

F.A.C.E.

INVESTIGATION REPORT

Fatality Assessment and Control Evaluation Project

FACE #95-NJ-061-01
Municipal Utility Worker Electrocuted
When a Backhoe Strikes an Underground
Electrical Transmission Line



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FROM: Fatality Assessment and Control Evaluation (FACE) Project
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SUBJECT: Face Investigation #95-NJ-061-01
Municipal Utility Worker Electrocuted When a Backhoe Strikes an Underground
Electrical Transmission Line

DATE: November 20, 1995

SUMMARY

On June 16, 1995, a 28-year-old male municipal utility worker was electrocuted when a backhoe struck a 4,100 volt underground electrical transmission line. A four-man crew was attempting to determine the source of a water leak in front of a private home and had dug a trench to examine the water lines. The victim was standing on the lawn and holding a shut off key that was attached to a water valve when the backhoe severed the electrical transmission cable. The electrical current traveled from the transmission line, through standing water, to a copper pipe, to the metal shut-off key, electrocuting the victim. The backhoe operator was not injured. NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, these safety guidelines should be followed:

- o Employers should always call for utility company mark-outs before excavating near underground utility lines.

- o Employers should ensure that heavy equipment operators are properly trained before using the machinery.

- o Employers should ensure that employees are properly supervised at work sites.

- o Employers should use non-conductive tools when excavating near utility lines.

INTRODUCTION

New Jersey FACE personnel were notified of this fatality by a local police dispatcher on June 16, 1995. On June 20, FACE investigators conducted a joint investigation with a NJ Department of Labor (NJDOL) Public Employees Occupational Safety and Health (PEOSH) compliance officer. The victim's employer and co-workers were interviewed in the presence of the employer's attorney. FACE staff also examined and photographed the incident site, and later viewed the police photographs of the site and the severed electrical cable. Additional information was obtained from the PEOSH file and the police and medical examiners' reports.

The employer was a non-unionized municipal utility authority (MUA) that had been operating for 30 years and employed 31 workers. The MUA had a comprehensive written safety program which included procedures for notifying the utilities for mark-outs during excavation, but did not designate who had the responsibility for requesting mark-outs. The safety program also included basic electrical safety awareness. The MUA did not provide training in backhoe operation..

The victim had been employed by the company for one year as an assistant meter service operator. The employer stated that he had completed a training course in water and waste water management prior to his employment and was ready to take an examination for certification in his job specialty.

INVESTIGATION

The incident occurred near the front curb of a private home in a suburban residential neighborhood. The owner had complained that water had been seeping up from the ground, forming puddles in the area near the sidewalk. On May 29, 1992, the MUA sent a work crew to the site to find the source of the water. Since the utility lines were underground, the MUA called an 800 number which informed the power, telephone, and other utilities to mark-out the services for an excavation. The areas were marked but the crew was unable to find the water leak after excavating the area by hand. A few years later the home owner complained again, and the MUA sent a second crew the site on February 3, 1995, this time without calling for a utility mark-out. Again, they excavated by hand and did not find the source of the water. When the leak continued, the MUA sent a third crew to the site.

The day of the incident, a Friday, was clear and warm. The workers arrived at the MUA at about 7:30 a.m. and were assigned by their supervisor to go to the site and search for the leak. They did not request a mark-out since they were only going to hand dig with shovels and were not planning to use heavy equipment. At 9:30 a.m., the supervisor and a four-man crew arrived on

site. The supervisor discussed the job with the home owner before leaving the job to the work crew. The victim and some of the crew had been at the site previously and were familiar with the problem. Working as a team with no one specified as in charge, all four men dug into the ground on both sides of the sidewalk with fiberglass shovels. They soon realized that the water was coming from under the sidewalk and needed to remove some of the sidewalk sections. After getting permission from the homeowner to remove the sidewalk, one worker (who was also a backhoe operator) left the site to get a backhoe, which they planned to use to lift the sections out. The other workers had lunch while they waited for him to return.

