TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: A Welder Dies When the Diesel Fuel Tank He was Welding Explodes

SUMMARY
California FACE Report #07CA006

A 25-year-old Hispanic welder died from injuries received from an explosion of a diesel fuel tank he was welding. The victim had just struck an arc with the welding torch when the explosion occurred. He was making a repair to a diesel tank mounted on the bed of a pick-up truck. The diesel tank still had fuel in it. The victim did not correctly purge or ventilate the fuel tank before beginning to weld. The company had no documented safety or training programs available for the employees to follow. The CA/FACE investigator determined that, in order to prevent future occurrences, an employer should:

- Develop, implement, and enforce procedures for welding on fuel tanks.
- Establish and maintain an Injury and Illness Prevention Program (IIPP) in language employees can comprehend.
- Establish and maintain training and testing programs that verify and document an employee's achievement of skills.

INTRODUCTION

On May 19, 2007, at approximately 11:00 a.m., a 25-year-old Hispanic welder died from an explosion of a fuel tank on which he was welding. The CA/FACE investigator learned of this incident on May 22, 2007, from the Los Angeles Department of Coroner's post mortem reports. Contact with the victim's employer was made on June 12, 2007. On June 14, 2007, the CA/FACE investigator and a Spanish language interpreter traveled to the company that employed the victim and interviewed the company owner and other employees in the shop. Photographs of the incident scene were taken. The employer of the victim was a welding and repair shop for heavy duty trucks. The company had been in business for over 24 years, 13 of those years at the site of the incident. The employer of the victim employed four people. The victim had worked for the company for 16 months.

The victim was born in Honduras and had been in the United States for three years. He had an eighth grade education and did not speak English. It is unknown if he had any welding experience previous to this job. The company did not have a safety program or an IIPP. The company did not have a training program that provided safety training to

employees in the language spoken by the employees. The company's owner was born in Mexico and learned welding through on-the-job training (OJT) from his father. Employees of the company were trained in welding by the owner and there was no other formal training/testing program.

INVESTIGATION

The site of the incident was a service bay in a welding and repair shop for heavy duty trucks. On the day of the incident the victim was assigned the job of locating a leak in a diesel fuel tank mounted on the bed of a customer's pick-up truck. Once the leak was located, the victim was supposed to weld the spot using a welder referred to as a MIG/Flux Welder. According to the owner, the customer told him that the tank was used for carrying diesel. Neither the owner nor the victim verified the contents of the tank. According to the police report, the tank had less than one cup of fuel in it. The victim did not purge and ventilate the fuel tank before beginning to weld. When the victim struck an arc with the welder on the tank, it exploded. The victim was thrown approximately ten feet and he landed on the shop floor. Coworkers in the shop area who heard the explosion rushed to the victim's aid and immediately called 911. The paramedics and fire department arrived within minutes and treated the victim, then transported him to a local hospital where he died from his injuries.

CAUSE OF DEATH

The cause of death, according to the death certificate, was multiple traumatic injuries.

RECOMMENDATIONS / DISCUSSION

Recommendation #1: Develop, implement, and enforce procedures for welding on fuel tanks.

Discussion: Before any welding is done on a fuel tank, it should be drained, cleaned, and tested to ensure that it is free of any flammable fuel or vapors. When possible, replace the fuel tank rather than repair it. Welding on fuel tanks should only be done in specialized shops with certified welders. If nitrogen or argon is used for purging of tanks, constant testing must take place before and during the welding process. If a fuel tank requires welding while mounted on a vehicle, the following procedures or a similar one should be used:

- Disconnect the battery and remove or turn off ignition sources before draining the tank.
- Drain tanks only in well-ventilated areas, preferably outdoors.
- Drain the fuel into containers that are approved for use with flammable liquids.
- Do not drain gasoline or diesel tanks over or near inspection pits.
- Use approved siphoning equipment to remove fuel. Do not use a hose.

- If the fuel tank is removed from the vehicle, or if welding will be carried out near the fuel lines, ensure that the lines are drained and the vapors are purged from the lines before the welding activities are started.
- Thoroughly clean the surface on which the tank is mounted.
- Ventilate, purge, clean, and re-test before welding any area or space where a harmful atmosphere may exist.
- Filling the tank with water to within inches of the welding area can provide an extra measure of safety.

In addition, purge bladders and purge monitors are available to make welding on fuel tanks safer.

Recommendation #2: Establish and maintain an IIPP in language(s) employees can comprehend.

Discussion: In this particular case, the employer did not have a safety program in place for the employees to follow. Having a documented safety program and an IIPP has proven to be an effective method of ensuring all employees receive the necessary safety information needed to do their jobs. An effective IIPP should contain the following:

- The name of a person or persons with authority and responsibility for implementing the IIPP.
- A system for ensuring that employees comply with safe and health work practices.
- A system for communicating with employees in a form readily understandable by all affected employees on matters relating to occupational safety and health, including provisions designed to encourage employees to inform the employer of hazards at the worksite without fear of reprisal.
- Procedures for identifying and evaluating workplace hazards, including scheduled periodic inspections to identify unsafe conditions and work practices.
- Procedures to investigate occupational injury or occupational illness.
- Methods and/or procedures for correcting unsafe or unhealthy conditions, work practices, and work procedures in a timely manner based on the severity of the hazard.
- Training and instruction.

Employers with fewer than ten employees can communicate and instruct employees orally in general safe work practices with specific instructions with respect to hazards unique to the employees' job assignments. Had the employer had a safety and training

program specific to the task being performed in place, the hazard might have been identified and eliminated before this incident occurred.

Recommendation #3: Establish and maintain training and testing programs that verify and document an employee's achievement of skills.

Discussion: In this particular case, the employer had no training program in place for the employees to follow. The purpose behind a documented training and testing program is to ensure all employees receive the same safety information and that their achievement of skills is verified before proceeding with any given task. A training and testing program should be given:

- To all new employees;
- To all employees given new job assignments for which training has not previously been received;
- Whenever new substances, processes, procedures, or equipment are introduced to the workplace and represent a new hazard;
- Whenever the employer is made aware of a new or previously unrecognized hazard; and
- For supervisors to familiarize themselves with the safety and health hazards to which employees under their immediate direction and control may be exposed.

References:

California Code of Regulations, Subchapter 7, General Industry Safety Orders, Group 16. Control of Hazardous Substances Article, 109, Hazardous Substances and Processes, §5166. Cleaning, Repairing, or Altering Containers.

Group 20, Flammable Liquids, Gases and Vapors Article 142, Industrial Plants, §5549. Sources of Ignition. §5550. Repairs to Equipment. §5561. Maintenance and Repair.

Group 11, Electric Welding, Article 90. Electric Welding, Cutting and Heating §4850. General. §4851. Arc Welding and Cutting, §4853. Inert-Gas Metal-Arc Welding.

http://underbid.com/action/display/item/15539-1064492657/sku/we-LE-K18731.html

http://www.phppo.cdc.gov/niosh/docs/2004-101/chklists/r1n66w~1.htm

http://www.thefabricator.com/Safety/Safety_Article.cfm?ID=952

http://www.oshforeveryone.org/wsib/files/ont_mol/i12e.htm?noframe

http://www2.worksafebc.com/i/posters/1997/ha9712.html

EXHIBITS:

Exhibit 1. A picture of the MIG/Flux Welder that was used in this incident.

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May 5, 2008

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Public Health, 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 the CA/FACE program is to prevent fatal work injuries. 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: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

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

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