



# Electrical Incident Report

## Spread the Safety Message

When you finish reading this Electrical Safety Bulletin could you please pass it on to others  
The issues described here should be discussed as widely as possible with mine personnel

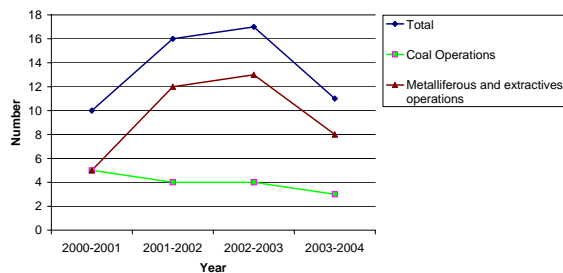
### Annual Review Highlights

The Senior Inspector of Electrical Engineering has completed a review of industry performance in Electrical Engineering Safety.

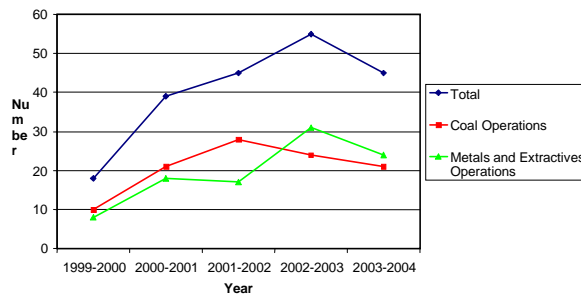
Some detailed feedback will be provided at the Electrical Engineering Safety Seminar at Penrith in November 2004.

But here are some performance indicators.

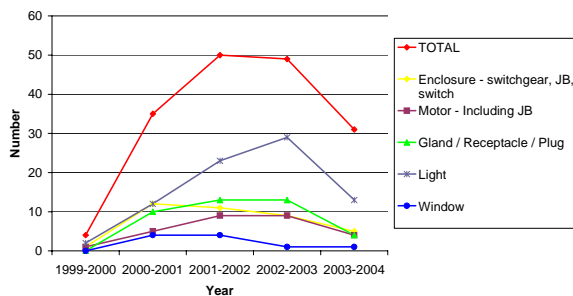
Fires - Electrical Ignition Source



Electric Shock and Burn Incidents



In-service failure of Ex apparatus



The SIEE, John Waudby, said that improvement in the incident performance figures in last year was supported by observations made by Inspectors of Electrical Engineering. Positive reports include:

- ✓ Generally improving installation standards
- ✓ Increasing awareness of key issues among electrical engineers and tradesmen
- ✓ Increasing participation in networking and electrical engineering safety forums.

There is, however, still significant room for improvement in the management of cables in hazardous areas. The mining industry must make some decisive gains in this area in the face of increasing voltage and power of production machinery.

New technology is increasingly being adopted by the mining industry in pursuit of safety and productivity goals. Engineers must employ a systematic and rigorous approach to identifying the potential impacts on existing systems and activities. This can only be achieved through an approach that considers the full life cycle of equipment.

□ STEVE MILLINGTON

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**TEST BEFORE YOU TOUCH**



## Electric Shock

### Processing Plant Coal 04/08/04

A contract electrician received an electric shock while working in a distribution board.

He thought the cubicle was isolated but had overlooked a back feed to a control wire.

#### Victim Management

The mine had in place Electric Shock Victim Management Procedures. These were put into effect and the apprentice was taken to hospital for assessment and an ECG.



#### Factors

- 1 Two contract electricians were working on the main distribution board in a washery substation.
- 2 The board has two supplies and is separated by a bus tie circuit breaker.
- 3 A JSA had been performed for carrying out work on No 1 side of the board.
- 4 It was decided by the men that some additional work would be carried out on No 2 side.
- 5 One of the electricians noted that No 2 supply was off and locked, so began working in the one of the cubicles.
- 6 He grabbed a spade lug on a control wire to straiten it before putting it into a relay terminal.
- 7 The spade lug was live at 240V, being fed from an alternate source from the other side of the bus tie.

#### Key Learnings



- ✓ **TEST BEFORE TOUCH.**
- ✓ If the scope of work changes, check that the JSA is still relevant.
- ✓ Electrical isolation **MUST** include checking for live conductors.
- ✓ Best practice is to use two forms to prove that a circuit is de-energised.
  1. A Fit for Purpose meter (e.g/ Cat III multimeter or better.)  
Make sure it is working.  
Test the conductors you are going to touch.
  2. A non contact tester.  
Test before and after use.  
Test generally all locations in the work area.
- ✓ **MAKE SURE YOU HAVE YOUR TEST EQUIPMENT WITH YOU**
- ✓ In addition, consideration must be given to the possibility that conductors may become live during the course of the job.

#### Some readily available reference material:

- ✓ AS 4836: Safe working on low-voltage electrical installations
- ✓ WorkCover COP "LOW VOLTAGE ELECTRICAL WORK"



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## Electric Shock

UG Coal - SE - 20/08/04

A contract electrician received an electric shock while installing a new control panel in a motor control centre.

He was installing fuses in a combination fuse switch that was in the incorrect position.

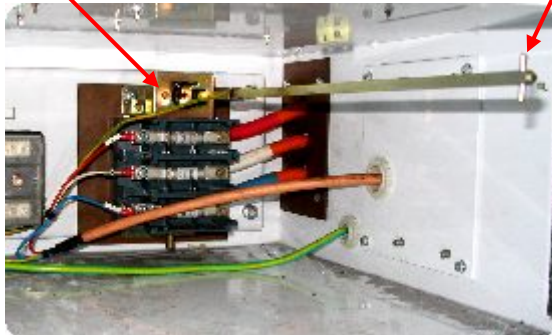
### Victim Management

The mine had in place Electric Shock Victim Management Procedures. These were put into effect and the electrician was attended on site by paramedics and taken to hospital for precautionary assessment.

