

FACE TO FACE

A NY FACE Training Guide for Health & Safety Professionals

**MODULE 1: PREVENTING DEATHS AND INJURIES TO
PUBLIC WORKERS WHILE WORKING AROUND
MOBILE EQUIPMENT**


PREVENTING DEATHS AND INJURIES TO PUBLIC WORKERS WHILE WORKING AROUND MOBILE EQUIPMENT

Training Curriculum Contents

- I. Introduction and Course Preparation Tips**
- II. Training Curriculum**
 - A. Getting Started**
 - B. Real-Life Example**
 - C. Discussion**
 - D. Talking Points**
 - E. Take Away Messages**

I. Introduction and Course Preparation Tips

INTRODUCTION

 This guide is meant to help you run a safety course for preventing deaths and injuries to people who work around mobile equipment. It includes examples you can share with workers, questions for discussion, and take away messages. The safety course is broken into 5 different sections:

- A. Getting Started
- B. Example
- C. Discussion
- D. Talking Points
- E. Take Away Messages

Each section includes tips you can use when presenting the material. The course will take about 30 minutes to complete. Instructor comments have been shaded gray for easy reference.

Additional materials have been provided at the back of this binder for your review.

COURSE PREPARATION TIPS

 Before beginning the training:

- 1) Get to know your company's safety rules about:
 - ✓ Working around mobile equipment
 - ✓ Work zone traffic control policies
 - ✓ Communicating hazards to on-site contractors
 - ✓ Personal protective equipment
 - ✓ Reporting safety incidents
 - ✓ Employee consequences for failure to abide by safety rules
- 2) Make a list of mobile heavy equipment used on-site and personnel who work with and around the equipment, including contractors. You may want to walk employees around the equipment, teaching them where blind spots are located, etc.
- 3) Read through this training guide and look over supporting materials.

I. Training Curriculum

A. Getting Started

STOP One goal of this training is to get workers to recognize the hazards of working with and around mobile equipment. A second goal is to teach them ways they can protect themselves and their co-workers. During the first part of the training, give your workers background information about safety problems that can happen with mobile equipment. Examples have been included in the “Supporting Materials” section of your binder. The question and facts below can help you provide background information to workers.

STOP Provide your workers with a copy of the “Safety Checklist for Working around Mobile Equipment” located on the next page. Read aloud the “Hazard Warning” to workers and the question and answer below.

HAZARD WARNING!

Workers who work with or around mobile equipment are at risk of serious injury or death.

Every year, many workers in the U.S. are injured by vehicles and mobile equipment while working in the same area at the same time.

QUESTION FOR GROUP (READ ALOUD):

About how many workers in the U.S. are killed each year because of being struck by vehicles and mobile equipment while on the job?

- a) 10
- b) 50
- c) 100
- d) 400

ANSWER (READ ALOUD):

Around 400 workers are killed on the job each year when they are struck by vehicles or mobile equipment. These workers leave behind countless family members. The tragedy here is that these deaths can be prevented. Workers have been killed when struck by vehicles whose drivers did not see them. In many of these cases, the workers killed were standing, walking, or working around vehicles that were backing up.

SAFETY CHECKLIST FOR WORKING AROUND MOBILE EQUIPMENT

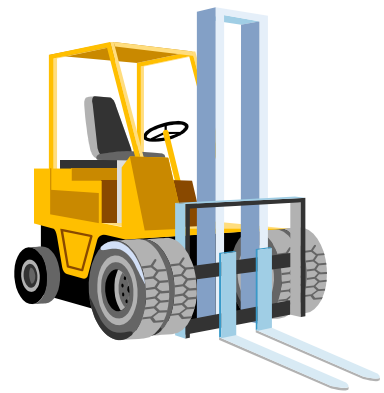
HAZARD WARNING!

Workers who work in or around mobile equipment are at risk of serious injury or death.

Here are some simple ways you can help protect yourself and your co-workers:

When you are operating equipment:

- ✓ Know equipment safety features. Know how they operate and use them properly;
- ✓ Inspect equipment and immediately report problems on safety devices. If these can't be immediately fixed, DO NOT use the machine;
- ✓ Reduce backing whenever possible — it is the most dangerous movement;
- ✓ Know where your blind spots are;
- ✓ Don't rely on mirrors alone—turn and look behind you before backing;
- ✓ Look for people on foot around you;
- ✓ Maintain a safe operating speed;
- ✓ STOP when you are signaled to or anytime you are in doubt;
- ✓ Strictly follow and obey company safety rules;
- ✓ Report unsafe workers and work practices to supervisors.



When you are walking on site:


- ✓ Keep eye contact with the operator. You must see and be seen;
- ✓ Communicate with the traffic control staff;
- ✓ Wear a fluorescent reflective safety vest;
- ✓ Be alert; stay clear; hear warnings; look for hazards;
- ✓ Strictly follow and obey company safety rules.



**YOU MUST SEE AND BE SEEN OR YOU COULD BE
SERIOUSLY INJURED!**

II. Training Curriculum (cont.)

B. Real-Life Example

 A useful way to train workers about safety hazards is to present them with real life examples. Pass out copies of the FACE Facts sheet located on the next page to workers and read the example below aloud. A copy of the full report on which this Facts sheet is based has been included in the “Supplemental Materials” section—“Contractor Run Over by Front-end Loader at City Salt Stockyard”. After reading the example aloud, use the questions in the “Discussion” section to get workers to talk about why the accident may have happened.

