



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

Village: Electrical audit – guide

Approved: 21 March 2017

1 Adelaide Terrace, East Perth WA 6004
Postal address: Mineral House, 100 Plain Street, East Perth WA 6004
Telephone: (08) 9358 8002
ResourcesSafety@dmirs.wa.gov.au
www.dmirs.wa.gov.au

Table of contents

Introduction 2

1 Management aspects 5

2 Technical aspects 10

Introduction

The scope of the 'Village' audit documents are designed to include operating standards associated with the management of villages, camps and accommodation facilities (mining infrastructure) in mine operations.

These audits were developed in 2016 and they are currently being trialled and assessed by the Department. They have also been made available to industry. The content will continue to be reviewed, and where appropriate updated, over the coming months. Minor changes were made in March 2017 to incorporate audit points 1.14 and 1.15.

The four 'Village' audit documents cover:

- Village: Occupational health and safety (OHS)
This broadly covers the safety standards associated with the management of occupational health and safety (OHS) matters (including aspects associated with administration, management, training, dangerous goods, traffic management, storage, food preparation, safety and health representatives, personal protective equipment and general aspects) at a village on a mine.
- Village: Infrastructure
This broadly covers the safety standards associated with the management of infrastructure matters (including aspects associated with mobile, prefabricated and permanent buildings and/or structures) at a village on a mine.
- Village: Electrical
This broadly covers the safety standards associated with the management of electrical matters (including management and technical aspects) at a village on a mine.
- Village: Mechanical
This broadly covers the safety standards associated with the management of mechanical matters (including aspects associated with workshops and other areas) at a village on a mine.

These audits have been developed to assist duty holders in their compliance with legal requirements under the mines safety legislation and other relevant legislation (e.g. Building Code of Australia), and to achieve good practice in village accommodation in the Western Australian mining industry. Though every effort has been made, the content is not exhaustive and duty holders should ensure they conduct a specific review of the mines safety legislation, and other state and national legislation (as applicable) to ensure compliance.

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 safe method which, if followed, should minimise the potential for an adverse incident to take place.

Accommodation situations cover the spectrum from long-term village accommodation to more transient camp arrangements (e.g. exploration camps). These audits have primarily been designed to address the fundamental aspects associated with village accommodation. However duty holders for more transient arrangements may find parts of the content applicable. Every effort should be made to risk assess and manage change as accommodation evolves.

Audits should be carried out by competent persons, properly authorised and appointed by the registered manager of the mine site.

While the occupational health and safety (OHS) audit is expected to take around 4 to 6 hours to complete, each of the other audits is expected to take less than 4 hours to complete, provided all necessary documentation is readily available and there is free access to all areas to inspect.

List of abbreviations

AS	Australian Standard
BCA	Building Code of Australia – is a requirement of the Western Australian Building Act and Building Regulations 2012
ELR	Electricity (Licensing) Regulations 1991
GP	Good practice – villages would be expected to adopt and achieve industry standards
ISO	International Standards Organisation
LR	Legal requirement – villages are expected to have addressed these items
MSIA	<i>Mines Safety and Inspection Act 1994</i>
MSIR	Mines Safety and Inspection Regulations 1995
NCC	National Construction Code series – is a requirement of the <i>Western</i>

	<i>Australian Building Act 2011 and Building Regulations 2012</i>
NZS	New Zealand Standard
RCD	Residual Current Device
SRS	The Department of Mines and Petroleum's online Safety Regulation System
r.	Regulation (of the MSIR)
rr.	Regulations (of the MSIR)
s.	Section (of the MSIA)
ss.	Sections (of the MSIA)

Supporting documentation

Documentation referred to in the village audits can be found via the links below:

