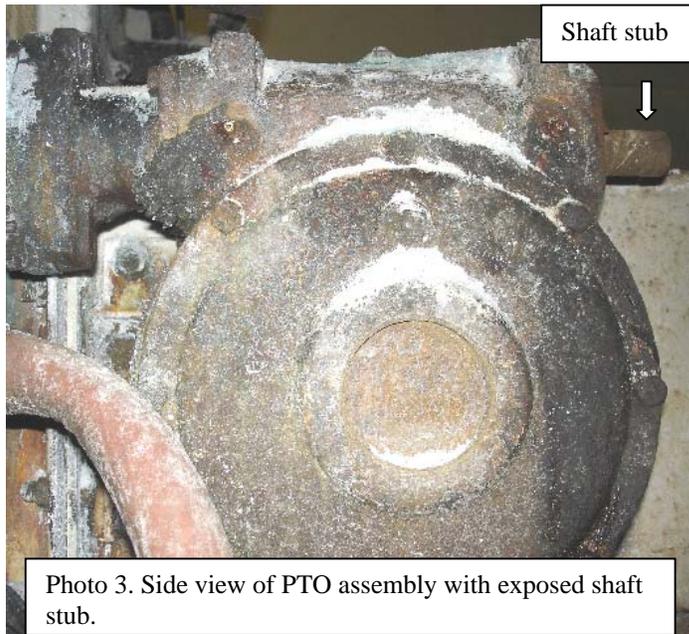


Photo 3. Side view of PTO assembly with exposed shaft stub.

The manufacturer of the salt spreading system specified that all shields be kept in place and the machine stopped when adjusting or oiling. There was a warning sign posted next to the PTO on the salt tank stating that the power to the machine should be disconnected before cleaning a clogged machine. The DPW did not have a standard operating procedure that required an operator to turn off the machine prior to working on the bed chain.



Photo 4. The shaft guard that had been removed during maintenance prior to the fatal incident.



Photo 5. The entrance to the salt shed where the victim parked his truck at the time of the incident.

A potential contributing factor to the incident was the access space inside the shed (Photo 5). At the time of the incident, the victim walked on the piled salt around the rear end of the truck. This unstable footing may have contributed to his contact with the shaft.

There were no witnesses to the incident. It appeared that just prior to the incident, the victim walked along the driver's side to the rear of the truck to either check the bed chain or the spreader. At approximately 4:10 p.m., a co-worker went to the shed to find out why the victim had taken so long to empty the truck. The co-worker found that the salt spreader and the bed chain were still operating and the victim's clothing, a tight-fitting sweatshirt, had become entangled around the rotating shaft stub. It appeared that the victim had been strangled by the tightened shirt. The co-worker called out to two other workers for help. One of the workers called a DPW dispatcher who forwarded the call to a 911 dispatcher, while the other two workers turned the truck off and freed the victim. The fire department, police department and ambulance service arrived within minutes. CPR was administered upon arrival of the rescue crew. The victim was transported to a hospital where he was pronounced dead.

## CAUSE OF DEATH

The immediate cause of death was listed on the autopsy report as asphyxia due to compression of the neck.

## RECOMMENDATIONS/DISCUSSION

**Recommendation #1:** *Employers should require maintenance staff to inspect and certify each piece of equipment before releasing it back into service after maintenance or repair.*

**Discussion:** Each piece of equipment that has undergone maintenance or major repair should be inspected and certified by DPW maintenance staff before it is released back into service. The DPW maintenance staff should verify and certify that the equipment is safe to operate and that all safety features, including machine guards, are in satisfactory condition and have been replaced after repairs. A fill-in inspection checklist may be developed to assist with the inspection. The inspection should be documented and records retained.

**Recommendation #2:** *Employers should require that operators or other competent persons perform daily safety checks on the mobile equipment prior to operating them.*

**Discussion:** Mobile equipment should be inspected daily by operators or other competent persons. An inspection checklist that has the items to be checked may be developed to assist the daily check. Workers should receive training on identifying hazards, such as an exposed rotating shaft or missing guard. If any of the safety features on the equipment are broken, malfunctioning, or missing, the operator should document the findings and report them to management. The DPW should immediately remove the equipment with damaged or missing safety parts from service and not return it to service until it is repaired and certified by maintenance staff.

**Recommendation #3:** *Employers should develop a salt truck standard operating procedure that requires operators to turn off the machine before working on the bed chain.*

**Discussion:** When operating the salt truck, one of the problems frequently encountered by the DPW workers was the clogging of the bed chain. At the time of the incident, the operators often cleaned or unclogged the bed chain without turning off the machine. A standard operating procedure that requires operators to turn off the machine prior to working on the bed chain should be developed and implemented. Workers should receive training and the DPW should increase supervision to ensure that the workers strictly follow the standard operating procedure and do not take short cuts.

**Recommendation #4:** *Employers should establish a safety and health management system that is responsible for implementing a comprehensive occupational safety and health program.*

**Discussion:** The DPW should assign a trained safety and health professional to oversee the development and implementation of the department's safety and health programs. The chain-of-command should be clearly defined in the organizational chart. Routine job hazard analyses should be performed. An effective system for reporting identified hazards should be developed and implemented. 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 employees.

**Keywords:** *machinery, PTO shaft, machine guarding, salt shed, salt truck, entanglement, DPW*

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](http://www.health.state.ny.us/nysdoh/face/face.htm)