EXAMPLE (READ ALOUD):

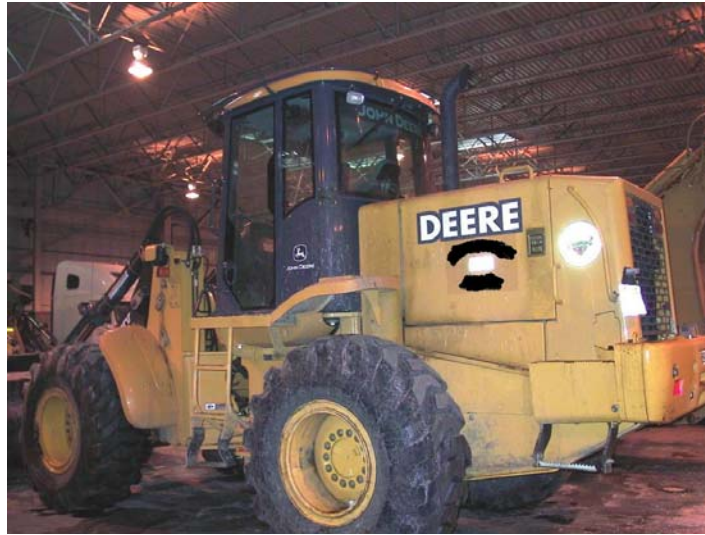
In January 2004, a 42-year-old male machine operator, who was hired by a liquid deicer distributing company as a subcontractor, died after he was run over by a front-end loader at a city salt stockyard in New York. On the day of the incident, the victim was providing customer service at the stockyard including operating a conveyor mixing system to treat salt with the deicer. While the victim was walking around the salt pile, a city equipment operator backed a loader out of a storage shed and struck the victim. The victim was transported to a local hospital where he was pronounced dead.

FACE FACTS

Fatality Assessment & Control Evaluation

HAZARD WARNING!

Workers who work in or around mobile equipment are at risk of serious injury or death.



A machine operator who worked for a liquid deicer distributing company was killed when he was run over by a front-end loader at a city salt stockyard. He was walking around the loader working area performing conveyer maintenance. A city equipment operator backed the loader out of a storage shed and struck the victim. The loader was missing two side-rearview mirrors and the victim was not wearing a high visibility safety vest. Also, there was no radio communication between the victim and the city equipment operators. (Case Report: 04NY002)

HOW CAN THIS BE PREVENTED?

- ▶ Employers should set up a traffic control plan to coordinate the movements of all workers at the site, whether they are on foot or operating mobile equipment.
- ▶ Repair damaged equipment in a timely manner.
- ▶ Consider using additional safety devices on mobile equipment to warn operators about people or objects in blind spots.
- ▶ All employees and contractors should wear high visibility safety vests.
- ▶ Develop standard procedures for informing contractors of potential safety hazards.

The Fatality Assessment and Control Evaluation (FACE) program, in cooperation with the National Institute for Occupational Safety and Health (NIOSH) is one of many workplace health and safety programs administered by the New York State Department of Health. Additional information about the FACE program can be obtained by contacting:

NYSDOH FACE, Bureau of Occupational Health, Flanigan Square, Room 230, 547 River Street, Troy, NY 12180
1-866-807-2130

FACE reports can be viewed on the New York State Department of Health website at: www.health.state.ny.us/nysdoh/face/face.htm



STATE OF NEW YORK DEPARTMENT OF HEALTH

II. Training Curriculum (cont.)

C. Discussion

STOP Questions can be a good way to get people thinking about a lesson. During this part of the training, discuss what caused the mobile equipment fatality you just read. Listed below are questions you can ask and some of the answers you are likely to receive.

Because some workers might be hesitant to answer right away, you may want to read one of the answers given below. Then, ask workers whether they think the answer you gave was correct. However, don't give an answer right away. It is best to wait at least 10 seconds after you ask a question before you give an answer. People remember things better when they hear them many times or both hear and see it. If possible, write down the answers workers give to questions. Or, if writing is not possible, repeat the answers aloud.

QUESTIONS AND ANSWERS (READ ALOUD):

STOP What could have gone wrong?

- Was the worker inexperienced?
- The victim had worked at this salt stockyard as a contractor for three winters prior to the incident.

