

F.A.C.E. INVESTIGATION REPORT

Fatality Assessment and Control Evaluation Project

FACE #95-NJ-108-01
Machine Operator Crushed in a
Recycling Center Baling Machine



New Jersey Department of Health and Senior Services
Occupational Disease and Injury Services
P.O. Box 360
Trenton, New Jersey 08625-0360
(609) 984-1863

TO: Division of Safety Research
National Institute for Occupational Safety and Health
Morgantown, West Virginia

FROM: Fatality Assessment and Control Evaluation (FACE) Project
New Jersey Department of Health (NJDOH)

SUBJECT: FACE Number 95-NJ-108-01
Machine Operator Crushed in a Recycling Center Baling Machine

DATE: May 3, 1996

SUMMARY

On November 7, 1995, a 21-year-old machine operator was killed in an industrial baling machine at a recycling center. The incident occurred as the victim and a group of laborers were compacting and baling discarded newspapers for recycling. When the machine jammed, the victim entered the machine's compacting chamber and was pulling out the excess newspaper when a co-worker accidentally activated the compactor, crushing the victim. FACE investigators concluded that, in order to prevent similar incidents in the future, these safety guidelines should be followed:

- o Employers should ensure that company lockout/tagout procedures are followed.

- o A procedure should be established that clearly describes the methods to clear jams in the baler.

- o Safety interlocks should be designed to immediately shut the machine down when activated.

- o Employers should assess each job for potential hazards and train employees in methods of dealing with them.

INTRODUCTION

On November 8, 1995, NJDOH FACE personnel learned about this work-related fatality from a newspaper article. After contacting the employer, site visits were conducted on November 9 and 10, 1995, at which time FACE investigators examined the machine and interviewed the employer and a witness. A third site visit was made on December 6, 1995, with NIOSH Division of Safety Research investigators who were doing a separate study of baler-related incidents. Additional information was gathered from the OSHA file, police report, and medical examiner's report.

The victim's employer was a county-owned recycling center that was operated by a private, nonprofit company who had been in business since 1964 and had operated this facility since 1987. The company employed a total of about 600 workers, 95 of whom worked at the recycling facility at the time of the incident. Part of the company's staff were disabled workers employed under a federal program for hiring and training the handicapped. A safety supervisor had been hired a month before the incident, however, machine safety was handled by the plant manager.

The victim was a 21-year-old machine operator who had worked for the company for one year and eight months. He had been hired as a laborer and did road collections of recyclables for three months before being promoted to a light equipment operator. He operated a forklift and skid steer loader until September 18, 1995, when he was promoted to heavy equipment operator to run the compacting machine. The victim did not have any disabilities.

INVESTIGATION

The incident occurred in a county recycling facility located in a suburban area. The large, single-story building contained the tipping floor, two baling machines, and the business offices for the company running the facility. Each day, facility workers picked up recyclable materials such as paper, glass, metal, and plastic that were left at the curb by the area residents. The materials were separated, with newspapers and plastics taken to this recycling facility while glass and metals were taken to another site. The newspapers were trucked to the facility in garbage trucks and dumped on the tipping floor, where a large front-end loader pushed the newspapers into large piles. A skid-steer loader moved

the newspapers to the conveyor belt leading to the baling machine.

The baling machine was a large, two-stage horizontal baler that was reportedly manufactured and installed in 1991. The entire machine (including the conveyor) measured about 15 feet high by 15 feet wide by 55 feet long. Newspapers were deposited on a floor level conveyor belt and transported up to the top of the machine. Laborers standing on an elevated platform on each side of the conveyor removed wastes (such as cardboard) from the newspaper and dumped the waste into small hoppers. The remaining newspapers moved off the conveyor into a large hopper that fed the baler's compactor chamber. When the 60-inch square, 30 inch deep chamber was filled, a horizontal ram compacted the material into the baling chamber. Three to six strokes were required to make a bale, as indicated by a hydraulic pressure meter at the operator's station. When complete, a second hydraulic ram perpendicular to the baling chamber pushed the bale out through a wire tying device that fastened and secured the bale. The bales were then stacked and later moved onto trucks with forklifts. A finished bale of newspaper measured about 60 by 40 by 30 inches and weighed approximately 1,400 pounds.

The baler's operating station was also located on the machine's elevated platform. This consisted of a console that controlled the conveyor, the baler's compression and ejection rams, and the wire tying device. The baler could be operated in three modes: fully automatic, in which the compression cycle was triggered when a sonic sensor indicated that the compression chamber was full; or semiautomatic, in which the compression cycle was started by the operator pressing the start button. The machine could also be operated in manual mode, in which the rams were advanced or retracted by the operator moving a lever switch. Due to problems with the sonic sensor, the machine was usually run in the semiautomatic mode. The manual mode was usually used for unclogging jams.

Safety devices on the machine included a key-operated main power switch and emergency stop button on the operator's console. Emergency stop pull cords were located along the conveyor belt, and other emergency stop buttons were positioned on the main power panel and the wire-tying device. A rear access door leading to the baler's compacting chamber was equipped with a safety interlock limiting switch.

