The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

52-Year-Old First Class Electrician Electrocuted in Indiana

FACE 86-53

Introduction:

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR) is currently conducting the Fatal Accident Circumstances and Epidemiology (FACE) Project, which is focusing primarily upon selected electrical-related and confined space-related fatalities. The purpose of the FACE program is to identify and rank factors that influence the risk of fatal injuries for selected employees.

On September 3, 1986, a 52-year-old first class electrician was electrocuted while performing preventive maintenance on a high voltage circuit breaker.

Contacts/Activities:

Officials of the Occupational Safety and Health Program for the State of Indiana notified DSR concerning this fatality and requested technical assistance. This case has been included in the FACE Project. On February 4, 1987, a DSR research team (consisting of a safety engineer and a safety specialist) met with representatives of the company. Photographs of the accident site were obtained and interviews were conducted with a surrogate for the victim and two comparison workers, who perform the same tasks as the victim.

Another electrical-related fatality occurred to another employee of this utility in February, 1987. A separate evaluation of that incident is given in FACE report 87-24-II.

Overview of Employer's Safety Program:

This is a public electrical utility company that employs over 2,200 personnel.

The company establishes and attains safety goals through a written safety policy and written safety program. Employees receive copies of the safety policy and safety program as part of the new employee orientation. Depending on their duties, employees receive both on-the-job and classroom training. A full-time safety staff administers and evaluates the safety program. Safety committees, which consist of supervisory personnel only, meet monthly to discuss and evaluate safety matters.

Synopsis of Events:

On Wednesday morning September 3, 1986, a two-man crew consisting of an Assistant Engineer and a First Class Electrician (the victim), were scheduled to perform preventive maintenance on a high voltage (34.5 kV) oil circuit breaker (OCB). As part of the preventive maintenance, the insulation values of the OCB bushings were to be tested.

The crew arrived at the substation where they parked the test van adjacent to the OCB scheduled for testing. Prior to the start of testing, the assistant engineer telephoned the load dispatcher and asked for permission to work on the breaker. After receiving instructions from the load dispatcher, the assistant engineer directed the victim to move the test van so they could test the bushings. In the meantime, the assistant engineer proceeded to the bus side of the OCB and pulled down (opened) the handle of the gang-operated disconnects for the OCB. The assistant engineer visually checked the disconnect blades to ensure they had opened. Satisfied that the disconnect blades were opened, he placed a hold card on the handle. The assistant engineer then tested the first bushing on the OCB. After finishing the test on the first bushing the assistant engineer informed the victim, who was still in the van, he was ready to test the second bushing. The victim came out of the van and switched the test lead from the first bushing to the second bushing. After completion of this test, the assistant engineer informed the victim he was ready to test the third bushing. The victim removed the lead from the second bushing and as he touched the lead to the third bushing, which was energized, he provided a path to ground and was electrocuted.

Investigation of the accident revealed that one of the disconnect blades remained closed after the handle for the gang-operated disconnects had been pulled down (opened). An equipment failure (i.e., a broken porcelain insulator skirt at the base of the cap) allowed the cap to remain stationary while the rest of the mechanism rotated when the handle was pulled downward. This action permitted the disconnect blade to remain in the closed position allowing current to flow through the third bushing.

Cause of Death:

The coroner's report indicates the cause of death as electrical burns.

Recommendations/Discussion:

Recommendation #1: The safe job working procedure should be revised to include additional steps to further verify the status of this equipment.

Discussion: The closed disconnect blade was the result of an equipment malfunction and oversight by an employee. During routine maintenance, other disconnects should be visually examined for signs which indicate similar malfunctions. The implementation of additional steps in the safe job working procedure (i.e., testing the bushings with a "noisy tester" or statoscope) prior to performance of maintenance would indicate to the employee the presence or non-presence of electrical energy in the bushings. Additionally, a procedure for grounding the system prior to testing the bushings should be developed and implemented. This last recommendation is currently being developed by the utility for incorporation into the safe job working procedure.

Recommendation #2: Training should address both safe job procedures and hazard recognition.

Discussion: A disconnect blade remained in the closed position creating a dangerous situation and ultimately causing the death of a worker. A visual check of the disconnect failed to identify the closed disconnect blade. The handle for the gang-operated disconnects is located approximately 18 feet below and 5 feet to the side of the disconnects. The assistant engineer made the visual check from the ground where the handle was located. This remote location and other equipment in the area may have obstructed his vision. Visual verification of disconnect opening should be performed in a manner that considers location, background obstructions, and angles of sight.

Recommendation #3: Include selected employee representatives in the monthly safety meetings.

Discussion: Employee representatives from different departments can be a valuable asset to the safety program and all levels of personnel should be represented at periodic safety meetings. Safety-related problems should be communicated to personnel responsible to take corrective action.

Return to In-house FACE reports

Last Reviewed: November 18, 2015