TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Hod Carrier dies and three co-workers injured in fall from rolling tower scaffold in California

SUMMARY
California FACE Report 98CA017

A 29-year old hod carrier (decedent) died and three co-workers were injured when they fell from the fourth story of a pump house building that was under construction. The decedent and three co-workers were spraying fireproof insulation onto the structural steel frame of the building. They used a rolling tower scaffold to gain access to the structural steel overhead. Putlogs (types of trusses) had been added to sides of the rolling tower scaffold on which an extension platform had been constructed. This platform was used to gain access to the outer side of the structural steel. A fourth worker (the decedent) joined his three co-workers to help install a guardrail. Their combined weight caused the scaffold to tip and throw them to the concrete deck 44 feet below. The scaffold had not been engineered for the extension platform. No counterweights, anchorage or bracing were used. Neither the decedent nor his coworkers were wearing personal fall protection. The scaffold was constructed using parts from different manufacturers. The CA/FACE investigator determined that, in order to prevent future occurrences, employers should as part of their Injury and Illness Prevention Program (IIPP):

- ensure scaffolds are constructed according to manufacturer's recommendations or are properly designed/engineered.
- ensure employees follow safe work practices when constructing scaffolds.
- ensure employees do not exceed scaffold load limits given by the manufacturer or by the engineer.

INTRODUCTION

On December 8, 1998, at approximately 10:00 a.m., a 29-year old male hod carrier was fatally injured and three co-workers injured when they fell from a rolling tower scaffold located on the fourth story of a pump house under construction. They fell onto a concrete deck located 44 feet below. Three workers were attempting to install a guardrail on the scaffold. When the fourth worker walked onto the extension platform of the scaffold, the scaffold tipped. The CA/FACE investigator learned of this incident on December 15, 1998 from the local legal office of the California Department of Industrial Relations, Division of Occupational Safety & Health (Cal/OSHA). On January 7, 1998 the CA/FACE investigator traveled to the incident site where he met with the training and construction safety representative and the attorney for the project's owner; the vice president and the attorney for the employer; the attorney for the general contractor; the site safety supervisor; and a workers' compensation attorney. The CA/FACE investigator interviewed the site's safety supervisor, the owner's training and construction representative, and the employer's vice president.

The employer, a general construction contractor, had been in business for 40 years at the time of the incident. The number of employees in the company is 120 with 6 working on site at the time of the incident. The decedent had worked for the company for approximately 4 months. On the day of the incident, the decedent had worked at the site for just over one month**.**

The company had a written Injury and Illness Prevention Program (IIPP) and a code of safe practices. According to the employer's vice president, the decedent was trained in the hazards of the construction industry by the Plasterer's and Laborer's Union. No documentation of this training was provided. The only time the employee received training from the employer was through tailgate safety meetings and formal safety meetings. Regularly scheduled safety meetings occurred each Monday and, in addition, a foreman's safety meeting was held every three months. No documentation of the safety meetings was provided. A site inspection of the construction project was not performed prior to beginning work.

INVESTIGATION

The site of the incident is a large reservoir construction project. The building from which the decedent and co-workers fell was a pump house under construction **(exhibit 1)**. The fourth floor did not have walls at the time, but its periphery was protected by catenary (safety) lines **(exhibits 2 & 3)**. The job being performed was to spray fireproof insulation onto structural steel members prior to the installation of the walls.

Several days prior to the incident, the workers began spraying fireproof insulation onto the structural steel located on the lower floors of the pump house. They used the same rolling tower scaffold involved in this incident **(exhibit 4)**. The scaffold was used to gain access to the structural steel overhead and the outer side of the steel. No scaffolding was erected on the outside of the building, so the workers built an extension platform on the scaffold. Although end brackets are available for adding such a platform, the involved employees used 16-foot long putlogs (a type of truss which is a separate, horizontal load carrying member) **(exhibit 5)**. The putlogs were connected to the long sides of the scaffold using tube and clamp couplers. The materials used to construct the rolling tower scaffold were from different manufacturers **(exhibit**

6).

In order to spray the outer side of the structural steel, the workers placed the end of the rolling tower scaffold on which the extension platform was located against the catenary lines. The extension platform projected 5 feet 9 inches from the end of the scaffold. A top guardrail only was installed.

Two workers were employed in the spraying operation. After they completed the lower three floors, the rolling tower scaffold was moved to the fourth (top) floor **(exhibit 7)**. However, since the structural steel at the peak of the roof needed to be sprayed, a 3-foot frame was added to the scaffold **(exhibit 8)**. With the two tiers, which included a 5-foot frame and the casters, the scaffold now stood 8 feet, 8 inches high at the working platform. As before, the end of the scaffold was moved up against the catenary line to gain access to the outer side of the structural steel. At this time the site safety supervisor informed the workers that they must add a mid-rail to their scaffold since the working surface was now above the height limit of 7 1/2 feet. When the employees were working on the extension platform outside of the building on the lower floors, they were standing more than 7 1/2 feet above the deck below.

