

Fatality Assessment and Control Evaluation (FACE) Program

Licensed Electrician Dies When Electrocuted by 480 Volts

Summary

On July 4, 2003, a 36-year-old male lead electrician died after being electrocuted with 480 volts of electricity. A crew of five licensed electricians were working at an automotive supply manufacturing facility running wires to connect service for two air conditioning units (3-phase; 480 volts; 30 amp and 35 amp) and service for a lighting panel (3-phase; 277/480 volts and 200 amps). The manufacturing facility had been shut down for the holiday, and besides a facilities office worker in the facilities main office, the five men were the only workers at the site and had complete control of the facility utilities (they were the only ones who had the ability to turn on/off utilities at the facility). Normally, everyone who was working directly with wiring or who could come in contact with live electric wires would place their lock and tag on the appropriate breaker or other control device to guard against unexpected energy being released. This time, it was decided by the crew only the job foreman would use his lockout/tagout equipment on the breakers.

The victim was sitting in a 4'x 4' junction box with another employee pulling wires to connect two air conditioning units and service to a lighting panel. Having completed the wiring connection for the lighting service, the lead electrician instructed the job foreman to throw on the breaker to the lighting service while he continued to run the wiring for the two air conditioning units. Instead, the foreman thought he was supposed to throw on the breakers for both the lighting service and the air conditioning services, which he did. As the foreman threw on the breakers, the lead electrician was holding the wiring for the air conditioning service in his hand and was electrocuted. Upon the lead electrician collapsing, the foreman summoned emergency services to the facility while another coworker administered CPR to the victim. Paramedics arrived and transported the decedent to a nearby hospital where he was pronounced dead. To prevent future occurrences of similar incidents, the following recommendations have been made:

- **Employees should always follow company lockout/tagout**

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procedures.

- **Communication between workers should be clear and precise.**

Background

On December 22, 2003, the Kentucky Fatality Assessment and Control Evaluation program became aware of an occupational fatality which occurred July 4, 2003, involving a 36-year-old electrician via the Kentucky Department of Vital Statistics. A site visit was made and the employer and coroner were interviewed. Photographs were taken.

An electrical contracting company was installing electrical service in a new addition of a manufacturing facility. The contracting company had been in business for more than a decade and had restructured in 1997. A safety program which included safety awards, monthly safety meetings, weekly toolbox talks and appropriate training for employees was in place and was practiced on a regular basis. Training sessions were documented with attendees' signatures. The decedent had worked for the electrical contractor since 1990 and was a licensed journeyman electrician as well as a certified competent person.

At the time of the incident, the electrical job was 50% complete and the 5-man crew had 10 more minutes of work to complete the day's agenda. The job foreman and one worker were on the ground, the lead electrician and another worker were in a 4'x4' junction box pulling wires into the junction box (which was supported by 2 railings 20 feet in the air). A fifth worker was working on a scissor lift next to the junction box, assisting the two workers in the junction box.

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Investigation

On July 4, 2003, a contract crew of 5 electricians (job foreman, decedent who was also the lead electrician and three other electricians) were working at a manufacturing facility which was shutdown for the holiday. Besides a plant employee working in the office, they were the only workers on site and had complete control of the facility. The contractor had already installed wiring in the newly constructed addition to the manufacturing facility and was connecting service for two air conditioning units (3-phase; 480 volts; 30 amp and 35 amp) and service for a lighting panel (3-phase; 277/480 volts with 200 amps).

Each of the three services had its own breaker located approximately 130 feet away on the wall, near the ground. A 4' x 4' x 12" deep metal junction box, 20 feet in the air rested on two metal tracks suspended from the ceiling, housed the junction of wiring from the new addition and the main building.

The work crew began working at 7:00 AM. At 9:00 AM, the owner of the contracting company stopped by and checked on the workers. Work was progressing nicely and the crew had approximately one hour left of work to finish so they could go home and enjoy the holiday. As the owner left the work site, the outside temperature was a hot and humid 85° F with dew point of 71° F ⁽¹⁾. It is unknown what the temperature was inside where the men were working. The area where the men were working was not air conditioned, nor did they have fans running to cool the work environment.

At approximately 9:45 AM, the job foreman and another employee were on the ground gathering up tools and putting them away while waiting for instructions from the lead electrician (decedent) and another worker who were in the 4'x4' junction box. A fifth employee was assisting the two workers in the junction box from an 8'x 6' scissor lift located adjacent to the junction box. The workers in the junction box were pulling 3 sets of wiring service (2 sets for air conditioning units; 1 set for lighting) from the breaker box in the main plant and connecting it to new electrical service in a new addition to the facility. Each set of wiring had its own breaker on a breaker panel which the foreman, but not the lead electrician had locked out, modifying the normally followed lockout/tagout procedure. Normally, the employee (in this instance the lead electrician) performing the work would place their lockout/tagout equipment on the necessary breakers and then remove the lockout/tagout equipment when work was completed and the breakers could be re-energized.

