Transmission Substation Work Practice Manual
Think Safe
Work Safe
Live Safe
Pocket guide

C - Crush
H - Heights
E - Electric
S - Shocks
T - Travel

westernpower

SET OUT FOR SAFETY
Introduction

Work practices

Western Power is committed to meeting all legal obligations in relation to legislative, regulatory and environmental requirements.

The work practices contained in this manual have been developed to ensure standardisation of work practices and procedures for the Network Total Workforce (NTW). They ensure that the NTW is aware of their roles and responsibilities in creating and maintaining a safe working environment that meets state and national legislation, standards and work practices.

These work practices, which set the minimum requirements, must be issued to all relevant staff and must be followed at all times except when:

- in the opinion of the employee, a potential injury or life threatening situation dictates alternate action. In this situation, stop work and contact your formal leader.

or

- written authorisation for an alternative practice has been obtained, in advance, from Work Practice Development

The manual is constantly being reviewed, updated and developed to meet new legislation, newly developed techniques and technological advancements in equipment and network design for accessing and working on the Western Power Network.

Version control

- It is the user’s responsibility to update and maintain their own hard copy manual.

- It is the formal leader’s responsibility to ensure that employees are using the current version of the Transmission Substation Work Practice Manual.

Note:

Use the electronic version wherever possible. It is available on Depot Pack, the Western Power website and busbar. This helps to ensure that the most up to date version of the manual is being used.
Depot Pack

Depot Pack is an electronic resource that was designed to be used by workers in the field where a data connection may not be available. It does not require a network or internet connection to be used (although one is required to update the Depot Pack files).

Figure 1: Depot Pack main menu

Depot Pack is available to the entire NTW and is in use by all Western Power staff and many of our contractors.

Depot Pack is:
- the one stop shop for all Western Power work practice information
- easier to use and more reliable than printed paper documents. It’s regularly updated, so you know the information is current, unlike a printed document that may have changed since your copy was printed.
- a controlled source of information, which is crucial when it comes to safe and efficient work practices

For information on installing and updating Depot Pack, see Depot Pack Instructions (DM# 9001578).
Western Power website

The Transmission Substation Work Practice Manual is available on the Western Power website in the *Network contractors* section:


Hierarchy of documentation

Government legislation and regulations set the requirements for company-level policy. Within Western Power, documentation is governed by the hierarchy shown in Figure 2, below. If there is ever a difference between documentation, the higher level documentation always overrides documentation at a lower level.

- The Transmission Substation Work Practice Manual overrides guidance notes, etc.

![Figure 2: Western Power’s Safety and Health Management System Document Framework](image)
Feedback

The Work Practice Development team strives for continual improvement of systems, procedures, processes and instructions. We value feedback, and encourage any suggestions or recommendations for changes, alterations or inclusions.

Feedback must be submitted to a formal leader for review, who may then forward it on to us at:

work.practice.development@westernpower.com.au

References

- Depot Pack Instructions (DM# 9001578)
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Definitions

Aboriginal
A member of the Aboriginal race of Australia, including a descendant of the indigenous inhabitants of the Torres Strait Islands.

Above
Greater in height than a given level, at or to a higher point.

Active or phase conductor
Any conductor that is maintained at a difference of potential from the neutral or earthed conductor (also known as phase, line, red, white, blue, live).

Anchor/anchorage point
A secure point of attachment on a structure to which a fall-arrest device, or lanyard assembly, or restraint line may be secured.

Apparatus
Any item of electrical machinery or equipment (including primary and secondary) in which conductors are used, or supported, or of which they form a part.

Approved
Having appropriate Western Power endorsement in writing for a specific function.

Approved work technique
A documented technique which meets the requirements of this manual and which has been approved by Western Power.

As constructed drawing
A design drawing that has been modified or altered due to changes to the construction. As constructed drawings should be prepared by a qualified surveyor where cable routes are shown and should be verified and signed by the person in charge of the work.

Asbestos
The name given to a group of naturally occurring fibrous, crystalline minerals. The three main types of asbestos minerals that have been used in products throughout WA are Crocidolite (Blue Asbestos), Amosite (Brown Asbestos) and Chrysotile (White Asbestos). Contact with asbestos is strongly linked to fatal illnesses.
Atmospheric monitoring device
A device that can measure continually or at intervals, the composition of the air including:
  - combustible gases
  - oxygen level
  - carbon monoxide
  - hydrogen sulphide

Authorisation/Authorised
Shall be approved in writing or by means of an approved technique by western power.

Authorised person
Is a competent person with the delegated authority to perform the duty concerned on behalf of Western Power.

Barrier
A temporary visual device (fence/restraint/person) that restricts or prevents access to non-authorised personnel.

Boundary
The property line / fence / wall that separates two properties. This also indicates the area of jurisdiction for procedures, safety, permits, work practices, etc.

Brownfield site
An operational site undergoing enhancement and expansion work that:
  - has sections disconnected under an Electrical Access Permit by the physical removal of conductors
  - remains under the overall control of a primary system operating authority

Note:
Control may be delegated by the primary operating authority to a construction or commissioning authority via a formal handover certificate. (As defined in ESSR, 2012)

Brush contact
Momentary accidental or inadvertent contact.
Bush fire
A fire, or potential fire, however caused, including a fire in a building.

Bush Fire Service (previously the Bush Fire Board before 1997)
Co-ordinates the volunteer bush fire brigades that fight fires in rural areas.

Cable
An insulated conductor or two or more such conductors laid together, whether with or without fillings, reinforcements or protective coverings.

Cable cover
A mechanical protective object that affords protection to cables from inadvertent contact (e.g. split conduit, planking, slabs, conduit, poly pipe and concrete) covered with earth placed over the cable in accordance with the design manual.

Cable locator
A device that can be used to detect the presence of buried apparatus either by sensing fields or signal injection.

CDD/EDD
Controlled Descent Device / Emergency Descent Device. A device or system that enables a person to descend from a height at a predetermined speed

ChemAlert
A database providing chemical and product information and Material Safety Data Sheet (MSDS).

Circuit
Circuit is a configuration of electrically connected components or devices that has a closed loop giving a return path for the current.

Clean down
The removal of all soil and vegetation from a vehicle and/or footwear by either washing or brushing down. Particular attention is to be made to wheel arches, mudflaps, tyres and vehicle under-body.

Close to
The position of any person, item or part thereof to energised apparatus such that inadvertent movement could breach the applicable minimum safety clearances to that energised apparatus.
Collapsible area
The area surrounding an excavation that may be subject to collapse due to excavation work. A safety provision is using the natural angle of the lay of the soil to the horizontal in which the soil will not collapse (angle of repose up to 30°).

Collection tank
A grease trap, oil interceptor, or an impervious vessel, other than an apparatus for the treatment of sewage, for the collection, storage, transfer or treatment of controlled waste.

Combined earthing system
A combined earthing system as defined in AS 2067:2008, clause 8.2.3, in which high and low voltage electrical equipment is connected to a common earthing system.

Combustible material
Any material capable of catching fire and burning.

Commissioning
Activities carried out in order to ensure that new and existing equipment is safely and accurately connected to the network and, once in service, will operate as intended. Activities include inspections to verify installation, commissioning tests and post-energisation tests/checks.

Commissioning Authority
The Commissioning Authority is the group, which conducts pre-commissioning and final commissioning activities. The Commissioning Authority controls access to plant and equipment (which cannot be energised by normal switching) during the commissioning stage.

Commissioning Notice
Issue of this notice signifies that all commissioning tests have been completed and that a site or items(s) of plant is accepted by the Operating Authority ready for service. The notice may contain a list of outstanding items.

Competent/competent person
A person having the skills, knowledge and attributes needed to safely complete a task.
Completion Notice
A Completion Notice is issued to advise that construction work has been completed. It may be used for a complete site, part of a site, or may only cover certain items of plant. It may also contain a list of outstanding items.

Concentrated
Oil, chemical, gas or fuel that has collected in one location.

Conductive pole
Concrete poles, steel poles and wooden poles with a down earth conductor.

Conductor
A wire, cable or form of metal designed for carrying electric current (includes neutral and earth).

Confined space
An enclosed or partially enclosed space that is not intended or designed primarily for human occupancy, within which there is a risk of one or more of the following:

- An oxygen concentration outside the safe oxygen range.
- A concentration of airborne contaminant that may cause impairment, loss of consciousness or asphyxiation.
- A concentration of flammable airborne contaminant that may cause injury from fire or explosion.
- Engulfment in a stored free-flowing solid or a rising level of liquid that may cause suffocation or drowning.

