



HEN-MPE-A Electrical Shock Incident - Update

WHAT HAPPENED?

This **Safety Alert** updates the **First Alert** of 2 December 2014 which described an electrical shock to a tower refurbishment worker while he was setting up tower (251) by rigging a block to the top diaphragm. He was located in the top section of the tower approximately 500mm from the earthwire. The work was to fully refurbish the structure starting with bolt replacement, preparation of surfaces and painting. The worker has made a good recovery.

The protection on the circuit saw a blue phase (top phase) to earth fault which tripped and auto reclosed. Distance to fault indication placed the fault in the vicinity of the worksite. Evidence of the fault was later found on an adjacent strain tower (250) on the blue phase jumper along with bird excrement on the crossarm.

This part of the line passes through a rural area with open waterways frequented by large water fowl, (shags and herons).

Further fault arcing marks were found on the earthwire hardware on tower 251. The tower was corroded.

ACTIONS TO BE TAKEN

The previous temporary measure to observe a MAD to the earth wire is now superseded by the following further interim measure:

- For all work in the superstructure (above the waist) of towers with earth wires, where the work period exceeds 10 minutes, the earthwire shall be bonded to an earthplate below the work position or onto prepared and cleaned metal at the same location. Refer also TP.SS 07.23 and drawing TP 63285.
- The earth lead size shall have a minimum rating of 10kA (1 second).

Note (TP SS 07.23 requires bonding for all work on earthwires or fittings and this remains unchanged)

ROOT CAUSE (Interim and subject to completion of analysis and modelling)

It appears the fault on the adjacent tower (250) resulted in a transferred potential with fault current travelling along the earthwire to tower (251).

Corrosion on tower members and bolts can result in high resistance metal to metal joints due to loss of tension and the insulating properties of corrosion products. This can give rise to a difference in potential between meshed tower steel members under fault conditions.

It appears this rare combination was sufficient to create a harmful situation for a worker.

LEARNINGS

- This appears to be an extremely rare event with no other similar recorded events or anecdotes.
- Investigations will continue into modelling the tower and fault conditions to assess the level of potential difference possible on corroded towers. A review of international experience will also be undertaken.
- Workers can create safe work zones through bonding and creation of equipotential work zones appropriate to the work they are undertaking. Refer TP.SS 07.23 Worksite equipotential bonding and portable earthing of transmission lines.