

TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Heavy equipment operator dies when excavator slips down a hill and becomes buried in mud

SUMMARY
California FACE Report #97CA005

A 39-year old heavy equipment operator (decedent) died when his excavator slid over a hill and was buried in mud. The decedent was scooping mud from a desilting pond with the excavator bucket and placing the mud in a scraper/loader. He was working at the edge of a 20-foot embankment with his tracks parallel to the edge of the hill. The decedent had just dumped a load of mud into the scraper/loader. As he swung the bucket around to pick up another load of mud, the track of the excavator nearest the scraper/loader lifted off the ground. As the decedent was attempting to stabilize the excavator, it slid down the side of the hill and the cab side was buried in the mud. Before the heavy equipment operator could be extricated from the cab, he was suffocated by the mud. The CA/FACE investigator concluded that, in order to prevent future occurrences, employers should:

- . ensure when equipment operators are working at the edge of an embankment the tracks of their machine are placed a safe distance away from the edge.
- . implement a formal, written program that provides the correct procedure for operating an excavator.

INTRODUCTION

On February 20, 1997, at 11:30 a.m., a 39-year old male heavy equipment operator was fatally injured when he was buried in mud while in the cab of the track-driven excavator he was operating. The excavator was working from the top of a 20-foot embankment. The equipment operator was using the excavator's bucket to scoop mud from a pool of mud at the bottom of the embankment and loading the mud into a scraper/loader. When the operator swung the bucket around to fill the bucket with mud, the track nearest the scraper lifted off the ground and the excavator slipped down the hill and into the mud.

The CA/FACE investigator learned of this incident from a newspaper article on February 21, 1997. The CA/FACE investigator traveled to the site of the incident on February 26, 1997 where he met with a representative of the sub-contractor for whom the decedent worked and a

representative of the company that maintained the excavator. The CA/FACE investigator interviewed the sub-contractor's representative and photographed an operation similar to the one being performed by the decedent. Later that morning, the CA/FACE investigator traveled to the maintenance yard to inspect and photograph the excavator. He also interviewed the vice-president of the maintenance company.

The employer was a pipeline construction sub-contractor and had been in business for 6 years and 2 months. The company had 20 employees with 5 working on site at the time of the incident. The decedent had been working for the company and at the site of the incident for 3 days. Company foremen on the job were assigned safety responsibilities. The company representative stated that the foremen devoted 50% of their work time to safety. The company held bi-monthly safety meetings for employees. The company did not have written procedures for the task being performed. The decedent had not received training from the company, but according to the employer his skill level in operating an excavator was evaluated and was considered adequate at the time of hire. The decedent had been a heavy equipment operator for 15 years. No certification was necessary to operate the type of excavator involved in this incident.

INVESTIGATION

The site of this incident was a new residential home development within a number of hills and valleys. Within the development was a desilting pond or catch basin used to capture and hold water and soil runoff (see **Exhibit 1**). The pond was approximately 100 yards long by 60 yards wide. It was filled with mud due the mixture of rain and soil that was directed into it. The pond was at the bottom of a 20-foot tall embankment. The mud pond varied in depth and appeared to be approximately eight feet deep in some areas. The decedent was operating the excavator on the compacted soil at the top of the embankment.

The excavator was being used to scoop the mud into its bucket (see **Exhibit 2**) and then place it into a scraper/loader (see **Exhibit 3**). When the scraper/loader was filled to capacity, it would proceed to an open area where the mud would be spread to dry. The dried mud would later be used as fill soil. A bulldozer was used to push the mud from different areas of the desilting pond to the area in which the excavator was operating (see **Exhibit 4**).

The excavator was a 68,000 pound, track-driven machine using a 13-foot, 3-inch boom attachment having a 2 1/8 cubic yard bucket. The boom was articulated at the attachment point. The maximum digging radius of the boom was 38 feet, 11 inches. The bucket could be lifted a maximum of 34 feet, 7 inches above the ground level and the excavator had a maximum dumping height of 24 feet, 6 inches.

According to witness statements, the decedent was operating the excavator with its tracks pointing east and west which was parallel to the edge of the embankment. The decedent would operate the excavator's controls so that the bucket would scoop mud from the desilting pond while the boom was extended in a southerly direction. He would then swing the excavator's bucket around to the west to miss the scraper/loader cab and dump the mud with the boom extended in a northerly direction.

A scraper/loader arrived to receive a load of mud. The decedent used his normal

procedure to dump a load of mud into the scraper/loader. As the decedent swung the bucket back to the west and south, the northern-most track of the excavator lifted. According to witness statements, the decedent tried to swing his boom around to the south and drop it down to stabilize the excavator. Before he could do that the excavator began to slide down the embankment and was buried in the mud (**see Exhibits 5 and 6**). The decedent could not get out of the cab and was buried in the mud.

According to the company representative statements, the bulldozer in the desilting pond was used to keep the excavator from possibly sinking deeper into the mud. Another excavator was brought from another location in the development, but it took about 20 minutes to arrive.

Emergency services were called by a witness with a cellular phone. Paramedics received the call and were dispatched at 11:33 a.m. They arrived at the site at 11:44 a.m. They finally were able to locate the decedent in the mud at 12:17 p.m. and pronounced him dead at 12:25 p.m.

Subsequent investigation, including interviews with two independent heavy duty equipment operators, revealed that the most probable cause of the incident was that the operator swung the bucket too quickly and at too low of an angle. It is also likely that the hillside gave way partially when it experienced the surcharge load of the excavator while it was supported only by the southernmost track (nearest the edge of the embankment).

CAUSE OF DEATH

The death certificate stated the cause of death to be suffocation.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure when equipment operators are working at the edge of an embankment that the tracks of their machine are placed a safe distance away from the edge.

Discussion: The excavator used in this incident was positioned with its tracks parallel to the embankment. Although this is not unusual, the excavator could not make the best use of its counterweight and the weight of the excavator itself. If the tracks were perpendicular to the edge of the embankment and the front of the tracks did not protrude over the edge, more of the excavator's weight would be placed further from the edge of the embankment. Where the track length achieves a base of 15 feet, 11 inches, its width only has a base of 11 feet, 2 inches. Additionally, the counterweight would be positioned over a more stable base when the boom and bucket would be in positions that would have the most potential for tipping the excavator. When the tracks of an excavator are positioned parallel to the edge of an embankment, there is a greater risk that the track nearest the edge may cause the embankment to give way which could result in loss of excavator stability. If the excavator was positioned with its tracks perpendicular (north and south), the additional stability of the excavator may have prevented this incident from happening.

Recommendation #2: Employers should implement a formal, written program that provides the correct procedure for operating an excavator.

Discussion: There were no written company safety rules or procedures in place for the task being performed by the decedent who had been on the job only three days. He did not receive training for the specific job he was hired to perform. He was evaluated and his performance was considered adequate at the time of hire. It is unknown why the decedent began operating the excavator parallel to the edge of the embankment instead of perpendicular. The company representative stated that the operation was to be performed with the tracks perpendicular to the edge of the embankment. It is also unknown why his inappropriate operation of the excavator in this incident was not corrected by management. If a formal, written safety program was in place and, as part of the program, excavator operators were provided training in the safe and correct operation of an excavator, this incident may not have happened.

References:

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

MacCollum, David V., Construction Safety Planning, Van Nostrand, Reinhold, 1995

Operating Techniques for the Tractor, Loader, Backhoe, Gary Ober, Ober Publishing, Northridge, CA

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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, Colorado, Georgia, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Wisconsin, and Wyoming.

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

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