(As defined in OSHR 1996, reg 3.82)

Connectable
Apparatus capable of being connected to the live system by switching.

Connected
Joined together by a conductor capable of carrying electrical current for its required function or purpose by physically clamping or bolting conductors together or closing a circuit breaker, switch or similar device.

Constant leakage monitoring
Monitoring continually or at intervals of leakage (in micro amps) of current across the insulated section of the boom during high voltage work, 1µA/kV allowable.
Work Practices

Construction Authority
The body or group responsible for constructing, installing and controlling access to plant and equipment, which cannot be energised by normal switching, during the construction stage.

Construction Authority Work Permit (CAWP)
Construction Authority Work Permit (CAWP) – a non-operational permit issued by a Construction Authority that authorises the work on new or non-operational and not connected electrical apparatus and associated equipment.

Construction site
A workplace at which construction work (see definition below) is done and includes any adjoining area where plant or other materials used or to be used in connection with that work are located or kept and over which the Network Total Workforce has control for the purpose of doing the construction work. (As defined in OSHR 1996, reg 1.3)

Construction work
The assembly, erection, installation, alteration, repair, maintenance, cleaning, painting, renewal, removal, excavation, dismantling or demolition of, or addition to, any buildings or system apparatus. (As defined in OSHR 1996, reg 1.3)

Consumer
See ‘Customer’.

Contact area
The surface area of one object that makes contact with another.

Continuity test
A test to determine the health of electrical connections between two ends of a closed circuit.

Contractors
Any person(s) engaged to execute works under a contact.

Controlling Authority
This is the representative authority responsible for the control of the apparatus. Typically, this includes:
- Construction Authority
• Commissioning Authority
• Operating Authority: Transmission SOCC and Distribution NOCC
• third party (ESSR, 2012)

**Controller**
An authorised person who co-ordinates switching, performs switching by remote control and approves the issue of work permits.

**Cover (insulated)**
A barrier of insulating material specifically designed, approved and tested for use as a line cover or as a cover for equipment or apparatus.

**Customer**
A person or corporate body who purchases power from, and/or sells power to, Western Power. For the purpose of this document, Verve Energy is considered to be a customer.

**Customer owned network**
An electricity system or network owned and operated by a customer.

**Customer standing agreement (CSA)**
A document which represents a standing agreement between the high voltage customer and Western Power. The purpose of a CSA is to ensure that any customer switching of specified circuits is performed with the network operator’s prior permission and approval.

**Danger**
The presence of risk to health and/or risk of bodily injury.

**Danger zone**
Lines – Distribution and Transmission:

The area surrounding live electrical equipment (such as powerlines), that ordinary persons, other equipment and materials must not enter. (ESSR, 2012) The size of the zone varies depending on the voltage.
Danger zone
In substations, the area limited by the non-flash over distance (N) around live parts that are without complete protection against direct contact.

**Note:**
Infringing the danger zone is considered the same as touching live parts. (AS 2067:2008 clause 1.3.10).

Dangerous goods
Classified goods having, or potentially having, a dangerous or hazardous nature.

Dangerous goods in bulk
Dangerous goods of Class 2 (gases) in a container with a capacity greater than 500 litres or dangerous goods of another class in a container with a capacity greater than 450 litres; and a container with a net mass of more than 500 kilograms.

(As defined in Dangerous Goods Safety Regulations 2007, reg 9A)
Also see ‘Packaged dangerous goods’.

De-energised
The electrical supply to electrical apparatus has been switched off. (As defined in ESSR, 2012)

The apparatus has been switched off but not necessarily isolated, tested and earthed.

Dewatering
The action of removing groundwater or surface water via pumping from a construction site. Also known as ‘construction dewatering’.

Discharge
The controlled release or dissipation of stored energy.

Discharged (electrical)
Conductors which have been connected to earth so that any stored electrical energy has been removed. (ESSR, 2012)

Discharged (mechanical)
Mechanical, hydraulic, pneumatic or fuel energy apparatus which has had all stored energy removed. (ESSR, 2012)
Disconnected
Apparatus that has been separated from the system by the removal of jumpers or sections of conductor such that the apparatus cannot be re-energised through normal switching operations (sometimes referred to as ‘non-connectable’).

Distribution Network Access Request (DNAR)
The formal request to Network Operation Control Centre to access the high voltage distribution network.

Do Not Operate Danger tag
An approved tag that reads ‘DO NOT OPERATE DANGER’ which is affixed to isolation and program earthing points established for the purpose of issuing a work permit to personnel.

Drop zone
The area below an elevated work area where objects could fall or be deflected into during the fall.

Earth
The general conductive mass of the earth, the electric potential of which, at any point, is conventionally taken as zero. (ESSR, 2012)

Earthed
Electrically connected to earth in an approved manner.

ECL
Electrical Contractor’s Licence.

Electrical Access Permit (EAP)
Western Power’s standard form that authorises access to, and work on, electrical apparatus which has been made safe by isolating and earthing. (As defined in ESSR, 2012)

The EAP is also used to authorise access to secondary plant which has been isolated but not necessarily earthed (e.g. protection, control and metering circuits).

Electrical apparatus
Any electrical equipment or machinery, in which conductors are used, or supported, or of which they form a part.
Emergency
An event, current or imminent, which endangers or threatens to endanger life, property or the environment, and requires immediate management activities.

EMISWeb
A database for recording and tracking Western Power’s environmental activities and legal compliance.

ENMAC
Electricity Networks Management and Control (for distribution systems). An advanced DMS/TCS/SCADA product that completely computerises Electricity Distribution Control Room operations.

Equipotential mat
A conducting device at ground level, connected electrically to equipment, to avoid differences of step and touch potential through the body of a person.

Equipotential bonding
Electrical connections intended to bring exposed conductive parts or extraneous conductive parts to the same or approximately the same potential, but not intended to carry current in normal service. (As defined in ESSR, 2012)

ESA
Environmentally sensitive area.

ESO
Environmental support officer.

ESSR – Electrical System Safety Rules
The intention of the ESSR is to provide Western Power with a standard set of procedures and rules that govern all access to the network issued and owned by NOCC and SOOC.

EWL
Electrical Worker’s Licence.

EWP
Elevated work platform. Mobile plant equipment used to gain access to overhead apparatus.
**Elevated work platform operator**
A person trained, authorised and appointed to operate an EWP.

**Excavation**
Any action that digs, displaces or penetrates the ground.

**Extra low voltage**
Not exceeding 50 volts AC or 120 volts ripple-free DC. (As defined in AS/NZS 3000: 2007, section 1.4.98)

**Extreme fire danger**
The fire danger rating for the day in a district that exceeds specific values (as determined by the Bureau of Meteorology) and aspects of the Bush Fires Act 1954 which are in force for the day.

**Ferro-resonance**
A resonance condition that may occur when an unloaded delta / star distribution transformer becomes energised or de-energised by single phase high voltage switching, causing sustained over-voltages.

**Fire danger warning**
Advice from the Bureau of Meteorology indicating adverse fire weather conditions.

**Fire extinguisher (hand held)**
The hand-held fire extinguisher is simply a pressure vessel from which is expelled a material or agent to put out a fire.

**Fire fighting unit**
A device that comprises a container filled with a minimum of 400 litres of water and a motor driven pressurised pump (spray unit) capable of discharging water.

**Formal handover**
A formal handover is a written exchange of information between two or more people who have responsibility for the job.

The formal handover information must be accurate and understood, thereby ensuring the continuity of safe work processes.

**Fully insulated EWP**
An approved, tested and insulated EWP that has constant leakage monitoring facilities to ensure continued insulation for higher voltage work, 66 kV and above.
Greenfield site
A whole site that is not connectable to Western Power’s operational network. (As defined in ESSR, 2012)

Ground safety clearance
The minimum distance required between the earthed end of any exposed insulator carrying or containing live parts and ground or the floor of permanent walkways used for normal inspection and operation functions. This distance is equivalent to the reach of a person at ground level (2,400 mm) which includes an allowance of 300 mm for tools.

Ground approach distance
The distance to be maintained by all ground personnel from the base of the mobile plant (stabilisers/outriggers) when deployed.

Ground observer
A person whose sole role is to advise the EWP operator of any hazards that could restrict the operation or cause damage to the EWP, and be able to perform emergency operation by use of manual recovery system if required to do so.

Note:
This function could be performed by the safety observer if trained in emergency recovery by manual means.

Handover Certificate
Is used when responsibility for control of one or more items of plant, or an entire site, is transferred from one Control Authority to another. (As defined in ESSR, 2012)

Hazard
A source of potential harm or a situation with the potential to cause loss or damage.

