TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Maintenance welder dies when his electric cart is struck by a forklift in California

SUMMARY
California FACE Report # 99CA003

A 49-year old male maintenance welder (decedent) died when he was run over and crushed by a forklift. The decedent and his co-worker had loaded oxyacetylene and electric arc welding units onto an electric cart. The decedent drove the cart as they proceeded to their destination down a roadway located in the facility's concrete pipe storage area. As they were traveling west they encountered a forklift traveling east on the same roadway. Just before the electric cart and forklift passed each other, the forklift driver turned left into the cart. The decedent and his co-worker were thrown from the cart. The forklift ran over the decedent. The co-worker was thrown clear of the forklift's path and received cuts and bruises. The forklift was being driven with the load held high. The electric cart did not have a high warning flag to increase its visibility. 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 employees drive forklifts with the forks as low to the ground as is safe**.**

. equip electric carts and similar small vehicles with high warning flags.

Manufacturers and/or employers should:

. equip electric carts and similar small vehicles with a rollover protective structure and seat belts.

INTRODUCTION

On April 7, 1999 at 12:40 p.m. a 49-year-old male maintenance welder was fatally crushed when he was run over by a forklift. The decedent was riding on an electric cart with a co-worker when the cart was struck by the forklift. The decedent and his co-worker were thrown onto the ground. The forklift ran over the decedent, crushing him. The CA/FACE investigator learned of this incident on April 9, 1999 from the local legal office of the California Department of Industrial Relations, Division of Occupational Safety & Health (Cal/OSHA). On April 13, 1999 the CA/FACE investigator traveled to the incident site where he met with a company

representative in charge of safety who was interviewed. The CA/FACE investigator took photographs of the site. On May 13, 1999 the CA/FACE investigator traveled to the incident site where he interviewed the executive vice president and photographed the forklift and electric cart involved in this incident.

The employer, a concrete pipe manufacturer, had been in business for 10 years and 11 months at the time of the incident. The total number of employees in the company is 87. There were 75 employees working at the site at the time of the incident. The decedent had worked for the company for 3 years at the time of the incident.

The company had a written Injury and Illness Prevention Program (IIPP) and a code of safe practices. On February 26, 1999 all available employees, including those who do not drive forklifts, attended a forklift certification class given by safety consultants hired to present the training program. The forklift operator involved in this incident was re-certified to operate forklifts at that time. Regularly scheduled safety meetings were held once a week by company management and safety consultants presented monthly safety meetings.

INVESTIGATION

The scene of this incident is a 45-acre expanse of land on which are situated several office buildings, an equipment maintenance building, a pipe manufacturing plant and many storage areas for concrete pipe. The pipe ranged in diameter from 18 inches to 144 inches. In the area of the incident, the smaller diameter concrete pipes were stacked on either side of a paved roadway. Access to the stacks of pipe is by wide, dirt areas off an approximately 20-foot wide, paved roadway (**exhibit 1**).

Traffic in the yard consisted of tractor-trailer rigs used to transport the pipe, forklifts (the company had 30), pickup trucks and electric carts. Forklifts are used to transport the concrete pipe from one area to another and to load it onto the bed of the trailers.

On the day of the incident, the decedent and his co-worker loaded oxyacetylene welding and electric arc units onto a 3,585 pound (2,000 pound load capacity) electric cart (**exhibit 2**) so they could transport it to a work area. During the same period, the operator of a 45,010 pound (36,000 pound capacity) forklift (**exhibit 3**) was loading and moving stacks of 18-inch diameter concrete pipe that were 8-feet long. The forklift operator would pick up a load of pipe and transport it to the stacking area by using the roadway and then turning off the roadway onto the dirt area between the stacks to offload.

According to the manager interviewed, the cart and forklift involved in this incident passed once prior to the incident. The drivers acknowledged one another. Just before the incident, the forklift operator picked up a stack of five of the 18-inch diameter concrete pipes. He picked up the load high and carried it, tilted back, with the front of the forks and load at 63 inches above ground level and the rear of the load at 58 inches above ground level. He was traveling east on the roadway with the load as he headed toward a stacking area. At the same time, the cart with the decedent driving and his co-worker as the passenger, headed west on the same roadway.

As the forklift and cart approached one another at, the forklift operator did not see the cart because the load of pipes was blocking his view. The speed of the vehicles involved was

stated to be normal, safe speeds for the yard, but was not able to be specifically determined. As the forklift made a left turn into the open space between the stacks of pipe, one of the concrete pipes grazed the top of the arc welding unit. As the forklift continued, it struck the cart. The decedent and his co-worker were thrown off the cart and onto the ground. The decedent was thrown off the left side of the cart and run over and crushed by the wheels of the forklift. The cart was spun nearly 180 degrees around. The co-worker and cart were thrown away from the forklift and ended up near a stack of pipes to the east of the collision.

Two-way radios were used to call the office personnel, who called 911. First aid was not provided to the decedent because of the seriousness of his injuries. His co-worker refused attempts at first aid stating that he was okay.

Paramedics were dispatched at 12:55 p.m. and arrived at 12:59 p.m. They found the decedent to have no pulse or spontaneous repirations. He was pronounced dead at the scene.

CAUSE OF DEATH

The cause of death according to the certificate of death was massive crush injury of torso.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure employees drive forklifts with the forks as low to the ground as is safe.

Discussion: The forklift involved in this incident was being driven with the load of pipes being held high, 63 inches, off the ground. Company policy states that loads should be transported with the forks held as low to the ground as is safe. If the load needs to be held high and blocks the forklift operator's vision, the forklift should transport the load with the forks following. In this instance, the load could have been lowered so the forks were close to the ground. With the load in this position, the operator's forward vision would have been unobstructed. If the load of concrete pipes had been transported with the forks low to the ground, this incident may not have happened.

Recommendation #2: Employers should equip electric carts and similar small vehicles with high warning flags.

Discussion: Compared to other traffic in the yard, the electric-powered carts are small and, therefore, much less visible to the larger vehicles (forklifts and tractor-trailer rigs, e.g.). The electric carts are not equipped with a high visibility warning flag that could alert operators of larger vehicles to their presence. All of the electric carts should be equipped with high visibility warning flags. If this electric cart involved in this incident had been equipped with a high visibility warning flag, the forklift operate may have seen it and this incident may not have happened.

Recommendation #3: Manufacturers and employers should equip electric carts and similar small vehicles with a rollover protective structure and seat belts.

Discussion: The electric cart involved in this incident was not equipped with seat belts or a rollover protective structure. In areas where such electric carts are used around larger pieces of mobile equipment, it is especially important to consider the installation of a rollover protective structure and seat belts. In case of a collision with a larger piece of equipment, the seat belts would most likely allow the driver and passenger to stay in the electric cart. This is almost always preferred to being thrown out of a vehicle. The rollover protective structure would protect the driver and passenger in instances where the collision causes the cart to roll over.

References:

Barclays Official California Code of Regulations, Vol. 9, Title 8, Industrial Relations, South San Francisco, 1998
For general information regarding forklift operation refer to:
http.www.dir.ca.gov./title8/3650.html; /3664.html

Essentials of Material Handling, U.S. Department of Labor, Occupational Safety and Health Administration, 1978

Forklift Safety Training, *Professional Safety*, American Society of Safety Engineers, January 1993

The New Professionals, Rules for Safe Industrial Truck Operation, Clark Equipment Company, Battle Creek, MI, 1983

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September 7, 1999

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the California Public Health Institute, 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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