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NIOSH > Workplace Safety and Health Topics
> Fatality Assessment and Control Evaluation(FACE) Program > State FACE Reports

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Massachusetts Plant Operator Dies in Fall at a Petroleum Marketing Terminal

MASSACHUSETTS FACE 94-MA-07

SUMMARY

On December 13, 1993, a 37 year old, male plant operator was fatally injured at a Massachusetts oil supply terminal when he fell nine feet from the top of a home heating fuel truck. The victim and the fuel truck driver had climbed on top of the truck to purge air from a load arm assembly line prior to filling the truck with fuel. The plant operator inserted the loading tube in the opening at the top of the truck and pushed it in until it reached the bottom of the tank. When he pressed the loading tube handle to activate the fuel line, a jet of compressed air blew the pipe out of the truck and knocked the victim onto the asphalt ground below. Seconds later, the terminal supervisor found the victim unconscious and bleeding profusely from the head and face. The supervisor immediately summoned emergency medical assistance and the victim was transported to a hospital, where he died five days later from craniocerebral injuries due to blunt trauma.

The MA FACE Program concluded that to prevent similar occurrences in the future, employers should:

- **explore the feasibility of devising a system to stabilize the load arm tube when purging air from supply lines;**
- **install mechanical devices (safeguards) in the load arm assemblies to allow for a slower or more diffuse release of built up pressure;**
- **always use the on site purging tank with the built in man lift and guard rail when evacuating air from supply lines;**

Furthermore, fuel truck manufacturers should:

- **consider making all fuel trucks with bottom loading charge points.**

INTRODUCTION

The employer was an oil marketing terminal which had been in business for 20 years. The parent company of the marketing terminal is an international oil company. The company employed 75 workers at the incident site, 16 of whom were plant operators.

The company had a written, comprehensive safety and health program, and employed designated safety personnel, including a full time safety trainer. Respiratory protection, hazardous waste and spill control, fire training, hazard communication, and blood borne pathogen safety precautions were included in the safety training program. Although the company had written safety rules, there were no safety procedures for the task of purging air from the load arm assembly. The company had a joint management and labor safety committee which met regularly.

The victim was a 37 year old Salvadoran immigrant and a union employee who had worked for the company for 7 years. He had received extensive safety training from the company.

INVESTIGATION

The marketing terminal had the following configuration for distributing oil. Petroleum storage tanks were connected via supply lines to twelve loading areas, or bays. Fuel trucks were driven into the bays where their tanks were filled. Each bay had a load arm assembly, terminating in a loading tube, which the driver inserted into the truck's charge port.

In early December new pipeline leading from the storage tanks to the load area at the oil supply terminal had been installed to replace old pipeline. The newly installed pipeline supplied oil to load arm assemblies nine through twelve at the terminal.

Before fuel loading could resume at bays nine through twelve, it was necessary to first evacuate the air from the newly installed pipeline. On the day of the incident the terminal plant operators were charged with this task. The routine procedure for evacuating air from new or repaired supply line involved bleeding the load arm assembly furthest away from the supply line first. This procedure allowed for the majority of the air to be bled on the first purging, and it minimized the potential for air build up in the last line to be purged. To perform the task, employees normally used a special top load, purging tank with a built in man lift and a guard rail.

Using the purge tank, the terminal plant operators purged lines twelve through ten without any mishaps. When it came to purge line nine, however, the purging tank was no longer available. The employees therefore asked the driver of the home oil truck, who had just pulled into bay nine for loading, if they could use his truck to purge the load arm assembly.

The victim climbed on top of the truck with the driver and prepared the load arm assembly for purging. He was wearing a hard hat and safety shoes. The victim inserted the loading tube in the opening at the top of the truck until it touched the bottom of the tank. The terminal supervisor on the ground below opened the butterfly valve to begin the flow of fuel from the supply line to the loading arm. When the victim pressed the loading tube handle to activate the fuel line, a jet of compressed air blew the pipe out of the truck and jolted the victim, who fell nine feet to the asphalt covered ground. The terminal supervisor found the victim seconds later unconscious and bleeding profusely from the head and face. The supervisor immediately summoned emergency medical assistance, and the victim was transported to a hospital, where he died five days later from a severe head injury.

Employees who witnessed the event claimed that, although the loading tube usually jostles during routine air purging from a load arm assembly, never before had anyone witnessed the extreme force of air which was emitted from load arm assembly number nine on the day of the incident. The FACE Project later learned, however, that a similar incident had

occurred at 10:00 PM on December 12, the previous evening. In that incident, a company tanker truck driver had been knocked down on his back, on the top of a fuel truck, by the loading arm tube. The driver was taken to the hospital for treatment of his injuries, and an accident report had been written and circulated.

Immediately after the fatal injury, the company hired an engineering consulting firm to investigate the cause of the air build up in load arm assembly number nine.

CAUSE OF DEATH

The Medical Examiner reported cause of death as craniocerebral injuries due to blunt trauma.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should explore the feasibility of devising a system to stabilize the load arm tube when purging air from supply lines.

Even under normal air purging and fuel charging situations, the load arm tube jiggles in the fuel loading orifice. To eliminate this movement, and minimize the risk of an employee being knocked off the top of a fuel truck during air purging or fuel charging, employers should explore mechanisms for fastening the loading tube to the fuel truck. Bolting the loading arm to the charge point is one possibility; however, if different makes and sizes of fuel trucks have different fuel loading orifices, development of a universal bolting system may not be feasible. As an alternative mechanism, a lock could be placed on the hinge of the loading tube; by locking the actual loading tube, the arm would be stabilized without having to fasten it to the fuel truck. Another possible means for tying down the tube might be to use the grounding system as a physical restraint system. The grounding cables could be made strong enough to hold the loading tube, or they could be linked to cables specifically designed to hold the tube. An advantage to this approach would be linking the fastening of the loading arm to a safety procedure already in place.

Recommendation #2 Employers should install mechanical devices in the load arm assemblies to allow for a slower or more diffuse release of built up pressure.

Another means for stabilizing the loading tube during purging or fuel loading would be to install mechanisms in the load arm assembly that would allow for a slower or more diffuse release of built up pressure. This action would minimize the risk of an employee being knocked off the top of a fuel truck during air purging or fuel charging. To obtain a slower release of built up pressure, employers should install bleed switches in each load arm assembly, and to allow for a more diffuse release of pressure, employers should use only load arm tubes with side vents in the spout. Had these safeguards been in place at the time of the incident, the victim may not have been knocked off the top of the truck by the highly pressurized loading tube.

Recommendation #3: Employers should ensure that the purging tank with the built in man lift and guard rail are always used when evacuating air from supply lines.

Although the purging tank requires the plant operator to be at an elevated height when evacuating air from a load arm assembly line, the purging tank has a guardrail to protect employees from the fall hazard. Had the purging tank been used instead of the home heating fuel truck, the guardrail may have prevented the victim from being knocked to the ground below.

Recommendation #4: Fuel truck manufacturerers should consider making all fuel trucks with bottom loading charge ports.

Larger fuel tank trucks, such as those which supply industry or oil retail facilities, have bottom loading fuel charge ports. To prevent future falls from the smaller home oil fuel tank trucks, manufacturerers should consider equipping all fuel trucks with bottom load charge ports.

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Back to Massachusetts FACE reports (http://wwwn.cdc.gov/NIOSH-FACE/Default.cshtml?Category=0000&Category2=ALL&State=MA&Submit=Submit)

Back to NIOSH FACE Web

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