Hazardous workspace
Any space that, during its occupancy is likely at any time to:
- Have an atmosphere which could contain unacceptable levels of harmful contaminates.
- Have a too high or too low level of oxygen.
- Cause engulfment of the space.
• Has a means of entry or exit that is restricted.

Restricted entry or exit requires the use of three limbs to enter or exit. Therefore it is impossible for a single person to remove an incapacitated person unaided.

Training must be provided by a registered body and meet national requirements for Confined Space Entry.

High voltage (HV)
A nominal voltage exceeding 1,000 volts a.c. or 1,500 volts d.c. (As defined in AS/NZS 3000: 2007, clause 1.4.98)

High voltage earth installation
Any high voltage installation where high voltage earth electrodes are to be installed. This could be at ground-mounted substations wood poles with a down earth or conductive poles.

Horizontal work safety clearance
The minimum distance from the extremities of the work object, horizontally to the nearest live part.

Hot work
Any naked flame, any hot air blower or any gas operated handgun.

(Not to be confused with the American term for ‘Live Work’.)

Independent earth
An effective earthed reference point used for testing purposes.

Independent scaffold
A free-standing, self-supporting temporary structure used for the purpose of providing elevated access.

Information Caution tag
An approved general purpose information tag affixed to apparatus to provide information about existing abnormal conditions. An Information Caution tag would be used for conditions that do not require a Do Not Operate Danger, Restricted Use Danger or Out of Service Warning tag and may not be apparent to the observer if the tag was not present.

Inspection
To view or examine to a set criteria as part of a job process.
Work Practices

Inspection tag
A tag which is used to indicate that the equipment to which it is attached has passed inspection. The tag should also show the date the equipment was inspected and the date when the next inspection is due.

Instructed person
A person who, whilst operating mobile plant (crane) near energised overhead electrical apparatus, is adequately advised and supervised by an authorised person to ensure they avoid the dangers presented or created by energised equipment.

Insulated
Separated from adjoining conducting material by a non-conducting substance, which provides adequate resistance to the passage of current, or to disruptive discharges through or over the surface of the substance at the operating voltage and to mitigate the danger of shock or injurious leakage of current.

Insulated conductor
A conductor covered by a type of insulation that prevents the danger of electric shock.

Insulated EWP
An approved and tested insulated EWP fitted with an approved and tested insulating liner to the inside of the basket – glove and barrier method. An approved and tested insulated EWP without a liner – stick method.

Insulated tools and equipment
Tools and equipment specifically designed, approved and tested for use on or near live electrical apparatus.

Insulating barrier
A barrier of rigid or flexible insulating material specifically designed, approved and tested for use as an insulated cover.

Insulating equipment
Equipment of insulating material specifically designed, approved and tested for use on high voltage equipment.

Insulating gloves
Gloves especially designed, approved and tested to a rated voltage for working on or near live electrical apparatus.
**Isolated**
De-energised by an isolating device that prevents unintentional energisation of the electrical apparatus.

**Isolating device**
A device for rendering plant and apparatus isolated.

**Isolation point**
An isolating device that has been positioned off, remote operation disabled, has a danger tag fitted and is assessed as a suitable step in the process of making safe for access purposes. (As defined in ESSR, 2012)

**Issuing officer (IO)**
Is an authorised person who is responsible for issuing and cancelling work permits. (ESSR, 2012)

**Job briefing**
A meeting conducted with all members of the work team that focuses on the work to be performed and the site-specific hazards associated with the task. It is to be done prior to the commencement of any work and as required throughout the duration of the task.

**Job risk assessment (JRA)**
See Workplace Risk Assessment Plan

**Karabiner**
An oblong metal ring with a spring clip, used to attach a running rope.

**Lanyard**
A line used, usually as part of a lanyard assembly, to connect a fall-arrest harness to the anchorage point or static line in situations where there is risk of a free-fall.

**Leaching**
Action of a liquid filtering or gradually oozing through the wooden pole, typically indicated by a moist, gummy or sticky surface.

**Lead Combat Authority**
A title used to describe an organisation that is responsible for ensuring that all emergency management activities are undertaken for a specific emergency.
Live
Energised or subject to hazardous induced or capacitive voltages. (ESSR, 2012)

Live line equipment
All approved live line tools, rope, insulating equipment and other gear used for live line work.

Live line stick (also called hot stick)
A stick of insulating material specifically designed, approved and tested for use in physically bridging the distance between the live line worker and energised apparatus, between the energised apparatus and earth, between adjacent phases, and to enable physical loads to be taken or tools to be applied to the stick.

Live line stick method
A method of performing live line work using tools and equipment attached to live line sticks with the live line worker maintaining the MAD from energised apparatus.

Live line work
All work performed on high voltage or low voltage apparatus capable of being energised without implementing the full protective practice of isolating, proving de-energised and earthing at the worksite.

Live line worker
A person who, by way of training and demonstration of competency, performs live high voltage or low voltage work.

Live work
All work performed on components of electrical apparatus, not isolated, nor proved de-energised or short-circuited or earthed. (ESSR, 2012)

Low voltage (LV)
A voltage less than 1,000 volts AC or 1,500 volts DC. (ESSR, 2012)

Maintenance Access Permit (MAP)
Verve Energy’s standard form which authorises access to and work on apparatus under Verve Energy’s control which has been made safe by means of isolating and, where applicable, earthing. This may include electrical, mechanical, steam, pneumatic and hydraulic apparatus.

The MAP can also be used to authorise testing in certain situations.
Manual recovery system
A system that is capable of being operated by a person located on the ground to manually retrieve an EWP basket.

Material Safety Data Sheet (MSDS)
A document providing detailed information on a hazardous substance.

Mats
An insulated material specifically designed, approved and tested for use as a mat to stand on insulating you from earth.

Mechanical protective glove
A glove that by its design affords the wearer protection against cuts, abrasion and penetrating hazards.

Medical air cylinder
A cylinder containing air of breathing quality. Used to oxygenate the atmosphere within a power transformer.

MEN
Multiple Earthed Neutral system of earthing, as defined in AS/NZS 3000.

Midspan
The centre of a span between two fixed points or poles.

Minimum approach distance (MAD)
The minimum separation distance that must be maintained by a person, mobile plant (including its load) or any object (other than insulated objects designed for contact with live conductors) from electrical apparatus for that apparatus nominal voltage and the person skill level (authorised person or ordinary person). (As defined in AS 5804.1:2010, section 9)

Minimum tool insulating distance
The distance that the insulating material (stick or rope) is subjected to whilst touching energised conductors. This distance shall be measured between the metal end fitting at the conductor end of the insulating material and the metal end fitting or handmark, where provided, at the opposite end of the insulating material. When live line sticks consist of sections joined with metal couplings, the insulating distance shall be the total of each of the lengths of insulating material which have not been bridged out by the metal couplings.
Work Practices

Mobile plant
Cranes, elevated work platforms, tip trucks or similar plant; any equipment fitted with a jib or boom and any device capable of raising or lowering a load.

Mobile scaffold
An independent scaffold that is freestanding and mounted on castors.

Multi-task workplace risk assessments
These are sophisticated workplace risk assessments that form part of the planning process of the more complex jobs and projects. They follow a similar format to that of formal Workplace Risk Assessments in as much as they require hazard identification and risk assessment, but involve a more highly structured, facilitated risk assessment.

Near
Outside the minimum approach distance (MAD) but where there is a reasonable possibility of a person, mobile plant or any object, either directly or through any conducting medium, coming within the MAD. (ESSR, 2012)

Network
An interconnected system of transmission and/or distribution conductors and electrical apparatus. The word ‘network’ can be used interchangeably with ‘system’. (ESSR, 2012)

Network Authority Card (NAC)
A card issued by Western Power to an authorised person as evidence of their authority to work on a Western Power construction site, that is inclusive of working on or near the network. The card provides written and photographic identification of the authorised person. The Network Authority Card remains the property of Western Power and may be recalled by Western Power if the worker’s authority to work on a Western Power construction site is suspended. (As defined in Worker Authorisation Standard, 2012.)

Network operator
The owner, controller operator of an electricity network (NOCC/SOCC).

Network Total Workforce (NTW)
Is the total workforce who work on Western Power’s Assets ‘the network’ and consists of Western Power employees, contractors, subcontractors, Alliance Participants and partners.
Neutral conductor
The conductor of a three-wire or multi-wire system that is maintained at an intermediate and approximately uniform potential in respect of the active or outer conductors, or the conductor of a two-wire system that is connected to earth at its origin.