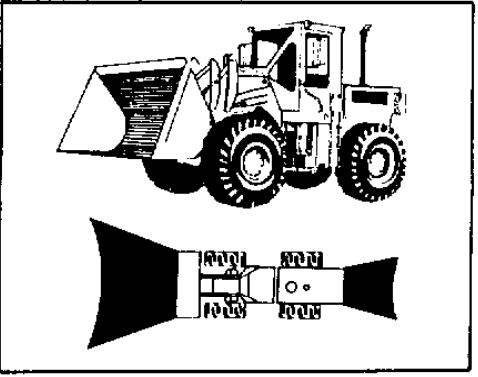
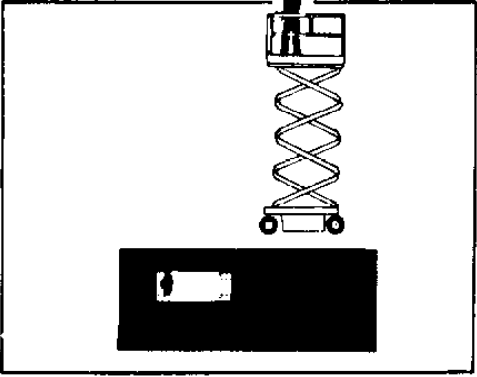
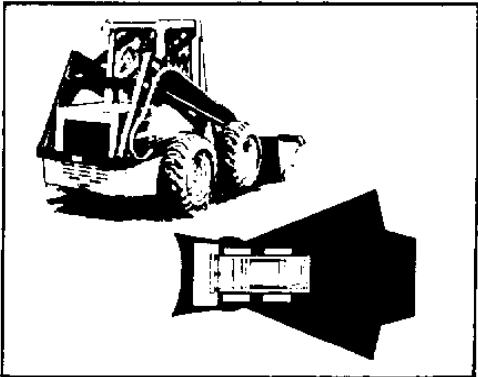
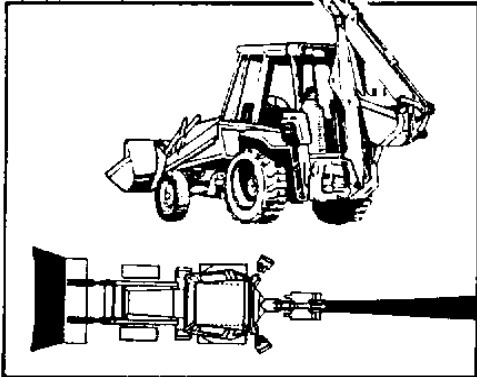
STOP What did go wrong?

- **Poor hazard communication:** There was no procedure for communication between personnel on foot and mobile equipment operators. In some cases, employees may have to leave their vehicles to perform certain work tasks. Equipment operators should be made aware of these conditions.
- **Damaged equipment:** The side rearview-mirrors on the loader had been broken off the winter before and had not been replaced. The missing mirrors created a blind spot for the equipment operator which may or may not have directly contributed to the incident. **(HAND OUT COPIES OF THE BLIND SPOT DIAGRAM LOCATED ON THE NEXT PAGE TO WORKERS)**
- **Lack of safety vests:** The victim was not wearing a high visibility safety vest.

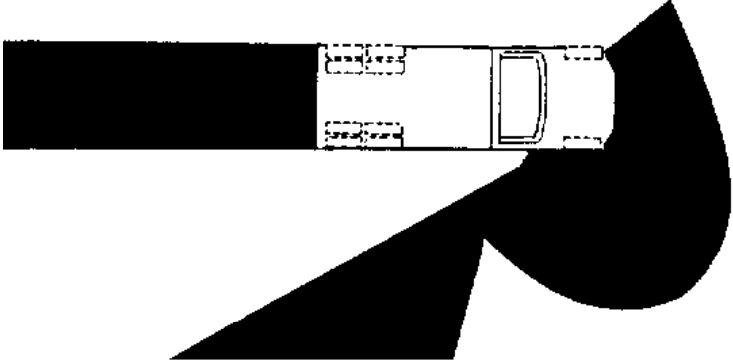
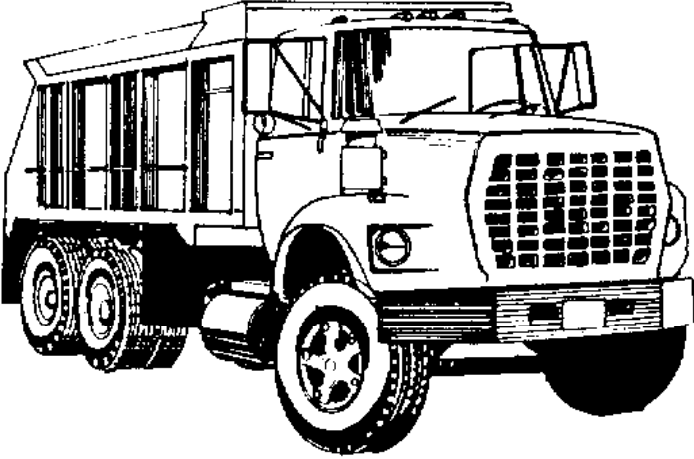
STOP Who is at risk?

- Many different workers are at risk including laborers, equipment operators, and related contractor staff.
- Are you at risk?

EXAMPLES OF MOBILE EQUIPMENT BLIND SPOTS



Illustrations courtesy CSAO



II. Training Curriculum (cont.)

D. Talking Points

STOP The goal of this part of the training is to get workers talking about their own experiences working in and around mobile equipment. Listed below are questions you can use to get people talking and questions you can use to get people to provide more details. You may also want to include information on the consequences for employees who do not follow established safety rules (e.g., verbal warning for first infraction, written warning, etc.).

QUESTIONS (READ ALOUD):

- STOP** Have you ever had an accident or near-miss accident that involved mobile equipment?
 - Do you know anyone who has had one?
 - What went wrong?
 - What could have been done to avoid the accident?