It was a hot and muggy morning and the decedent was hot, sweaty and not wearing a shirt. After running wires and completing connections for the lighting service from the main building breaker panel to the new addition, the two electricians in the junction box began pulling wires for the two air conditioning units. The lead electrician was pulling the wires for the air conditioning service from the breaker box in the main building and was getting ready to connect the wires to the new wiring in the addition. As he pulled the wires into the junction box, he routed the wires under his legs, tapping the ends of the wires into his right hand to make them even. He was not wearing insulated gloves as he handled the wires and made the connections. At the same time, the decedent was ready for breaker to the lighting service panel to be turned on and instructed the foreman to throw the breaker to the "on" position. The foreman, thinking he should throw all three breakers to the "on" position, walked over to the breaker panel, removed his lockout/tagout

on all three breakers and proceeded to throw all three to the “on” position. This sent electricity through the wires into the lead electrician’s hand, killing him.

Reportedly, the decedent looked at his co-worker in the junction box and said “help me”, then collapsed. The worker on the lift and the other worker in the junction box called down to the foreman to contact emergency services which he immediately did. As emergency services were in route, the other employee in the junction box and employee in the scissor lift, placed the victim in the scissor lift and performed CPR on the victim until paramedics arrived. Paramedics took the decedent to a nearby hospital where a doctor notified the coroner who arrived at 10:25 AM and declared the victim dead.

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Cause of Death

The cause of death was electrocution.

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Recommendations/Discussion

Recommendation No. 1: Employees should always follow company lockout/tagout procedures.

The company had lockout/tagout procedures in place that were to be used in these types of situations. All employees were equipped with lockout/tagout equipment, but because they were the only workers at the facility, only the foreman used his. Normally, all employees that could be adversely effected by the electrical equipment would have locked out the breaker panel. The occupational safety and health regulation 1926.416(a)(1) states that “No employer shall permit an employee to work in such proximity to any part of an electric power circuit that the employee could contact the electric power circuit in the course of work, unless the employee is protected against electric shock by deenergizing the circuit and grounding it or by guarding it effectively by insulation or other means”. The job foreman had used his lockout/tagout but the decedent and the other worker in the junction box had not put their lockout/tagouts on the breaker. This was done to save time. All three men should have removed their lockout/tagouts from the breaker. The two men in the junction box needed to lower themselves to the ground, walk to the breakers and with the foreman, all

three electricians then remove their lockout/tagouts so that the correct breaker could be energized. Gloves were not required in this instance since the electrical circuit had been de-energized. However, if the circuit had been hot, gloves would have been required.

Recommendation No. 2: Communication between workers should be clear and precise.

Communication between workers should be clear and precise when instructing other workers on what they want the other workers to do. “Throw the breaker” could mean anything. The men involved in this incident had worked together for several years and knew each other but still miscommunicated. Only the person performing the work should throw the breaker when the work is completed. In this case, the lead electrician should have been the one to throw the breaker in the “on” position after completing the work.

