This fatal shock incident involved an experienced electrical worker working on a system that he had not worked on previously. The worker arrived on site to repair a 13.8 kV primary-fused switch compartment that had previously been involved in a flashover due to excessive moisture contamination. The electrical switchgear lineup was fed by two 13.8 kV services from the utility; these two sources were isolated and tagged by the local electrical authority. The switchgear had two 13.8 kV fused disconnect switches fed from a common bus from the two utility sources; one fed an in-service transformer, and the second switch fed an out-of-service transformer which had its fuses removed, as shown in Figure 1. The second transformer had been out-of-service for a long time prior to the incident and was assumed to have been disconnected from the secondary bus. There were no up-to-date single-line drawings for reference.

When work was to commence, all potentials were verified to be dead by two contractors on the job site. Temporary safety grounds were installed on the primary bus to the system ground in the switch associated with the in-service transformer. All company procedures were in place and were followed by the workers.

After all isolation and grounding was complete, a generator was connected to supply emergency 600 volt power to the customer while repairs were being completed. The secondary leads were removed from the in-service transformer, and the generator was connected to these leads. After the generator was connected and running, work commenced.

This experienced electrical worker was killed in the out-of-service disconnect switch cell when he made contact with the conductors connecting the fused disconnect switch to the transformer.

The cause of the fatality was shock caused by a backfeed from the backup generator through the out-of-service transformer. During the initial job prep it was assumed that the secondary leads from the out-of-service transformer were previously disconnected; these leads, however, were connected to both the out-of-service transformer as well as its associated 13.8 kV disconnect switch. The tie switch was closed connecting the in-service and out-of-service transformers on the 600 volt side. Both of these conditions permitted a backfeed from the 600 volt backup generator through the tie switch and then through the out-of-service transformer.
transformer which transformed the 600 volt source up to 13.8 kV. Since the point of contact was not grounded with temporary safety grounds, 13.8 kV potential was on the conductor when the worker came into contact with it.

Follow-Up Recommendations

In this case all potential sources, including all possible backfeeds, should have been identified, isolated, tested for the absence of voltage, and grounded. An assumption was made that the primary leads from the out-of-service transformer were disconnected at the transformer end; this connection should have been visually checked and not left to assumption. Ideally, appropriately-sized safety grounds should have been installed at the incoming utility feed on the load side of the in-service transformer’s disconnect switch after the fuses and on the load side of the out-of-service transformer. This would have created a zone of protection around the area in which the service technicians were working.

Employers are required by clause 25(2)(h) of the Occupational Health and Safety Act (OHSA) of Canada and standard 1910.333 of the Occupational Safety and Health Administration (OSHA) of the United States to take every precaution reasonable under the circumstances to protect workers from contact with energized conductors. However, employees must follow the rules and policies outlined in their companies’ safe work policies and procedures.

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