No work zone
An area around a suspected object of Aboriginal origin in which no construction activities are to be conducted.

NOCC
Network Operations Control Centre. NOCC is responsible for control of the Distribution Network.

Noxious weed
A non-native species, which is declared to be harmful and if found, must be controlled or eradicated by the property owner.

Object of Aboriginal origin
An object, including Aboriginal remains, used, made or adapted for a purpose consistent with Aboriginal traditional cultural life.

One Call
(Dial Before you Dig, phone number 1100) The service that issues information about the likely presence of buried apparatus installed by various service utilities.

http://www.1100.com.au

On-site person in charge
A person who is responsible for the work being carried out by a work team.

Operational work
All construction, maintenance, trade based and switching activities undertaken in a field environment.

Operating Agreement (OA)
A formal agreement between two control authorities, which could include a customer owned and operated network, confirming that an electrical apparatus' operational state will be held in an agreed state until the cancellation of the
agreement. An OA is **not** a work permit and does not authorise work to be undertaken. (As defined in ESSR, 2012)

**Operating Authority**
The division responsible for the operation and control of the network. The transmission system is controlled by SOCC and the distribution system is controlled by NOCC. (As defined in ESSR, 2012)

**Ordinary person**
A person without sufficient training or experience to enable them to avoid the dangers that electrical apparatus may create. Any person who is not a competent or authorised person (as defined by the ESSR) is therefore an ordinary person. (As defined in ESSR, 2012)

**Organochlorine pesticide**
A wide range of organic chemicals, which contain chlorine and sometimes several other elements.

**Other cable systems**
Telecommunications cables, pay television cable, control cables, aerial earthed cables, electrolysis drainage cables.

**Out of Service Warning tag**
An approved tag that reads 'OUT OF SERVICE WARNING' warning which is affixed to apparatus and advises of the physical condition of apparatus or network controlled by the apparatus.

**Out of use (electrical)**
For HV the removal from each source of electrical supply, a length of conductor equal to or greater than the insulation distance for that voltage. For low voltage, a gap in the conductor of not less than 150 mm. An isolator is not an acceptable alternative to the removal the length of a conductor.

**Packaged dangerous goods**
Dangerous goods Class 2 (gases) in a container with a capacity of not more than 500 litres or dangerous goods of another class in a container with a capacity of not more than 450 litres; and a container with a net mass of not more than 400 kilograms.
Packing groups
Packing groups are used for the purpose of determining the degree of protective packaging required for Dangerous Goods during transportation.

- **Group I**: great danger, and most protective packaging required. Some combinations of different classes of dangerous goods on the same vehicle or in the same container are forbidden if one of the goods is Group I.
- **Group II**: medium danger
- **Group III**: least danger among regulated goods, and least protective packaging within the transportation requirement

(As defined in Dangerous Goods Safety (Road and rail transport of non-explosives) Regulations 2007)

**PCB**
Polychlorinated Biphenyl – a hazardous substance found in capacitors and transformers manufactured before 1978.

**PCB coffin/drum**
A container acceptable for PCB contaminated chokes and capacitors is a steel drum of gauge 18 or heavier with a gasket made of PCB resistant material.

**Permanently leaving site**
RIC/TIC: the loss of control of a work site under a work permit, requiring the formal transfer of RIC/TIC responsibilities.
Recipient: leaving a work site with the intention of no longer working on the relevant electrical apparatus' under the work permit.

**Person in charge**
The person responsible for the work being carried out by a work team. (ESSR, 2012)

**Personal protective equipment (PPE)**
Approved personal protective equipment and clothing specified for the task or work area.

**Phase rotation**
The direction phases rotate relative to each other.
Phasing out
The identification of active conductors of the same phase (having no significant angular displacement i.e. red phase to red phase).

Pilot systems
Hard-wired overhead or underground secondary systems that link certain substations utilised for protection and communication functions.

Plant
Mechanical plant including all machinery and equipment not elsewhere defined as apparatus.

Point of demarcation
Identifies the crossover point of operational control of apparatus and systems between authorities. This point may exist on either side of the boundary.

Polarity
The voltage of a conductor relative to another conductor or the general mass of earth.

Portable earthing equipment
Earthing equipment that can be transferred from one location to another and used for earthing and short-circuiting de-energised apparatus.

Potholing
The action of removing earth by hand or vacuum excavation to determine the existence of any known or unknown buried apparatus.

Primary plant
Primary plant is all equipment which can be connected to HV levels (e.g. circuit breakers, isolators and current transformers) and any equipment directly associated with the major plant (e.g. Buchholz relays on transformers, SF₆ gas pressure switches on circuit breakers). (As defined in ESSR, 2012)

Process owner
The person who has been assigned with the authority and responsibility for managing the whole process from end-to-end. This authority may extend across more than one division and/or functions, in order to deliver agreed business results.
Program earth
Earthing equipment of approved type applied as part of an electrical switching program/schedule. (ESSR, 2012)

Prohibited burning time
The times of the year during which it is declared by the Minister under Part III, Division 2, Section 17 of the Bush Fires Act 1954, to be unlawful to set fire to the bush within a zone of the State and, in relation to any land in that zone.

Proposed Outage Plan (POP)
A Proposed Outage Plan is the online mechanism by which outage requests are lodged with the Transmission Network Operating Authority. The request for access (POP) can be utilised for the purpose of maintenance, construction or testing. A Proposed Outage Plan outlines:
- Isolations which are required to complete the work.
- Operational impact.
- The date and time of the intended work.
- The types of permit required.
- Any special precautions which need to be taken.
- Contingency planning information

Pyrolysis
The chemical decomposition of a substance by the action of heat.

Rated voltage
The manufacturer’s recommended maximum voltage to be applied to the specified equipment.

Recipient
A person authorised by Western Power to sign on and sign off work permits under control of the recipient in charge.

Recipient in charge (RIC)
The authorised person who has the responsibility of accepting and relinquishing EAPS and VAs and managing the work group activities to ensure compliance with the conditions of the EAP or VA and the requirements of the ESSR 2012.
Remote control
A module that is used to operate a base unit.

Remote end
The opposite end of the cable or line from where work is being carried out.

Restricted Use Danger tag
An approved tag that reads ‘RESTRICTED USE DANGER’ which is affixed to apparatus and advises of the person who controls the operation and state of the apparatus. The tag allows the nominated person to change the status of the apparatus as required for their work.

Risk
The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood.

Risk control
That part of risk management, which involves the implementation of policies, standards, procedures and physical changes to eliminate or minimise adverse risks.

RMU – ring main unit
One or a combination of ring main switches and/or switch fuses used to control and operate HV underground systems.

Road safety barrier
A physical barrier separating the work area and the travelled way, designed to resist penetration by an out of control vehicle and as far as practicable, to redirect colliding vehicles back into the travelled path. (As defined in AS/NZS 3845)

RSU
Radio switching unit comprising a base unit and remote control.

Running earth
Additional aerial earthed conductor run either above or below the active conductors.

Rural area
The countryside and pastoral areas outside the boundaries of a city or town.
Work Practices

Safe-cut
A method of exposing underground cables to establish their status.

Safe Work Method Statements (SWMS)
A document that outlines a safe method of working on a task that has been identified as being high risk. Lists the key steps for the task, including the generic hazards and risk controls.

Note:
CA SWMS must be used in addition to a standard risk assessment, e.g. WRAP, so that the risks specific to the local environment of the task are addressed.

Safe working load
The maximum load (in kg or kN) to be applied to the specified equipment, apparatus or hardware.

Safety observer
A person competent at the task, assigned by the person in charge and whose sole function is to observe and warn against unsafe approach to live electrical apparatus or unsafe conditions. (As defined in ESSR, 2012)

The safety observer must remain outside the minimum approach distance.

Sag
The vertical distance between the final conductor position midspan and the conductor fixing points.

Sanction to Test (STT)
Western Power’s standard form which authorises the testing of electrical apparatus. (As defined in ESSR, 2012)

SCADA
See Supervisory Control and Data Acquisition.

Scaffold
A temporary structure, specifically erected to support access platforms or working platforms.
Secondary equipment
All equipment that is not directly connected to a HV system. Typically, anything that is installed on a protection panel. This includes (but is not limited to) protection relays, control relays, contactors, indication equipment, SCADA equipment, panel wiring, marshalling boxes and control kiosks. The demarcation point on CTs and VTs is the magnetic interface point. The secondary cores within CTs and VTs are part of the secondary system.

Secondary isolation schedule (SIS)
The Secondary Isolation Schedule is used to:
- Formalise the preparation of secondary isolations.
- Pass written information to the recipient.
- Provide information for isolation and restoration.