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References

1. Kentucky Climate Center
2. Kentucky Occupational Safety & Health Regulations

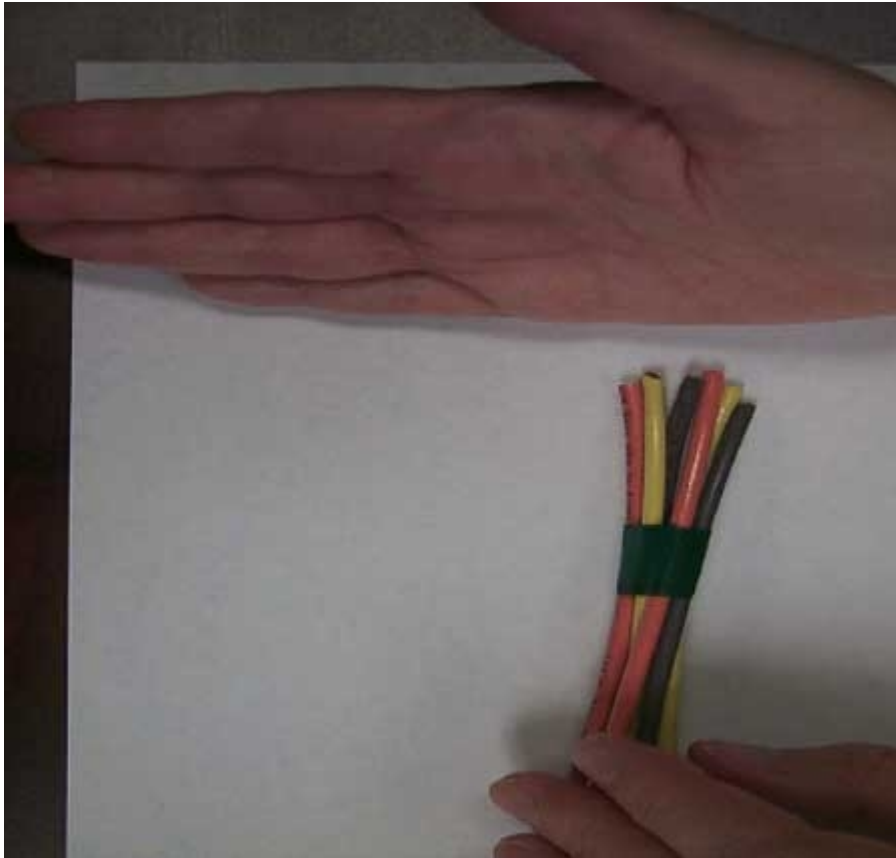
Acknowledgements

Coroner
Company owner
Electrical technician
KY OSH

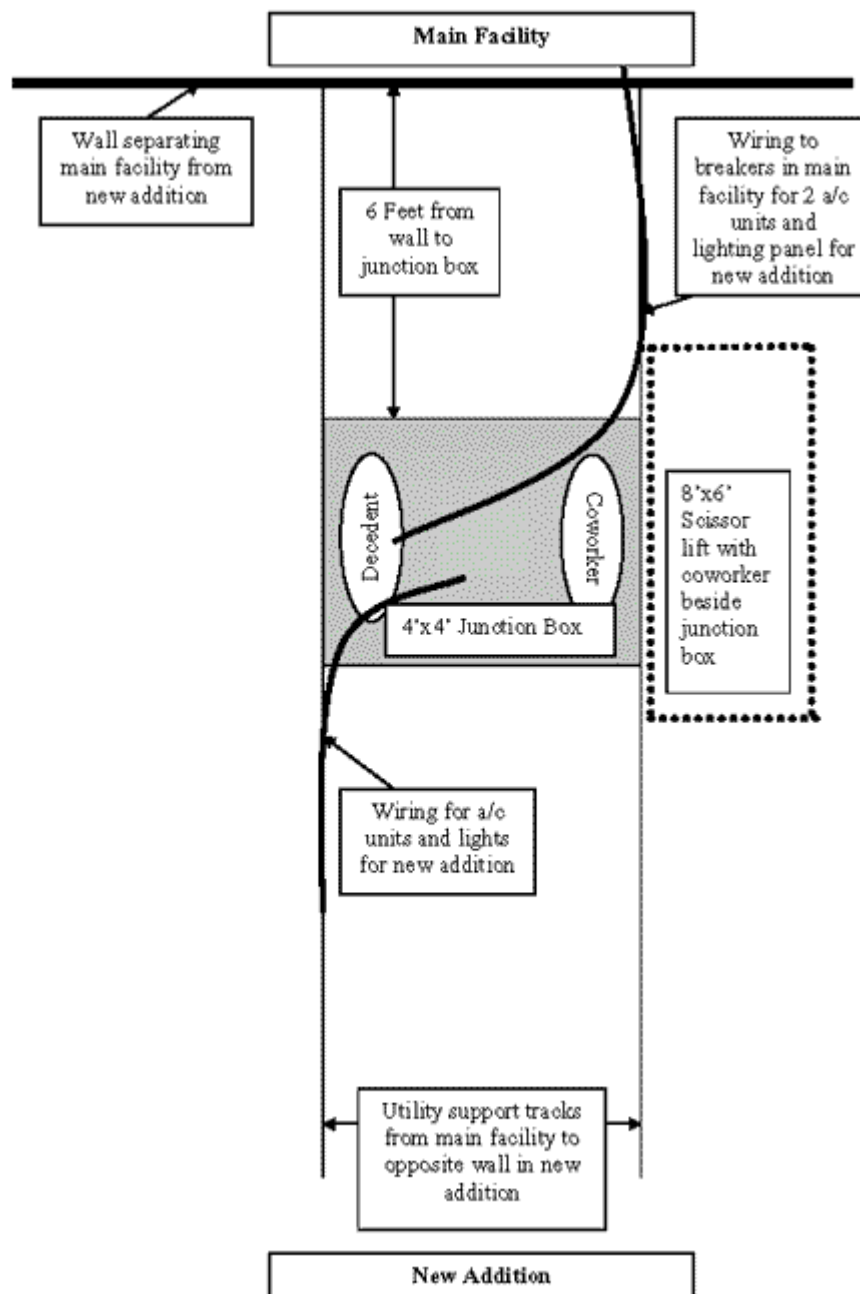
Note: Immediately following this incident, the company held a meeting with its employees to discuss how to prevent this scenario from reoccurring. Besides always using the lockout/tagout procedure, more precise communication between employees was at the top of the list. Also, breakers would not be turned on if there was anyone in the junction box. After this meeting was held, the company held another meeting with other area electrical contractors and explained the incident and the changes the company was making in its own safety practices to prevent this type of incident from reoccurring.

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Photographs



An example of wires lead electrician was taping in his palm when he was electrocuted.



Aerial View from Ceiling

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Kentucky FACE Program

The Kentucky Fatality Assessment & Control Evaluation Program (FACE) is funded by a grant from the Centers for Disease Control and the National Institute of Safety and Health. The purpose of FACE is to aid in the research and prevention of occupational fatalities by evaluating events leading to, during, and after a work related fatality.

Recommendations are made to help employers and employees to have a safer work environment.

To contact [Kentucky 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.



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