



Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

Electrical arc flash hazard awareness audit – guide

Approved: April 2021

Level 2, 1 Adelaide Terrace East Perth Western Australia 6004
Postal address: Locked Bag 100 East Perth WA 6892
Telephone: 1800 SAFE MINE (1800 7233 64)
ResourcesSafety@dmirs.wa.gov.au
www.dmirs.wa.gov.au

Table of contents

- Introduction 3
- 1 Engineering..... 4
- 2 Maintenance..... 6
- 3 Safety 7
- 4 Training 9
- 5 Personal protective equipment..... 11



Introduction

The *Electrical arc flash hazard awareness audit* was developed in 2020 and trialled at a number of WA mine sites. In April 2021 the content was updated and the audit approved to be a published audit.

The Electrical arc flash hazard awareness audit is designed to help assess compliance with the *Mines Safety and Inspection Act 1994* and the Mines Safety and Inspection Regulations 1995. It also relates to Electricity (Licensing) Regulations 1991 where applicable. It is also designed to help identify that key risk management strategies are in place to manage and control electrical arc flash hazards.

The audit is split up into sections covering engineering, maintenance, safety, training, and personal protective equipment.

Where, in the intent, the word “verify” is used, this means that it is a regulatory requirement, which is mandatory and has to be complied with. Where, in the intent, the word “ensure” is used, it is not a mandatory requirement, but it does set out a recommended practice which, if followed, should minimise the risk of exposure to electrical arc flash hazards.

List of abbreviations

DMIRS Department of Mines, Industry Regulation and Safety

E(L)R Electricity (Licensing) Regulations 1991

MSIA *Mines Safety and Inspection Act 1994*

MSIR Mines Safety and Inspection Regulations 1995

PPE Personal protective equipment

r. Regulation (of the MSIR or the E(L)R)

rr. Regulations (of the MSIR)

s. Section (of the MSIA)

SRS The Department of Mines, Industry Regulation and Safety’s online Safety Regulation System

ss. Sections (of the MSIA)

Supporting documents

Documentation referred to in this audit can be found via the following:

- State Law Publisher, www.slp.wa.gov.au
 - *Mines Safety and Inspection Act 1994*
 - Mines Safety and Inspection Regulations 1995
 - Electricity (Licensing) Regulations 1991
- Code of Practice for Persons working on or near energised electrical installations
<https://www.commerce.wa.gov.au/building-and-energy/code-practice-persons-working-or-near-energised-electrical-installations>

1 Engineering

To ensure that the electric arc flash hazard is considered in the engineering and design of electrical installations.

Point	Standard	Guideline
1.1	Electrical switchboards have been arc flash hazard assessed and documented.	<p>Intent: To verify that electrical switchboards have been arc flash hazard assessed to the current installation.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review and assess electrical arc flash assessment Refer MSIR r. 6.17</p>
1.2	A design review has been conducted to identify potential areas to reduce hazards including fault levels, exposure times, isolation and energisation, containment and system grounding.	<p>Intent: To verify that controls to mitigate the arc flash hazard have been implemented.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review arc flash analysis studies, reports Refer to MSIR r. 6.18</p>
1.3	Protection devices have been calibrated / tested to verify performance per design.	<p>Intent: To verify that the calibration and testing of electrical switchgear protection devices are included in the sites preventative maintenance programme, and is completed by competent persons.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review and assess electrical maintenance program Refer to MSIR r. 6.20</p>

Point	Standard	Guideline
1.4	Procedures are in place to ensure engineering details, preventative maintenance programmes and PPE requirements are updated and testing is performed when changes are made.	<p>Intent: To verify that the procedures describe how this work is to be performed when changes are made to existing electrical installations.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review and assess established procedures Refer MSIR r. 6.23</p>
1.5	Single-line diagrams are up-to-date reflecting any modification to the electrical distribution system.	<p>Intent: To verify that current single line drawings for electrical installations are accurate.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review single line diagrams for accuracy Refer MSIR rr. 5.13, 6.23</p>
1.6	Arc flash labels are clearly displayed on electrical installations.	<p>Intent: To verify that the arc flash labels provide sufficient information on the electric arc flash hazard. This may include equipment name, incident energy, arc flash boundary, hazard/risk category and date of analysis.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: View and assess electrical installations Refer MSIR r. 4.10</p>

2 Maintenance

To ensure that appropriate maintenance strategies have been implemented to maintain the integrity of the electrical installation and to manage the risk of the electric arc flash hazard.

