TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Operator dies when his front-end loader falls into an excavation and crushes him in California.

SUMMARY
California FACE Report #96CA010

A 61-year old male front-end loader operator (victim) died after being crushed by his loader. The front-end loader, which was equipped with a rollover protective structure (ROPS), was being used to move construction materials for recycling. The victim, who had not used the front-end loader before, had picked up a load of metal and was moving it to a large dumpster. When positioning the loader near the dumpster, the victim backed it too close to the edge of a 15-foot deep excavation which was used as a ramp for loading materials into trucks. When the loader began to fall into the trench, witnesses observed him trying to jump from the cab into the clear. The operator fell into the bottom of the excavation and the loader fell on top of him. The operator had not been wearing his seatbelt before he jumped out of the cab. There was no operator manual in the cab and the company did not provide any training for the victim on the operation of the front-end loader. The CA/FACE investigator concluded that, in order to prevent future occurrences, employers should:

· Assure that ROPS equipped-backhoe operators stay in their machines, with their seatbelts fastened, when the backhoe may be in danger of falling or rolling over.

· Assign an employee to traffic control where moving machinery must operate in confined areas.

· Delineate the perimeter of excavations in areas where moving machinery must operate.

· Train employees, including periodic refresher training, in the operation of machinery before they use it on the job.

· Perform an initial hazard assessment of the job prior to beginning work.

Additionally, manufacturers should:

· Install seatbelt interlocks so that machines of this type cannot be started or operated without the seatbelt properly fastened.

INTRODUCTION

On August 5, 1996 at 2:50 p.m., a 61-year old male trainee recycling sorter was crushed when he jumped from the cab of his front-end loader and it fell on him. He was declared dead at 3:32 p.m. Witnesses observed the victim jump when the front-end loader began to fall into an excavation. He landed in the bottom of the excavation and the front-end loader fell on him. The CA/FACE investigator learned of the incident on August 8, 1995 from a local district office of the California Division of Occupational Safety and Health. The CA/FACE investigator traveled to the site of the incident on August 8, 1996 and met with the yard supervisor and lead worker. On September 4, 1996, the CA/FACE investigator met with company owners and the company's program administrator. He also traveled to the site of the incident on September 10, 1996 to photograph the front-end loader when it was extricated from the excavation. A copy of the police report, fire/paramedic report, coroner's report, death certificate, and CAL/OSHA form 36 were obtained by the CA/FACE investigator.

The recycling company had been in business since April of 1995 in its present organizational structure and, in a different structure, since 1989. They had been working at the site where the fatality occurred for approximately one and one-half years. The victim had been working for this company 10 days, all at this job site. The company employs 8 people, 4 of whom were working at the site at the time of the fatality. The employer stated that safety was the responsibility of the yard supervisor, but could not state what percentage of his time was spent on safety. The employer also stated that the employee was on three months probation, but there was no system for documented review. Safety meetings were held monthly, but the employer could not provide written documentation. The employer stated that the last safety meeting was held five days before the incident. The employer stated that safety inspections were held every two weeks, but could not provide written documentation for this. The employer had not provided the victim with general or specific training with regard to his job duties. The victim did pass a performance review three days prior to his hire date. The employer stated that there was a weekly inspection of the front-end loader, but could not provide a checkoff list or other written documentation for this.

INVESTIGATION

The site of the incident was a recycling yard in a remote, somewhat rural location. The site consisted mostly of huge piles of construction materials to be recycled. Included for recycling were metal, wood, cardboard, concrete and dirt. The metal, wood and cardboard are sorted and recycled. The other materials are sent to the local dump. A dirt road provides access to the working area. At the west end of the road is an excavation dug north to south as a ramp for trucks to back down and be loaded. The excavation was approximately 190 feet long, 19 feet wide and 15 feet deep at the south end (Exhibit 1). It had been dug just a few days before the incident.

The decedent had been hired as a sorter on July 22, 1996. His job entailed separating construction waste materials by hand. Prior to the incident, he also drove a small backhoe to sort and transport materials. His employer stated that he was not instructed to use motorized equipment, only perform manual labor.

On the day of the incident, the decedent had been performing his duties as normal. However, the backhoe broke down and was unusable. With the knowledge of his employer, he began to operate the front-end loader involved in this incident (Exhibit 2). The decedent had used the front-end loader for approximately 3 or 4 hours. He then picked up a load of construction waste metal with the front bucket of the loader. The metal was required to be placed into rolloff dumpsters for later recycling. He moved the front-end loader, with the metal in the bucket, toward the dumpster. The dumpster was located approximately thirty feet to the west of the west wall of the excavation near the south end. The loader had to be driven from the south area of the yard, to the north and slightly west to the dumpster. In order to dump the metal into the dumpster, the loader had to be moved forward and then backed up to achieve proper alignment.