Secondary systems
Secondary systems include (but are not limited to) station LV supply, batteries and battery chargers, protection circuits, pilot cables, control and alarm circuits, SCADA and communication equipment.

Secondary work activities
All construction, installation, replacement or modification work on secondary equipment conducted under an EAP permit. Whenever access to secondary equipment is required, a SIS must be attached to an EAP/STT for primary plant or secondary plant.

Section safety clearance
The minimum distance between live parts and the foot position of a person, whether they are on the ground, a walkway, a platform or on top of equipment.

Serviceable apparatus
Parts of the network and consumer owned apparatus to which access is allowed by the Network Operator and Service Providers for the purposes of maintaining supply.

Shall and should
Throughout this manual the word ‘shall’ is to be interpreted as the minimum requirement and ‘should’ is to be interpreted as advisory or discretionary.
**Short circuited low voltage**
Earthing of LV circuits is performed by bonding all phase and neutral conductors using approved equipment and procedures. This is commonly referred to as short-circuiting.

**Site contact**
A person nominated to receive, advise and direct visitors at a job site where multiple teams are working.

**SOCC**
System Operations Control Centre. SOCC is responsible for control of the Transmission network and authorisation of transmission switching operators.

**Specialised insulated plant**
Device(s) designed to perform specialist activities close to energised apparatus.

**SpidaWEB**
A geographical information system (GIS) that allows users to view the electrical distribution network in relation to physical geographical location in Western Australia. Users can view and analyse network assets using spatial information. Replaces earlier similar systems, Distribution Facilities Information System (DFIS) and Network Mapping System (NMS).

**Spiking**
The process of proving a cable has no hazardous voltage present, by creating a short circuit between the core(s) and neutral/earth screen, using a method that poses no risk to persons during the spiking of the cable.

**Stabiliser**
An approved, hydraulically deployed stabilising structure fixed to a crane borer sub-frame.

**Substation**
Any yard, terminal, zone substation or facility that transforms or switches high voltage.

**Supervisory Control and Data Acquisition (SCADA)**
A system of equipment that provides network operators at East Perth Control Centre real time remote visibility and control of the Transmission and Distribution electrical network. A SCADA system is comprised of master station equipment.
installed at East Perth Control Centre and remote equipment called Remote Terminal Units (RTUs) installed at terminals, zone and distribution substations. (As defined in ESSR, 2012)

**Switching**
The operation of circuit breakers, isolators, disconnectors, fuses or other methods of making or breaking an electrical circuit and/or the application and removal of program earths. (As defined in ESSR, 2012)

**Switching Authority**
An authority that has been issued an approval to give approval to perform switching operations.

**Switching device**
Any item on the network capable of connecting and disconnecting apparatus. (As defined in ESSR, 2012)

**Switching operator**
A person authorised by the Operating Authority to carry out switching operations within the limits of their authorisation. (As defined in ESSR, 2012)

**Switching program/schedule**
A list of switching operations that are placed in a logical sequence to ensure the operation of electrical apparatus is carried out in a safe sequence. 'Program' and 'schedule' can be used interchangeably. (As defined in ESSR, 2012)

**System**
Refer to ‘Network’.

**Test**
The measurement of electrical apparatus, with an approved device, to establish the present condition.

**Test voltage**
The voltage which shall be applied to the specified equipment for the purpose of periodic electrical testing.

**Tested**
Apparatus which has been tested in accordance with the relevant standard.
Tester in Charge (TIC)
The authorised person who is responsible for accepting and relinquishing Sanction to Test (STT) permits, managing work group activities to ensure compliance with the conditions of an STT and ensuring all work activities comply with the requirements of the ESSR. (As defined in ESSR, 2012)

TNO
Technical network officer.

Ultra-Low Voltage
See ‘Extra Low Voltage’

Under direction
The authorised switching operator who can carry out switching on their own. However, each item of the program requires direction by telephone or radio from the authorised switching operator. (ESSR, 2012)

Vegetation
Flora of any description.

Vertical work safety clearance
The minimum distance from the extremities of the work object, vertically to the nearest live part.

Vicinity Authority (VA)
Western Power’s standard form that authorises work near to live electrical apparatus or apparatus which must be treated as live. (As defined in ESSR, 2012)

VIR
Vulcanised insulated rubber.

Western Power Authorised Representative
Is authorised to act on behalf of Western Power within their scope of authorisation.

Work area
The location between program earths where, once a work permit has been issued, work and/or switching can take place. In the case of terminal and zone substations, this defined work area would normally be flagged and barriered. (As defined in ESSR, 2012)
**Definitions**

**Working earth**
Applied during electrical access work to provide more obvious confirmation of program earths and/or to control induced and static voltages at the worksite. (As defined in ESSR, 2012)

**Workplace**
A place such as a substation, vehicle, building or other structure, where employees or self-employed persons work or are likely to be in the course of their work. (As defined in OSHA 1984, section 3)

**Workplace risk assessment plan (WRAP)**
A formal document signed by the work team that lists the hazards and risk control measures identified at the site for the task.

**Worksight**
Colloquial term used by Western Power that refers to a construction site.

Refer to ‘Construction site’.

**Work team**
One or more authorised persons who have been authorised to carry out work on Western Power equipment/network.

**Working load limit**
Working load limit (WLL) is the maximum load (tension) that may be applied to slings or to any materials handling equipment.

**Working voltage**
The maximum voltage to be applied to the specified equipment while conducting actual fieldwork.
2.1 Worksite evacuation plan

Purpose
This work practice outlines how and when to establish a worksite evacuation plan.

Scope
This work practice:
- applies to any work within a Western Power transmission substation where the risk assessment for a task has identified the need for an evacuation plan
- does not apply at sites that have a formal evacuation plan

Training
If it is identified during the risk assessment that an evacuation plan is required, and the plan requires a person with specific training, you must have a person onsite that has the relevant training.

Instructions

Identify if an evacuation plan is required
While doing the risk assessment, identify if an evacuation plan is required. Factors that may affect this decision include:
- the tasks to be done
- the environment of the worksite. This may change with seasons and weather conditions, and includes:
  - fire (e.g. bushfire)
  - flooding
  - lightning
  - venomous fauna (e.g. snakes, spiders, bees, ticks)
- any other incident that may endanger personnel or the public

Establishing an evacuation plan
If it is identified during the risk assessment that an evacuation plan is required, the following steps must be completed before work starts, and noted on the risk assessment.
1. Consider if any members of the public may be affected by the evacuation. If so, ensure that the evacuation plan takes them into account, including methods of communication.

2. Establish:
   - a means of raising the alarm
   - an evacuation route
   - an assembly point

3. Establish an effective means to communicate with emergency services in the event of an emergency (e.g. landline phone, mobile phone, two-way radio).

4. Obtain the direct phone numbers of local hospitals and doctors when working in country areas. For more on this, see Appendix 4 (Emergency contact information) in this manual.

   **Note:**

   If a non-phone communication device (e.g. two-way radio) is chosen in step 3:
   - obtain the contact details of local emergency services as appropriate to the device
   - ensure that all team members know how to use the device

5. Ensure that a first aid kit is onsite and contains equipment relevant to the potential injury risk.

6. Ensure that all team members understand their roles and responsibilities.

For more on risk assessments, see work practices:

- 2.15 (Job briefing process)
- 2.17 (Construction site hazard management forms)

**In the event of an emergency**

1. Stop work and act according to the evacuation plan.

2. If safe to do so, attend to and assist with situations such as rescue, fire and injured personnel. Call emergency services or Network Operations if required (see *Emergency contact numbers*, below).

3. Move to the assembly point and:
   - confirm that all personnel are accounted for
b. await further instructions from the site coordinator, a team leader or other
person as appropriate to the situation

4. Continually monitor the hazards and re-evaluate the emergency and
evacuation plan if required.

5. Where practical, immediately document any additional actions on the risk
assessment.

6. Report the incident, including details (e.g. fire, personal injury (including
electric shock, even if it’s just a tingle), network asset damage), to both of the
following within an hour of the incident happening:
   • your formal leader
   • the Incident Hotline on 1300 CALL WP (1300 2255 97)

**Emergency contact numbers**

**Emergency – Fire, Police, Ambulance** 000

**Emergency switching** to *stop injury or damage during the emergency*

Network Operations 9427 0626

**To report an incident** after *the emergency has passed*

Incident Hotline 1300 CALL WP (1300 2255 97)

**For assistance coping with natural or man-made emergencies**

SES 132 500

**Note:**

For more emergency contact information, see Appendix 4 (Emergency contact
information) in this manual.