- State Law Publisher, www.slp.wa.gov.au
 - *Mines Safety and Inspection Act 1994*
 - *Mines Safety and Inspection Regulations 1995*
 - *Electricity (Licensing) Regulations 1991*
- Department of Mines and Petroleum (DMP), mining safety publications, www.dmp.wa.gov.au/Safety/Mining-Safety-publications-16162.aspx
 - *Accident and incident reporting – guideline*
 - *Management of noise in Western Australian mining operations – guideline*
 - *Prevention and management of violence, aggression and bullying at work – code of practice*
- Department of Mines and Petroleum (DMP), General exemption: Approval for fit person to inspect classified plant, www.dmp.wa.gov.au/Safety/What-are-the-requirements-for-7947.aspx
 - *General exemption from Mine Safety and Inspection Regulation 6.40(1) and 6.40(3) (dated 5/12/2003)*
- Safe Work Australia, Publications and resources, www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/publication
 - *Hazardous Manual Tasks Model Code of Practice*
 - *National Standard for the Storage and Handling of Workplace Dangerous Goods [NOHSC:1015(2001)]*
 - *Industrial lift trucks guidance material*
- Department of Commerce, WorkSafe, High risk work licensing, www.commerce.wa.gov.au/worksafe/high-risk-work-licence
- National Transport Commission, Australian Dangerous Goods Code (Edition 7.4), www.ntc.gov.au/heavy-vehicles/safety/australian-dangerous-goods-code/
- Department of Health (WA), Australian drinking water guidelines, www.public.health.wa.gov.au/3/657/2/australian_drinking_water_guidelines.pm
- Australian Environmental Pest Managers Association, Industry codes of practice www.aepma.com.au/Codes-of-Practice
 - *Code of practice for Pest Management in the Food Industry in Australia and New Zealand*
- Food standards Australia New Zealand, Australia New Zealand Food Standards Code, www.foodstandards.gov.au/code/Pages/default.aspx
- Standard 3.2.2 *Food Safety Practices and General Requirements* (Australia only)
- Australian and other standards, SAI Global, <http://infostore.saiglobal.com/store/>
 - AS 1170 *Structural design actions – General principles*
 - AS 1170.1 *Structural design actions – Permanent, imposed and other actions*
 - AS 1319 *Safety signs for the occupational environment*
 - AS 1657 *Fixed platforms, walkways, stairways and ladders – Design, construction and installation*
 - AS 1940 *The storage and handling of flammable and combustible liquids*
 - AS 2359.1 *Powered industrial trucks – Powered industrial trucks*
 - AS 2444 *Portable fire extinguishers and fire blankets – Selection and location*
 - AS 3780 *The storage and handling of corrosive substances*
 - AS 4084 *Steel storage racking*
 - AS 4282 *Control of the obtrusive effects of outdoor lighting*
 - AS 4332 *The storage and handling of gases in cylinders*

- AS 4452 *The storage and handling of toxic substances*
- AS 4801 *Occupational health and safety management systems – Specification with guidance for use*
- AS 5104 *General principles on reliability for structures*
- AS ISO 13822 *Basis for design of structures – Assessment of existing structures*
- AS/NZS 1680 *Interior lighting – Safe movement*
- AS/NZS 1891 *Industrial fall-arrest systems and devices*
- AS/NZS 3000 *Electrical installations (known as the Australian/New Zealand Wiring Rules)*
- AS/NZS 4600 *Cold-formed steel structures*
- AS/NZS ISO 9000 *Quality management systems – Fundamentals and vocabulary*
- AS/NZS ISO 31000 *Risk management – Principles and guidelines*

