Painter Is Electrocuted While Power-Washing a Bridge

DATE: March 2, 1992

SUMMARY

On August 10, 1991, a 26-year-old male bridge painter died after the steel-reinforced water hose connected to his pressure-washing gun made contact with a 13,000 volt electrical powerline. The victim was working from a suspended work platform approximately 50 feet above the powerline. NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, the following guidelines should be followed:

- ***Prior to working in close proximity of powerlines, the employer should contact the local utility company and request that the powerlines be de-energized;***
- ***Alternate methods of securing the hose to the bridge framework should be devised.***

INTRODUCTION

On August 11, 1991, NJDOH FACE personnel learned about this work-related electrocution from articles in several newspapers. On August 14, 1991, after receiving permission from the victim's employer and the owner of the incident site, we observed the site of the fatality with an OSHA compliance officer who had initiated his investigation two days earlier. We interviewed the superintendent of the project and two co-workers, photographed the scene, and inspected the hose that was in possession of the local fire marshal. Information was also derived from the OSHA file, county fire marshal, and county prosecutor's representative (this office investigates all industrial fatalities in the county).

The victim's employer was a large painting contractor that operates nationally and has been in business for approximately 80 years. The company had been contracted to clean and paint an 8000 foot inter-state bridge, a project that was expected to last for 15 months, with work continuing seven days a week. The project included power-washing the structural steel, scraping away loose paint and debris, spot priming if rust was breaking through, and painting the bridge structure with a lead-based paint.

Seventy two painters were employed for the project, hired from two labor unions, one from each state. Workers in each state started work at their respective ends of the bridge and planned to complete the job in the middle of the bridge. The victim had worked on the project for about seven weeks. It is unknown how much prior experience he had in this type of work.

The company's on-site superintendent normally conducted a walk-through safety inspection of the work area twice a day. Foremen held weekly safety meetings with the painters. Attendees were required to

sign a roster to indicate they were present during the meetings. Company policy included penalties for violation of certain safety policies by a worker (i.e., failure to use fall protection).

INVESTIGATION

The site of the fatality was an area underneath the bridge that spans a street bordered on its west side by utility poles carrying high voltage electrical powerlines. The highest powerline is a three phase, 13,000 volt (phase to ground) line, 41 feet above the ground. Although the powerline was insulated, the function of the insulation was to protect the line from exterior damage.

A water truck (source of water) was parked on the east side of the road under the bridge. Connected to it by a hose were three high pressure pumps situated on the grass within a fenced-in area. Each pump supplied water under 2000 pounds of pressure through a steel-reinforced hose (a hose with a braided steel jacket and a rubber outer cover). Several lengths of 51 foot hose were used.

The painters performed the power-washing work from boards (or scaffolds) 90 feet above the ground and 10 feet below the bridge deck (see diagram). The hoses ran up from the pumps and were tied horizontally to the bridge truss work. They were secured by ties at 50 foot intervals to allow enough slack in the hose for the operator to move 30 feet. Each hose was connected to a power-washing gun held and directed by a painter.

On the day of the fatality, a Saturday, the painting crew began work at 7 a.m.. By 8 a.m. they had filled the water truck, taken the elevator to the bridge, and begun power-washing the assigned area. Three painters were power- washing at the time of the incident. The crew worked from the east side of the bridge, moving west towards the center of the bridge. The victim worked on a board at the south side of the bridge; co-worker A worked on another board about 50 feet away, under the bridge; co-worker B was on the north side of the bridge. A fourth worker was in charge of running the pumps and worked on the ground. A foreman was also on the job but was not in the immediate area at the time of the incident.

Work was progressing faster than the crew anticipated. According to a co-worker, the victim was warned several times that day by the foreman to be careful because they were in the vicinity of the powerlines. The victim, wet from the water, was last seen sitting on his wood scaffold with his feet on metal cables supporting the scaffold and holding his gun while he sprayed water. At this point, a sagging loop in the hose contacted the high voltage line. All those present heard a loud bang and saw a bright flash.