**References**

- Transmission Substation Work Practice Manual:
  - work practice 2.15 (Job briefing process)
  - work practice 2.17 (Construction site hazard management forms)
  - Appendix 4 (Emergency contact information)
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2.2 Use and management of portable earthing and short circuiting equipment

Purpose

This work practice outlines the minimum requirements for the use, care and maintenance of portable earthing and shorting equipment, in transmission substations.

Safety

- Conduct a risk assessment and job briefing. For more on this see work practice 2.15 (Job briefing process) in this manual.
- If earths are installed inside the work area, the associated hazards (e.g. whip or dynamic movement) and controls must be added to the risk assessment.
- Ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements. For more on this see section 3 (Personal protective equipment) in this manual.
- Only use approved and appropriately rated portable earthing equipment.
- Establish worksite safety barriers to prevent step and touch potential risks, earth lead damage or trip hazards.
- Do not handle earthing leads during attachment and removal, or while in service.
- Avoid unnecessary touching or leaning against elevated work platform (EWP) vehicles and cranes while they are in use to avoid possible touch potential. Observe ground approach distances (GAD), as specified in work practice 5.8 (Mobile elevated work platform (EWP) safety).

Inspection and maintenance

- As a minimum, conduct six monthly detailed inspections and resistance tests every twelve months on all portable earthing equipment using the Transmission Substation Portable Earth Inspection Quality Verification Sheet.
- Test approved and rated insulated sticks in accordance with work practice 2.12 (HV insulated tools and equipment – testing and use for substations) in this manual.
- All portable earthing equipment must clearly display the due date of their next inspection.
2.2 Use and management of portable earthing and short circuiting equipment

Work Practices

- Damaged or defective portable earthing equipment must be tagged with an ‘Out of Service’ warning tag and either:
  - discarded
  - repaired and approved for use.

**Resistance testing**


Resistance testing is an accurate way of comparing and detecting deterioration in earthing leads. This is done by comparing results over time or between units of the same type. This reassures the user that the earth lead is fit for purpose and protects workers in the event of re-energisation when portable earths have been applied.

**Overview of test**

The test uses a micro-ohmmeter with a DC output to measure the resistance of the cable and the end terminations. To get a reading that represents a healthy earth lead, the resistance of the cable needs to be calculated per metre and multiplied by the length (corrected for temperature). The resistance of the end connections is then added to this value to achieve a pass value.

![Figure 1: Calculation diagram for different sections](image)

The resistance value of the cable per metre can be obtained from the manufacturer. Temperature corrections may need to be applied for ambient temperature, as outlined in the manufacturer guidelines. The total resistance of the cable is then added to the value of the clamp connections.
Carrying out the test

Personnel intending to carry out the test must familiarise themselves with manufacturer guidelines, and the procedure and requirements for the test as stated in ASTM F2249 - 03(2015) Standard specification for in-service test methods for temporary grounding jumper assemblies used on de-energised electric power lines and equipment.

Note:

- If an earth set or component of an earthing or shorting set has been subjected to fault current or energisation, it must be removed from service and retained as possible evidence for investigation by Western Power’s Safety Health and Environment function. It must be tagged ‘Out of Service’ and not used again.
- Portable earths are not designed to protect personnel from the effects of lightning. For more on this, see work practice 2.3 (Electrical storms) in this manual.

Earthing

Note:

- In this document information common to both program and working earths is presented first, followed by sections specific to program earths and working earths.
- If induced voltages are present, or suspected of being present, follow the additional steps in the Earthing requirements for induced voltages section.

- Only use approved portable earthing equipment that is rated for the application.
- All portable earths must be applied and removed using the approved and rated insulated stick, with leads kept clear of personnel.
- Before use, check the earth set and confirm:
  - that the inspection date has not expired
  - the tightness of bolted connections
  - the condition and serviceability of earthing leads
  - the condition and serviceability of ground and aerial clamps.
- Always use permanently installed earth points.
Applying and removing earths

Applying earths

- Before applying portable earths, confirm that the apparatus to be earthed has been de-energised by using an approved non-contact proximity sensing device set (e.g. a Modiewark kit) at the voltage of the apparatus to be tested. Perform safety tests as follows:
  1. Ensure that the non-contact proximity tester is operating correctly by testing it on the phase conductor or using the self-test function.
  2. Confirm that the isolated apparatus is de-energised.
  3. Test the proximity sensing device again on an energised apparatus or on a tester.
- Apply portable earths using an approved and rated insulated stick immediately after a test has proven that the electrical apparatus is de-energised.

Note:
Maintain a clearance of 700mm from the earthing leads to the body during attachment and removal.

- The earth connection clamp must be:
  - attached to the earth point first, before the phase clamps are installed onto the aerial conductors
  - properly attached so that it will not become detached in event of a massive current discharge
  - attached to a permanently installed earth point.
- The aerial/phase clamps must be:
  - connected quickly and positively to minimise possible arcing, conductor damage and personal injury
  - aligned with the conductor and tightened sufficiently to allow the teeth to penetrate any surface corrosion. Do not over tighten.
- Earth leads must be arranged so that:
  - they are not hung up, crossed over or coiled on the ground
  - excess lead is placed away from the worksite
  - they are not tied together.
Removing earths

- When removing portable earthing equipment:
  - use an approved and rated insulated stick
  - disconnect all aerial phase clamps from the conductor first and lower the earths to the ground

  **Note:**
  Maintain a clearance of 700mm from the earthing leads to the body during attachment and removal.

  - disconnect the earth clamp from the permanently installed earth point.

Program earths

- Program earths are applied to, and removed from, apparatus as part of the switching program. It is essential that they are applied before access to apparatus is granted through an Electrical Access Permit (EAP).
  - Program earth details must be recorded on the EAP and may only be removed after the EAP has been cancelled.

- Program earths must be applied by, or under the direct supervision of the switching officer (SO) in accordance with the switching schedule.

- A ‘Do Not Operate’ danger tag must be attached by the SO to the earth lead ‘G’ clamp on program earths. In some cases a ‘Restricted Use’ danger tag may be applied if a Sanction to Test (STT) permit is to be issued.

- The SO responsible for the placement and removal of the program earths must enter their name in the ‘Placed By’ and ‘Removed by’ columns in the EAP.

- When work continues for a number of days, prior to commencing work each day, the Recipient in Charge (RIC) or Tester in Charge (TIC) must inspect the earthing equipment to make sure that it is still correctly installed.

- A program earth (portable or fixed) must be tagged with one of the following:
  - ‘Do Not Operate’ danger tag – when an EAP is issued.
  - ‘Restricted Use’ danger tag – when an STT is issued.

For more on the use of tags, see work practice 2.6 (Network tags) in this manual.

- Program earths must be noted on the EAP and STT.
2.2 Use and management of portable earthing and short circuiting equipment

- Where it is not practicable to install program earths in accordance with the switching program, Network Operations Control (NOC) must be notified and an alternative position agreed on.
- Install transmission line program earths at the switching program isolation points.

**Note:**

- Only earths fitted with a ‘Restricted Use’ danger tag may be removed for testing and/or commissioning purposes under an STT permit.
- The *Electrical System Safety Rules* provides exceptions to this rule, as detailed in the extract below:

  A range of simple tests – circuit breaker timing tests and insulation integrity tests requiring the removal of program earths fitted with restricted use tags for example – can be performed under an EAP only after:
  
  1. the issuing officer has granted permission
  2. all recipients of the EAP are notified by the RIC and have stopped work
  3. the RIC of the EAP, or a competent person under their immediate direction, is responsible for the removal and reapplication of the program earths
  4. work must not restart until the earths are reapplied (and restricted use tag reapplied if they were removed)
  5. all recipients of the EAP are notified by the RIC that work can safely recommence.

  Extract from *Electrical System Safety Rules, 2012, Section 12.4 ‘Testing under an EAP for zone substation maintenance’, p97*

**Working earths**

- Where there is a risk of induced voltage, install additional working earths. For more on this, see work practice 5.14 (Induced voltages in isolated conductors/apparatus) in this manual.
• The application of working earths is the responsibility of the RIC. It is a worksite requirement and may only be placed after the acceptance of the EAP by the RIC. They must be removed before the EAP is relinquished.

• The RIC responsible for the placement and removal of working earths must enter their name in the ‘Placed By’ and ‘Removed by’ columns in the EAP.

• Working earths must be installed as close as possible to the worksite. An assessment of the potential dynamic movement, or whip, of the earthing leads must be assessed using a risk assessment.

• Working earths must be installed as close as possible on either side of the point of work.