1 Management aspects

Management aspects

Point	Standard	Guideline
1.1	Entries made in electrical log books are properly completed.	<p>Intent:</p> <p>Verify that the electrical record book is used for the recording of electrical information only, installing information in Section 1 and other electrical information required in Section 2.</p> <p>Electrical log books are solely used for the purpose of recording details that are required to be recorded pursuant to MSIR.</p> <p>Personnel:</p> <p>Appointed electrical supervisors.</p> <p>Method:</p> <p>View entries in the electrical log book(s) kept at the mine.</p> <p>Refer to MSIA s. 89(1)(a), MSIR r. 5.11 -5.14, 5.27(4) and Electricity (Licencing) Regulations r. 52B(4C)</p>
1.2	Entries in electrical log books are acknowledged by the signature of the registered manager or delegate. (alternate registered manager)	<p>Intent:</p> <p>To verify that mine managers are being informed of electrical work being performed on a mine site. The mine manager shall sign each completed page in Section 1 and Section 2.</p> <p>Personnel:</p> <p>Manager or delegate.</p> <p>Method:</p> <p>View signatures acknowledging entries in electrical log book(s).</p> <p>Refer to MSIA s. 89(1)(a). MSIR r. 5.14 and Electricity (Licencing) Regulations r. 52B(4C)</p>

1.3	Appointed electrical supervisors verify that electrical work at the village is supervised.	<p>Intent:</p> <p>To verify that electrical supervisor(s) understand which electrical workers require supervision. Electrical work carried out by a person holding a licence to undertake that work does not require supervision. Others must be supervised by a person who holds a licence for carrying out the work in question (referred to as the supervising electrical worker). <i>Special provisions apply to apprentices. Electricity (Licencing) Regulation r. 50 specifies and can be referenced to determine what is regarded as acceptable supervision.</i></p> <p>Personnel:</p> <p>Appointed electrical supervisors.</p> <p>Method:</p> <p>Identify any electrical workers that are required to be supervised and assess levels of supervision established. Refer to MSIR r. 5.10 , 5.11</p>
1.4	Electrical installing work is undertaken by persons holding a current electrical workers licence.	<p>Intent:</p> <p>To verify that persons undertaking electrical installing work hold the appropriate licence for that work.</p> <p>Personnel:</p> <p>Manager or delegate, appointed electrical supervisor and/or relevant licence holders.</p> <p>Method:</p> <p>Check details in Section 1 of Electrical Log Book against licence records.</p> <p>Refer to MSIR r. 5.9 and Electricity (Licensing) Regulations 1991 r. 19.</p>
1.5	Electrical workers operate within the authority of the licence held	<p>Intent:</p> <p>To verify that electrical workers do not work outside the authority of their licence, e.g. apprentices or restricted licence holders.</p> <p>Personnel:</p> <p>Manager or delegate, appointed electrical supervisor and/or relevant licence holders.</p> <p>Method:</p> <p>Identify licence holders other than 'A' Grade Electrical Workers Licence from the licence register and enquire in regards to electrical work those persons undertake. Refer to MSIR r. 5.9 Electricity (Licensing) Regulations 1991 r. 19.</p>

1.6	Electrical apprentices, permit holders, and 'B' grade licence holders have been instructed regarding electrical work undertaken that requires supervision and are appropriately supervised	<p>Intent:</p> <p>To verify that supervised electrical workers understand the limits of their authority when performing electrical work.</p> <p>Personnel:</p> <p>Appointed electrical supervisors.</p> <p>Method:</p> <p>Interview relevant employees and/or assess records. Refer to MSIR r. 5.9, 5.11(a) and the Electricity (Licencing) Regulation r. 50</p>
1.7	A written procedure has been established to safeguard persons required to excavate ground in the vicinity of buried cables.	<p>Intent:</p> <p>To verify that the procedures describe how this work is to be performed and that work party members have ready access to them.</p> <p>Personnel:</p> <p>Manager or delegate</p> <p>Method:</p> <p>View and assess written procedures for the excavation of ground in the vicinity of buried cables. Refer to MSIR r. 5.31(2)</p>
1.8	Emergency signage and lighting is fitted to all exits.	<p>Intent:</p> <p>To verify emergency lighting and illuminated exit signage is installed and working.</p> <p>Personnel:</p> <p>Manager, appointed electrical supervisor or delegate</p> <p>Method:</p> <p>Inspect installation to ensure all emergency signage and lighting is working as per design. Refer to MSIR rr. 4.10, 4.31-4.32</p>
1.9	Portable electrical apparatus normally used in heavy operating environments is examined, tested and tagged quarterly, and the results are recorded in an electrical log book	<p>Intent:</p> <p>To verify that portable apparatus normally associated with kitchens, cleaning and maintenance workshops are examined and tested regularly. The results are entered in an electrical log book.</p> <p>Personnel:</p> <p>Appointed electrical supervisor</p> <p>Method:</p> <p>Review tagging records and work areas. Review electrical log book Part 2. Refer to MSIR rr. 5.27(2)(a), 5.27(4)</p>

