



ALERT



HIGH VOLTAGE SWITCHGEAR REPAIRS

Hazard Summary

An experienced high voltage worker suffered a fatal electrical shock while performing maintenance and repairs on a 3.8kV primary switchgear in a substation. The two main high voltage infeed supplies were opened (turned off) and tagged by the local electrical authority. The switchgear had two primary fuse compartments. One compartment fed the in-service transformer, the second one fed an out-of-service transformer and had had the fuses removed. The second transformer had been out-of-service for a long time and was assumed to have been disconnected from the secondary buss* at some point. There were no up to date single-line drawings for the workers to use.

All potentials were verified as dead by both contractors on the jobsite. Temporary grounds were connected to the primary buss and to the system ground in the switchgear associated with the in-service transformer (per rule 119 of the EUSA rulebook , 2004 edition). All company procedures were in place and followed by the workers.

The repair work was required to repair damage from a flash-over in the primary fuse compartment due to excessive moisture. A generator was needed to supply the secondary 575 volts to the customer while repairs were being completed. The secondary leads were removed at the main transformer and the generator was tied into the secondary from the main 1000 kVA transformer. The generator connections were made after checking of potential and installation of the temporary grounds.

The investigation showed that the secondary leads on the out-of-service transformer were still tied into the distribution buss from the building supply room. In this room, a Tie switch was present from a long past owner of the building. The Tie switch was in the closed (on) position. This supplied 575 volts to the secondary lines to which the out-of-service transformer was connected. As a result, the second transformer was being back-fed resulting in 13.8 kV being present at the pothead conductors in the fuse compartment for the transformer. With no fuses present, there was no connection to the temporary grounds, allowing the potential to sit on the conductors. A worker went into this compartment to move some equipment, made contact and was killed.

Location and Sectors

All electrical sectors and locations.

Recommendations

All potentials should be verified before and after a temporary source of power is brought on-line. The temporary grounds should be applied to the line and load side of all fuses even if fuses are NOT present in the primary circuit. These grounds will safely carry to ground any current from the conductors becoming inadvertently energized from an unknown source. Ensure up to date single-line diagrams are present and legible.

Legislative Requirements

Employers are required by clause 25(2)(h) of the Occupational Health and Safety Act (OHSA) to take every precaution reasonable in the circumstances to protect workers. In this respect, employers should refer to, among other things, accepted industry standards such as the current editions of the EUSA Rulebook and the Ontario Electrical Safety Code in determining what precautions are reasonable when working around electricity.

Glossary of Terms

* An electrical “buss” is a physical electrical interface where many devices share the same electrical connection.

“Primary” refers to the system which carries high-voltage power to the transformer.

“Secondary” refers to the system which takes power from the transformer, usually into a house or other building.

“Temporary Grounds” are grounds attached between the grounding system and the conductors, in order to ensure a safe work area. Any inadvertent energizing of the conductors will be conducted safely to ground, giving time for the circuit protective devices to operate and clear the fault.

This Ministry of Labour Alert has no legal effect and does not constitute and is not a substitute for legal advice. If you require specific assistance with respect to the interpretation of a legislative provision and its potential application to you, please contact your legal counsel.

Remember that while complying with occupational health and safety laws, you are also required to comply with applicable environmental laws.