TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Laborer is crushed by a clam shell bucket when it disconnects from its crane in California

SUMMARY
California FACE Report #97CA009

A 22-year old laborer (decedent) died when he was crushed by a clam-shell bucket which disconnected from the hook of the truck-mounted crane lowering it. The decedent was in a deep excavation when the bucket fell on him. The bucket snagged the side of the trench shield which caused it to disconnect from the crane's load hook. The safety latch on the hook was damaged and not operating properly. The CA/FACE investigator that, in order to prevent future occurrences, employers should:

- assure lifting equipment is inspected and repaired before use.
- avoid lifting equipment and loads over the heads of employees.
- develop a written daily checklist for inspecting equipment.

INTRODUCTION

On May 22, 1997, at 3:09 p.m., a 22-year old male laborer was fatally injured when he was crushed by a 1,000 pound clam-shell bucket when it disconnected from the load hook of a truck-mounted hydraulic crane. The decedent was helping to direct the bucket while standing in an excavation that was approximately 20-feet deep. The bucket snagged the side of the trench shield which caused it to disconnect from the crane's load hook due to a defective safety latch.

The CA/FACE investigator learned of this incident from a newspaper article on May 23, 1997. The CA/FACE investigator was unable to meet with the owner of the company involved but traveled to the site on June 6, 1997. He observed the site but did not meet with a representative of the employer. The CA/FACE investigator interviewed the company owner by telephone.

The employer, a pipeline excavation and tunneling contractor, had been in business for 26 years. The company had 13 employees with 2 working on site at the time of the incident. The decedent had been working for the employer for 6 years as a laborer. The crane operator had worked for the employer for 10 years, 9 of which were as a crane operator. The employer and the decedent began work at the site on the day of the incident. Company safety responsibilities were defined in the company Injury and Illness Prevention Program (IIPP). The crane operator was trained and certified as a competent person in excavation work. In addition, all legally required employee training had been performed by the employer.

Safety tailgate meetings were held weekly at the worksite and formal safety meetings were held on a monthly basis. A safety briefing was held before work on any new project. In addition, safety information was distributed on occasion with employee paychecks.

The employer's truck-mounted hydraulic crane which was involved in this incident was inspected and certified on January 28, 1997. The truck-mounted crane's service log, maintenance history and safety inspections were also in order.

INVESTIGATION

The scene of the incident was a construction site occupying the westbound lane of a city street in front of business buildings. The site was protected with a chain link fence. The employer had assigned the two employees to bore a 20-foot long horizontal hole as part of a water pipe installation. The job the decedent was performing at the time of the incident was removing soil from an excavation. The excavation was approximately 20 feet deep, 24 feet long and 6 feet wide and was protected by two trench shields stacked on top of one another.

The employer was using a 7-ton, truck-mounted hydraulic crane with a clam-shell bucket to remove soil from the excavation. The bucket weighed approximately 1,000 pounds and measured 31 inches by 27 inches. The truck was facing westbound and was located on the west side of the excavation. The crane on the rear of the truck faced east where it was able to lower the bucket into the excavation. The soil was loaded into dump trailers being pulled by a tractor.

The clam-shell bucket had been used twice previously without problem on the day of the incident to remove soil from the excavation. The crane operator had entered the excavation,

using the ladder provided, to help the decedent move the soil manually. When there was enough soil piled up for the bucket to be used, the crane operator exited the excavation. He returned to the crane and using its controls began to lower the bucket into the excavation. The decedent remained in the excavation to help guide the bucket to the pile of soil that was to be removed.

As the crane operator lowered the bucket into the excavation he heard what he described as a loud pop. The bucket had caught on the edge of the trench shield. This caused the load line to go slack allowing the load hook to disengage from the bucket. The safety latch, a gravity type, was bent and did not cover the opening of the load hook which allowed the hook to fall free of its attachment to the bucket. The hydraulic line, used for opening and closing the bucket, was still attached to the bucket.

When the bucket disengaged it fell into the excavation and struck the decedent in the area of his back. It rolled over him and pinned him against the trench shield. His hard hat had been knocked off but when found later was undamaged. The crane operator exited the crane and entered the excavation to help his co-worker. An employee of the bank located adjacent to the excavation called 911. The fire department was dispatched at 3:09 p.m. Upon arrival a few minutes later, paramedics entered the excavation where they found the decedent and his co-worker. The decedent was located on the south side of the excavation in a compressed down position between the bucket and the power unit for the drilling auger. The paramedics noted massive body damage and began to treat the decedent. A basket was lowered into the excavation and the decedent was placed on it. The crane's load line was used to lift the basket out of the excavation and the decedent was transported to a local hospital. Upon arrival at the hospital the decedent was found to have no respiration, pulse or blood pressure. The employee was pronounced dead at 4:01 p.m.

CAUSE OF DEATH

The death certificate stated the cause of death to be intrathoracic and abdominal hemorrhage due to multiple crushing internal injuries and blunt force trauma to the chest and abdomen.

RECOMMENDATIONS/DISCUSSION:

Recommendation #1: Employers should assure lifting equipment is inspected and repaired before use.

Discussion: In this incident the safety latch attached to the load hook of the truck-mounted hydraulic crane was defective. It had been bent at some point and no longer covered the opening in the hook. With the opening in the hook uncovered, release of tension of the load line when the load is snagged can cause it to disengage from the hook. That is what happened in this case. Although the employer had numerous documents demonstrating that his equipment was frequently inspected and certified as required, the load hook's defective safety latch was not discovered prior to this incident. Documents received by the CA\FACE investigator did not

designate the load hook for inspection. The load hook was not new and had to be cut off with a torch because the nuts on the pin which attached it were badly damaged.

The safety latch was a gravity type which closed when the hook is in a vertical position by falling into place. This is an inappropriate type of safety latch. A spring-loaded safety latch is recommended for this type of operation. If a proper operating safety latch was used during this operation, this fatality most likely would not have happened.

Recommendation #2: Employers should avoid lifting equipment and loads over the heads of employees.

Discussion: Lifting loads over employees is a dangerous maneuver. It is sometimes necessary, but often it is not. In this incident, the decedent was in the excavation to help guide the bucket to the soil which was to be scooped up. In these situations it is best to stand away from the bucket or at the top of the excavation and give the crane operator hand signals to achieve the proper placement of the bucket. The type of hydraulic crane used in this incident is fully capable of placing the load line, and, therefore, the bucket, directly over the pile of soil with the use of hand signals from another employee. It would not be necessary to manually guide the bucket to the pickup area. If the decedent had moved out of harm's way prior to the lowering of the bucket, this incident may not have happened.

Recommendation #3: Employers should develop a written daily checklist for inspecting equipment.

Discussion: Although the employer had checkoff sheets for various parts of the truck-mounted crane, such as water, oil, tires and horn, there were no area for checking off the load hook, safety latch, sheaves, load line, etc. These are all parts that wear or can become damaged and should be inspected on a daily basis. Developing and having trained employees use a checkoff sheet to inspect lifting equipment on a daily basis may prevent incidents of this type.

References:

Barclays Official California Code of Regulations, Vol. 9., Title 8, Industrial Relations. South San Francisco, CA, 1990.

Dickie, D.E., Crane Handbook, First Edition, Construction Safety Association of Ontario publications, 1978

MacCollum, David V., Crane Hazards and Their Prevention, First Edition, ASSE publications, 1993

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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, Georgia, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Ohio, Oklahoma and Wisconsin.

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

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