

TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Two Equipment Operators Electrocuted when Irrigation Pipe Made Contact with an Overhead Electrical Line in California

SUMMARY
California FACE Report #94CA001
November 30, 1994

A 53-year-old white, Hispanic, male equipment operator and a 23-year-old white, Hispanic, male equipment operator were both electrocuted when the irrigation pipe they were lifting made contact with an overhead electrical line. There were no witnesses to the incident. The victims were found lying on the ground by the employer. The employer stated that a piece of irrigation pipe was laying on top of one of the decedent's chest. The decedents were not installing irrigation pipes at the time of the incident, but had been cleaning weeds next to a concrete slab. It is not known why they elevated the pipe. Co-workers and the supervisor believe the employees were attempting to remove a rabbit or some other small animal from the pipe when contact was made with the overhead power line. The CA/FACE investigator concluded that, in order to prevent similar future occurrences, employers should:

- use plastic irrigation pipes whenever possible.
- conduct jobsite surveys to identify potential hazards prior to beginning work on a project and during the project.
- establish a standard operating procedure (SOP) that pipes not be elevated near overhead electrical lines.
- place electrical lines out of reach of workers either by increasing the minimum height of the lines or by burying them.
- decrease the length of hand-carried irrigation pipes.
- consider adopting alternative methods of irrigation.

INTRODUCTION

On January 28, 1994, two equipment operators were electrocuted when a 30 foot section of aluminum irrigation pipe was elevated into a vertical position, and contacted an energized 12000 volt power line. The CA/FACE investigator was informed of this incident on February 1, 1994. A copy of the California Occupational Safety and Health Administration (Cal/OSHA) Report and the Coroner's Autopsy Report were obtained by the CA/FACE investigator.

Both decedents in this incident had worked for their employer for one month. They were both initially employed as tractor drivers. However, since recent rains had prevented tractor use, they had been instructed to clear weeds and brush from a field. The employer had an established bilingual (English & Spanish) Injury and Illness Prevention Program (IIPP). Safety documentation was maintained and copies of safety training records were also kept.

INVESTIGATION

The employer in this incident was a farming company. The decedents had been hired to drive tractors, but because of recent rains had been given other chores by their supervisor on the day of the incident. According to their employer, the employees were not engaged in irrigation work. The employer also stated that his employees do not utilize individual pieces of sprinkler pipe to irrigate the cotton fields because of potential hazards which could occur while working near or around overhead power lines.

On the day of the incident, the employees had been assigned to do clean-up work using shovels to remove weeds next to a concrete slab. Their supervisor (field foreman) stated that at approximately 12:00 pm he spoke with both employees as they were eating their lunch. He returned to the site at approximately 2:30 pm and did not see them working. He looked around and discovered both decedents lying on the ground, with an aluminum irrigation pipe laying across one of the decedents. He (supervisor) immediately called his employer, who then contacted the local fire department.

According to the Coroner's Investigation Report the irrigation pipe measured 4 inches in diameter and about 30 feet in length. Two electrical lines ran directly overhead of the decedents' bodies. There were electrical burns on decedent #1's fingertips and corresponding burn marks on the pipe. The coroner investigator observed that all the fingertips on decedent #1's right hand were burned and the thumb and middle finger on the left hand were burned as well, in addition to burn marks on the soles of both feet. Decedent #2 had slight electrical burns on the palms of both hands, between the thumb and forefinger as well as burn marks on the left foot on the instep and big toe. There were no other obvious external signs of trauma on either decedent.

CAUSE OF DEATH

The Coroner's Autopsy Report stated the cause of death to be electrocution for both of the decedents.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should use plastic irrigation pipes whenever possible.

Discussion: In this incident, the decedents' handled metal pipes. If plastic pipes had been used, it would have reduced the likelihood of electrocution if contact had been made with electrical power lines.

Recommendation #2: Employers should establish a standard operating procedure (SOP) that pipes not be elevated near overhead electrical lines.

Discussion: This incident would not have occurred if the aluminum irrigation pipe had not been elevated while under high voltage electrical power lines. Under Title 8 of the CCRs Provisions for Preventing Accidents Due to Proximity to Overhead Lines section 2946 (a) General. No person, firm, or corporation, or agent of same, shall require or permit any employee to perform any function in proximity to energized high-voltage lines; to enter upon any land, building, or other premises and there engage in any excavation, demolition, construction, repair, or other operation; or to erect, install, operate, or store in or upon such premises any tools, machinery, equipment, materials, or structures (including scaffolding, house moving, well drilling, pile driving, or hoisting equipment) unless and until danger from accidental contact with said high-voltage lines has been effectively guarded against. If a standard operating procedure had been in effect which prohibited elevating irrigation pipes while near electrical power lines, these fatalities may have been avoided.

Recommendation #3: Employers should conduct jobsite surveys to identify potential hazards prior to beginning work on a project and during the project.

Discussion: A thorough evaluation of each jobsite should take place before and during any job, in order to detect workplace hazards. In this incident, if the workers had prior training in the handling of irrigation pipes, they could have been instructed to avoid moving the pipe.

Recommendation #4: Employers should place electrical lines out of reach of workers either by increasing the minimum height of the lines or by burying them.

Discussion: According to an official utility company, overhead power lines in rural areas are generally placed 25 feet above ground level. The typical length of irrigation pipes is 30 feet. If all electrical lines were at least 35 feet above ground, a 6-foot-tall worker handling a 30-foot irrigation pipe would not be able to contact the line while standing on the ground.

Recommendation #5: Manufacturers should be encouraged to decrease the length of hand-carried irrigation pipes.

Discussion: Given the expense of switching to shorter pipes (increased material and labor costs), the near term reduction of electrocution from this method would be expected to be small. However, decreasing the length of irrigation pipes would reduce the risk for employees contacting electrical power lines.

Recommendation #6: Employers should evaluate and consider adopting alternative methods of irrigation.

Discussion: Irrigation pipes on wheels, center-pivot irrigation systems, and "solid-set" pipes (buried pipes with sprinkler heads above the ground) may prevent many electrocutions. Despite high initial costs, these methods are labor-efficient over time and are replacing the use of hand-carried irrigation pipes on large farms and orchards.

References:

Helgeson, S.D., and Milham, S. Jr. (1985). Farm workers electrocuted when irrigation pipes contact powerlines. Public Health Reports, 100(3), 325-328.

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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

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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.

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

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