

F.A.C.E. INVESTIGATION REPORT

Fatality Assessment and Control Evaluation Project

FACE #94-NJ-090-01
Lifeguard Electrocuted After Contacting
An Energized Pump Motor Housing



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FROM: Fatality Assessment and Control Evaluation (FACE) Project
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SUBJECT: Face Investigation #94-NJ-090-01
Lifeguard Electrocuted After Contacting An Energized
Pump Motor Housing

DATE: February 1, 1995

SUMMARY

On June 14, 1994, a 20 year-old male lifeguard was electrocuted after entering the pump room of a swimming pool at an apartment complex. The victim had just checked in for work and had taken a brief swim before going into the pump room to begin his pool maintenance duties. As he apparently tried to adjust the chlorine pump, his leg contacted the metal pump housing that had been energized with 220 volts. He was shocked and cried out for help before falling unconscious in the pump room. Despite rescue efforts, he was pronounced dead 2 hours after the incident. An inspection of the pump found that faulty wiring and grounding allowed the pump housing to become energized. NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, these safety guidelines should be followed:

- o Employers should maintain all equipment in safe operating condition.

- o State agencies should require that all swimming pool electrical systems be fitted with ground fault circuit interruptors.

- o State agencies should require that all swimming pool electrical systems receive periodic electrical inspections.

- o Certified pool managers and lifeguards should be provided with training that includes discussions of electrical hazards. o Employers should ensure that electrical controls are located where they can be easily and safely operated.

INTRODUCTION

On June 22, 1994, NJDOH FACE personnel were notified by a newspaper article of the work-related electrocution of a lifeguard. After contacting the employer, FACE investigators conducted a site visit June 28, 1994 to interview the employer and photograph the incident scene. It was noted during the visit that the employer had already corrected many of the deficiencies in the pump house electrical system. Additional information was obtained from the OSHA compliance officer, medical examiner's report, and police report (which included written witness statements).

The employer owned and operated several large apartment complexes with swimming pools in the area. The company employed a total of 24 lifeguards who worked at the three complexes with swimming pools. They hired certified lifeguards with current cardio-pulmonary resuscitation (CPR) certifications. Although the employer did not have a formal employee health and safety program, general written rules and procedures were available outlining the lifeguards duties. Specific procedures for cleaning the pumps and pools were also available for each facility.

The victim was a 20 year-old male college student who was working as a lifeguard at the apartment complex for his third summer. He had been working part-time for about two weeks, since Memorial day when the pool opened for weekends. He was anticipating working full-time when the pool opened on weekdays in late June.

INVESTIGATION

The incident site was a swimming pool located at a 360 unit suburban apartment complex. The pool was one of three pools that were owned and operated by the apartment complex managing company. The three pools were run by a full-time certified pool manager, and each pool had a head lifeguard who supervised the other lifeguards. The pool itself was a large, 200,000 gallon, Riviera style pool located near the rental office for the complex. The pool and surrounding deck area were fenced in and admission was restricted to the apartment residents and neighbors who pay a fee to use the pool. Within the fenced area was an above ground pump house that contained the pool's filter, water pump, chlorine system, valves, piping, and related electrical wiring. The pump house was also used to store the vacuum and skimming equipment used to clean the pool. Even though the pool was closed on weekdays, the lifeguards were responsible for cleaning the pool each day. This usually required skimming leaves and other debris from the surface of the pool and using a water vacuum to clean the bottom. The pool's filter was also regularly "backwashed", or cleaned by reversing the flow of water through it.

The day of the incident was a hot, humid Tuesday evening. The victim arrived at the pool at 6 p.m. and used his key to enter the closed pool area. After punching the time clock, he dove into the pool for a short swim before starting his duties. After getting out of the pool, he went to the pump house apparently to adjust the chlorine pump. The pump house was a relatively cramped space which required an operator to reach over the pump motor and PVC piping to the chlorine controls and power switch. As he reached for the control switch, the victim's leg came in contact with the metal pump motor housing which had been energized with 220 volts. Shocked, the victim shouted for help before falling back against a short stairway and injuring his head. A witness who had seen the victim swimming in the pool heard him cry for help and went to one of neighboring apartments for assistance. Two residents responded by jumping the perimeter fence and searching the pool for the victim. They immediately called 911 after finding him lying unconscious on the pump house floor.

