The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research NIOSH

Trash Collector Dies After Being Caught In Compactor of Refuse Vehicle–North Carolina

FACE 9603

SUMMARY

A 47-year-old male refuse collector (the victim) was in the process of cleaning behind the compactor plate (platen) of a refuse collection truck when the platen suddenly and unexpectedly retracted, fatally crushing him. While a co-worker was returning a trash container on the curb side of the truck, the victim advanced the platen into the compactor body and then without shutting down the engine, entered the loading hopper behind the compactor platen. The victim inadvertently tripped the platen return switch and the platen suddenly retracted, crushing him between the rear edge of the pinch point cover and the front of the hopper opening. The co-worker turned toward the truck and saw that the victim had been pinned. He immediately activated the platen stop switch, and notified the owner by radio to contact 911. A local emergency medical service (EMS) responded within 10 to 15 minutes; however, the victim was pronounced dead at the scene.

NIOSH investigators concluded that, to prevent similar occurrences, employers should:

- **ensure that employees follow appropriate hazardous energy control procedures including lockout/tagout by conducting frequent observation of work habits**
- **ensure that workers are familiar with all operating features and characteristics of the equipment being used.**

In addition, manufacturers and designers of automatically operated equipment should:

- **consider including redundant safety features to protect against injury due to inadvertent activation of automatic controls**
- **ensure that equipment is operating correctly when delivered and that all operating and safety features are explained and demonstrated to the customer.**

INTRODUCTION

On November 3, 1995, a 47-year-old trash collector (the victim) was crushed by the platen of the hydraulically operated compactor of a refuse truck. On November 13, 1995, officials of the North Carolina Occupational Safety and Health Administration (NCOSHA) notified the Division of Safety Research (DSR) about the fatality and requested technical assistance. On December 12, 1995, a DSR safety engineer reviewed the NCOSHA case file with the compliance officer assigned to the case and interviewed the employer. Measurements and photographs of the refuse truck were taken and a demonstration of the operation of the equipment was observed.

The employer in this incident was a small refuse collection business of ten employees which had been in business for 15 years. The business owns and operates 14 refuse collection and compaction vehicles of various type and manufacture. Overall safety responsibilities reside with the owner and although there is no written safety policy, safety is discussed during the daily pre-shift meetings. Newly hired employees receive a week of on-the-job indoctrination while riding with an experienced collector. Collectors normally work alone, driving and operating the compactor and retrieving trash containers. This was the employer's first fatality.

Investigation

Trash collectors normally begin the daily routes at 4:30 a.m., ending the shift about noon, depending on the volume of refuse collected. Refuse is gathered from curb-side pickups of trash cans and loaded at the side of the truck into the hopper opening of the truck's compactor body (see Figure).

On November 3, 1995, the victim and a co-worker began the daily collection route at their normal start time. Although the routes are normally run by only one worker, the co-worker was riding the route with the victim so that he could learn it in preparation for relieving the victim the following week. The victim was driving the vehicle while the co-worker was working the curb side of the vehicle. Shortly before 7:30 a.m., after completing about two hundred pick-ups, the victim told the co-worker that it would soon be necessary to advance the compactor platen beyond the normal automatic stroke to obtain increased load compaction. Several stops later, at about 7:39 a.m., as the co-worker was returning a trash container to the curbside, the victim, located on the street side of the vehicle, activated the switch to advance the platen into the compactor body. Without shutting down the engine, he entered the hopper behind the pinch point cover, assumedly to remove spillage which routinely accumulated in behind the platen. While inside the hopper, he inadvertently activated the platen return switch and the platen suddenly retracted, pinning the victim. As this was occurring, the co-worker heard the engine suddenly speed up, turned toward the truck, and saw that the victim was pinned. He immediately shut down the platen by activating the platen stop switch located at the curb-side control station, and contacted the owner via radio. The owner notified a local EMS who responded within 10 to 15 minutes. Due to the nature of injury, no life-saving attempts were made and the victim was pronounced dead at the scene.

The refuse collection truck involved in the incident was a side-loading mobile refuse compactor, equipped with a compactor platen powered by two hydraulic cylinders. The platen can be operated from control stations located on either side of the truck. When activated, the platen advances across a 48-inch by 50-inch by 32-inch deep loading hopper, packing refuse into the compactor body at the rear of the truck (see Figure). There are two modes of platen operation, automatic and manual, determined by the position of a selector switch, located at the street-side control station.

In automatic mode, used during route pick-ups, the platen is operated by pushing the platen start switch. The platen automatically advances through the hopper opening, packing refuse into the compactor body until the platen return switch is tripped, automatically retracting the platen.

In manual mode, used during load ejection at the landfill, the platen is operated by pushing the platen lever located at either control station. Holding the lever to the right advances the platen, while holding the lever to the left retracts the platen.

As the compactor body becomes full, automatic operation does not advance the platen far enough into the body to completely fill the truck, and it is necessary to override the automatic cycle. Override is accomplished by pressing the platen start switch while holding the platen lever to the right until the desired amount of compaction is attained. The victim used this override feature to advance the platen inside the compactor body and entered the hopper behind the platen.

Cause of Death

The cause of death was crushing injuries.

Recommendations/Discussion

Recommendation #1: Employers should ensure that employees follow appropriate hazardous energy control procedures including lockout/tagout by conducting frequent observation of work habits.