1.10	RCD devices are tested periodically and the results are recorded in an electrical log book	<p>Intent: To verify that testing is carried out periodically. Industry best practice is regarded as quarterly.</p> <p>Personnel: Appointed electrical supervisors.</p> <p>Method: Review records entered in the electrical log book(s). Refer to MSIR rr. 5.27(2)(a), 5.32(2).</p>
1.11	Switchboards and their electrical equipment are clearly labelled.	<p>Intent: To verify electrical switchboards are labelled and electrical equipment supplied from those switchboards is clearly identified for isolation purposes.</p> <p>Personnel: Manager, appointed electrical supervisor or delegate</p> <p>Method: Refer to MSIR r. 5.3 AS/NZS 3000, section 2.9.5</p>
1.12	<p>Electrical equipment and accessories are safe to use. There is no damage that could impair safe operation. Any room, enclosure or other place used principally for the installation of electrical equipment:</p> <ul style="list-style-type: none"> • Can be safely isolated from the electrical supply • Is designed to restrict access by unauthorised persons 	<p>Intent: To verify that electrical equipment forming part of an electrical installation shall operate in a safe and reliable manner. Where required, restrict access by unauthorised persons.</p> <p>Personnel: Appointed electrical supervisor.</p> <p>Method: Inspect electrical equipment to ensure it is maintained in safe working order. Review electrical maintenance records. Inspect restricted electrical areas to ensure a system is in place to restrict access by unauthorised persons Refer to MSIR rr. 5.3, 5.5 AS/NZS 3000, section 1.7</p>
1.13	Switchboards are protected against external influences.	<p>Intent: To ensure switchboards are protected from external influences such as mechanical and environmental factors (e.g. impact from vehicles or heat)</p> <p>Personnel: Manager, appointed electrical supervisor or delegate</p> <p>Method: Inspect access to switchboards by mobile plant and vehicles. Review the protection of switchboards against heat and water exposure. Refer to MSIR r. 5.3 AS/NZS 3000, section 3.3</p>

1.14	<p>Personal portable electrical equipment and appliances owned by persons occupying accommodation units that are located on mining tenements are inspected, tested and tagged at intervals as may be necessary to ensure safety.</p>	<p>Intent:</p> <p>Verify that the site has a procedure to ensure that all personally owned electrical appliances and equipment taken to site by persons occupying accommodation units is tested for electrical safety before use.</p> <p>Personnel:</p> <p>Manager, appointed electrical supervisor or delegate</p> <p>Method:</p> <p>Inspect portable appliance test records, inspect sample accommodation units. Refer to MSIR r.527</p>
1.15	<p>USB chargers, travel adaptors and power supplies are approved by a recognised certification body and display the Regulatory Compliance Mark (RCM) or an approval number on the product.</p>	<p>Intent:</p> <p>To ensure electrical equipment located and used on the mining operation has been approved for use within Australia. The <i>Electricity Act 1945</i> prohibits the sale of prescribed electrical appliances unless 'approved' by an Australian regulatory authority.</p> <p>Personnel:</p> <p>Manager, appointed electrical supervisor or delegate</p> <p>Method:</p> <p>Inspect portable appliance test records, inspect sample accommodation units. Refer to Electricity Act 1945 s.33B</p>