- STOP** Have you ever found that the mobile equipment you were about to use had damaged parts?
 - If yes, what did you do?


- STOP** Do you look up when you hear a backup alarm?

- STOP** What are some of the work activities you and your co-workers do that put you at risk?

- STOP** Have you ever observed others engaging in risky behavior?

II. Training Curriculum (cont.)

E. Take Away Messages

 The training is nearly complete. Before wrapping up, provide workers with a list of things they can do to protect themselves by reviewing the “Safety Checklist for Working around Mobile Equipment” (found in Section A “Getting Started) aloud. These are the key messages you will want workers to have and remember. Once you have finished reviewing the information, ask if anyone has any comments about the advice. Finally, thank workers for their time and ask them to complete the evaluation form located on the next page.

Evaluation forms should be returned to you. Completed forms should then be send to the NY FACE program. The evaluation will help us to improve this program and make it more useful to workers.

New York FACE Program
New York State Department of Health
Flanigan Square, Rm. 230
547 River St.
Troy, NY 12180



STATE OF NEW YORK DEPARTMENT OF HEALTH

Flanigan Square, 547 River Street, Troy, New York 12180-2216

Antonia C. Novello, M.D., M.P.H., Dr.P.H.
Commissioner

Dennis P. Whalen
Executive Deputy Commissioner

The New York State Fatality Assessment and Control Evaluation (NY FACE) program would like to know if the NY FACE Tailgate Training program was helpful to you. Please answer the questions below and return the survey to your training instructor. Your input and opinions will help strengthen our program and allow us to provide better information to you and others in the future. If you have any questions, or would like to report a work-related fatality, please call Ms. Jennifer Hallisey, the program coordinator, toll-free at 1-866-807-2130.

Please help us improve our efforts to prevent worker fatalities by answering the following questions about our NY FACE Tailgate Training program.

1. How would you rate the NY FACE Tailgate Training program?

Excellent Good Fair Poor

2. How would you rate the amount of information in the course?

Too Much About Enough Not Enough

3. Did you learn anything new or useful during the Tailgate Training?

Yes No

4. What did you like most about the Tailgate Training?

OVER

5. What did you like least about the Tailgate Training?

6. How likely are you to change some of your work behaviors based upon what you learned during the Tailgate Training?

Very Likely Somewhat Likely Somewhat Unlikely Unlikely

7. Would you be interested in other safety trainings like this one related to your job?

Yes No

If yes, do you have any suggested topics?

8. Had you ever heard of the NY FACE program before attending this training?

Yes No

If yes, where did you hear about it?

Thank you for your time. If you are interested in other NY FACE reports, please visit our web site at: www.nyhealth.gov/nysdoh/face/face.htm



STATE OF NEW YORK DEPARTMENT OF HEALTH

FATALITY ASSESSMENT AND CONTROL EVALUATION

Truck Driver Run Over by Trash Compactor at Municipal Landfill Case Report: 02NY007

SUMMARY

On February 20, 2002, a 35 year-old male truck driver (the victim) sustained fatal injuries as a result of being run over by a mobile landfill compactor at a local municipal landfill. The victim, a truck driver for a municipal solid waste (MSW) trucking company, was delivering a load of refuse to the landfill at approximately 2:00 p.m. He pulled his semi-truck up to a working face, where landfill employees were operating two landfill compactors and a bulldozer, and started unloading. At approximately 2:20 p.m., one of the landfill compactors backed up along the driver's side of the victim's truck to get sand from a sand pile. The back up alarm on the compactor was working properly and the operator stated that he looked through both the rear and side mirrors before he began backing up but did not see the victim in his path. When the compactor curved away from the victim's truck, the other compactor operator saw the victim lying on the ground next to his semi-truck waving his hands for help. It appeared that the victim had been struck by the compactor as he was putting a broom into his truck following unloading. The victim suffered massive crushing wounds to his left torso (pelvic area) and left leg. Paramedics were summoned immediately and responded within minutes. The victim was treated at the scene before being transported by helicopter to a hospital trauma center where he died six days later.

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

- *Develop a traffic control plan that can be used to coordinate the movements of personnel on foot, landfill mobile equipment and delivery trucks;*
- *Enforce a policy that requires delivery drivers to remain in the truck cab during unloading;*
- *Consider using additional safety devices on landfill equipment to warn drivers when someone is in their blind spot;*
- *Develop and enforce a policy that requires all landfill employees, delivery drivers and visitors to wear high visibility safety vests while they are on landfill property;*

Additionally, MSW trucking companies should:

- *Design, develop, and implement a comprehensive health and safety program and train all employees in the program.*

INTRODUCTION

On February 20, 2002, at approximately 2:00 p.m., a 35 year-old male truck driver (the victim), who was employed by a municipal solid waste (MSW) trucking company, sustained fatal injuries as a result of being run over by a mobile landfill compactor at a municipal landfill. New York FACE (NY FACE) investigators learned of the incident on February 27, 2002 from an area office of the Occupational Safety and Health Administration (OSHA). On March 5, 2002, NY FACE investigators traveled to the incident site, where they examined the landfill compactor that was involved in the incident, observed the landfill daily operation, and reviewed the company's written safety programs. During their site visit, NY FACE investigators interviewed the landfill's environmental engineer, who was in charge of the company's safety and health programs as well as the superintendent of daily operation. The landfill compactor operator who was involved in the accident and another compactor operator who was present at the time of the incident were also interviewed. The owner of the MSW trucking company that employed the victim and one of the company's drivers were interviewed several days later. NY FACE staff also reviewed reports from the state police homicide investigator who investigated the incident.

