

Occurrence Summary For Near Miss Event, 12-6-05, Fluor Fernald

On December 6, 2005, at approximately 1415 hours, two Electricians were using a CEN-TECH Digital Multimeter to check the line-side voltage of a 480-volt electrical disconnect switch when a malfunction occurred and a flash emanated from inside the panel. At the time of the flash, a Fluor Fernald Electrician was placing the two leads of the Multimeter on the lugs while another Electrician was holding the Multimeter itself. The heat from the flash caused minor burning (redness) to the right side of the face of Electrician who was placing the leads on the lugs. The other Electrician, who was standing immediately to the left of the first Electrician, was not injured in any way. The Electrician who was holding the leads was transported to a local hospital, where he was treated and released.

Background Information/Sequence of Event

On Monday, December 5, 2005, Fluor Fernald Construction personnel contacted the Site Electrical Engineer and requested the isolation of an overhead 480-volt line in an area where planned excavation activities were to occur. The line feeds electrical power to water pumps at the run-off pond and to Trailer 582, a Silo 3 Project Breakroom. Construction personnel determined that the line needed to be Locked & Tagged Out because it was anticipated that their excavator may have to operate within 10 feet of the overhead line.

In response to this request, the Site Electrical Engineer directed two Electricians to Lock & Tag Out the electrical disconnect switch for the line. The disconnect switch was locked and tagged out without incident.

Shortly thereafter, Silo 3 Project personnel asked the Site Electrical Engineer if he could restore power to the Breakroom Trailer. After consulting with the Construction personnel and verifying that the area was clear, the Site Electrical Engineer ordered the Electricians to clear the locks and tags on the disconnect switch and restore the system.

Then, the Site Electrical Engineer developed a new plan that would keep power to the Breakroom and isolate power to the overhead line in the Construction Area. On December 6, the Electricians were briefed by the Site Electrical Engineer on the new plan.

The Electricians were to repeat the same Lock Out & Tag Out of the disconnect switch, air-gap the wires leading to the overhead line, tag them, and then clear the locks and tags on the disconnect switch to restore power to the Breakroom Trailer. To air-gap the wires, the Electricians would have to use a bucket truck to reach the point where the line would be air-gapped. Therefore, Radiological Control Technicians (RCTs) were contacted to expand the Contamination Area boundaries to facilitate the placement of a bucket truck in the area.

With the plan in-place and all involved personnel briefed on the plan, the two Electricians and a RCT went to the area to perform the work. After the RCT expanded the Contamination Area ropes to allow the placement of the truck in the area, the Electricians positioned their truck adjacent to pole #WP070. The Electricians opened the disconnect switch on the outside of the 480-volt panel and opened the panel door. With one Electrician holding the two leads of a CEN-TECH Digital Multimeter and the other Electrician holding the Multimeter itself, the Electricians verified that the load side of the disconnect was dead.

When the Electricians attempted to verify the voltage on the line side of the disconnect (as required by procedure) and the Electrician touched the two leads to the first and second phase lugs above the fuses, a loud "bang" was heard and a flash was emitted from inside the panel.

The Electrician who was holding the leads had his head turned to the left to see the meter that was being held by his co-worker. The heat from the flash caused redness to the right side of the Electrician's face and the light from the flash caused the Electrician to experience discomfort in his right eye. The Electrician who was holding the Multimeter stated that he did not see the flash, but heard the bang. When he looked up, the Electrician who was holding the leads was recoiling backwards and falling to the ground.

Immediately after the flash from inside the panel occurred, three separate actions were performed concurrently:

1. The Electrician who was holding the Multimeter attended to his co-worker. The Electrician who was holding the leads stated that he was "OK," other than he felt discomfort on the right side of his face and he was having trouble seeing out of his right eye. The un-injured Electrician noticed several areas of his co-worker's outer clothes (disposable Anti-C coveralls) were charred and verified that his co-worker's clothes were not burning.
2. A nearby Construction Supervisor heard the bang and saw the Electrician fall to the ground. The Construction Supervisor immediately called 911 to summon an ambulance to the area. Then, the Construction Supervisor positioned his personnel along the route from the front gate to the area of the incident to direct emergency vehicles to the area. The Construction Supervisor then proceeded to the main gate and coordinated his efforts with Security personnel.
3. The RCT in the area was on his phone talking to a Radiological Engineer at the time of the incident. When the incident occurred, he informed the Radiological Engineer, who immediately contacted the Fluor Fernald Assistant Emergency Duty Officer (AEDO).

The AEDO, a state certified Emergency Medical Technician, arrived at the scene within 3-4 minutes after the event. Off-site, contracted Emergency Response personnel arrived at the scene within 6-8 minutes after the event. The Electrician who was injured was assisted in the removal of his PPE (for the Contamination Area) and surveyed for contamination (with none found) before the arrival of the ambulance. When the ambulance arrived, the Electrician was transported to a local hospital, where he was treated and released.

A post-event debriefing was conducted at 1600 hours on December 6, 2005. That debriefing was postponed after reports from the hospital that the Electrician was not seriously injured and that he would be released. Therefore, the debriefing was rescheduled for 0700 hours on December 7, 2005, when the Electricians who were involved in the incident would be available to attend.

At the debriefing, it was determined that the most probable cause for the incident was that the Multimeter malfunctioned, causing a short from one phase of the 480-volt feed to another phase. According to the Electricians, the Multimeter was placed in the correct setting (750 volts AC) and the leads were properly installed. According to the Maintenance Supervisor and the Site Electrical Engineer, this type of energy isolation and verification has been performed hundreds of times in the past without incident.

It was also revealed that the Multimeter that was used in this evolution was not approved by a Nationally Recognized Testing Laboratory (NRTL). The Multimeter was made in China and is embossed with "CE" markings, indicating that it is approved for use in European countries. A review of the Operator's Instruction Manual revealed that the Multimeter's operating environment is 0 to 50 degrees C. At the time of the incident, the temperature was 26 degrees F (-3 degrees C).

In response to this event, Fluor Fernald issued an Employee Update to all personnel, including onsite subcontractors and vendors, stating:

"Effective immediately all electrical voltage test equipment shall be pulled from service until meters are inspected and approved by [the Site Electrical Engineer] and [the] Fluor Fernald Environmental Safety and Health Director..."

The Employee Update directs all personnel with voltage meters, multimeters, amprobes, or voltage detectors to submit their equipment for inspection prior to placing them back into service. Items that have been inspected will be identified with an approval sticker on the equipment.