



# SAFETY ALERT

## Electric shock from a light fitting.

### INCIDENT

A mineworker received an electric shock when his forearm made contact with a flameproof Burn Brite fluorescent light fitting (Certificate No AUS EX 424X) on a continuous miner in the hazardous zone of a coal mine. The victim was transported to hospital in accordance with the mine's electric shock protocol and was allowed to leave after medical tests and examination determined that no permanent injury had occurred as a result of the shock and there was minimal risk of delayed arrhythmia.

The presence of electricity external to the flameproof enclosure also presented a potential ignition source of methane

### CIRCUMSTANCES

The source of voltage was from a 110 volt power supply located in the master control enclosure on the continuous miner. The Burn Brite light fitting case was plastic; however three brass threaded inserts are embedded in the boss assembly to enable cable glands to be fitted. These metal inserts are not connected to earth, and any metal gland screwed in may not be earthed (see photograph below)



The light fitting was mounted vertically which allowed water to enter and accumulate as a result of a missing "O" ring between the boss and nut assembly of the light fitting. The missing "O" ring constitutes a failure of the Ingress

Protection (IP). (Note: The “O” ring may become dislodged during re-assembly of the light fitting after maintenance). The outer case collar (flamepath) was cracked (see photograph below) and the poly-carbonate case was also cracked.



The presence of water in the light fitting caused a fault current to flow to the earth screen of its supply cable. This imposed a touch voltage onto the unearthed external cable gland. The fault current was below the magnitude necessary to cause the electrical protection to operate. The circuit protection is a 10-ampere fuse and a toroidal earth-leakage relay set to trip at 500 milliamps, within 250 milliseconds. The light fitting continued to operate with the water present.

## **INVESTIGATION**

The three factors of:

1. A failure of the ingress protection,
2. Unearthed external metal on the Burn Brite light fitting, and
3. The 500 mA/250 ms setting of the earth leakage protection,

combined to present two separate hazards in the hazardous zone of the coal mine.

These hazards were;

1. A touch voltage was able to deliver an electric shock to a mineworker,  
AND
2. The explosion-protected equipment failed to contain the electrical energy within the enclosure under fault conditions creating a potential source of ignition of methane.

## **RECOMMENDATIONS**

The issues raised herein may also apply to other light fittings and on other machinery at NSW mines.

Manufacturers of light fittings and continuous miners, should review the risks to safety from their products and to promptly stipulate earthing, protection, maintenance and inspection requirements to their customers as required by the NSW OHS Act.

All mines should assess the risks to safety of the Burn Brite light fitting in a manner consistent with clause 6 of the Coal Mines (General) Regulation to decide if continued use is appropriate, and if so, under what conditions of use, including inspection, environment, earth leakage protection settings and inspection and overhaul schedules.

All mines should review the training and competence requirements of persons responsible for maintenance of the light fitting to:

- Prevent mistaken assembly,
- Identify cracks in the flameproof assembly.
- Ensure adequate earthing

All mines should review the inspection, testing and maintenance of all electrical equipment to include the checking of the integrity of earthing of exposed metal parts and earth continuity testing.



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