

# F.A.C.E. INVESTIGATION REPORT

## Fatality Assessment and Control Evaluation Project

FACE #94-NJ-150-01  
Laundry Worker Killed When Struck by  
Ejected Ring of a Commercial Laundry Extractor



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

**SUBJECT:** FACE 94 NJ 150-01  
Laundry Worker Killed When Struck by Ejected Ring of a Commercial  
Laundry Extractor

**DATE:** July 17, 1995

## SUMMARY

On December 13, 1994, a 40 year-old male laborer died when he was struck by the ejected ring of a commercial laundry centrifugal extractor as he waited for the machine to finish spinning.

NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, the following safety guidelines should be followed:

- o Institute a regularly scheduled machine maintenance program;
- o Replace machines when essential parts are no longer available.

## INTRODUCTION

On December 14, 1994, NJDOH FACE personnel learned about this work-related fatality from a newspaper article. A site visit was conducted on January 11, 1995. Information for this report was derived from the OSHA file, medical examiner's report, police report and interview of the victim's employer and one co-worker. FACE staff were accompanied by a graduate safety engineering student.

The victim's employer was a unionized commercial laundry that had been in business for more than 40 years and employed 100 people at the time of the incident, 75 of whom worked at the site. The facility runs a day and an evening shift. The victim, a 40 year-old laundry worker, was employed for ten years by the company and was a member of the union. He was bilingual and served as an unofficial representative of other workers who spoke limited English.

## INVESTIGATION

The incident site was the building in which the laundry was processed. The company launders linen supplies for area food establishments. The company purchased the building eleven years prior to the incident and moved the business there from another part of the state. The laundry is designed so there is a smooth flow to the process of receiving, sorting, washing, drying, ironing, folding and packing the linens. The company also provides pick up and delivery service to their customers.

Linens are brought into the laundry in bags. Workers on the 4 p.m. to midnight shift empty the bags, sort the laundry by hand according to colors of the linens, and store them in plastic bins.

The day shift loads the sorted soiled linens into large commercial washing machines with a capacity of approximately 300 pounds. Soap, bleach and other additives are fed automatically into the machines during the wash cycle. Processes differed, depending upon the age of the washing machines. The newer machines are washers/extractors and complete the entire cycle of washing, rinsing, and spinning. The lid of the washer automatically locks when the cycle begins. When the cycle is completed, the washer tips to dump the clean load into a hopper. Towels and heavier linens are transported to the dryers. Lighter linens are transported directly to the ironers. The linens dry during the ironing process and are folded, ready for delivery to the customer.

Older washing machines only washed and rinsed the load; water drained out of the machine but fabrics remained soaking wet. The load was removed from the washer and transferred to centrifugal extractors (see figures) for removal of excess water. The extractor was loaded, usually with two sacks of linens, the top shut, and the timer set. When the extractor finished, the sacks of linens were attached to hooks and lifted by overhead hoists. While supported by the hoists, the bottom of the fabric sacks were opened and the contents emptied into laundry carts. The process of moving the load to the dryer or the ironers was the same. The work area was noisy due to the number of machines in operation.

The extractor was a large industrial machine (see graphic) roughly similar in appearance to a common top-loading washing machine. Laundry was loaded from the top into a 5 foot diameter, 2 1/2 feet deep cylindrical drum. At the top edge of the drum was a steel ring that was spot welded to the drum about every 12 inches. Adjacent to this ring was a larger stationary steel ring bolted to the body of the machine. The top of the extractor was covered with a hinged steel lid that was hydraulically lowered over the drum before the machine was started. A timer started an electric motor that spun the drum at a maximum of 750 revolutions per minute (RPM) to centrifugally extract the water from the laundry. Setting the timer also locked the machine. The front of the extractor was mounted on two large steel posts. Each post was equipped with a shock absorber to absorb vibration from the machine. According to the employer, the machines were supposed to shut off if they were off balance.

On the day of the incident, work started at 7 a.m.. Throughout the day, there reportedly were no problems. Around 3:25 p.m. the victim had put a half-load (one bag of laundry instead of two) of wet linens in the extractor and turned the machine on. He stood at the machine, waiting for the last load of the day to finish its 5 minute cycle (plus 2 minutes braking time) when suddenly, the machine flew apart. The hinge at the lid snapped off and the lid of the machine and a steel ring flew off. The lid broke a pipe, hit the cinder block wall and gouged it, ricocheted off, and landed in front of the machine, remaining in one piece. The outer steel metal ring split and at least two welds on the inner ring broke loose. A piece of airborne metal, probably the steel ring, struck the victim, transecting and killing him instantly. One worker standing about 30 feet away reported hearing a loud bang, possibly the sound of the cover hitting the ground. After the incident, the machine was still spinning and the shop steward turned the machine off by turning the timer off. A second extractor, about four feet away, was damaged from the impact with flying machine parts. Debris was found 50 yards away in the plant.

It is not known why the machine came apart. The laundry extractor involved in the incident was manufactured in 1958 and purchased used in 1985. (Although this machine had no nameplate, a similar extractor purchased at the same time bore a nameplate which identified manufacturing information.) The manufacturer stopped producing this extractor in the 1970's and parts have not been available for about 20 years. One of the two shock absorbers was missing. According to an OSHA compliance officer, the extractors are considered to be very reliable by the trade and normally function for a long time.

According to "Laundry News, the Newspaper of Record for Institutional Launderers," there is a

record of one other fatality caused by a centrifugal extractor. In 1990, a worker in a Florida commercial laundry was killed when a metal ring broke free and struck him with tremendous force as he stood in front of the machine. The machine involved in that fatality was manufactured by a different company.

## CAUSE OF DEATH

The medical examiner determined that death was caused by multiple injuries due to impact of the body with an ejected airborne machine part.

## RECOMMENDATIONS/DISCUSSIONS

RECOMMENDATION #1: Institute a regularly scheduled machine maintenance program.

DISCUSSION: Machine maintenance consisted of basic procedures such as lubrication. No trouble-shooting was done. The centrifugal extractor involved in this incident was missing one of two shock absorbers. It is recommended that a program of preventative maintenance be initiated and that preventative maintenance be conducted on a schedule as recommended by the manufacturer. The original manufacturer's instruction manual recommended a monthly inspection and maintenance and also other adjustments to be made every three months. The maintenance program should include training for the company mechanic so that he or she is able to inspect the machines, evaluate their function, and provide necessary repairs and maintenance.

The employer has hired a consultant to design and implement a comprehensive safety program and conduct training for all workers.

RECOMMENDATION #2: Replace machines when essential parts are no longer available.

DISCUSSION: The cause of the disintegration of the extractor is unknown; several factors probably contributed. Possible contributing factors may have been: deterioration with use for many years, metal stress/fatigue, a missing shock absorber, broken welds, an unbalanced load, and other unknown factors.

The manufacturer of the extractors has been out of business for many years. It is recommended that when essential parts cannot be purchased or fabricated, equipment should be replaced. Since this incident, the company has removed all centrifugal extractors.

## REFERENCES

American National Standard for Commercial Laundry and Drycleaning Operations - Safety Requirements, ANSI Z8.1-1990, American National Standards Institute, New York, NY 10018.

Section 5(a)(1) of Public Law 91-956, The Occupational Safety and Health Act of 1970.