TO: Project Officer, State FACE Project, Division of Safety Research, NIOSH, CDC

FROM: FACE Program Manager, Nebraska Department of Labor, Division of Safety and Labor Standards

SUBJECT: Nebraska FACE Investigation 94NE039
Commercial Garage Door Falls, Fatally Crushing Worker

SUMMARY:

A 32 year-old male lumber yardman died after being struck by a 1,200 pound steel commercial garage door. The victim was closing the garage door at the time of the incident and was standing directly beneath the door. Shortly after he activated the door, the door free-fell and crushed him.

The Nebraska Department of Labor evaluator concluded that to prevent future similar occurrences, employers and overhead door manufacturers/installers should:

*Ensure that operating controls for overhead doors are designed and located to prevent workers from hazards of malfunctioning doors.

*Develop, implement and enforce a comprehensive safety program that includes, but is not limited to, training in hazard recognition.

*Consider developing commercial overhead door regulations/industry standards which would provide minimum standards for safe operation.

PROGRAM OBJECTIVE:

The goal of the workplace investigation is to prevent work-related deaths or injuries in the future by a study of the working environment, the worker, the task the worker was performing, the tools the worker was using, and the role of management in controlling how these factors interact.

This report is generated and distributed **solely** for the purpose of providing current, relevant education to the community on methods to prevent occupational injuries.

INTRODUCTION:

On August 19, 1994, a 32 year-old lumber yardman died when a commercial garage door fell on him. The Nebraska Department of Labor was notified by telephone on August 19, 1994, by the local police department that responded to the incident scene. The FACE evaluator accompanied an OSHA investigator to the incident site on August 22 and 23, 1994, and interviewed the employer, witnesses to the incident, the police officer responding to the incident and the county coroner.

The employer is a building supply company that has been in business at the incident location for 25 years, employing 15 personnel at this particular store. This was the first occupational fatality in the history of the company. The company had a written safety program and a designated safety officer. The safety officer performed other primary duties and was not present at the site at the time of the incident.

INVESTIGATION:

The victim had worked a full workday and was closing one of four overhead metal doors in preparation for closing the store for the day. The metal door, 18 feet wide by 15 feet high, weighing approximately 1200 pounds, is raised and lowered electrically. An electric motor drives cable reels which wind two cables, one on each side of the door, attached to the door's lower panels. A counterbalancing coil spring is mounted on the cable reel shaft. The controls to activate the door are located directly beside the door rails. As the victim was beginning to activate the door controls someone outside of the building yelled at him and he stuck his head through the door opening to answer. Witnesses said at this point the door was closing and had traveled about two feet when they heard a snap and the door free-fell, striking the victim on the back of the head doubling him over, and pinning him to the ground. Medical help was immediately called and arrived on the scene within 5 minutes. A co-worker lifted the door off the victim with a forklift prior to the medical personnel arriving. The victim was transported to the hospital and pronounced dead in the emergency room.

The door involved in the incident had been struck by a forklift three months prior to the incident. The forklift struck the overhead support rails and damaged them causing the door, which was in the open position at the time, to fall. The door maintenance company was called out to repair the door. The support rail on the left side and the top two panels of the door were replaced after that incident. Approximately three weeks before the fatal incident the door malfunctioned when one of the take-up cables came off one of the take-up reels. (There are two cables - one on each side of the door.) The door caught in the rails askew after the cable came off the reel. The door maintenance company came out and replaced the cable.

During the investigation after the fatal incident the brackets to which the door cables were attached were both hanging freely, attached to the cable but separated from the door. The bolts which connected them to the bottom door panels had been

sheared.

Exactly what happened to cause the bolts to shear is unknown but a couple of scenarios are feasible. The victim could have pushed the down button on the door and then, when he heard his friend yell at him, he could have immediately pressed the up button. This sudden reversal of the door travel could have stressed the bolts enough to shear them. The bolts were 1/4 inch, grade two bolts. The brackets the cables are attached to are flat steel and are bolted flat against the lower inside of the bottom garage door panels. The two brackets on the incident door each had 10 holes which appeared to have had bolts in them prior to the incident. Two of the ten holes on each bracket appeared to have been drilled subsequent to original door installation, which was in 1969. The other three garage door cable brackets all had just eight holes.

Another possible scenario was that the door or cables were binding in someway and the motor continued applying force on the cables until the bolts sheared. The door did not have a sensor on it, like those required on residential garage doors, that reverse the door when resistance is detected.

CAUSE OF DEATH:

The cause of death, as determined by the coroner, was massive head trauma.

RECOMMENDATIONS/DISCUSSION:

Recommendation #1:Ensure that operating controls for overhead doors are designed and located to prevent workers from hazards of malfunctioning doors.

Discussion: If a "deadman" control had been physically separated a sufficient distance from the door (in this case approximately 20 feet), this victim could not have been in a position to be struck by the door. Of course, all others must remain clear of the door during operation also. The "deadman" controls would allow the operator to immediately stop door operation if anyone entered the area of door operation.

Recommendation #2:Develop, implement and enforce a comprehensive safety program that includes, but is not limited to, training in all hazard recognition.

Discussion: A comprehensive safety program should address the hazards involved with all machinery. Written guidance should be available and enforced concerning staying clear of all operating machinery to include garage doors. This guidance should be covered initially with all new personnel and periodically with all

employees.

Recommendation #3:Consider developing commercial overhead door regulations/industry standards which would provide minimum standards for safe operation.

Discussion: If standards were developed and enforced for commercial garage doors, the potential for fatal injuries could be greatly reduced. The following areas should be addressed:

* As stated in recommendation #1, physically separate controls from the door and install "deadman" controls.

* Consider requiring an audible warning which would sound several seconds prior to door activation to warn any persons in the door area.

*Consider requiring sensor switches on door drive motor which would reverse door direction when resistance is detected.

* Consider redesigning brackets to which the drive cables are attached. A "U"-shaped bracket that would wrap around the bottom of the door would provide much greater strength and lessen the possibility of shearing the bolts connecting the bracket to the door. Also, consider requiring a higher grade bolt to withstand the stresses applied.

*Consider requiring periodic inspections (at least annually) by competent technicians to assess proper operation and condition of equipment.

William E. Hetzler
Field Investigator
Department of Labor

Gary L. Hirsh
Principal Investigator
Department of Labor