

## MOP 0084

# COMMISSIONING AND MODIFICATION OF ELECTRICAL EQUIPMENT

### KEY CONTROLS

- ◆ Electrical drawings maintained and secured in accordance with MOP 0096 Management of Electrical Drawings.
- ◆ EEM approval for all permanent modifications.
- ◆ Protection settings to be adjusted by EEM authorised personnel only.
- ◆ All electrical modifications recorded with drawings / plans updated.

The purpose of this procedure is to provide for the safety of all coal mine workers at Dawson Mine by reducing the risks associated with commissioning and modification of electrical equipment to an acceptable level.

This procedure applies to all coal mine workers at Dawson Mine.

## 1. PROCEDURAL REQUIREMENTS

### 1.1 General Requirement

The management of electrical drawings, including security and maintenance shall be undertaken in accordance with MOP 0096 Management of Electrical Drawings.

Electrical installations and equipment in service at The Dawson Mines shall be maintained in the "as built" condition unless the need, and the engineering standards of the modification, is assessed by the Electrical Supervisor or competent person and approved by the EEM. All electrical articles in use at the mine shall be of a design and standard suitable for the purpose for which it is used, and shall be properly installed and commissioned by competent electrical worker(s), authorised by the EEM or their delegate, to the relevant recognised standards.

To ensure standards are met, the following steps shall to be applied to all electrical installations or equipment purchases:

1. Evaluation of proposed purchases of equipment and materials, contract review; and contract management.
2. Evaluation through risk management principles of proposed changes to electrical equipment.
3. Electrical modification processed and approved through the change management process as per SOP 0068 Change Management.
4. Installations or equipment shall only be modified as recommended by the manufacturer or in documented procedures and to a recognised standard. (See Dawson's Supply and Installation of Electrical Equipment Specifications.)
5. All equipment installed in a location that is exposed to the weather or where they may be subject to hosing activities shall be provided with the degree of protection IP54 as a minimum.
6. The design of all new electrical installations shall consider arc flash hazards. New installations shall be designed as arc flash category 0 unless approved by Electrical Engineering Manager.
7. The design shall ensure reliable circuit interruption under fault conditions at all points in the mines distribution system.
8. The earthing system shall be of sufficiently low impedance to ensure reliable operation of all protection systems and devices and adequate protection against indirect contact.
9. The design shall ensure prospective touch voltages are limited to acceptable levels under fault conditions.
10. The design shall ensure that potential impacts from voltage rise from lightning strikes, static electricity, voltage surges and other transient voltages are minimised to within acceptable limits.
11. The design shall prevent a person from inadvertently contacting live parts of equipment or an installation exceeding extra low voltage.
12. The installation shall include easily accessible full current isolators for electrically driven equipment. The isolator shall be clearly identified as the isolator for the equipment and the equipment shall be clearly identified as being supplied by that isolator.
13. The design shall ensure each electrical control system operates safely under all operating conditions, including electricity supply instability or failure; and if the system suffers a fault or fails, all emergency stopping systems and safety alarms remain effective.
14. The design shall ensure any control circuits run externally to an enclosure from which the circuit originates and has a voltage of not more than a nominal voltage of 55 V to earth, or is

protected by earth leakage current protection of not more than 30mA sensitivity, or minimises the risk of direct contact and limits prospective touch voltage to within acceptable limits.

15. The design shall ensure each single-phase light and power circuit for low voltage electrical equipment has earth leakage current protection of not more than 30mA sensitivity, or a device preventing its use by portable electrical equipment. (This is not mandatory if the power outlet is the only outlet in an isolated electricity supply, e.g. generators).
16. The design shall ensure each circuit protection device has an appropriate operating time and tripping current, having regard to a risk assessment of the operation of the part of the electrical installation it protects.
17. The design shall ensure an unearthed electrical installation has earth fault detection and control.
18. The design shall ensure an earthed electrical distribution system has earth leakage protection.
19. The design shall ensure that if high voltage equipment (supplied via trailing cable) does not have a local earthing system; ensure the cable has an earth continuity monitoring system that cuts off the electricity supply immediately after an earth continuity fault is detected in the cable or equipment.
20. The design shall require the use of a key, tool or interlock to allow access to exposed conductors greater than extra low voltage.

