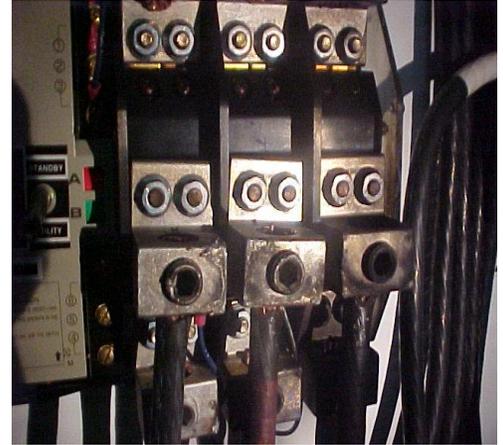


Safety Mishap Lessons Learned

Mishap: ARC Flash Mishap (240V)
Injury: Burns to the hands
Damage: Superficial damage to shield
Type of Work: Testing Voltage
Equipment: Emergency Generator
Automatic Transfer Switch



MISHAP - DESCRIPTION: An Industrial Equipment Mechanic from a PWD received burns to his hands due to an ARC Flash that occurred while testing voltage at the control panel of a fixed generator automatic transfer switch. He was using a fluke meter to test the voltage across contact points to ensure the generator was functioning properly. Access to the contacts was hindered by a clear plastic shield. In the process of working around the shield phases were crossed with the meter contacts.

DIRECT CAUSE:

- ◆ ARC Flash caused when one of the Fluke meter contacts crossed the phases.

INDIRECT CAUSE:

- ◆ The clear plastic (plexi-glass) guard was not removed to allow direct access to the testing points.
- ◆ Maintenance Mechanic not wearing Personal Protective Equipment appropriate for the task (no gloves/arc flash protection).
- ◆ Ineffective implementation of PWBL SOPs/JHAs and UFC-3-560-01 Working on or Near Energized Equipment.
- ◆ No SOP for performing maintenance on fixed generators and associated electrical system.

ROOT CAUSE:

- ◆ Procedures not followed for High-voltage / Low-Voltage Utility workers.

LESSONS LEARNED:

- ◆ Plastic guard or shields (not intended as electrical enclosures should be removed by qualified employees to access equipment for testing/maintenance. The automatic transfer switch is provided with a fully enclosed wrap-around arc clear cover plastic that shields the main contacts. According to the manufacturer's literature the arc cover is provided to protect an operator when the transfer switch is manually operated. The shield is not intended to protect an operator performing voltage testing.
- ◆ Personal Protective Equipment (PPE) must be available and used when required by SOP/JHA and UFC-3-560-1. UFC 3-560-01, "Electrical Safety O & M", Table 4-2 provides the hazard/risk category classifications for specific electrical work tasks. Voltage testing of energized equipment rated below 240 volts is assigned a hazard/risk category 1. The Personal Protective Equipment (PPE) required for a hazard/risk category 1 is detailed in paragraph 4-4.1.2 and Table 4-1 of UFC 3-560-01. The PPE required includes the following: fire-rated long-sleeve shirt, pants or coveralls with a minimum arc rating of 8 cal per centimeter squared; cotton underwear; leather electrical hazard-rated work shoes or boots; safety glasses with side shields or safety goggles; voltage rated gloves; and hearing protection when required.
- ◆ Superintendents and Supervisors must ensure SOPs/JHAs are reviewed, updated and implemented periodically with refresher training of affected employees. A thorough preparation and review of JHAs coupled with the Risk Management process would have reduced the likelihood of this mishap.
- ◆ SOP to be developed to clarify the duties, training, and limitations of Industrial Equipment Maintenance Mechanics associated with electrical testing.
- ◆ Assure training on diesel generators also includes voltage testing procedures of the automatic transfer switch and assure employees are designated as qualified electrical workers in accordance with paragraph 2-2 of UFC 3-560-01.
- ◆ A process in development NAVFAC wide by the PWBL (Electrical S.A.F.E.) is planned to be implemented to address past training gaps for some Utilities workers performing work on less than 600 volts.