The landfill where the incident occurred had been in business for more than 40 years. It had an average annual employment of 90 and received up to 8,000 tons of waste daily, equivalent to 300 truckloads. The landfill had employed an environmental engineer to be in charge of the company's safety and health programs. A management safety committee held monthly committee meetings. The landfill had developed written policies for delivering waste and task-specific safe work procedures for the landfill covering operation. Crew safety meetings were held weekly. All landfill employees were required to wear steel-toed safety shoes while working at the landfill. Only some of the landfill employees were required to wear high visibility orange vests.

The MSW trucking company that employed the victim was located approximately 180 miles east of the landfill. The trucking company had 35 semi-trucks and employed 40 workers and 35 sub-contractors delivering waste from local transfer stations to landfills (Photo 1). This was the first fatality the trucking company had since beginning business 15 years ago. The decedent was a licensed commercial truck driver and had been employed by this trucking company for five years. At the time of the FACE investigation, the trucking company did not have a full time safety person, nor had it developed a comprehensive health and safety program. The trucking company provided the drivers with high visibility orange vests, but did not require them to be worn.

INVESTIGATION

On the day of the incident, it was cloudy, with the temperature around 50 degrees F. The victim was wearing an earth-tone Carhart suit; he was not wearing a high visibility orange vest. According to the trucking company, the victim delivered his load to the landfill at about 2:00 p.m. He was directed by one of the compactor operators to pull up to a working face where the refuse would be unloaded. Before he reached the discharging point, the victim stopped the truck, got out of the cab and walked to the rear of the trailer to open and secure the trailer door. At the discharge point, the victim parked his truck, facing north, four feet away and parallel to the west (left) of another semi-truck that was unloading at the same time. Two landfill compactors (LP1 and LP2) and a bulldozer,

which were operated by landfill employees, were spreading, crushing, and compacting the waste (mixed with sand) at the same working face.



Photo 1. MSW delivery trucks in the municipal landfill

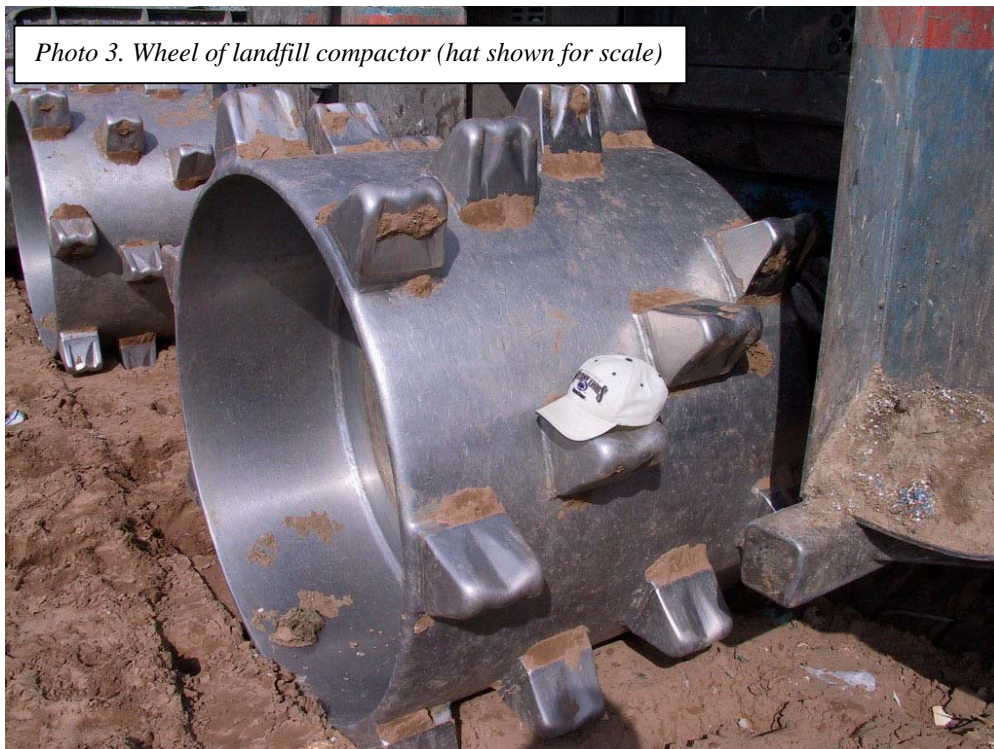
Each landfill compactor used at the time of the incident was about 30 feet long and 15 feet wide and weighed about 100,000 lbs. (Photo 2). It was an articulated vehicle with a front plow to push and spread the waste and sand, and with two sets of double metal wheels to crush and compact the waste. Each metal wheel was six feet in diameter and had 28 evenly staggered triangular metal cleats that were eight inches in height (Photo 3). The compactor moved at a speed of five to six miles per hour. The vehicle had an audible backup alarm, a rearview mirror in the cab and four side mirrors, two on each side.