Point	Standard	Guideline
2.1	Preventative maintenance programs for electrical switchboards and equipment specifically address arc flash hazards.	<p>Intent:</p> <p>To verify that the electrical maintenance programme includes activities to assess and maintain installations to minimise the hazard exposure to personnel.</p> <p>Personnel:</p> <p>Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method:</p> <p>Review and assess electrical maintenance program</p> <p>Refer MSIR r. 6.2</p>
2.2	The preventative maintenance program for electrical switchboards and equipment are completed when scheduled.	<p>Intent:</p> <p>To verify that the maintenance of electrical switchboards has occurred and is current to the preventative maintenance program.</p> <p>Personnel:</p> <p>Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method:</p> <p>Review maintenance system</p> <p>Refer MSIR r. 6.2</p>
2.3	Arc flash hazard label information has been updated with changes to the electrical installation.	<p>Intent:</p> <p>To verify that arc flash labels are current for the electrical installation.</p> <p>Personnel:</p> <p>Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method:</p> <p>View and assess electrical installations</p> <p>Refer MSIR r. 4.10</p>

3 Safety

To ensure adequate procedures and processes are in place to manage the risk of electric arc flash hazards.

Point	Standard	Guideline
3.1	The site safety program includes electrical hazard/risk evaluation procedures, safe electrical work procedures and electrical safety principles.	<p>Intent: To verify that procedures describe how to safely manage electrical work.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review and assess electrical safety procedures Refer MSIR r. 6.20</p>
3.2	The site has safety procedures in place to minimize dangers where “working on or near energised electrical installations” cannot be avoided.	<p>Intent: To ensure the safest practical methods are employed by electrical and non-electrical workers.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review site procedure and interview relevant employees Refer E(L)R r. 55</p>
3.3	The site has a formal record-keeping process for documenting arc flash accidents and near misses.	<p>Intent: To verify that every occurrence involving electricity is immediately reported (internally and externally) and investigated.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Compare site details of accidents/incidents with DMIRS records in SRS Refer to MSIA ss. 76, 78, 79 and E(L)R r.63, MSIA r. 6.22</p>

Point	Standard	Guideline
3.4	There is a process in place that ensures actions will be taken to review and update procedures when an arc flash accident or near miss occurs.	<p>Intent: To verify that every arc flash incident is appropriately investigated by a competent person and that the recommended actions are completed.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review sample investigation reports Refer MSIR r. 6.22</p>

4 Training

To ensure operation personnel have the knowledge and understanding of electrical hazards in the workplace.

Point	Standard	Guideline
4.1	The site has an Electrical Safety training program that provides workers the knowledge and understanding of electrical hazards in the workplace.	<p>Intent:</p> <p>To verify that appropriate training on electrical safety is provided to all employees.</p> <p>Personnel:</p> <p>Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method:</p> <p>View training records</p> <p>Refer MSIR r. 4.13</p>
4.2	The Electrical Safety training program includes arc flash awareness, selection and use of appropriate PPE, explanation of warning signs and labels, and procedures for isolating/energising of electrical equipment.	<p>Intent:</p> <p>To verify electrical safety training material includes information on electrical arc flash hazard awareness.</p> <p>Personnel:</p> <p>Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method:</p> <p>View electrical safety training material</p> <p>Refer MSIR r. 4.13</p>
4.3	Site personnel have been trained in the hazards when working on or near energized electrical installations.	<p>Intent:</p> <p>To verify that all employees are aware of the requirements for working on or near energised electrical installation.</p> <p>Personnel:</p> <p>Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method:</p> <p>View training material and interview employees</p> <p>Refer MSIR r. 4.13</p>

Point	Standard	Guideline
4.4	The training program is periodically reviewed to identify needed changes.	<p>Intent: To verify that the training program has been updated with any recent changes to the electrical installations.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: View training material Refer MSIR r. 6.23</p>
4.5	Electrical safety training records are maintained and stored.	<p>Intent: To verify that all employees have completed appropriate electrical safety training, and that the information is readily available.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: View training records Refer MSIR r. 4.13(2)</p>

5 Personal protective equipment

To ensure the required PPE is used when there is a risk of an electric arc flash hazard.

Point	Standard	Guideline
5.1	The site has a procedure on how and when arc flash PPE should be worn and maintained.	<p>Intent: To verify that the procedures describe the arc flash PPE requirements when working on or near electrical installations.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review and assess procedures and/or interview with employees Refer MSIR r. 4.1</p>
5.2	Arc flash PPE is readily available for use when required.	<p>Intent: To verify that electrical workers have ready access to the required arc flash PPE.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review and assess procedures and/or interview with employees Refer MSIR r. 4.1</p>
5.3	Arc flash PPE is appropriate to the hazard level of the assessed arc flash incident energy.	<p>Intent: To verify that the available PPE is appropriate to the hazard level of the assessed arc flash incident energy.</p> <p>Personnel: Manager or delegate, Electrical Engineers, Electrical Supervisors</p> <p>Method: Review and assess procedures and/or interview with employees Refer MSIR r. 4.1</p>