Finding the victim lying on a wet floor with his foot wedged under the pump, the residents did not attempt to move him because they thought he might have been in contact with a live electrical wire. The police arrived within 5 minutes of the 911 call followed by the EMS. One police officer entered the pump room and switched off the pump before attending to the victim. After finding him unresponsive and without a pulse, the rescuers moved the victim out of the pump house and started CPR. He was transported to the local trauma center where he was pronounced dead at 7:40 p.m.

An inspection of the pump by OSHA and the township electrical inspector found that the equipment did not meet current electrical codes. The pump motor and wiring was not adequately grounded and was not approved for wet locations. The pump became energized when a taped or capped wire contacted the housing and energized it. The 20 year-old equipment had also not been inspected or maintained for at least ten years.

CAUSE OF DEATH

The medical examiner determined the cause of death to be from cardiac arrest due to electrocution. Burn marks were noted on the victim's right calf and both feet.

RECOMMENDATIONS AND DISCUSSION

Recommendation #1: Employers should maintain all equipment in safe operating condition.

Discussion: The OSHA inspection of the pump room found that the water pump motor was not adequately grounded and that the pump was not designed for wet locations. Employers should

routinely have swimming pool electrical systems inspected by a qualified electrician and repair or replace equipment that is faulty, damaged, or presents a safety hazard.

Recommendation #2: State agencies should require that all swimming pool electrical systems be fitted with ground fault circuit interruptors.

Discussion: Although constructed in accordance with the building codes at the time it was installed, the pool's electrical system was not equipped with a ground fault circuit interruptor (GFCI). A GFCI device is designed to detect even slight electrical imbalances caused by faulty wiring or grounds and will automatically shut down the circuit. Because water is a good electrical conductor, GFCI devices are especially useful around pools, outdoor wiring, and bathrooms. The FACE project recommends that state agencies require that all wiring around swimming pools be fitted with GFCI devices, as required under current building codes. This requirement should apply both to private as well as public pools. It was noted that the employer installed GFCI devices on the pool immediately after the incident.

Recommendation #3: State agencies should require that all swimming pool electrical systems receive periodic electrical inspections.

Discussion: The owners of the swimming pool complied with the state and local regulations for maintaining and operating the pool but these regulations did not require electrical inspections. As water and chlorine will corrode metal fittings and wiring, it is important that public swimming pool electrical systems be regularly inspected to ensure their integrity. The FACE Project recommends that state agencies require swimming pool electrical systems be inspected by a qualified electrician before permitting a pool to open for the season.

Recommendation #4: Certified pool managers and lifeguards should be provided with training that includes discussions of electrical hazards.

Discussion: Training courses provided to certified pool managers and lifeguards should include discussions of electrical hazards that they may encounter. This training should include warnings about operating electrical equipment while wet. Pool managers should also be made aware of the need for electrical inspections by qualified electricians as a routine part of pool maintenance and safety. Pool managers and lifeguards should never attempt to perform any work on the system.

Recommendation #5: Employers should ensure that electrical controls are located where they can

be easily and safely operated.

Discussion: The shut off switch for the pump was located in a poor location, possibly forcing the victim to lean across the piping and pump to operate it. This also put the police officer at risk of electrocution when he shut down the pump to rescue the victim. The employer corrected this problem after the incident and moved the switch close to the pump room door where it could be easily operated.

REFERENCES

Pool-Spa Operators Handbook. National Swimming Pool Foundation, 10803 Gulfdale, Suite 300, San Antonio TX 78216.

NJ State Sanitary Code, Chapter IX, Public Recreational Bathing, N.J.A.C. 8:26-1 et seq, May 1991. NJ Department of Health, CN 364, Trenton NJ 08625.

Code of Federal Regulations 29 CFR 1910, 1992 edition. US Government Printing Office, Office of the Federal Register, Washington DC.