

NJ FACE INVESTIGATION REPORT



Fatality Assessment & Control Evaluation Project

FACE 01-NJ-108

August 29, 2002

Worker Killed in Compressed Air Explosion at a Tire Retread Plant

On September 27, 2001, a 36-year-old male laborer at a tire retreading company was killed when a truck tire exploded as it was being filled with compressed air. There were no witnesses to the incident. The victim had been hired one week before the incident as a laborer for a small company that retreaded (recapped) truck tires. The victim came in early that morning before anyone else had arrived for work. He was let into the building by the manager of a neighboring auto body shop and was last seen doing chores from a list that had been left by his supervisor. At about 8:00 a.m., the victim may have tried to fill a truck tire undergoing the retread process with compressed air. An improperly installed air pressure regulator allowed too much air to enter the tire, causing it to explode. The manager of the body shop heard the loud explosion and went into the plant to find the victim bleeding from wounds caused by fragments of the exploding tire. Despite rescue attempts, the victim died of his injuries at the scene. NJ FACE investigators recommend following these safety guidelines to prevent similar incidents:

- **Employers should periodically inspect all process and safety equipment to ensure proper operation.**
- **Employers should consider using safety valves on compressed air hoses that prevent the use of excessive air pressures.**
- **Employers should ensure that employees are properly trained and supervised before permitting them to work alone.**
- **Employers should conduct a job hazard analysis of all work activities with the participation of the workers.**
- **Employers should become familiar with available resources on safety standards and safe work practices.**



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INTRODUCTION

On October 3, 2001, a county Medical Examiner's office notified FACE staff of a worker who was killed in a machine-related incident. A FACE investigator contacted the company and arranged to conduct an investigation, which was done on December 13, 2001. During the visit, a FACE investigator interviewed the plant manager and photographed the incident site. The owner of the neighboring body shop was also interviewed. Additional information was obtained from the police report, the medical examiner's report, and the OSHA investigation file.

The victim's employer was a family-owned tire retreading (recapping) company that had been in business for 28 years. The company employed five workers at the time of the incident, including the victim. Although independent, the company was a subsidiary of a parent company that held the patent for the retreading process. The parent company did quality and safety inspections of the plant twice a year. Employee training was mostly on-the-job, with newer employees learning from a company-certified tire rebuilder. Employees who stayed on the job were sent to the parent company for additional training and certification. The company did not have a safety program or written safety procedures. The plant processed 125-150 tires per month.

The victim was a 36-year-old male laborer who had worked for the company for eight days. Formerly employed as a paver on a road crew, he was referred to the company after asking a relative of the owner about job opportunities. Hired as a helper, he did the basic hauling and support labor necessary in the plant. The plant manager described him as a hard and enthusiastic worker, but noted that he had problems in understanding the process. He was not responsible for retreading the tires and was not expected to perform these duties in the near future.

INVESTIGATION

The incident occurred at the tire retreading plant located in an industrial section of a suburban area. The company specialized in retreading (or recapping) worn truck tires, and provided road service to trucks with flat tires. In the retreading process, customers brought in tires that had worn out. Although the tread was worn down, the remaining tire casing still had value and could be recycled by adding a new tread. Tire casings could be re-used up to 12 times for slower moving trucks (such as garbage trucks)

and three times for high-speed, over-the-road trucks. Retreading can be done at a third of the cost of buying a new tire, making it an attractive option to truck owners using many tires.



Photo 1
Tire similar in size and appearance



Photo 2
Process mounting rims

Process

The company's retreading process begins with the receipt of worn tires. Each tire receives an initial inspection to ensure that the casing (the tire structure that supports the tread) is in good enough condition to mount a new tread. If necessary, rubber patches are glued to the inside of the casing to repair minor defects. The old tread is then removed with a buffing machine. This machine spins the tire as the operator directs a milling head against it, grinding off the old tread in a manner much like a lathe. The milled casing is taken to a small spray booth where cement is sprayed on, then set on a machine where the new tread is applied. The tread is the parent company's product and comes in a number of different designs and price ranges. It is unrolled onto the machine, which applies it squarely to the tire casing. The leading and trailing edges of the new tread are sealed together with rubber, and the casing is placed in a large rubber sheath (envelope) that covers the entire tire. A steel rim (see photo #2) seals the envelope to the tire bead, creating an airtight seal. The envelope is evacuated to check for air leaks, then filled with air to a pressure of 10 to 15 pounds per square inch (psi). Finished tires are placed into a large heated curing chamber pressurized to 120 psi. The pressure presses the envelope against the

tire, clamping the new tread firmly against the casing as the cement cures. Finally, the newly capped tire is removed from the chamber, the envelope removed, and the tire inspected for final sale.



