

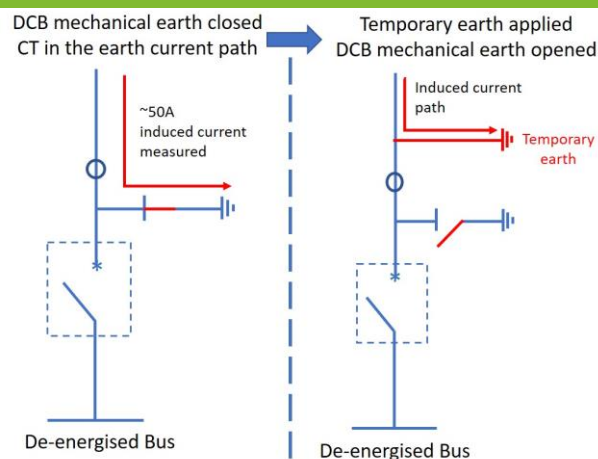
WORKING ON CURRENT TRANSFORMERS IN THE EARTH PATH

WHAT HAPPENED?

During a current transformer (CT) ratio change at Wilton substation in late 2016, crackling sounds were heard as the secondary wiring was being disconnected. The service provider stopped work and further investigated. It was found that 50 A of induced current from the transmission line was measured at the main earth of the DCB earthswitch.

Because the DCB earthswitch is behind the CT, the induced current in the earthed transmission line passes through the CT before reaching the earthswitch. This induced current will cause dangerous voltages on the CT secondary wiring.

The service provider reassessed the temporary earth requirements and has applied the temporary earths on the line side of the CT. Then opened the DCB earthswitch to remove the CT from the earth path, while the CT ratio change is taken place.



Note: The temporary earth requirements must be assessed on a case by case basis

ROOT CAUSE

Further review has found that this issue can exist with any arrangement where the CT remains in the earthed path. e.g. DCB's, CSA's and indoor switchgear's CT. Where the DCB, CSA or switchgear is connected to a line / feeder, there is no easy means of isolating the line/feeder side CT from primary current flow which can be caused by either induction or from returning primary faults. This is because there is no line side disconnector in the primary circuit and the work involves interrupting (open circuiting) the CT secondary wiring. e.g. For a CT ratio change. In these situations, hazardous voltages will appear across the open CT secondary circuit.

LEARNINGS

- When working on secondary circuits of a CT and there is no line side disconnector to isolate the primary circuit, the CT will need to be removed from the earth path. This can be achieved by applying a temporary earth on the line side and remove the mechanical earth at the bus side, prior to the work on the CT.
- Alternatively, the HV line side droppers can be removed while ensuring the line termination and equipment to be worked on remain earthed.
- If the CT cannot be removed from the possibility of induced current and returning fault current, the CT secondary wiring may be shorted across the full secondary winding, if it is safe to do so. Note: when shorting the full secondary winding, if existing wiring is disturbed (disconnected) then additional testing will be required prior to returning the CT to service. Reassurance is also required for removing any applied shorting arrangements prior to completion of work.
- Transpower relevant controlled documents TP.OG 42.02, TP.SS 07.24 and TP.CP 01.05.

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