Discussion: Frequent observation of work habits conducted by a management representative while the employees are on the collection route can ensure that proper procedures are followed. In this case, the manufacturer had affixed warning signs on the side of the truck near the compactor controls, prohibiting entry while the engine was running, because sudden and unexpected retraction of the platen could occur. The employer had an unwritten lockout/tagout procedure requiring that the engine be shut down prior to anyone entering the area behind the compactor platen, and was unaware that employees were entering this area while the engine was running. A management observer could accompany collectors on the route at periodic intervals to observe work habits and conditions. Unsafe procedures could be identified and corrected and safe work procedures could be reviewed while on the job.

Recommendation #2: Employers should ensure that workers are familiar with all operating features and characteristics of the equipment being used.

Discussion: The employer owns and operates one other compactor identical to that involved in the incident. This compactor was purchased in June of 1995, while the compactor involved in the incident was purchased in August of 1995. At the time of the incident, the employer also had an older model compactor in service, which was similar in design and operation, and which had been successfully operated for a number of years. The new compactors had been purchased because of the similarity to the older model. The employer and employees were very familiar with the older model, and they assumed that the newer models were the same. However, this was not the case, since the platen return switch on the new models was mounted nearer to the hopper than on previous models. The platen return switch, when tripped by a stud mounted on the street-side hydraulic cylinder, triggers the automatic retraction of the platen. When the victim overrode the automatic cycle, extending and stopping the platen inside the compactor body, this switch was exposed. Although no one actually observed the occurrence, two shirts were found entangled on the switch after the incident. The victim may have attempted to remove the shirts and in the process of doing so, tripped the platen return switch. Once activated, the platen retracts quickly and the victim was not able to clear himself from the area to avoid being pinned.

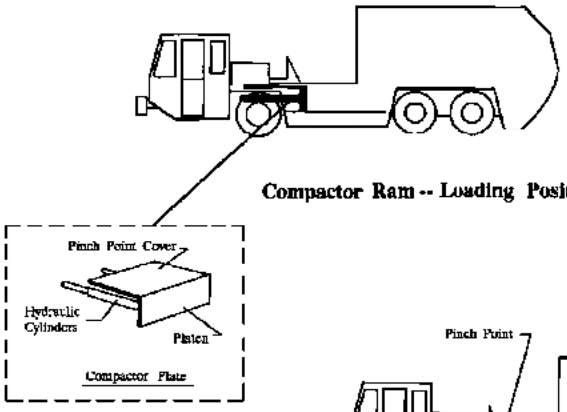
Recommendation #3: Manufacturers and designers of automatically operated equipment should consider including redundant safety features to protect against injury from inadvertent activation of automatic controls.

Discussion: The vehicle involved in the incident was equipped with a system to automatically retract the compactor platen at the end of its stroke during operation in the automatic mode. When operated automatically, the compactor platen advances about 48 inches, then retracts. During this cycle, the pinch point behind the compactor platen is guarded by a pinch-point cover formed by the back of the compactor platen. When the platen extension is increased by overriding the automatic controls, the pinch point is exposed. To protect against injury from inadvertent activation of the return limit switch, an anti-retract (interlock) switch is located on the street side of the loading hopper above the compactor platen guide rail. After the incident, it was found that the linkage for this switch was malfunctioning and would not prevent retraction of the compactor platen. It may be possible to incorporate a second identical switch above the curb side guide rail of the compactor, arranged so that both switches must be activated before the compactor platen will retract.

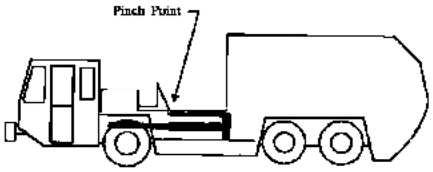
Recommendation #4: Manufacturers and distributors should ensure that equipment is operating correctly when delivered and that all operating and safety features are explained and demonstrated to the customer and users.

Discussion: As previously stated, the employer had taken delivery of a new compactor in June of 1995. This vehicle had been delivered by a distributor representative to the employer's place of business. The representative had demonstrated the truck to the workers, and accompanied the assigned operator on a test ride. Additionally, the representative had supplied the employer with a copy of an inspection checklist indicating that all safety devices had been inspected and were operating correctly. When the compactor involved in the incident was delivered, however, it was dropped off at the employer's place of business when no one was there. The employer and workers assumed that this vehicle had been inspected and was operating correctly. The vehicle involved in the incident operated essentially the same as the one delivered in June, however, it was noticed that when the manual override was activated on the vehicle purchased in June, a warning buzzer would sound. This did not occur on the vehicle purchased in August. It did not occur to either the operator or employer to question this difference because it had operated in this manner since delivery and therefore they assumed that it was correct. Also unknown to the operators or employer was the existence of the platen retract switch and of the anti-retract (interlock) switch. The anti-retract switch was found to be inoperative after the incident. It is not known how long the switch had been inoperative, however, if the truck had been demonstrated and all safety features thoroughly explained, the inoperative switch may have been detected and repaired before the incident.

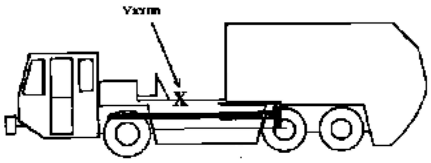
FACE 96-03 Mobile Trash Compactor



Compactor Ram -- Loading Position



Compactor Ram -- Limit of Automatic Advance



Compactor Ram -- Manual Override Pinch Point Exposed

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Yes Partly No