Photo 2. A landfill compactor.

Because of the length and height of the vehicle, the operator's blind spot extended from the rear of the vehicle up to 35 feet behind; the operator could not see a person unless he or she stood further than 35 feet away from the rear of the compactor.

At the time of the incident, the landfill did not have a specific written procedure to coordinate the work of the landfill equipment operators with that of the delivery drivers who often walked in the operator's blind spot at a working face.



At the working face, as soon as the truck was in the unloading position, the decedent started the hydraulic pump for the walking floor system to begin unloading. Both semi-trucks were left idling while unloading. Meanwhile, both landfill compactors were at the rear (south) of the semi-trucks, pushing and spreading the waste. The victim remained inside the cab until the trailer was half-unloaded. He then got out of the cab to get a broom that was stored on the platform behind the cab and climbed into the trailer through a ladder located in-between the cab and the trailer to sweep and clean the trailer.

Just prior to the incident, LP1 moved to the left (southwest) side of the victim's truck and LP2 remained at the rear (south) of the two trucks (see Figure 1). At approximately 2:20 p.m. the trailer was completely unloaded and swept. The LP2 operator stated that he saw the driver jump off the rear of the trailer and walk along the west side of the trailer toward the cab carrying his broom. At the same time, LP1 was backing up next to the victim's truck to get sand from a sand pile located at the left (west) side of the trucks. According to the landfill company representative, the back up alarm of LP1 was working properly at the time of the incident. The LP1 operator stated that he looked through both the back and side mirrors before backing up, and did not see the victim in his path. When LP1 curved to the left (west), away from the side of the victim's truck, to approach the

sand pile, the LP2 operator, whose view of the victim was temporarily blocked by LP1, saw the victim lying on the ground next to his semi-truck, waving his hands. The LP2 operator radioed the LP1 operator to check on the victim. The LP1 operator stopped the compactor immediately and ran over to the victim, who was lying on his back approximately five feet from the driver's side of the truck next to the platform behind the cab, with his broom lying next to him. The victim had massive crushing wounds on his left torso (pelvic area) and left leg. It appeared that at the time of the incident, the victim was walking to the front of the truck to put the broom back when he was struck by the LP1 compactor as it was backing up. The LP1 operator immediately radioed the landfill superintendent for daily operations and summoned the local emergency rescue crew, who arrived within minutes. The victim was transported by helicopter to a hospital trauma center 50 miles away, where he died six days later as a result of the injuries.

CAUSE OF DEATH

The cause of death was listed on the death certificate as injuries with complications.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Landfill employers should develop a landfill traffic control plan that can be used to coordinate the movements of personnel on foot, landfill mobile equipment and delivery trucks on a working face or on any other landfill operations that involve multiple mobile equipment.

Discussion: The traffic control plan should include management, safety, hazard assessment and control elements, and schematic diagrams that depict the movement of landfill workers, delivery truck drivers, and all other vehicles and mobile equipment on a working face. The following elements may be included in the plan:

- Chain of command;
- Description of working face equipment and personnel;
- A designated working face coordinator;
- Description of the role and authority of the coordinator;
- A communication plan that includes:
 1. A plan for orienting delivery truck drivers to a working face and the traffic control plan;
 2. Methods to communicate changes in the traffic control plan;
 3. A means for personnel on foot, landfill equipment operators, delivery drivers and the working face coordinator to communicate with each other

Recommendation #2: Landfill employers should develop and enforce a policy that requires delivery drivers to remain in the truck cab during unloading.

Discussion: Landfill compactors are often operated in close proximity to the delivery trucks at a working face during unloading. The space between a moving landfill compactor and an unloading truck can be as close as five feet. Given that the operator's blind spot extends to 35 feet behind the compactor, a driver is at great risk of being run over if he exits his truck. Therefore, he should

remain inside the cab during unloading. In order to eliminate or reduce the hazard, the unloading procedure should be modified and the following steps should be considered:

- A driver should open and secure the trailer door prior to entering the discharging point at a working face;
- While at the discharge point, drivers should remain inside the cab of the truck while unloading. As soon as unloading is completed, the truck should be pulled away from the working face to a designated sweeping area that is well away from the working face and other mobile equipment.

Recommendation #3: Landfill employers should consider using additional safety devices for landfill equipment, to warn drivers when someone is in their blind spot.

Discussion: A variety of devices are available for use on vehicles to identify and alert operators to the presence of objects or individuals in the blind spots behind a vehicle:

- Readily available devices include video cameras that can be mounted on the vehicle to monitor blind spots on the front, rear and side of the vehicle. A video monitor in the cab provides the equipment views.
- Other types of devices may also be available including electromagnetic signal detection, infrared detection, and ultrasonic systems.

Recommendation #4: Landfill employers should develop and enforce a policy that requires all landfill employees, delivery drivers and visitors to wear high visibility safety vests while they are on landfill property.

Discussion: Landfills should require that all landfill employees, delivery drivers and visitors wear high visibility safety vests while they are on landfill property. The delivery companies should require their drivers to wear the vests during delivery. The high visibility safety vests are much easier to spot than brown, navy or black uniforms in the earth-tone background of a landfill.

Recommendation #5: MSW trucking companies should design, develop, and implement a comprehensive health and safety program.

