TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Maintenance Mechanic Dies after Spreader Beam Falls and Crushes Him in California

SUMMARY
California FACE Report #96CA004

A 41-year-old male maintenance mechanic (the victim) died after a 2,180 pound spreader beam fell on him at work. The victim and two of his co-workers had planned to use the spreader beam in conjunction with a crane to lift a front-end loader so that the brakes could be replaced. The victim had informed his co-worker that he was going to walk over to the area of the facility where the spreader beam was located. The spreader beam was stored in a narrow alleyway, leaning unsecured against a wall. After approximately 15 minutes, a foreman went to find the victim and discovered him under the spreader beam with his back pinned against a shed. The foreman checked the victim for pulse and spontaneous respirations, could not detect either, and ran to call emergency services. There were no witnesses to the incident. The victim's co-workers stated that they thought the victim may have been trying to attach a shackle to the beam when the incident occurred. The victim had one shackle in his tool box and one was found on the ground near where the victim was located. Co-workers stated that the victim always carried two shackles in his tool box. Paramedics arrived in approximately five minutes and could not detect spontaneous respirations or a pulse. The CA/FACE investigator concluded that in order to prevent similar future occurrences employers should:

- require that heavy equipment be secured to minimize the risk of injury.
- develop, implement, and enforce a comprehensive safety program which includes, but is not limited to, training employees in hazards recognition and avoidance, and safe work practices, including task-specific procedures.
- evaluate their work practices and ensure that safe methods are used.

INTRODUCTION

On March 20, 1996, a 41-year-old maintenance mechanic died when a 2,180 pound spreader beam fell and crushed him. The CA/FACE investigator was informed of this incident by the county coroner's office on March 26, 1996. A site visit and employer interview were conducted by the CA/FACE investigator on April 2, 1996. Photographs of the incident site were taken at that time. Copies of the California Division of Occupational Safety and Health (Cal/OSHA) report, the coroner's autopsy report, police report, and paramedic's report were obtained by the FACE investigator.

The employer in this incident was a sand and gravel production company which had been in business at this location for approximately seven years. The facility occupied approximately

425 acres. The employer stated that the area where the victim had been working at the time of the incident was his normal working area. The victim had worked for his employer for approximately five months. Before his employment with his current employer the victim had worked for 14 years with a similar sand and gravel operation which was owned by the same company. The employer stated that the victim was familiar with the operation which was being conducted at the time of the incident. At the time of the incident, the company employed 36 workers. This number varied during certain times of the year and could reach as many as 40 workers during peak operations. The company had an Injury and Illness Prevention Program (IIPP) which emphasized on-the-job safety training. The IIPP was in compliance with Title 8 of the California Code of Regulations section 3203. The on-the-job training was described by the employer as being a one-on-one approach with supervisors and employees. There are three individuals in charge of safety at the site and the employer estimated that each devoted a third of his time to safety issues. The IIPP contains a provision for ensuring safe work practices by employees through the use of disciplinary measures: an initial verbal reprimand, followed by a written warning and then suspension.

INVESTIGATION

On the day of the incident, at approximately 10:00 a.m., the victim and two co-workers were about to use a spreader beam in conjunction with a crane to lift the back end of a front end loader. The employer stated that the brakes on the front-end loader had shown signs of wear and were in need of replacement. Replacing the brakes required that the back of the front-end loader be lifted off the ground, the axles removed, and the brakes replaced (**Exhibit 1**).

The victim had been assigned the task of removing the axles on a front-end loader. He and a co-worker had been instructed by their foreman to use the spreader beam in conjunction with a crane to lift the front-end loader and remove the axles. The foreman then left to go to an automotive dealership to obtain needed parts for the job. The victim and his co-worker discussed how the spreader beam was to be used for the job. They were also involved in preparing the front-end loader for the job. At approximately 10:00 a.m. the victim informed his co-worker that he was going to drive the company truck to the area where the spreader beam was located. The co-worker continued to prepare the front-end loader. The spreader beam was located in an area where the victim was accustomed to working. The beam was stored in an alleyway (five feet wide) between two large converted shipping containers (**Exhibit 2)** which were used for storage.