### Apparatus

On / off indicating tag and stamped face plate

Extension bar polarising key



### Crane isolator (Upper compartment)

**Note: live incoming supply at back, right of isolator.**

The equipment was a Stromberg OESA 32 G1, 32amp isolator. The isolator is believed to be more than 15 years old and no longer available for purchase. The incoming supply to the isolator is taken straight from the bus

### Factors

- 1 In the upper compartment for the crane isolator, the electrician tested the front terminals of the isolator with an ezy-scan (non-contact electrical tester) and also with a multimeter in accordance with isolation protocol.
- 2 From these tests he concluded that the front panel of the isolator was de-energised.
- 3 He completed the installation of the fuses.
- 4 He then moved to the lower magnet isolator compartment to complete a similar task tested only with the ezy-scan, believing this isolator too was in the off position.
- 5 He fitted the switch shaft and then start to fit the fuses.

6 He received an electric shock through both hands.



### Magnet Isolator (Lower compartment)

**note: extension bar incorrectly aligned to switch (indicator)**

### Key Learnings

The electric shock risk was extremely dangerous in nature however he was extremely fortunate, as there was **no barrier or protection device to prevent electrocution** at the point of contact with the live electric terminal and the victim reported that he felt the shock from hand to hand.

- ✓ **TEST BEFORE TOUCH.**
- ✓ The isolator had exposed live parts and should not have been worked on without isolating upstream.
- ✓ review and confirm isolation points from circuit diagrams and request circuit diagrams from site operator if not issued at commencement of job

### Some readily available reference material:

- ✓ AS/NZS 4836:2001 Safe Work on Low Voltage Installation
- ✓ WorkCover NSW Code of Practice 2001 Low Voltage Electrical Work



**TEST BEFORE YOU TOUCH**

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## Electric Shock

**UG Coal - Hunter - 10/08/04**

An operator and an electrician received an electric shock from a submersible pump installation.

They were in a wet area and received a mild shock from metal parts of the installation.

### Victim Management

The mine had in place Electric Shock Victim Management Procedures. These were put into effect and the apprentice was taken to hospital for assessment and an ECG.

### Factors

- 1 The investigation did not find any clear reason for the electric shock.
- 2 The supply system was an IT system (impedance earth) with sensitive earth leakage protection.
- 3 The pumping station was a considerable distance (> 1000m) from the supply transformer.
- 4 The connecting cables were symmetrical individually screened cables to AS 1802.
- 5 The metal parts of the installation were connected back to the transformer via the PE conductors in the cable.
- 6 The installation was not connected to a local ground.
- 7 The operator was very wet at the time, and wearing wet leather boots.
- 8 It is possible that there was sufficient stray current through induction to cause the operator to receive a tingling sensation.

### Key Learnings

Increased attention has been paid to local equipotential bonding and connection to ground.

## Unplanned Movement

**Metals - West - 15/08/04**

An Elphinstone Loader failed to stop when the levers were released on the radio transmitter.

### Details

The operator was using a radio control to operate an Elphinstone LHD. The machine went into auto shut down several times on comms fail.

The operator tried to restart it three times, succeeding on the third attempt. He then drove the machine out of the stope.

When he let go of the tram levers it continued to travel. He hit the Estop and the machine stopped.

The machine has been tested and no fault found. The problem may be associated with the comms failure and the finite time required to detect and respond to signal loss.



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## Catastrophic Pump Failure

### *Interstate*

We recently received a report about a pump that exploded causing considerable equipment damage, and risk from flying debris.

I have reproduced the key points from the report here in an effort to alert any operation with a similar installation.



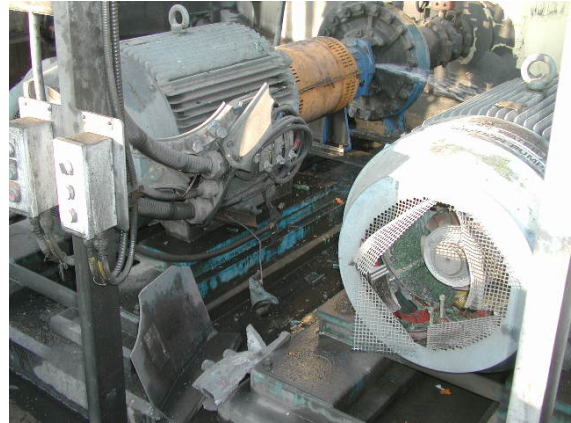
#### **Nature of Potential Loss:**

The incident could have resulted in severe injury or fatality to persons if they had been in the vicinity at the time of the explosion. The impact and heat of the explosion and flying shrapnel / pump parts exposed the major threats. The actual loss is production loss.



#### **Immediate Causes:**

Process Water Pump was operating with both suction and outlet valves closed. The water contained within the pump casing superheated and the high-pressure steam caused the pump to explode.



A procedural failure allowed the pump to be started without the suction and outlet valves first being opened. The other pump was still operating, hence the Process Plant was still receiving the required water flow and it was not noticed that Pump 040 was operating 'dry'.

At 7.20 am a loud explosive boom and large vibration was felt site-wide. A large amount of steam was observed in the area

Shrapnel had been ejected mainly within the concreted containment area, however some pieces of shrapnel had flown outside the containment area, up to 18 meters away. The second pump motor was damaged. Damage was also caused to the water tank, process water piping and nearby support structures.



The concrete containment wall prevented much of the shrapnel from being flung further. The shrapnel was still hot, up to 90 minutes after the explosion.

The valves at the Process Water Pumps were manually operated. They were not automated and do not contain instrumentation that allows interlocking with the pumps.



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