Safety Advice 10-2006 (NZ)

September 2006 – Re-Livening Prior to Completion of Work Under Access Permit

Overview of Incident

Two line mechanics received an electric shock simultaneously when the 11 kV circuit they were working on was livened when an Access Permit was returned prior to the completion of their work. The line out of service under the Access Permit conditions comprised 33/11 kV circuits recently re-mounted on replacement poles in preparation for a later line upgrade to 66/22 kV. The two-man work party, one of four work parties comprising the sum of 14 workers spread along 6.5 km of line under the one Access Permit, was in the process of completing tapping through on the centre and outer phases of the 11 kV circuit when the re-livening occurred. The task at the incident work site was to tap through conductors across an open 11 kV shackle point. The Access Permit Recipient was working with another of the four work parties, each of which was out of sight from each other.

Each of the work parties was briefed on the work site safety measures to be taken and communication throughout the day was by mobile radio, one-on-one face to face, and also by mobile phone contact. Work site safety measures in place at the incident work site was one set of multi-phase earths applied adjacent to the work position, on the opposite side of the pole to the direction of livening. Reliance was placed on earths applied by another work party further down the line towards the livening point for the second set of earths. An equipotential zone had not been established. As the conductors were not continuous at the work position, visible earths were required on each side of the break and the second set was not applied. A bond was not applied across the break in the conductors being worked on, although at the time of the incident two of the three conductors had been tapped through. This was a significant failure in terms of the requirements of SM-EI Rule 3.603.

Earlier in the day, the incident work party had left a mobile phone message on the Recipient's mobile phone to the effect that they had finished work and were treating everything as alive. However, the incident work party then moved to the incident work site on the same line to carry out another task to assist one of the other work parties. While this second task was nearing completion, the other work parties had completed their tasks and moved clear of the line, advising the Recipient of their status. A member of the Recipient's work party at this point checked the Recipient's mobile phone messages, noting the message from the incident work party which had been sent earlier in the day for the earlier task. Assuming this message related to their status at the end of the day (clear of the line and treating everything as live) the Recipient returned the Access Permit for re-livening, when in fact the incident work party of two were still working on the 11 kV circuit. The shock incident occurred on re-livening.

This incident involved potential for fatality, serious burns and other injury, however the two line mechanics received only an electric shock. The closing of the first drop-out fuse re-livened that phase, which was earthed through the completed tapped through jumper to the single set of multi-phase earths applied at the work site on the opposite side of the pole. This resulted in the electric shock and tripping of the 'Nulec' feeder circuit breaker to lockout after recloses, fortunately made possible by earth fault loop impedance low enough to cause the operation. Due to short-circuiting of the conductors via the temporary earth set, the completed centre phase jumper back-livened the centre phase, and the uncompleted outer

phase jumper also livened. After the shock the workers kept clear of the conductors and remained still at the work position, communicating events with the Recipient who then came to the incident site.

Incident work site

Fundamentally, the root cause of the incident was the Access Permit Recipient not being familiar with, and following, the specific prescribed requirements of Rule 3.504. Namely, that prior to returning an Access Permit, **the Access Permit Recipient shall ensure** that all employees working under the access permit:

- are **told** that the access permit is about to be returned;
- are **instructed** that they no longer have access to the equipment;
- must **sign off**, if they had signed on, and keep clear of the equipment.

An assumption was made about the currency of mobile phone message information relating to the movements of the incident work-party, which was in fact old information relating to an earlier period in the day. The deficiency was reliance on mobile phone messaging as a means of communication which was not real-time two-way communication implied by Rule 3.504.

A second crucial deficiency, impacting the potential severity of the harm to the work party, was the failure to put in place the additional measures required by SM-EI Rule 3.603.

Recommendations

- Asset owners and contractors review communications plans to eliminate potential for the deficiencies highlighted by this event, and
- Ensure the SM-EI Rules applying to work site safety measures are fully and adequately applied in all situations.