FLASHOVER WHILE REPLACING DEFECTIVE AIR BREAK SWITCH

BACKGROUND

This is advice of a live line electrical accident which occurred in 2002. The accident involved an 11,000 volt flashover which occurred while carrying out the replacement of a defective air break switch (ABS) on a power pole. As a result of the accident, a live line mechanic sustained burns to the right side of his torso, neck and face and was hospitalised for 6-8 weeks.

INITIAL ACCIDENT DESCRIPTION

Five employees were sent by their live line supervisor to carry out the work. One of the workers assumed the role of safety observer on the ground and was designated supervisor of the work. The supervisor outlined how the work was to be done, a hazard assessment was completed and the work commenced. It was agreed that the two teams of two live line mechanics would start from the footpath side of the pole and would work towards the road. There were two elevated work platforms (EWPs) on site so that both teams could work either side of the pole simultaneously.

Both teams loaded up their respective EWPs with live line safety gear - one worker loading the gear into their EPW while the other made up some temporary jumpers with rigid barriers. Once it had been checked that all the necessary gear was loaded, one of the workers operated the EWP and moved the bucket into position. Both teams then began to cover up the conductors on the footpath side and then the middle phase conductor. One worker in each team applied the temporary jumpers to keep the power on but divert the power from the ABS.

Both teams then moved over to the centre conductor. Half mats were used to cover the line and were secured with HV pegs. The HV tail was taken out from the top of the ABS and folded back onto the HV line. This was then secured with cable ties. The teams then moved over to the roadside and covered up the conductors in the same manner. One of the workers climbed out of his bucket onto the power pole below the ABS to complete the hardware disconnection. He was secured to the pole by a pole strap.

The teams then agreed to remove the bolts on the ABS which were fixed to a "T" shaped bar at the top of the power pole. One of the workers asked his co-worker to move the bucket over to the footpath side so that he could remove the bolt on that side. The bolt was rusty and proved difficult to remove. The worker then told his co-worker that he would take off the ABS's actuating pivot bolt which was attached to a galvanised pipe which opens and closes the ABS.

Before the bucket was moved, the cover-up used on both the footpath side and the middle conductor was checked. Satisfied that it was properly in place, the worker took off his gloves. As the line mechanic reached up to the pivot bolt, his co-worker moved the barrier blanket towards him. This left part of the live HV conductor exposed. It was at this point that a flashover occurred.

The line mechanic experienced excruciating pain under his right armpit and his clothing ignited. He crouched down in the bucket. His co-worker moved the bucket clear of the conductors. When the victim stood up, his clothes re-ignited. His co-worker patted the flames out and then proceeded to lower the bucket to the ground. The victim then climbed from the bucket and removed his clothing whilst the safety observer poured water over him. He was then taken to Accident and Emergency where he was later transferred to the intensive care unit.

ANALYSIS

An investigation into the accident concluded that during the unbolting of the ABS structure, one of the hard covers on the centre conductor was moved, thus allowing the live conductor to initiate an arc to the earthed metal of the ABS structure.

The investigation issues were:

(a) Inadequate supervision on site allowed a variation from the safe system of work in that:

(i) The worker removed his gloves, thus failing to ensure there were at all times two levels of insulation during live line work.

(ii) There was insufficient cover up of live conductors and earthed metal to provide protection from body and equipment contact. The cover up half blankets used were not long enough to completely cover the jumpers that had been bent back out of the way of the ABS connection. The bottom of the blankets left a gap sufficient for the conductor to be exposed. One of the blankets used to cover the jumpers had been cut in half reducing its overall effectiveness. Furthermore, one of the workers moved one of the blankets at the same time that his co-worker moved in to loosen one of the bolts.

(iii) One of the operators climbed out of the EWP.

(iv) The low voltage lines were not covered and yet were within 300mm of the EWP bucket.

(v) The earthing system on the EWP was substandard.

(b) There were safety procedures for carrying out the replacement of ABS's in a manual in the truck on the site, but none of the employees (apart from the designated supervisor) had ever seen them.

(c) Monitoring and audit systems were not effective. Monitoring was not specific enough for individual tasks and performance of individual employees. Variation from safe working procedures had occurred on numerous occasions in the past. Auditing of overall systems should have been sufficient to have picked up the variation and specific for live line work.