TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Sheet metal worker falls off step ladder and dies in California

SUMMARY

California Face Report #98CA00601

A 46-year old sheet metal worker (decedent) died when he fell off an 8-foot step ladder and struck his head on the edge of a metal floor plate. The employer was performing sheet metal work on a hospital addition. The decedent was working with his right foot on the 5th step at the 4-foot, 9-inch level and the left foot on the step above. He was adding a fire damper to an previously installed sheet metal plenum. According to a co-worker, the decedent fell when the ladder spun around catching the decedent's legs in the ladder. The CA/FACE investigator determined that, in order to prevent future occurrences, employers should:
ensure employees use ladders in a safe manner.

- Ensure employees use ladders in a safe manner.
- Ensure employees reposition ladders or use alternate means to access work safely.

INTRODUCTION

On April 22, 1998, at 2:30 p.m., a 46-year old male sheet metal worker was fatally injured when he fell off an 8-foot step ladder and struck his head on the edge of a metal floor plate. He was installing a fire damper in the end of a sheet metal duct when he fell.

The CA/FACE investigator learned of this incident on April 27, 1998 from the local legal office of the California Occupational Safety & Health Administration (Cal/OSHA). On April 30, 1998, the CA/FACE investigator traveled to the incident site where he met with the company's general foreman and the general contractor's assistant project manager. The CA/FACE investigator photographed the area where the incident happened. Later the same day the CA/FACE investigator went to the company's main office where he met the operations manager, and examined and photographed the ladder involved in the incident.

The employer, a heating, ventilation and air conditioning (HVAC) contractor, had been in business for approximately 63 years at the time of the incident. The company had 140 employees with 7 working on site at the time of the incident. The decedent had worked for the company for 1 year and 9 months and had worked at the site of the incident for 3 months. The decedent was a journeyman sheet metal worker. Company safety responsibilities were defined, with the operations manager having responsibility for the company and the general foreman having site responsibility. The company had an Injury and Illness Prevention Program (IIPP) that contained all of the required elements and a code of safe practices. According to the general

foreman, the decedent was trained in the hazards of the job including the use of ladders. Safety meeting documents provided to the CA/FACE investigator verified training. Safety meetings were conducted once a week on Mondays. Once a month the general contractor held a safety meeting for all job site workers. Prior to the job, a site survey was conducted by the company's general foreman as well as the other contractors on the job to identify potential hazards.

INVESTIGATION

The site of the incident is a four-story hospital to which four stories were being added. The employer was hired by the general contractor to perform the sheet metal duct work. The incident occurred on the sixth floor which was in the framed stage. The framing for the various walls was all metal.

On the day of the incident, the decedent was adding a fire damper (a fire safety device) to the end of an existing sheet metal duct measuring 12 X 18-inches (**exhibit 1**). To reach the end of the duct, the decedent used an 8-foot, Type I (250 lb. load) step ladder (**exhibit 2**). The end of the duct was 9-feet, 4-inches off the finished floor.

The job required the decedent and two co-workers to place the damper in position. The damper was a slip-fit connection to the existing duct. The fire damper had been attached to the east wall. The job was to bring the existing duct work to the damper (**exhibit 3**). The decedent was on the south side of the damper on his ladder. The second co-worker was on the north side of the damper on another ladder. His ladder was behind the framed wall of the room in which the decedent and third co-worker were working. The second co-worker had to reach around the metal framing to grab the fire damper and duct work. The third worker was applying pressure to the duct work with a 2X4 to help it make the connection. The decedent was moving up and down several steps of the ladder struggling to make the connection. He was reaching on both sides of the north wall, which was in the framed stage, to try to make the damper slip into the duct.

The third employee stated, after about three tries to make the connection, the decedent had his right foot on the 5th ladder step at the 4-foot, 9-inch level and his left foot on the step above. In the struggle to make the connection, it appeared to the third employee that the decedent may have extended himself out too far or lost his balance. The ladder spun counter clockwise tangling the decedent's feet in the steps. The decedent fell head first to the concrete floor striking his head on the edge of a metal floor plate which extended approximately three inches above floor level.

The co-workers immediately untangled the decedent's feet from the ladder and noted that he was seriously injured. The general contractor's superintendent arrived at the accident site and called 911 on his cellular phone. The hospital's emergency room doctor received news of the incident and arrived along with city paramedics at the incident within one minute site to treat the decedent. The city fire department paramedics transported the decedent to the hospital emergency room. Construction management had to clear the use of the elevator at the west end of the building so the decedent could be lowered to the emergency room on the first floor.

CAUSE OF DEATH

The death certificate stated the cause of death to be blunt trauma to the head.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure employees use ladders in a safe manner.

Discussion: In this incident, the employee used a step ladder inappropriately. By having one foot on a lower step (rung) and the other on the next highest step, most of the decedent's body weight would be on the lower step. By necessity, the foot on the lower step would be on one side of the ladder, near to one of the side rails. This places a side load on the rail reducing the stability of the ladder. The decedent, according to the third employee, reached out while struggling with the fire damper he was attempting to put into place. This action further reduced the stability of the ladder. If the decedent placed some body weight on the foot on the higher step in attempting to reach out, the ladder would become very unstable. If a step ladder becomes side loaded on one of the side rails, the ladder may lift the other foot off the working surface and spin around. This is what apparently happened in this incident. Proper use of a step ladder dictates that users keep their body weight inside of the rails and "A" frame. When the center of gravity is maintained inside of the "A" frame, the step ladder maintains stability. If the decedent had kept his body weight inside of the rails of the ladder and on one step, this incident most likely would not have happened.

Recommendation #2: Employers should ensure employees reposition ladders or use alternate means to access work safely.

Discussion: In this incident, the decedent reached outside the rails of the step ladder in order to access his work causing the ladder to become unstable and the decedent to fall. When possible, ladders should be repositioned so the work is directly over the ladder. This incident took place in a cramped corner of an unfinished room. The ladder may have been able to be moved some, but perhaps not directly under the fire damper on which the decedent was working. Alternate means of accessing overhead work should be provided in such instances to prevent employees from falling.

References:

A Consumer's Guide to Safe Ladder Selection, Care and Use, Consumer Product Safety Commission, Washington DC, 1980

Accident Prevention Manual for Industrial Operations, Engineering and Technology, National Safety Council, Chicago, 1988

Barclays Official California Code of Regulations, Vol. 9., Title 8, Industrial Relations. South San Francisco, CA, 1998.

Portable Ladder Safety, Division of Occupational Safety and Health, San Francisco, 1980

There's a Right Ladder for Every Job, American Ladder Institute, Chicago, IL

For general information regarding ladder safety refer to:
http.www.dir.ca.gov./title8/3276.html, /3278, /3279, /3280, /3287, /3413, /1675

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August 21, 1998

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the California Public Health Foundation, and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations on 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, Maryland, Massachusetts, Maryland, Minnesota, Missouri, Nebraska, New Jersey, Ohio, Oklahoma, Texas, Washington, West Virginia, and Wisconsin.

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

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