Discussion: MSW trucking company employers should develop, implement and enforce a comprehensive health and safety program. The program should begin with an analysis of hazards associated with all specific tasks that employees are required to perform and the implementation of controls for those hazards. Employers should ensure that all drivers are trained to recognize and avoid hazardous work conditions and environments in a landfill. Truck drivers should be instructed by their employers to be sure that they have a clear understanding of who is authorized to direct traffic on a working face at the landfill. Drivers should also be instructed to strictly follow the standard unloading procedure at the landfill. This procedure should reinforce the requirement that drivers remain in the truck cab during unloading.

Keywords: landfill, trucking, machinery, traffic

REFERENCES

1. NIOSH [1997]. NIOSH Alert: preventing worker injuries and deaths from moving refuse collection vehicles. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No.97-110
2. Wisconsin FACE Program Report No. 00WI074
<http://www.cdc.gov/niosh/face/stateface/wi/00WI074.html>

The Fatality Assessment and Control Evaluation (FACE) program is one of many workplace health and safety programs administered by the New York State Department of Health (NYS DOH). In cooperation with NIOSH, the NYS DOH FACE program collects information on all occupational fatalities throughout New York State (excluding New York City), evaluates specific types of fatalities, and develops recommendations for prevention of future injuries. These recommendations are distributed to employers, workers, and other organizations interested in promoting workplace safety.

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

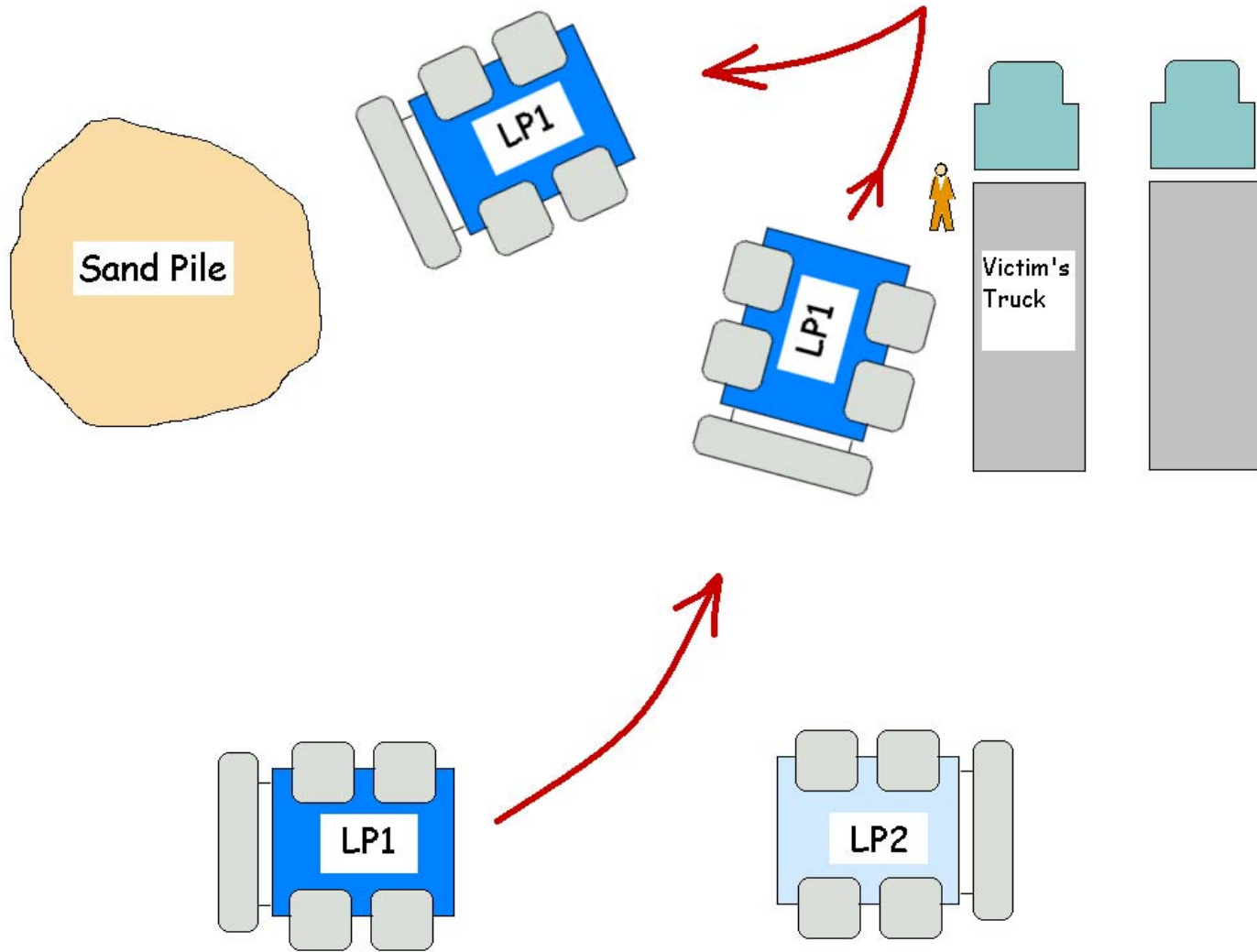


Figure 1 - Illustration of Accident



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.