Photo 3
Tire in envelope hanging in front of curing chamber

Incident

The incident occurred on Thursday, September 27, 2001. The victim, who had only worked for the company for a little over a week, came into work earlier than his usual 8:00 a.m. starting time. Arriving at around 7:30, the victim had been told by the retreading plant manager that he could be let in by the owner of the auto body shop next door. He went to the body shop and the owner let him into the plant. After entering the plant, the victim started work from a list of chores left the night before by his supervisor. This included carrying tires outside the plant, where he was last seen by the body shop owner. The night before, the crew had completed capping a large (size 1220) truck tire and placed it into an envelope with a steel rim. The rim was used only for this process and was stamped with a warning not to exceed 35 psi. Air for the process came from the plant's central 140 psi air compressor and storage tank. The air hose in this area had a pressure regulator for reducing the air pressure to a working pressure of 10 psi for the process. There were no witnesses to this incident. It is possible that the victim took it on himself to fill the tire with air when it exploded, striking him with fragments from the

rim and tire. Federal OSHA noted that the air hose may already have been connected to the tire from the night before. In this case, the tire would start to fill after the victim turned on the power to the air compressor, and exploded when the victim was near the tire.

The body shop owner heard a loud explosion at around 8:00 am. He went over to the plant, directing his other workers to look around outside for the victim. Stepping into the plant, he immediately noticed a hazy fog in the air and that the overhead florescent light tubes had been broken. He found the victim lying nearby, bleeding from a large neck wound. Seeing him badly injured, the body shop owner shouted for his employees to call 911 and ask for a helicopter rescue. The call was made at 8:11 a.m., with the first police unit arriving two minutes later. The responding officer found the victim unresponsive as the paramedic and fire units arrived. The victim's injuries were assessed to be too grave to start CPR, and he was pronounced dead at the scene by telemetry at 8:32 a.m.

As part of the OSHA investigation, the pressure regulator for the compressed air hose was sent to the OSHA Technical Center for inspection. The OSHA analysis found that the airlines leading to the pressure regulator had been installed backwards, i.e., the air from the compressor was entering the regulator through the output port instead of the input port. The regulator was not designed to function in this configuration, resulting in the air flowing through the regulator at the full 140 psi pressure instead of 10 psi. The tire overfilled beyond the specifications of the process and exploded.

RECOMMENDATIONS/DISCUSSIONS

Recommendation #1: Employers should periodically inspect all process and safety equipment to ensure proper operation.

Discussion: The plant used a compressed air hose attached to an improperly installed pressure regulator that allowed the full 140 psi air pressure into the tire, leading to the explosion. FACE recommends that all process equipment be periodically inspected to ensure that it is operating properly. This inspection should include testing of machines and safety devices to ensure they

are working. Employees should be instructed to notify management of any problems with the equipment.

Recommendation #2: Employers should use safety valves on compressed air hoses that prevent the use of excessive air pressures.

Discussion: NJ FACE recommends equipping each air hose with a safety valve set for the maximum amount of air required at that stage of the process. Hoses should be color coded (e.g., red for high pressure) and kept short enough to prevent being taken to another part of the plant. If possible, different types or sizes of air hose connectors should be used to ensure that the correct hose is coupled with the correct port.

Recommendation #3: Employers should ensure that employees are properly trained and supervised before permitting them to work alone.

Discussion: The victim in this case was a new employee on his second week at the job. He apparently had problems understanding the process, and may have taken it on himself to use the compressed air hose to fill the tire. To prevent future incidents of this type, NJ FACE recommends that all employees should be fully trained by a qualified supervisor before being allowed to work alone. If employees are required to work alone in process areas, the employer should consider de-energizing and locking-out the controls to process equipment.

Recommendation #4: Employers should conduct a job hazard analysis of all work activities with the participation of the workers.

Discussion: NJ FACE recommends that employers conduct a job hazard analysis of all work areas and job tasks with the employees. A job hazard analysis should begin by reviewing the work activities that the employee is responsible for and the equipment that is needed. Each task is further examined for mechanical, electrical, chemical, or any other hazard the worker may encounter. The results of the analysis can be used to design or modify a written employee job description. Additional information on conducting a job hazard analysis is included in the appendix.