• When work continues for a number of days, prior to commencing work each day, the RIC or TIC must inspect the earthing equipment to make sure that it is still correctly installed.

• A program earth can be used as a working earth if it is visible from the worksite, but remains a program earth only to be removed as a step in a switching schedule after the EAP is cancelled.

**Earthing requirements for induced voltages**

Overhead conductors and apparatus could have voltages induced into them from energised conductors that are in close proximity to the line that is being worked on. For more on this, see work practice 5.14 (Induced voltages in isolated conductors/apparatus) in this manual.

When induced voltages are, or are suspected of being present, the following requirements must be met.

**Applying earths**

• A non-contact proximity tester must be used to indicate the level of induced voltage that is present.

• Working earths must be applied with an approved and rated insulated stick and as close as possible to each side of the point of work, ensuring that the grounding leads are bonded at the same earth point to create an equipotential work zone.
  - When applying the working earths, there may be an electrical discharge when the earth is applied to the overhead conductor/apparatus.
## Work Practices

### Removing earths

- The working earths must be removed using an approved and rated insulated stick. All sets of phase clamps must be removed before disconnecting the grounding leads from the same earth point.
  - When removing the working earths, there is still a possibility of drawing an arc when removing the phase clamp from the conductor.

**Note:**

If any part of the conductor being worked on is disconnected in any way, a temporary jumper must be installed to bridge the gap and maintain an equipotential bond.

### Steel and concrete structures

- Where a running earth is supported on a steel or concrete structure, ensure that it is bonded to one of the following:
  - the structure’s earth terminal
  - the metalwork of the structure
  - the down earth.
- Use a separate portable earth lead and grounding electrode where the low voltage (LV) neutral conductor is bonded to the steel or concrete structure, e.g. on transmission poles where an earth conductor has an LV bond.

### Earthing mobile plant

- Stationary vehicles and mobile plant working in a substation must be earthed to permanently installed earth points.
- Mobile vehicles and mobile plant working in a substation must:
  - have a drag chain attached to the chassis earth connection. The chain must have at least 150mm of 10mm bright or galvanised chain touching the ground
  - be repositioned carefully so as not to damage or release the earth connection.

‘Mobile’ is defined as a vehicle or mobile plant that may be in motion or can alter its height, e.g. EWP, bobcat, concrete pump, tip truck.
• Before use, inspect the earth lead and confirm:
  o that the test date is not expired
  o the tightness of bolted connections
  o the general condition of earthing leads.
• When working in a substation, earth leads must have a minimum of 150mm² aluminium.
• Securely attach the earth lead to the vehicle or plant chassis.
• **Do not** connect the earth lead to a structure fitted with an earth to neutral bond.
• When more than one mobile plant is involved, the following applies:
  o If the mobile plants are within a distance of two metres of any part of each other, they must be connected (bonded) to a common earthing point.
  o If the mobile plants are separated by more than two metres, each mobile plant must have its own direct earth connection applied with a minimum of five metres between the earth points.
• The earth lead must be bolted to the vehicle or plant chassis or connected with a screw-on clamp. See Figures 2 and 3 for examples.
• A G-clamp must be used to securely connect the earth lead to the permanently installed earth point or temporary earth electrode.

**Note:**
Spring loaded clamps must not be used to secure the earth lead to either the vehicle, temporary earth electrode or permanently installed earth point.

• Personnel must stand on an equipotential mat while operating base controls on a stationary vehicle or plant that is on or near live HV overhead electrical apparatus. Attach the earthing lead of the equipotential mat (either bolted or clamped) to the approved bonding point or a clean metal surface on the vehicle.
• Temporary buildings or structures at a substation must be solidly bonded to the substation earth leads rated at the site’s fault level rating. Install an independent earthing stake/rod if the connection to the grid is not possible.
2.2 Use and management of portable earthing and short circuiting equipment

Figures 2 and 3: Examples of earth connections

References

- Electrical System Safety Rules (ESSR), 2012 (DM# 9199327)
- Transmission Substation Work Practice Manual:
  - work practice 2.3 (Electrical storms)
  - work practice 2.6 (Network tags)
  - work practice 2.12 (High voltage insulated tools and equipment – testing and use for substations)
  - work practice 2.15 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 5.8 (Mobile elevated work platform (EWP) safety)
  - work practice 5.14 (Induced voltages in isolated conductors/apparatus)
- Transmission Substation Portable Earth Inspection Quality Verification Sheet (DM# 9419705)

Related documents

- Outdoor Portable Earthing Equipment for Transmission Substations and Lines (DM# 4722352)
- AS/NZS 3000:2007 Electrical installations (known as the Australian/New Zealand Wiring Rules)
2.3 Electrical storms

Purpose

This work practice outlines how to manage the risks associated with lightning strike and what to do if it occurs.

Instructions

Risk management

- There is an increased risk of lightning strike during stormy weather. If stormy weather is experienced during the work day, or if a storm warning has been issued:
  - include relevant controls in the risk assessment, including a worksite evacuation plan
  - ensure that personnel are aware that the hazards associated with working during lightning activity can be extremely dangerous

Note:

- Storm warnings are issued by:
  - Bureau of Meteorology
  - Network Operations

- For more on:
  - risk assessments, see work practices:
    - 2.15 (Job briefing process)
    - 2.17 (Construction site hazard management forms)
  - worksite evacuation plans, see work practice 2.1 (Worksite evacuation plans)

- If you can see lightning or hear thunder:
  1. stop work and seek shelter in a building or enclosed vehicle that is in a safe location and is away from powerlines as lightning strike can induce very high voltages
  2. wait until 30 minutes after the last time you see lightning or hear thunder before recommencing work
Work Practices

Important

- If shelter is taken in the Relay room:
  - cease work
  - don’t touch or work on any secondary apparatus
  - do not use fixed line phones
  - stay away from pilot protection equipment

- During a storm, if you cannot seek shelter in a building or enclosed vehicle, avoid using fixed line phones and avoid the following locations as they have a higher risk of lightning strike.
  - Tall objects, e.g. poles, trees. The lightning could jump to you (i.e. side flash) or result in a voltage gradient in the ground, creating a step potential.
  - High elevation compared to the surroundings, e.g. on top of a hill or building.
  - Electrical apparatus connected to the network. Lightning strike to or near the network can result in explosive damage to plant.

Notification requirements

If an incident occurs (e.g. fire, electric shock (even if it’s just a tingle), network asset damage), report it to both of the following within an hour of the incident happening, whether caused by lightning or otherwise:

- your formal leader
- the Incident Hotline on 1300 CALL WP (1300 2255 97)

References

- Transmission Substation Work Practice Manual, work practices:
  - 2.1 (Worksite evacuation plan)
  - 2.15 (Job briefing process)
  - 2.17 (Construction site hazard management forms)
2.4 Hazardous workspace safety

Purpose

This instruction outlines the safe system of work associated with the entry and activities performed by any person working on behalf of Western Power who enters a hazardous workspace.

Scope

The instruction only provides the key points relevant to hazardous workspaces identified on Western Power worksites and does not attempt to replicate the OSH Regulation Division 8 – Work in confined spaces, or any confined space training provisions.

Instructions

Basic requirements

- The person in control of the worksite must conduct a risk assessment and complete all documentation for all work activities undertaken in the hazardous workspace.
  
  Foreseeable risks include but are not limited to:
  - changing task conditions
  - the working environment
  - an individual's physical size and shape
  - work materials and tools
  - task competency
  - the rescue of an incapacitated person.
  
- Some substations adjacent to a building/site that contain hazardous material (e.g. chlorine plant) may need to be included in the risk assessment.

- Determine whether the work environment is a hazardous workspace or confined space.
Note:
Avoid entry if the work environment is determined to be a confined space and designate a competent person who is trained in confined space entry to implement safe systems of work in accordance with WorkSafe WA requirements. (Refer to Field instruction 2.5 – Confined space safety.)

- Confirm that all team members are conversant with all risk controls and if required designate competent safety observers and a rescue team.
- Establish a communication system.
- Consider methods of completing the work without entering the hazardous workspace.
- Identify a method to isolate any power supply in the event of an emergency.
- Determine any work permit requirements.
2.5 Confined space safety

Purpose

This work practice provides an understanding and knowledge of the requirements when performing work safely in a confined space.

Scope

This work practice provides the key points relevant to working in confined spaces. It reinforces the following references:

- Occupational Safety and Health Regulations 1996 (WA), Division 8 (Work in confined spaces)
- AS 2865:2009 Confined spaces
- Western Power Safety and Health Procedure, Confined Space Procedure (DM# 4742320)
- Any other Western Power approved confined space training provisions.