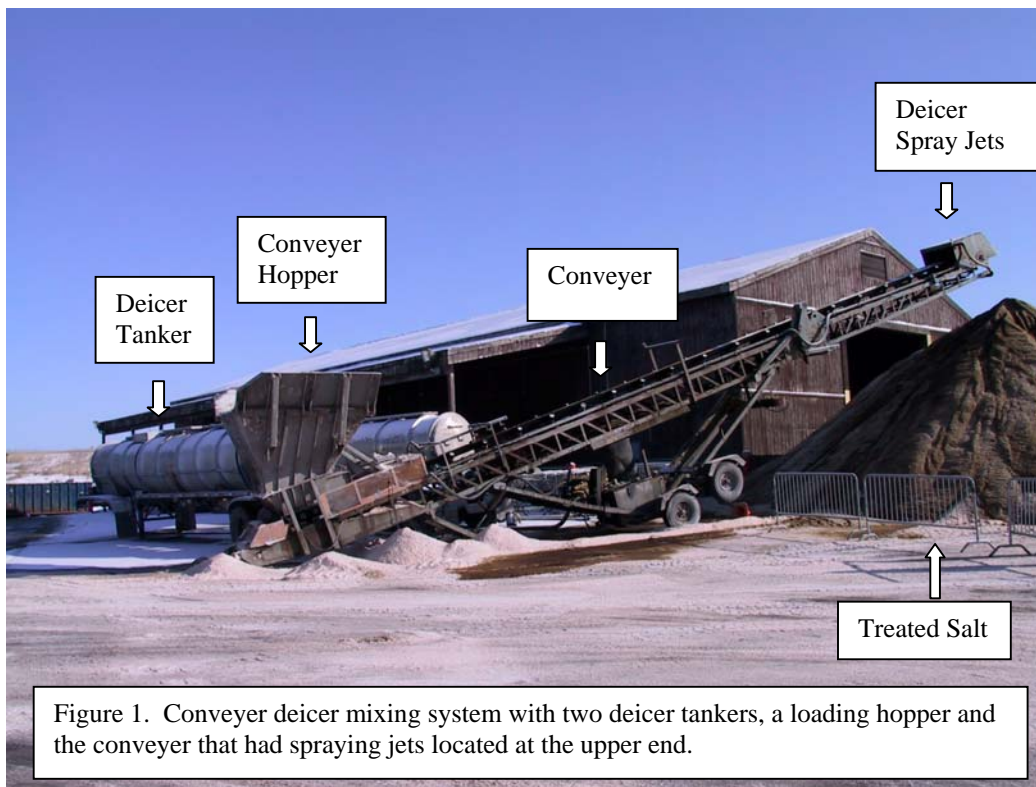
The city DGS where the incident occurred had approximately 100 employees and was in charge of maintaining the city streets. The equipment used for street maintenance included graders, dump trucks, backhoes, and front-end loaders. At the time of the incident, the DGS did not have a

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.

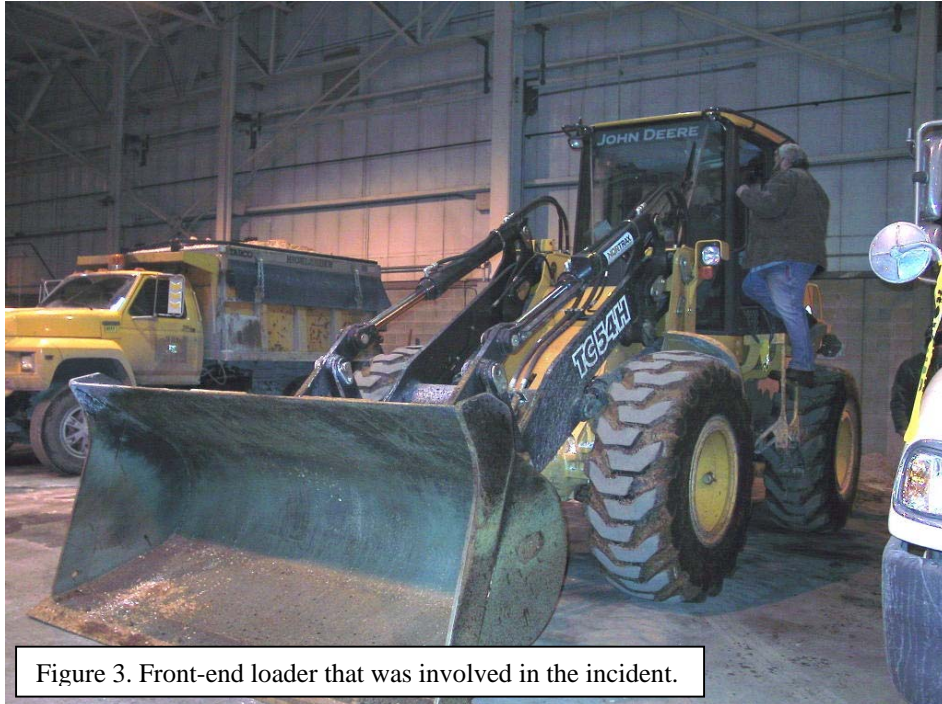


Figure 3. Front-end loader that was involved in the incident.

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