Recommendation #5: Employers should become familiar with available resources on safety standards and safe work practices.

Discussion: It is extremely important that employers obtain accurate information on safety and applicable OSHA standards. The following sources of information may be helpful:

U.S. Department of Labor, OSHA

Federal OSHA will provide information on safety and health standards on request. OSHA has several offices in New Jersey that cover the following counties:

- ☎ Hunterdon, Middlesex, Somerset, Union, and Warren counties.....(732) 750-3270
 - ☎ Essex, Hudson, Morris, and Sussex counties.....(973) 263-1003
 - ☎ Bergen and Passaic counties.....(201) 288-1700
 - ☎ Atlantic, Burlington, Cape May, Camden, Cumberland, Gloucester, Mercer, Monmouth, Ocean, and Salem counties.....(856) 757-5181
- 🌐 Federal OSHA Website: www.osha.gov

NJ Public Employees Occupational Safety and Health (PEOSH) Program

The PEOSH act covers all NJ state, county, and municipal employees. Two state departments administer the act; the NJ Department of Labor (NJDOL) which investigates safety hazards, and the NJ Department of Health and Senior Services (NJDHSS) which investigates health hazards. PEOSH has information that may also benefit private employers. Their telephone numbers are:

- ☎ NJDOL, Office of Public Employees Safety(609) 633-3896
- 🌐 Website: www.state.nj.us/labor/wps/psosh/peosh/peosha.htm
- ☎ NJDHSS, Public Employees Occupational Safety & Health Program.....(609) 984-1863
- 🌐 Website: www.state.nj.us/health/eoh/peoshweb

NJDOL Occupational Safety and Health On-Site Consultation Program

Located in the NJ Department of Labor, this program provides free advice to private businesses on improving safety and health in the workplace and complying with OSHA standards. For information on how to get a safety consultation, call ☎(609) 292-3923.

🌐 Website: www.state.nj.us/labor/wps/psosh/onsite/onsite.htm

New Jersey State Safety Council

The NJ State Safety Council provides a variety of courses on work-related safety. There is a charge for the seminars. Their telephone number is: ☎(908) 272-7712.

🌐 Website: www.njsafety.org

Internet Resources

Other useful internet sites for occupational safety and health information:

www.cdc.gov/niosh - CDC/NIOSH.

www.dol.gov/elaws -USDOL Employment Laws Assistance for Workers and Small Businesses.

www.nsc.org – National Safety Council.

www.state.nj.us/health/eoh/survweb/face.htm – NJDHSS FACE reports.

REFERENCES

1. *Job Hazard Analysis*. US Department of Labor Publication # OSHA-3071, 1998 (revised). USDOL, OSHA/OICA Publications, PO Box 37535, Washington DC 20013-7535.

DISTRIBUTION LIST

Immediate Distribution

NIOSH

Employer

NJ State Medical Examiner

County Medical Examiner

Local Health Officer

NJDHSS Occupational Health Service Internet Site

NJDHSS Census of Fatal Occupational Injuries (CFOI) Project

General Distribution

USDOL-OSHA New Jersey Area Offices (4)

NJDOL Office of Public Employees Safety

NJDHSS Public Employees OSHA

NJDOL OSHA Consultative Service

NJ Institute of Technology

University of Medicine & Dentistry of NJ

Rutgers University

Stevens Institute of Technology

NJ Shade Tree Federation

NJ Utilities Association

NJ School Boards Association

Public Service Electric and Gas Company

Liberty Mutual Insurance Company Research Center

Private Consultants (2)

Private Employers (3)

Public Employers (4)

Other Government Agencies (2)

Fatality Assessment and Control Evaluation (FACE) Project
Investigation # 01-NJ-108

Staff members of the New Jersey Department of Health and Senior Services, Occupational Health Service, perform FACE investigations when there is a report of a targeted work-related fatal injury. The goal of the FACE Program is to prevent future injuries by studying and identifying the risk factors that contribute to workplace fatalities, by recommending intervention strategies, and by disseminating information to employers and employees. NJ FACE data is reported to NIOSH for trend analysis. All identifiers are removed from the FACE reports and other data to protect the confidentiality of those who participate in the program.

NIOSH funded state-based FACE Programs include: Alaska, California, Iowa, Kentucky, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, New York, Ohio, Oklahoma, Texas, Washington, West Virginia, and Wisconsin.

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