When the decedent backed the loader up, its rear wheels got too close to the edge of the west wall of the excavation (Exhibit 3). When the loader began going over the edge, the decedent was observed to jump from the cab. He tried to land on the ground above the excavation, but fell into the bottom. The loader followed him, with the rear wheels running over the edge of the west wall. The loader fell on the decedent and he was pinned under the loader from his waist down (Exhibit 4). The lead worker, responsible for managing the yard, heard the crash and turned around to see the loader in the excavation. He yelled to another worker to call 911. He and another worker ran to the north side of the ramp and down the ramp to the south end where the decedent was pinned. One witness stated that they drove a second loader down the ramp to attempt a rescue. The lead worker said no second piece of equipment was used. Although the backhoe was disabled, there was a small bulldozer on the premises.

The decedent's co-workers attempted to dig the decedent out by hand from underneath the loader. When they were able to free him, they carried him to the north end of the ramp to await emergency services. The fire department was dispatched at 2:55 p.m., arriving at 3:03 p.m. The victim was found to have no pulse and agonal respirations. CPR was begun and an intravenous line established. He was airlifted by helicopter from the site and transported to a local hospital where he was pronounced dead at 3:32 p.m.

CAUSE OF DEATH

The coroners report stated the cause of death to be traumatic injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should assure that ROPS equipped-backhoe operators stay in their machines, with their seatbelts fastened, when the backhoe may be in danger of falling or rolling over.

Discussion: The front-end loader operator in this incident did not have his seatbelt fastened. The seatbelt would not latch and it appeared that the seatbelt had not been used recently. When the loader was thought to be in danger of falling into the excavation, the decedent jumped from the cab. His loader was equipped with a proper, factory-installed ROPS which is designed to

protect the operator's station in the event of a fall or rollover. Had the backhoe operator kept his seatbelt fastened and remained in the cab, he most likely would have suffered little or no injuries.

Recommendation #2: Employers should assign an employee to traffic control where moving machinery must operate in confined areas.
Discussion: The area for maneuvering the front-end loader in this incident was limited. No traffic control was in place when this incident happened. Two-way radios were available and were used for traffic control for incoming and outgoing trucks. The front-end loader was not equipped with a two-way radio and a hand-held was not used. If radios or a signal man were used to warn the front-end loader when he was coming in close proximity to a hazard, such as the excavation, this incident most likely would not have happened.

Recommendation #3: Employers should delineate the perimeter of excavations in areas where moving machinery must operate.
Discussion: In this incident, the excavation's perimeter was open with no warning system or barriers in place. It is difficult for operators to see the exact position of large vehicular equipment such as front-end loaders, especially when backing. Although the loader had right, left and center mirrors, perception of the ground would still be difficult. In this case the rear tires came too close to the edge of the west wall of the excavation and the loader fell into the excavation. If the perimeter of the excavation had been provided with barriers such as concrete K-rails or with delineators, cones or barrier tape, the decedent may not have moved the loader so close to the edge of the excavation.

Recommendation #4: Employers should train employees, including periodic refresher training, in the operation of machinery before they use it on the job.
Discussion: The employer in this incident stated that the decedent did not receive training on the use of the front-end loader he was operating. Moreover, he was not authorized to use any vehicular equipment including both the loader as well as the backhoe. There was no operators manual available in the cab or in the company office for this loader. Employees should be trained in their job, including safety precautions, when first hired, when assigned new tasks or when the job tasks are modified. Employers should not allow the use of machinery and equipment by employees until they are trained in their proper use. Employers should take steps, including discipline, to ensure unauthorized use of equipment does not occur. Although a generic checkoff sheet was available which revealed the decedent had a performance evaluation three days prior to being hired, the employer indicated it was not training specific to the job the decedent was performing. If the decedent had been properly trained in the use of the front-end loader and certified that he could operate it safely, this incident may not have happened.

Recommendation #5: Employers should perform an initial hazard assessment of the job prior to beginning work.
Discussion: The employer stated that they had not performed a hazard assessment of the area to

describe all of the hazards for the decedent, especially with regard to operating machinery near an open excavation. Employers should inform their employees about the hazards of their job and work area. Had the employer informed the decedent of the hazards of operating large machinery near open excavations, this fatality may not have occurred.

Recommendation #6: Install seatbelt interlocks so that machines of this type cannot be started or operated without the seatbelt properly fastened.
Discussion: Operators often neglect to fasten their seatbelts when operating machinery of the type involved in this incident. This front-end loader was equipped with a roll-over protective structure (ROPS). It is unlikely that an operator would be seriously injured if a ROPS vehicle rolled over with the operator in his/her seat with his seatbelt properly fastened. This suggests that manufacturers should install interlocks which prevent the starting or operation of the vehicle until the operator properly fastens the seatbelt. Since the cab of the front-end loader was intact after this incident (see exhibit 5), it is likely that the operator would not have been seriously injured if he would have had his seatbelt properly fasten and remained in the vehicle.

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

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

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

Richard W. Tibben, CSP
FACE Investigator

Robert Harrison, MD, MPH
FACE Project Officer

Judie Guerriero, RN, MPH
Research Scientist

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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.

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

California FACE Program
California Department of Health Services
Occupational Health Branch
850 Marina Bay Parkway, Building P, 3rd Floor
Richmond, CA 94804