

TO: Director, National Institute for Occupational Safety and Health

FROM: California Fatality Assessment and Control Evaluation (FACE) Program

SUBJECT: Elevator Maintenance Worker Dies from Fall in an Elevator Shaft in California

SUMMARY
California FACE Report #94CA014
April 24, 1995

A 34-year-old white, non-Hispanic, male elevator maintenance worker (the victim) died after falling approximately 30 feet into an elevator shaft. At the time of the incident, the decedent and two coworkers were pulling a hydraulic piston out from the bottom of the elevator shaft so that a new liner could be installed. They had installed an electrically powered, base mounted capstan or cathead in the bottom of the elevator shaft to be used as a hoist to lift the piston to the top of the shaft. Co-worker #2 had been sent to the fourth floor so that he could inform the other workers when the piston reached the overhead. The victim was working from the first floor and co-worker #1 was at the bottom of the shaft. Co-worker #2 yelled when the piston hit the top of the elevator shaft but his co-workers apparently did not hear him. Co-worker #1 continued in his efforts to raise the piston resulting in the capstan being pulled out from the floor of the shaft. It flew up into the shaft and the piston fell back down to the bottom of shaft. The victim, stationed on the first floor, apparently looked into the shaft to help and was hit in the head by the capstan. The victim then fell to the bottom of the shaft sustaining multiple fractures of the skull and jaw. The decedent was pronounced dead at the scene by fire department paramedics. The CA/FACE investigator concluded that in order to prevent similar future occurrences employers should:

- install capstans (catheads) into the sidewall of elevator shafts in order to create a shearing effect to insure that the capstan does not pull out during hoisting operations.
- allow elevator doors to be opened only enough to permit workers to observe work being performed in the shaft or, if kept in a fully open position, should have all hatchways or openings in the elevator shaft protected by guardrails or their equivalent.
- only have properly qualified employees working at the site performing complicated operations that require qualified personnel.
- only allow qualified employees whose duties are required to be present during repairs.
- have a standard operating procedure (SOP) which gives specific safety instructions on accomplishing hazardous tasks such as hoisting pistons.
- instruct employees and have a standard operating procedure (SOP) in standardized communication signals to use when voice contact is not adequate.

INTRODUCTION

On July 10, 1994, a 34-year-old elevator maintenance worker (the victim) died after falling approximately 30 feet into an elevator shaft. The CA/FACE investigator was informed of this incident by the City's Department of Building and Safety office. A site investigation and interview with the building manager were conducted by the CA/FACE investigator on July 14, 1994. Photographs of the incident site were also taken. A copy of the Cal/OSHA Report, the Coroner's Autopsy Report, the City's Department of Building and Safety Accident Investigation Report, Fire Department Paramedics Report, and Police Report were all obtained by the CA/FACE investigator.

The employer in this incident owned both a wrecking company and an elevator company. Only one employee, co-worker #1, was working for the employer at the time of the incident according to the owner. According to the employer and co-worker #1, the other two individuals (the victim and co-worker #2) went to the site only to deliver tools. However, a reconstruction of events indicates that they were performing tasks involved in elevator repair. The owner was qualified to perform elevator maintenance work but neither of these individuals nor co-worker #1 were qualified to do so.

INVESTIGATION

On the day of the incident, at approximately 3:02 p.m., the victim and two co-workers were pulling a hydraulic piston out from the bottom of an elevator shaft to install a new liner. According to a security guard at the building, the employer had installed a capstan (a revolving barrel on a vertical axis for winding cable) or cathead in the left front area of the elevator shaft. This cathead was being used to hoist and remove the piston. The elevator car/cage had been moved to the overhead area, locked in place, and a pulley suspended from the underside of the car by 2 X 2 blocks. The cable to lift the piston ran from the capstan up to the pulley and back down to the piston.

The following sequence of events was provided by co-workers. Co-worker #1 had been working at the bottom of the elevator shaft and was hoisting the piston to the top. Co-worker #2 was working on the fourth floor and was to inform his co-workers when the piston reached the bottom of the elevator car (i.e., top of the elevator shaft). He stated that he yelled when the piston reached the bottom of the elevator, but that his co-workers did not hear him. The capstan (cathead) was then pulled out from the floor. It flew up into the elevator shaft and the piston fell back down to the bottom of shaft. Co-worker #1 became entangled in the hoisting ropes and was pulled up into the air. The victim, stationed on the first floor, apparently looked into the shaft to help and was hit in the head by the capstan as it either flew up into the shaft or on its way down. The victim's head injuries would seem to indicate that the latter occurred. He then fell from the first floor to the bottom of the elevator shaft.