2 Technical aspects

Technical aspects

Point	Standard	Guideline
2.1	Ensure that electrical insulation and electrical enclosures provide effective protection against direct contact with live parts	<p>Intent:</p> <p>To verify that live parts are completely covered with insulation capable of withstanding mechanical, chemical, electrical and thermal influences to which they may be subjected to in service.</p> <p>Personnel:</p> <p>Appointed electrical supervisor</p> <p>Method:</p> <p>Inspect wiring systems. Inside enclosures or behind barriers the degree of protection from live parts is at least— (i) IPXXB or IP2X; and (ii) IP4X for horizontal top surfaces that is readily accessible. Refer to MSIR r. 5.3 AS/NZS 3000, section 1.5.4</p>
2.2	The effectiveness of earthing systems, continuity of earthing conductors and the adequacy of electrical insulation is routinely tested, and the results are recorded in an electrical log book.	<p>Intent:</p> <p>To verify any unsafe conditions arising from ineffective earthing systems, discontinuity of earthing conductors and inadequate electrical insulation is avoided by systematic testing.</p> <p>Personnel:</p> <p>Appointed electrical supervisors.</p> <p>Method:</p> <p>Review records entered in log book(s). Refer to MSIR rr. 5.27(2)(c), 5.27(4)</p>
2.3	Electrical equipment is connected, supported and fixed, in accordance with AS/NZS 3000	<p>Intent:</p> <p>To verify wiring systems are installed in accordance with the generally accepted principles of safe and sound practice, using methods that will protect the electrical installation against mechanical or electrical failure under ordinary use, wear and tear and any abnormal conditions that may reasonably be anticipated.</p> <p>Personnel:</p> <p>Appointed electrical supervisors.</p> <p>Method:</p> <p>Inspect the electrical installation to ensure wiring systems are fixed in position, using suitable clips, saddles or clamps or by means that will not damage the wiring system and it is not affected by the wiring system material or any external influences. Refer to MSIR r. 5.3, AS/NZS 3000, section 3.9 and Electricity (Licencing) Regulations r .52(C)(1)(c)</p>

2.4	<p>Above ground cables are segregated from other services and electrical installations by a minimum distance of:</p> <ul style="list-style-type: none"> • 25 mm for water/gas/electrical • 100 mm for heated water 	<p>Intent:</p> <p>To verify that wiring systems are not installed in the vicinity of services that produce heat, smoke or fumes likely to be detrimental to the wiring system.</p> <p>Personnel:</p> <p>Appointed electrical supervisors.</p> <p>Method:</p> <p>Inspect the electrical installation to ensure where electrical services are installed close to non-electrical services, they are arranged so that any reasonably foreseeable routine operation carried out on the other services will not cause damage to the electrical services.</p> <p>Refer to MSIR r. 5.3 and AS/NZS 3000, section 3.9.8</p>
2.5	<p>Low voltage (LV) below ground wiring is segregated by a minimum distance:</p> <ul style="list-style-type: none"> • 100 mm water/gas/electrical • 300 mm for water services greater than 65DN (internal diameter) • 100 mm communications 	<p>Intent:</p> <p>To verify underground wiring systems are spaced not less than 100 mm from other underground services so that any fault or reasonably foreseeable routine maintenance carried out on the other services will not cause damage to the electrical services.</p> <p>Personnel:</p> <p>Manager, appointed electrical supervisor or delegate</p> <p>Method:</p> <p>Review underground drawings. Interview plumbers, electricians and maintenance workers who have maintained these services.</p> <p>Refer to MSIR r. 5.3 and AS/NZS 3000, section 3.11.5 and Table 3.7</p>
2.6	<p>Particular installation conditions for socket outlets around showers and other fixed water containers (e.g. basins and sinks) are adhered to.</p>	<p>Intent:</p> <p>To ensure socket-outlets are not installed within 0.3 m of the floor of a bathroom, laundry or other similar location where the floor is likely to become wet.</p> <p>Personnel:</p> <p>Appointed electrical supervisor</p> <p>Method:</p> <p>Inspect wet areas to ensure the installation of electrical socket outlets meet the requirements of AS/NZS3000 6.2.4.2 - Classified zones.</p> <p>For example, there will not be any socket outlets fitted within Zones 0, 1 and 2. Socket outlets installed in a Zone 3 area must be protected by an approved method</p> <p>Refer to MSIR r. 5.3 and AS/NZS 3000, section 6.2.4.2</p>