The spreader beam is made of one inch steel construction, 16 feet long by four feet high, weighing 2,180 pounds. The top corners of the beam are beveled to an approximate 60 degrees towards the center. A large square opening is cut into the one inch steel plate at the center where a lifting clamp (shackle) is placed to accommodate a lifting hook from the crane. Six inches from the bottom of the metal plate are steel shoulders extending approximately three inches from each side of the plate. These shoulders extend along the entire length of the plate (**Exhibit 3**). The beam was stored with its long edge on the ground, in an upright, unsecured position, leaning against the external south wall of the northern most storage container. The employer stated that the beam had been moved to this location because it was considered to be a safe area for storage. He further explained that the spreader beam had previously been stored lying down in another area. However, the employer had deemed this unsafe because on one occasion a truck had backed over it causing it to flip upright and then to fall back to the ground. The employer also

stated that the spreader beam was not used often, so the storage area between the trailers was thought to be a better location.

After 15 minutes or so, at approximately 10:15 a.m. the victim's foreman returned from the automobile shop and asked the victim's co-worker where the victim was. The foreman then went to look for the victim and found him at approximately 10:18 a.m., trapped beneath the spreader beam. The victim was found in a crouched position with his back against the north wall of the southern most storage container. The top edge of the spreader beam was resting against his lower neck. Both of the victim's hands were positioned consistent with an attempt to push the beam away from him. The space between the two containers is an alleyway approximately five feet wide and the containers are approximately fifty feet long. The foreman checked the victim for pulse and spontaneous respirations but could detect neither so he ran to a nearby shop (mechanics' garage) and called for someone to call emergency services. The foreman then ran out of the shop to use the crane to move the spreader beam off of the victim. He stated that it took approximately four minutes to get the crane over to where the victim was located. When the spreader beam was removed from the victim, his body fell from a crouched position against the container to the ground. Police arrived in approximately two minutes, and paramedics in approximately five minutes at 10:27 a.m. The paramedics checked the victim for pulse and spontaneous respirations but could detect neither.

The employer stated that the victim was the last person to use the spreader beam, prior to this incident, and that he was the only one who knew whether a shackle (device used to accommodate a lifting clamp on a crane hook) had been placed on it or not. He further stated that the victim had no reason for attempting to remove or place the shackle on the spreader beam by himself, as he knew that this operation required at least two men. However, a shackle was found close to the victim's body. The victim was known to have carried two shackles in his tool box at all times. There was only one shackle found in his tool box after this incident. No one witnessed the incident. The most likely scenario is that the bar fell against the victim while he was attempting to attach a shackle.

CAUSE OF DEATH

The coroner's autopsy report stated the cause of death to be asphyxia due to blunt force trauma.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should require that heavy equipment be secured to minimize the risk of injury.

Discussion: In this incident, the victim had been instructed by his supervisor to use a spreader beam in conjunction with a crane to lift a front-end loader so that the brakes could be repaired. In order for the spreader beam to be used with the crane a shackle must be attached to the beam. The crane hook is then placed in the shackle and the beam can be lifted. The most likely scenario in this incident was that the spreader beam fell against the victim while he was attempting to attach a shackle. This incident may have been prevented if the spreader beam had been placed on the ground or secured to the storage container. Placing the spreader beam on the ground would have prevented it from falling. A cable could have been used to secure the spreader beam to the storage unit. Under Title 8 of the California Code of Regulations, section 3328 (e), Machinery and Equipment, "Machinery and equipment components shall be designed, secured, or covered to minimize hazards caused by breakage, release of mechanical energy (e.g., broken springs), or loosening and falling."

Recommendation #2: Employers should evaluate their work practices and ensure that safe methods are used.
Discussion: In this incident, the victim attempted to work unaided with a massive, unsecured beam. This was not in accordance with the employer's policy that required two workers be present when working with the beam. While the victim's actions probably contributed to his own death, given the mass of the beam and its inherent unstable configuration, the incident may even have occurred with two workers present. It is inherently hazardous to work near large, unstable, unsecured objects. Operations involving massive objects require methodical, comprehensive planning and implementation to ensure worker safety. A thorough evaluation of work practices by the employer might have revealed the inherent danger of the practice.

Recommendation #3: Employers should develop, implement, and enforce a comprehensive safety program which includes, but is not limited to, training employees in hazard recognition and avoidance, and safe work practices, including task-specific procedures.
Discussion: In this incident the victim did not comprehend the risk of attempting to work on the unsecured spreader beam without mechanical assistance, or he understood the risk but was not sufficiently motivated to stop. The safety training the victim received had been on-the-job. This type of training is often uneven in its depth and breadth due to lack of structure, and could have contributed to lack of comprehension by the victim. At any worksite, motivation to follow safe work practices is in part due to the progressive disciplinary system for safety violations. Since the standard protocol at the site was for two workers to be present when working on the beam, and the victim went on to work on the beam by himself, there is some question whether or not the employer's discipline system was effective. The victim's death may have been prevented if the employer's safety program had been more comprehensive.

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

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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:

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