In attempting to install the mid-rail, the two employees encountered trouble getting it to fit. They were joined by a third worker at the end of the extension platform. As they continued to struggle, they called to a fourth employee for help. As the fourth employee walked toward the extension platform, the side of the scaffold became overloaded. As the fourth worker passed the pivot point (fulcrum), the scaffold tipped and dropped all four workers to a concrete deck located 44 feet below **(exhibit 9)**. The scaffold rebounded off the catenary line and flew off the fourth story floor, landing just outside where the workers fell.

On site emergency medical technicians (EMTs) were summoned to the scene. The local fire department received the call at 10:00 a.m. and were dispatched. The EMTs provided first aid to the fallen employees until the paramedics arrived at 10:10 a.m. They were informed by the EMTs that the decedent was dead. The paramedics found no pulse or spontaneous respirations. They pronounced him dead at 10:20 a.m.

CAUSE OF DEATH

The death certificate stated the cause of death to be multiple traumatic injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure scaffolds are constructed according to manufacturer's recommendations or are properly designed or engineered.

Discussion: Although putlogs can be used to extend the side of a rolling tower scaffold, the Scaffold Shoring and Forming Institute, Inc. and the manufacturers contacted all agreed that users: "not cantilever or extend putlogs/trusses as side brackets without thorough consideration for loads to be applied." When the employees added the putlogs and constructed the extension platform, they considered it safe for two persons. However, no evaluation of the actual safe working load was done. Because the scaffold components were intermixed and the employer used putlogs to construct an extension platform on one end of the rolling tower scaffold involved, a professional engineer should have been consulted to determine the safe working load

of the scaffold and the extension platform. The engineer must consider quantities such as rotational forces, lever arm distance, fulcrum, weight of the scaffold and weight and placement of the workers and materials, etc. Such an analysis will define the safe working load at various points on the scaffold. If a safe working load must be exceeded, measures such as counter weights, anchorage (tie-downs), and bracing could be applied to the formula to increase the safe working load without exceeding the maximum load capacity of the scaffold or extension platform. If the rolling tower scaffold had been constructed according to manufacturer's or engineering recommendations, this incident may not have occurred.

Recommendation #2: Employers should ensure employees follow safe work practices when constructing scaffolds.

Discussion: The job being performed by the employees at the time of the incident was the installation of guardrails. The employees were positioned 44 feet above the deck below. The rolling tower scaffold could have been moved so it was completely inside the building. They then would have been working 8 feet 8 inches above the floor rather than 44 feet above the deck outside the building. In addition, scaffolding components from different manufacturers were used to construct the rolling tower scaffold. Scaffolding components from the same manufacturer are designed to fit together properly if they have not been damaged. Since manufacturers make no guarantee if scaffold components are intermixed, employees should use components in good condition from the same manufacturer. If the employees had finished the scaffold assembly inside the building, using single manufacturer components, this incident may not have happened.

Recommendation #3: Employers should ensure employees do not exceed scaffold load limits provided by the manufacturer or by the engineer.

Discussion: In this incident the load limits of the scaffold were exceeded as demonstrated by the upset of the scaffold. The load limits of the scaffold or its extension platform were not specified. The load limits of scaffolds should be determined prior to use and heeded. If the load limits of the scaffold were known and adhered to, this incident may not have happened.

References:

American National Standard, Inc., "Safety Requirements for Scaffolding," ANSI 10.8-1977

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

"Preventing Worker Injuries and Deaths Caused by Falls From Suspension Scaffolds," DHHS (NIOSH) Publication No. 92-108, NIOSH Alert: August 1992

"Recommended Scaffolding Erection Procedures," Scaffolding and Shoring Institute, Cleveland, OH

"Rolling Tower Scaffolds: Safe Use and Erection Procedure," Safway Steel Products, Milwaukee, WI, 1980

"Scaffold Safety Regulations and Inspection Check List," Safway Steel Products, Milwaukee, WI

"Scaffolding Safety Rules," Bil-Jax, Inc., Archbold, OH

"Scaffolding Safety Rules," Patent Scaffolding Company, Fort Lee, NJ

For general information regarding safety programs and scaffolding refer to Title 8 of the California Code of Regulations: http.www.dir.ca.gov./title8/1509.html; /3203.html; /1637.html; /1646.html; /3328.html

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May 20, 1999

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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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