

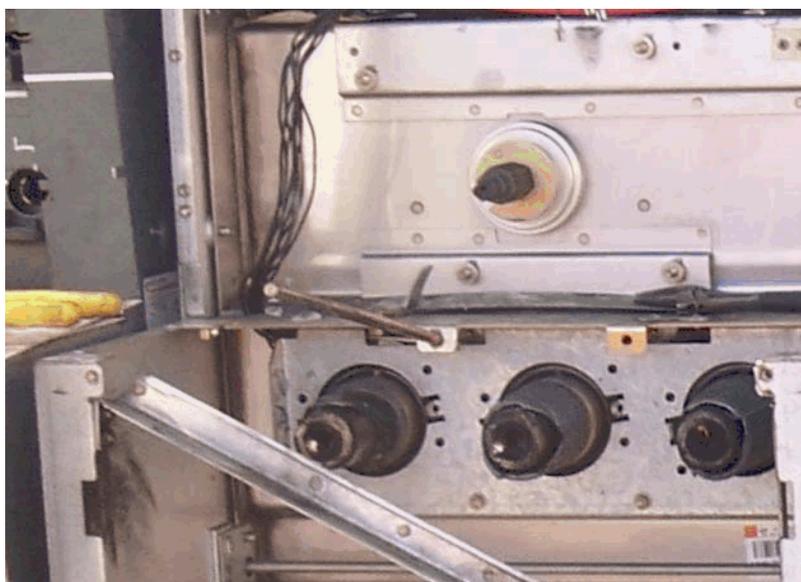
Arc flash injuries received from 22kV ring main unit

Mine Type: All Mine Types

Incident: Recently at a coal handling and preparation plant, the coal stacker was electrically isolated to allow for maintenance work. On completion of the work, attempts to re-power the stacker failed. The electrical switching mechanism from a ring main unit (RMU) had failed, and the mechanism needed to be removed for evaluation and/or replacement.

A switching mechanism from a spare RMU was also to be removed for use as a possible replacement. This 22,000 volt RMU can be seen below, with the 3-phase high voltage bushings shown in the lower half of the picture. The switching mechanism has been removed from in front of the hexagonal-shaped operating shaft in the middle top right of the picture. A vertically moving truck located behind this panel connects these three bushings to 'live', 'off', and 'off and earthed' positions, depending on where the operating shaft is positioned. With the truck at the topmost position, the three bushings are disconnected from power and earthed. In the middle position, they are disconnected from power, while in the lowest position, they will be contacting the live 22,000 volt conductors.

When the electrical switching mechanism was removed from this unit, it was de-energised by moving the switching mechanism to the 'off' position, which was then locked in place. However the hexagonal operating shaft was not locked in position and was only held in place by the switching mechanism. The switching mechanism was then removed. As the two electricians were replacing the external covers an arc flash occurred, causing serious burns to both electricians' hands.



Hazard: High energy arc flash

Equipment: RM-6 ring main unit

Cause: The exact cause of the incident is still under investigation. At this stage, it appears that the high voltage bushings on the RMU were re-energised as the operating shaft rotated and the truck mechanism in the RMU moved under gravity from the 'off' to the 'live' position.

As the electricians were re-assembling the cabinet, it appears an arc flash was initiated by clothing coming in contact with the high voltage terminal, initially creating a phase to phase short circuit.

Comments: The manufacturer's data recommends that prior to energising, check that the connection bushings are fitted with connectors or with insulating caps. This appears to have been overlooked during the testing and commissioning of the equipment.

Recommendations:

- All such incidents highlight the importance of switching sheets, access permits and access procedures.
- When performing unfamiliar tasks, a risk assessment is necessary. This should include contacting original equipment manufacturers (OEMs) for guidance and/or procedures if information relating to the task and identification of hazards is not immediately available.
- Inspection and test sheets, commissioning sheets and maintenance check lists must be developed using information supplied in the manufacturer's manuals. This should cover such issues as the insulating caps mentioned in this alert.

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