## **1.2 Guide For Testing, Examining and Inspection**

The following is a general guide for testing, examining and inspection of electrical articles or an electrical installation prior to connection of the source of supply:

1. Circuits that are not completed must be isolated and suitably terminated, so there is no possibility of their becoming live.
2. Check that all rubbish, dust and metal fillings are removed from switchboards and the work site.
3. Check that all loose articles within the switchboard (tools, cable glands etc.) have been removed.
4. Check all connections are tight.
5. Check soundness of the earthing systems, including the earthing electrode(s).
6. Label switches, circuit breakers, etc.
7. Testing equipment must be in good condition and suitable for the work being performed.
8. Ensure that the calibration test due date of testing equipment has not expired.
9. Allow time for any flammable-cleaning agents to evaporate before energising.
10. Check all clearances between bare, and live equipment such as busbars to earthed metal etc.
11. Ensure that access to neutral and earth links is not obstructed by the installation of cables and that any equipment inside the switchboard that may require access whilst live.
12. If applicable, confirm that HV protection is operational before energising.
13. Ensure that equipment is suitable for the prospective fault current and that protection is correctly rated, e.g. Overloads, etc.
14. Ensure that covers of switchboards are kept in place once energised and that there is no access to live parts (e.g. use circuit-breaker blanking plates etc.).
15. Perform insulation and continuity tests immediately before energising to ensure that no faults have developed between testing and energising and record on the test notice.



16. Where appropriate, ensure that circuit wiring is connected to the correct location.
17. Warn any workers in the area that testing is about to begin and where necessary do polarity tests immediately after energising.
18. Make personnel aware that such lines or apparatus are to be energised.
19. Personnel shall be clear of the lines or apparatus.
20. Ensure short circuits and earths are removed before any voltage is applied.
21. Electrical Test Notice (Form 0173) or other approved form completed and submitted for sign off by Electrical Engineering Manager.

### **1.3 Documentation of Installed Equipment**

Certificates and other documents evidencing compliance of installed electrical installations and equipment with recognised Standards and any other specifications, manuals, rules mentioned in special condition of contract shall be provided or obtained.

Documentation must be completed as soon as practicable after implementation is completed. The modifications to the drawings must be clearly marked. Documentation includes the modified drawings, any other specifications, manuals or rules mentioned in special conditions of contract.

It is the Competent Person's responsibility to ensure all documentation is updated in the following areas:

- Machine/Local if applicable;
- Electrical Library / Drawing Register;
- Copy of the modifications (Drawings) forwarded to the Electrical Supervisor for update in electronic format (AutoCAD) as per MOP 0096 Management of Electrical Drawings; and
- Arc flash labels attached or updated.

If the modifications involve the High Voltage System, special considerations shall be given to:

- HV protection settings;
- MVA fault levels including arc flash levels;
- Switchgear ratings and interrupting capacity; and
- Switching Operations – remote operations of the equipment is preferred.

Documentation shall be completed for HV changes within 24 hours. For LV changes documentation shall be completed as soon as practicable (not to exceed 8 days).

Electrical schematics are located in the Electronic Drawing Register. Copies of current electrical schematics should be available at each electrical installation (e.g. Substations)

### **1.4 Electrical Protection Settings**

Only persons authorised by the EEM may alter or adjust electrical protection settings. Modifications to electrical protection settings shall be processed and approved through the change management process as per SOP 0068 Change Management. A risk assessment must be carried out prior to the adjustment or alteration being made.

The risk assessment must include consideration of:

- fault currents;
- protection against indirect contact;
- voltage levels; and

- reliable circuit interruption under fault conditions.

#### 1.4.1 Temporary Alterations/Adjustments

An authorised person may alter or adjust electrical protection settings for the purposes of testing and commissioning. The settings must be returned to their original state before the equipment is returned to service. If this is not possible, the Electrical Engineering Manager must be notified before the equipment is returned to service.

#### 1.5 Mine Electrical Plans

The EEM shall hold and maintain a plan (Hard or Electronic) of the HV power reticulation system. The plan shall be amended whenever any new equipment or part of the installation is installed.