Electrical current traveled from the powerline to the victim through the hose and his hand-held gun. Current also traveled in the opposite direction, flowing through the steel-reinforced water hose back to the water pumps on the ground. Burn marks were visible on the ground from the hoses. From there the current traveled into the two other steel-reinforced water hoses and to at least one other painter through his gun. The painter reported feeling "like both hands were stuck in a light socket." This worker was standing on an aluminum board, was not wet and was using his gun with an extension wand on it. He immediately threw his gun down to break contact. He heard a buzzing sound and saw a blinding blue light in the vicinity of the victim. The third painter, only damp from the water, may have been on the catwalk of the bridge at the time of the incident and pulling slack out of his hose. It is not known if he felt any effects of electrical contact or if he was holding the gun in his hand.

The victim received an electrical shock of 13,000 volts, phase to ground. He immediately fell back onto the scaffold, prevented from falling off by his safety belt and lanyard. Contact was broken when he dropped his gun. A co-worker went to his aid immediately and found him unresponsive with no signs of life. He initiated, and continued, cardio-pulmonary resuscitation (CPR) until the site superintendent was able to reach them. They then continued with two-person CPR. After fire department and rescue squad personnel arrived, the victim was placed in a stokes basket and lifted horizontally to the bridge surface where waiting paramedics treated him. The local rescue squad transported him to the local hospital, which is also a regional trauma center. He was pronounced dead in the emergency room.

The evidence suggests that as the victim pulled on the hose, it may have slipped through the ties that secured it to the bridge truss work. This created greater slack in the hose than anticipated, resulting in a loop of hose sagging between the ties. The hose normally swings when the gun is used due to pulsing of the high water pressure. At this point, the victim's hose may have been sagging about 15 to 20 below the tie off points, and, as it swung, the hose made contact with the high voltage line. The resulting surge of electricity damaged the powerline and burned three holes in the exterior of the steel-reinforced hose.

CAUSE OF DEATH

The medical examiner determined that death was caused by electrocution. Points of electro-thermal contact were noted on the victim's left hand and left foot. No entrance or exit points were specified by the medical examiner.

RECOMMENDATIONS/DISCUSSIONS

Recommendation #1: Prior to working in close proximity of powerlines, the employer should contact the local utility company and request that powerlines be de-energized.

Discussion: In this case, the hose contacted the powerline despite operating procedures that allowed no more than 30 feet of slack in the hoses and despite the fact that the operation was conducted 50 feet above the powerlines. To prevent this, the local utility company should be asked to de-energize the lines. With the lines free of hazardous electrical energy, an error in procedures will not cost a worker's life. The local utility company has a policy of de-energizing powerlines when requested to do so for jobs such as this.

Recommendation #2: Alternate methods of securing the hose to the bridge framework should be devised.

Discussion: It appears that the method for tying the hose to the bridge framework failed and allowed too much slack to form in the hose. The employer should examine the work practices used and either devise a new method to secure the hoses or employ a backup procedure. Some possible examples include:

- Tying off the hose in closer intervals using a non-slip knot.
- This will prevent large sags from forming in the hose.

- Using a mechanical line tensioner.
- Such a device that will automatically take up any slack that forms in the hose.
- Securing a section of 4" diameter PVC piping to the bridge and running the water hose through the piping.

FATAL ACCIDENT CIRCUMSTANCES AND EPIDEMIOLOGY (FACE) PROJECT

Staff members of the FACE project of the New Jersey Department of Health, Occupational Health Service, perform FACE investigations when there is a work-related fatal fall or electrocution reported. The goal of these investigations is to prevent fatal work injuries in the future by studying: the working 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.

To contact New Jersey State FACE program personnel regarding State-based FACE reports, please use information listed on the Contact Sheet on the NIOSH FACE web site. Please contact In-house FACE program personnel regarding In-house FACE reports and to gain assistance when State-FACE program personnel cannot be reached.