The worker returned to the site with the backhoe between 12:30 and 1:00 p.m.. The victim used a concrete saw to cut the sidewalk and the backhoe was used to lift the concrete sections and lay them on the side of the road. At this point, the backhoe operator continued to dig with the backhoe and started to excavate the area that was under the sidewalk. He dug to the level of the hand-dug trench, enlarging it until the trench was about 7 feet long by 3 feet wide and 4 feet deep. The victim stood near the front of the backhoe, holding a 6-foot-long metal valve key set on the underground water service valve. He used the key to turn the water on and off to try to find where the leak was coming from. As this was going on, about 10 to 12 inches of water had accumulated in the trench. Two of the workers left the site to get a water pump to drain the trench, leaving the victim and the backhoe operator at the site. The backhoe operator continued to dig to make a sump for the water pump. The victim stood nearby, still holding the metal valve key. The backhoe then struck and severed one cable of a two phase, 4100 volt electrical transmission line which was 48 inches below ground. The power traveled from the line into the standing water, energizing the copper water pipe in the trench. The power moved through the pipe to the underground valve and up the metal key, electrocuting him.

The backhoe operator, who was not injured or aware of what happened, heard the victim say "Whoa!" and fall into the street. The operator then jumped from the backhoe and realized that he had struck a power line when he saw smoke rising from the trench. He went to the victim and gave him a few emergency breaths before going to a nearby house and telling them to call 911. He then returned to the victim and started cardio-pulmonary resuscitation (CPR). A skilled emergency medical technician heard the radio call for the ambulance and quickly responded to the scene. He took over CPR and continued until the other responders and paramedics arrived. The victim was treated at the scene and transported to a local hospital emergency room where he was pronounced dead at 2:19 p.m..

CAUSE OF DEATH

The county medical examiner determined the cause of death to be from cardiac arrest due to electrocution. Electrical burns were noted on the victim's knee and shoulder.

RECOMMENDATIONS AND DISCUSSIONS

Recommendation # 1: Employers should always call for utility company mark-outs before excavating near underground utility lines.

Discussion: According to the MUA safety manual, the location of underground installations "shall be determined prior to opening an excavation." The MUA's stated policy was to request mark-outs for underground cables only when planning to dig with heavy equipment; they did not call for this service because they planned to do only hand digging. To prevent future incidents, FACE recommends that all employees should call for mark-outs during all excavations near underground lines, even if the excavation is done by hand. The employer should designate who should call for the mark-out and document when the call was made. It should be noted that marking out excavations is required by the NJ Underground Facilities Protection Act and the OSHA standard 29 CFR 1926.651(b)(2).

Recommendation # 2: Employers should ensure that heavy equipment operators are properly trained before using the machinery.

Discussion: Although he had experience from previous jobs, the backhoe operator had not received any training from the MUA in operating the equipment. To ensure the competence of the equipment operators, FACE recommends that employers properly train equipment operators before allowing them to operate the machinery. This training may be commensurate with the operator's experience (i.e., new operators should be fully trained while experienced operators receive refresher and safety training), and the operators should be evaluated to ensure their competence with the machinery. It should be noted that training may be required under the OSHA standard 29 CFR 1926.20(b)(4).

Recommendation # 3: Employers should ensure that employees are properly supervised at work sites.

Discussion: In this incident, the work crew did not have an on-site supervisor to direct the work and ensure that the safety policies were being followed. FACE recommends that a member of the work crew should be assigned as a crew chief or otherwise have the responsibility to ensure

that MUA safety policies are being followed, including the calling for utility mark-outs.

Recommendation # 4: Employers should use non-conductive tools when excavating near utility lines.

Discussion: It was noted that non-conductive shovels were used in the excavation, however, the valve key was conductive. After this incident, the manager of the utility company phoned several suppliers but was unable to locate any non-conductive shut-off keys. Any equipment that is routinely used near electrical lines should be available in a non-conductive form.

REFERENCES

NJSA 48:2 Underground Facilities Protection Act. New Jersey Statutes Annotated Title 48, Chapter 2 (1994).

Code of Federal Regulations 29 CFR 1926, 1991 edition. U.S. Government Printing Office, Office of the Federal Register, Washington DC.

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