The incident occurred on a Tuesday afternoon. Work started at the facility at 7:30 a.m., with the victim operating the baling machine through the morning without incident. After lunch, the victim switched to operating a front-end loader while a co-worker operated the baling machine. About an hour later, the victim returned to operating the machine, and the other operator joined five other laborers in picking waste from the newspapers. At this point, the compactor became overloaded with paper and jammed. The victim backed the compacting ram a few feet to make room to clear the jam and left the workstation, leaving the operator's key in the console and the machine still energized and in manual mode. He entered the compactor through the rear access panel door, climbed into the compacting chamber, and started to pull out the excess newspapers. The other machine operator and one of the laborers watched him from the platform near the operator's station. As the three men talked with each other, the laborer accidentally bumped the control knob which activated the compactor ram. The victim heard the equipment start and tried to jump out of the compactor chamber, but was caught and crushed by the moving ram.

The laborer realized that he activated the machine but did not know how to stop it. He immediately stood back, allowing the other machine operator to hit the emergency stop button. The operator then went for help and alerted the plant manager. The plant manager found the trapped victim trapped and unresponsive and attempted to do CPR. The police and rescue squad arrived quickly and supervised the removal of the victim, who had been transected by the machine. He was declared dead on arrival at the local hospital.

It was noted that the access door interlock switch apparently failed to shut down the machine. An investigation by federal OSHA and the machine manufacturer found that the interlock switch was not properly wired into the emergency stop circuit. The switch prevented the machine from operating from its starting position (i.e., when the compactor ram was retracted) but could not stop the machine if it was in mid-compression cycle. The switch has since been rewired by the machine manufacturer.

CAUSE OF DEATH

The medical examiner determined that death was caused by crushing and cutting injuries to the torso

due to a baling machine accident.

RECOMMENDATIONS/DISCUSSIONS

Recommendation #1: Employers should ensure that company lockout/tagout procedures are followed.

Discussion: The victim failed to remove the baler's main power key from the operator's station, leaving the machine energized when he entered it. This was contrary to the company's lockout/tagout procedure which required the operator to remove the key and take it with him. To prevent future incidents, employers must ensure that company procedures are followed. This may be done by carefully training and supervising the employees that operate the machines. To ensure compliance with lockout/tagout rules, it is recommended that a supervisor should be responsible for all maintenance and other activities that require locking out the machine. It should be noted that lockout/tagout is required under the federal OSHA standard 29 CFR 1910.147(c).

Recommendation #2: A procedure should be established that clearly describes the methods to clear jams in the baler.

Discussion: In this case, neither the machine manufacturer nor the recycling company had written procedure for clearing jams in the baler. The FACE project recommends that a specific procedure is written outlining the procedure and safety precautions necessary to safely unjam the machine. The policy should include, but not be limited to, lockout/tagout procedures.

Recommendation #3: Safety interlocks should be designed to immediately shut the machine down when activated.

Discussion: The interlock on the access panel door to the baling chamber failed to stop the machine from operating. FACE recommends that all interlock switches should be wired into the emergency

stop circuit, which would stop the machine immediately when activated. Door interlocks are recommended by the American National Standard Institute standard ANSI Z245.5-1990 *Baling Equipment Safety Requirements*.

Recommendation #4: Employers should assess each job for potential hazards and train employees in methods of dealing with them.

Discussion: A walk-through of the facility noted a number of potential safety hazards in the plant, including (but not limited to) industrial trucks moving outside marked areas, trucks without backup alarms, and front-end loaders operating within striking distance of the gas heating units on the ceiling. FACE investigators recommend that the facility conduct a job hazard analysis of the various jobs and machines in the plant. The analysis, which identifies the potential hazards of each job, should be conducted by a safety professional knowledgeable about the company's processes, operations, and equipment. Plant management and employees should also participate in the evaluation. The evaluation should include an assessment of the safety features on all machines (including the skid steer and front-end loaders) and an operational test of all safety devices. Each employee should then receive safety training (as appropriate to their level of skills) both verbally and in writing. More information is included in the attached OSHA publication, *Job Hazard Analysis*.

REFERENCES

29 CFR 1910.147. Code of Federal Regulations. U.S. Government Printing Office, Office of the Federal Register, Washington, D.C.

ANSI Z245.5-1990 *Baling Equipment Safety Requirements*; American National Standard Institute, New York, NY.

Job Hazard Analysis, U.S. Department of Labor, Occupational Safety and Health Administration, 1988.

DISTRIBUTION LIST

Immediate Distribution

NIOSH

Employer

NJ State Medical Examiner

County Medical Examiner

Local Health Officer

NJDOH Census of Fatal Occupational Injuries (CFOI) Project

General Distribution

USDOL-OSHA Region II Office

USDOL-OSHA New Jersey Area Offices (4)

NJDOL OSHA Consultative Service

NJDOL Public Employees OSHA

NJDOH Public Employees OSHA

NJ State Safety Council

NJ Institute of Technology

NJ Shade Tree Federation

NJ Utilities Association

University of Medicine & Dentistry of NJ

Jersey Central Power & Light

Public Service Electric and Gas Company

Atlantic Electric

Liberty Mutual Insurance Company Research Center

Private Consultants and Companies (3)