2.7	Particular installation conditions for switches and other accessories around showers and other fixed water containers (e.g. basins and sinks) are adhered to.	<p>Intent:</p> <p>To ensure switches and other accessories are not installed within 0.3 m of the floor of a bathroom, laundry or other similar location where the floor is likely to become wet.</p> <p>Personnel:</p> <p>Appointed electrical supervisor</p> <p>Method:</p> <p>Inspect wet areas to ensure the installation of electrical switches and other accessories meet the requirements of AS/NZS3000 6.2.4.3 - Classified zones. For example, there will not be any switches or accessories fitted in a Zone 0 area. Switches and accessories fitted within Zone 1, 2 and 3 areas shall be protected by an approved method. Refer to MSIR r. 5.3 and AS/NZS 3000, section 6.2.4.3</p>
2.8	Particular installation conditions for other electrical equipment around showers and other fixed water containers (e.g. basins and sinks) are adhered to.	<p>Intent:</p> <p>To verify the correct degree of protection required for each Zone has been provided for all other electrical equipment.</p> <p>Personnel:</p> <p>Appointed electrical supervisor</p> <p>Method:</p> <p>Inspect wet areas to ensure the installation of other electrical equipment meet the requirements of AS/NZS3000 6.2.4.5- Classified zones. Refer to MSIR r. 5.3 AS/NZS 3000, section 6.2.4.5</p>
2.9	Particular installation conditions for the selection and installation of electrical equipment for refrigeration room(s) are adhered to.	<p>Intent:</p> <p>To verify electrical equipment installed within the refrigeration room(s) have a degree of protection of at least IPX4B or IP24. The correct degree of protection is provided for all equipment.</p> <p>Personnel:</p> <p>Appointed electrical supervisor</p> <p>Method:</p> <p>Inspect refrigeration rooms to ensure that electrical equipment has a degree of protection of at least IPX4B or IP24. Refer to MSIR r. 5.3 AS/NZS 3000, section 6.6.4 NOTE: See also AS/NZS 3000 Clause 6.7 regarding areas that are subjected to a sanitization or hosing-down process.</p>

2.10	Particular installation conditions for the selection and installation of electrical equipment for hose down areas are adhered to.	<p>Intent:</p> <p>To verify electrical equipment installed within the classified zone has been selected, installed and is suitable for the temperature and pressure of the fluids used in the hosing-down or sanitization process.</p> <p>Personnel:</p> <p>Appointed electrical supervisor</p> <p>Method:</p> <p>Inspect hose down areas to ensure the correct degree of protection has been provided. (IPX5 low medium hose down and IPX6 when a high pressure hose is used)</p> <p>Electrical equipment installed in an area subject to sanitization processes has been selected to be suitable when exposed to the relevant chemicals used in that process.</p> <p>Refer to MSIR r. 5.3 AS/NZS 3000, section 3.3, 6.7.4.2</p>
2.11	Emergency systems are correctly installed	<p>Intent:</p> <p>To verify wiring systems associated with safety services are capable of maintaining an adequate supply to such equipment when exposed to fire.</p> <p>Personnel:</p> <p>Appointed electrical supervisor</p> <p>Method:</p> <p>Inspect wiring systems associated with safety services comply with AS/NZS 3013 with a WS classification as specified by the standard relevant to the installation of the equipment.</p> <p>Refer to MSIR r. 5.3 AS/NZS 3000, section 7.2.7 NOTE: See AS/NZS 3000 Appendix H for further information regarding the application of the WS classification system.</p>