As part of commissioning, full and detailed information of changes involving the following must be recorded:

- HV protection settings;
- MVA fault levels;
- Switchgear ratings and interrupting capacity; and
- Any other information that should be readily available for the purpose of safe operation of the mine.

## 2. ROLES & RESPONSIBILITIES

All persons operating equipment or undertaking other designed tasks shall be authorised by the SSE (or representative) unless undertaking training in accordance with the site Training Scheme.

#### The EEM / Competent Person

The EEM or the Competent Person responsible for certifying the modification shall take all reasonable steps to ensure the proposed modification meets all applicable standards. In addition the certification shall ensure that the proper engineering standards and skills competencies are to be used in carrying out the modification. The certification shall ensure that all appropriate documentation relevant to the modification is available.

#### The Persons Carrying Out Modification

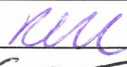


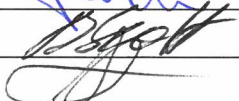

A person who carries out a modification to an electrical installation or equipment shall ensure that nothing about the way the plant modification is carried out makes the installation or equipment unsafe or a risk to the health and safety of any person. This is achieved by compliance with the instructions of the modification designer or equipment manufacturer. Where the Competent Person carrying out the modification cannot comply with instructions the matter is to be referred to the EEM.

#### The Electrical Supervisor / Electrical Engineer

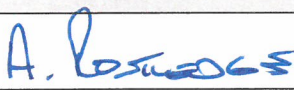
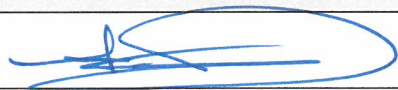
The Electrical Supervisor or Electrical Engineer shall review commissioning sheets as appropriate and file in the Drawing Register.


The Electrical Supervisor shall forward all marked-up drawings for update as soon as practicable.

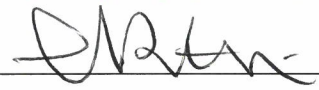
### 3. RECORD OF CONSULTATION

NAME	POSITION	SIGNATURE
Rhys Liverton	HSE Consultant	
Greg Conway	Electrical Engineer	
Frank Locke	EEM	
Brenton Scott	Electrician	
Alastair Shannon	Electrician	

### 4. AUTHORISATION

MANAGER	SIGNATURE	DATE
		6-11-17

SAFETY & HR MANAGER	SIGNATURE	DATE
S. Thomson		15/12/17

SSE	SIGNATURE	DATE
C ROBERTSON		22/12/17

### 5. REVIEW CRITERIA

This document shall be reviewed as follows:

- ◆ When there is a change of method and/or technology that may affect the accuracy of this document;
- ◆ When there has been a significant event to which this document was relevant;
- ◆ As a result of audit findings.

### 6. AMENDMENTS

ISSUE N <sup>o</sup> .	REVIEW DATE	DESCRIPTION	INITIAL
1	29 August 2008	New document	LB
2	27 May 2014	Reviewed	JP
3	17 October 2017	MOP reviewed	RL



## 7. REFERENCES

<b>Legislation:</b>	<i>CMSHR s. 27</i>
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*Coal Mining Safety and Health Act 1999.*

*Coal Mining Safety and Health Regulation 2001.*

*Recognised Standard 02 – Control of Risk Management Practices.*

*AS/NZS ISO 31000:2009 Risk Management.*

*MetCoal\_2-3\_STD\_Management SHE Risk*

*DEEDI Industry Hazard Database*

*AS 3000 – Wiring Rules*

*AS 3007 – Electrical Installations – Surface Mines and Associated Processing Plant.*

*MOP 0123 Definitions for Electrical Procedures*

*MOP 0114 Trailing Cable Management*

*Supply and Installation of Electrical Equipment Specification.*

*Form 0173 Electrical Test Notice*

## 8. DEFINITIONS

**CMSHA:** Coal Mining Safety and Health Act

**CMSHR:** Coal Mining Safety and Health Regulation

**Shall:** Indicates that a statement is mandatory

**Should:** Indicates a recommendation