The victim's co-workers yelled to the security guard to call 911. When the security guard returned, he stated that he saw the victim lying in the front area at the bottom of the shaft. Co-workers pulled the victim from the shaft and provided First Aid but the victim never regained a pulse. Fire Department paramedics arrived at 3:07 p.m. and found the decedent in a supine position in the access space of the elevator. An on-site examination revealed multiple fractures of the skull and jaw. The decedent also had multiple facial and head lacerations and his neck

appeared to be broken. The decedent was pronounced dead by the fire department paramedics at 3:10 p.m.

CAUSE OF DEATH

The Coroner's Autopsy Report stated the cause of death as being multiple blunt force injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employer should install capstans (catheads) into the sidewall of elevator shafts, and not the floor, in order to create a shearing effect to insure that the capstan does not pull out during hoisting operations.

Discussion: In this situation, the capstan was installed into the floor of the elevator shaft. Normally, capstans are installed into a side wall of the shaft where they are less likely to pull out during hoisting operations. Had the capstan in this situation been side-mounted, or more securely mounted into the floor, this fatality may have been prevented.

Recommendation #2: Employers should allow elevator doors to be opened only enough to permit workers to observe work being performed in the shaft or, if kept in a fully open position, should have all hatchways or openings in the elevator shaft protected by guardrails or their equivalent when doing repair work.

Discussion: In this situation, the victim was positioned on the first floor with the elevator doors fully open. Had the doors been open only enough to allow the victim to observe his co-workers, he may have been prevented from leaning into the path of the capstan and he would have been prevented from falling. Under Title 8 of the CCRs, Section 3212(a)(2), hatchways and chute floor openings shall be guarded by guardrails or by hinged or removable covers or by removable railings provided such covers or railings will afford protection equivalent to that provided by a guardrail. If a guardrail had been present, this may not have prevented the victim from being struck by the capstan, but it would have prevented him from falling to the bottom of the shaft.

Recommendation #3: Employers should have properly qualified employees working at the site when performing complicated operations requiring qualified personnel.

Discussion: Under Title 8 of the California Code of Regulations (CCRs), Section 3328(h), only qualified persons shall be permitted to maintain or repair machinery and equipment. In this incident, the owner was the only person determined to be qualified as to perform elevator maintenance and repair, and he was not on site at the time of the incident.

Recommendation #4: Employers should only allow qualified employees whose duties are required to be present during repairs.

Discussion: In this incident, two inexperienced individuals were present at the site. These workers were not familiar with elevator repair or the hazards associated with it and consequently did not take the precautions necessary to ensure their own safety during these activities. Additionally, having people at the site not involved in the work itself creates distractions during

the performance of complicated and hazardous tasks. Under Title 8 of the CCRs, Section 4985(a), only those persons whose duties require them to be in the hoist room or station are permitted to be in those areas during elevator repair work.

Recommendation #5: Employers should have a standard operating procedure (SOP) which gives specific safety instructions on accomplishing hazardous tasks such as hoisting pistons. In addition, workers should receive training in these procedures so that they can safely accomplish hazardous tasks.

Discussion: This incident may have been prevented if a standard operating procedure had been developed which described in detail all tasks of employees involved in removing a piston. Such a procedure should also describe escape operations.

Recommendation #6: Employers should instruct employees and have a standard operating procedure in standardized communication signals to use when voice contact is not adequate or provide employees with control devices that allow employees to ascertain the position of the hoisted equipment.

Discussion: Voice contact should have been adequate in this situation. However, for some reason, the co-worker #1 was not able to hear signals given by co-worker #2. This incident may have been prevented if the employees had been instructed in some type of communication signals other than voice contact or had they been using a control device that would have allowed them to ascertain the position of the equipment. If co-worker #1 had received some sort of signal, he would not have continued to pull the piston up and this incident may have been avoided.

References

Brown, L. (Ed.). 1993. The new shorter Oxford English dictionary, Vol. 1. Oxford: Clarendon Press.

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the Public Health Institute and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations of work-related fatalities. The goal of this program, known as the California Fatality Assessment and Control Evaluation (CA/FACE), is to prevent fatal work injuries in the future. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. NIOSH-funded, state-based FACE programs include: Alaska, California, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, New York, Oklahoma, Oregon, Washington, West Virginia, and Wisconsin.

Additional information regarding the CA/FACE program is available from:

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