Risk control

1. Establish a register to record all workplaces defined as a confined space.
2. Fix a ‘Confined Space’ danger sign (shown below) at all access points of every confined space.

Note:

- Only remove a “‘Confined Space’ danger sign if the space is no longer a confined space, e.g. due to a redesign.
- Temporary confined spaces, i.e. spaces which are not normally accessible but that have been opened temporarily for works, must display the signs for the duration of the work.
Training

- In addition to the (Network Authority Card) NAC requirements, personnel working in confined spaces must have a confined space authorisation.

- The following units of competence (or equivalent) must be achieved by personnel required to work in confined spaces.
  - RIIOHS202A – Enter and work in a confined space
  - MSAPMPER205C – Enter a confined space
  - MSAPMPER200C – Work in accordance with an issued permit.

- The additional units below are applicable for anyone who issues the confined space entry permits or supervises work in a confined space.
  - MSAPMOHS217A – Gas Test Atmospheres
  - RIIRIS201D – Conduct local risk control
  - MASPMPER300C – Issue work permits.

- A person must be reassessed every two years to maintain their competency to work in confined spaces.

- Depending on the confined space work activity risks, the key confined space training competencies may be either general awareness training or specific training.

- At least one member of the work team must be trained in the following first aid competencies:
  - HLTCPR201B – Perform CPR
  - HLTFA211A – Provide basic emergency life support
  - When working in remote locations – HLTFA302C – Provide first aid in remote situations.

- If there is a possible fire risk, ensure that an appropriate number of team members are trained in the use of fire-fighting equipment.

- Anyone who needs to use atmospheric monitoring equipment must be trained in its use and calibration requirements.

Permits

Before starting any confined space activities, a Western Power approved Confined Space Entry Permit must be issued in addition to any other relevant permits (see Appendix 2 (Standard forms) in this manual).
Instructions

1. Consider methods of completing the work without entering the confined space.
2. The work parcel or any pre-job instruction must include all possible risks associated with the confined space work activity.
3. The person receiving the Confined Space Entry Permit is responsible for:
   • accepting and relinquishing the permit and managing the work activities to ensure compliance with approved procedures and processes
   • assigning accountabilities related to the confined space activity
   • conducting a risk assessment for all work activities to be done in the confined space, which may include but are not limited to:
     o entry and exit restrictions
     o engulfment by fumes, gas or liquid
     o engulfment by soil or sand
     o dangerous oxygen levels
     o breathable oxygen levels, i.e. 19.5–23.5%
     o explosion or fire
     o electrical arcing
     o unsafe temperatures
     o harmful noise levels.
   • ensuring the risk controls are implemented and followed and that all permits are completed.
4. Confirm that all team members understand all risk controls.
5. Postpone the work activity if all the confined space risk controls cannot be implemented.
6. Perform atmospheric testing if harmful fumes or gases may be existing or introduced due to things such as:
   • work processes
   • stored materials
   • any possible risk.
7. Designate a competent rescue person.
8. Establish and document an Emergency Rescue Plan appropriate to the confined space risk.
9. Establish a communication system.

10. Identify a method to isolate any power supply in the event of an emergency.

11. Anyone working in the confined space work must wear personal protective equipment (PPE) appropriate to the risk. For more on this, see section 3 (Personal protective equipment) in this manual.

12. Work must be done in compliance with all instructions.

13. When work in the confined space is finished, sign off the Confined Space Entry Permit and secure the confined space from unauthorised access.

**DANGER**

Sulphur hexafluoride (SF₆) gas is five times heavier than air. Escaped SF₆ gas will displace oxygen at ground level, especially in confined spaces. If SF₆ gas is present, it could present a danger of asphyxiation due to oxygen deficiency to anyone working in tanks, enclosed vessels, ducts, trenches and pits.

**References**

- **AS 2865-2009 Confined spaces**
- **Confined Space Safety Permit (DM# 6460100)**
- **Occupational Safety and Health Regulations 1996 (WA), Division 9 (Work in confined spaces)**
- **Transmission Substation Work Practice Manual:**
  - section 3 (Personal protective equipment)
  - Appendix 2 (Standard forms)
- **Western Power Safety and Health Procedure Confined Space Procedure (DM# 4742320)**
2.6 Network tags

Purpose

This work practice outlines the minimum requirements of Western Power's electrical tagging system by explaining the application and use of the four operational tags that are approved for use in Terminal or Zone substations (including secondary plant and communication systems).

Training, authorisation and permissions

Personal applying and removing network tags must be suitably trained and authorised in their roles and functions, as shown in Table 1: Network tag permissions, below.

Table 1: Network tag permissions

<table>
<thead>
<tr>
<th>Role / Function of Person</th>
<th>Applying tags</th>
<th>Removing tags</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do Not Operate (Danger)</td>
<td>Out of Service (Warning)</td>
</tr>
<tr>
<td>Authorised switching operator/issuing officer¹</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tester in charge during electrical apparatus operation</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Person responsible for maintenance, construction or commissioning</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Network field staff – in a more general sense</td>
<td>×</td>
<td>✓</td>
</tr>
</tbody>
</table>

¹ Issuing Officers can apply and remove tags within the limit of their authorisation. For specific work this includes authorised protection and control Issuing Officers.

² The Tester in Charge (TIC) can temporarily remove and then reapply earths associated with the “Restricted Use” danger tag during the process of changing...
the state of an electrical apparatus. This procedure may require the removal and reapplication of the tag.

**Transmission only**: there are provisions in the ESSR (Electrical System Safety Rules) to allow a restricted number of activities where the Recipient in Charge (RIC) is also authorised to remove/reapply this tag, e.g. phase issuing colours, insulation resistance tests and circuit breaker timing tests.

3 Those responsible for maintenance are likely to be general network field staff; however, in this context they are tasked with repairing/maintaining. They may need to remove the warning tag as part of this task, and can leave the “Out of Service” warning tag on or replace it if the equipment is returned as serviceable. If the equipment to be repaired requires isolation and network access, then a danger tag must also be in place.

4 Any person can apply the “Information” caution tag.

5 Any authorised person can remove the “Information” caution tag when normal operating conditions have been restored.

---

**Note:**

See section 12.4 (Testing under an EAP for zone substation maintenance) of the ESSR for additional “Restricted Use” danger tag fitting and removing exemptions.

---

**Important**

Personnel applying tags without completing all required fields of information may have their Switching Ticket cancelled.

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**Approved tags**

The four approved tags for use on Western Power’s network apparatus in Terminal or Zone substations are:

- “Restricted Use” danger tag
- “Do Not Operate” danger tag
- “Out of Service” warning tag
- “Information” caution tag
Danger tags

“Restricted Use” danger tag

Staples reorder number: 18697732

- Prohibits all personnel, other than the person nominated on the tag, from operating the apparatus.
- Must be attached and removed by the issuing officer or switching officer when issuing a Sanction to Test (STT).
- Must be fitted/removed in accordance with the approved switching program unless during fault conditions (where tags will be fitted as instructed by Network Operations Control (NOC)).
Work Practices

“Do Not Operate” danger tag

Staples reorder numbers: 18697727 (thick); 18697728 (thin)

- Prohibits operation of the apparatus.
- May only be used when work is being carried out on the system.
- Must be attached to apparatus:
  1. that has been isolated and earthed in accordance with a switching program
  2. for which an Electrical Access Permit (EAP) or Sanction to Test (STT) has been issued
- Must be fitted and removed accordance with the approved switching program unless during a fault condition (where tags will be fitted as instructed by NOC).
- Must be attached to all isolation points of the plant/equipment in a clearly visible position.
- Must be attached to high visibility warning signs placed on interconnectable normally open points that can be closed. A sample of the high visibility warning sign is shown below.
High visibility warning sign (Stock code: CZ5012)

- Must be removed after all work has been completed.
- If any defect is still present on the apparatus, and work has ceased on the apparatus or the apparatus is not to be returned to operation, the “Do Not Operate” danger tag must be replaced with an “Out of Service” warning tag.
- When further work is to be done on the plant/equipment at a later date, a new “Do Not Operate” danger tag must be attached to the plant/equipment.

Removing danger tags

- Danger tags (“Do Not Operate” and “Restricted Use”) can only be removed per the switching schedule, or in fault conditions as directed by NOC.
- Tags discovered in the field with no current schedule can be removed by:
  - the person who affixed the tag
  or
  - other authorised personnel who have contacted one of the following:
    - the operating authority (NOC)
    - the person who fitted the tag
    - the team leader of the group responsible for fitting the tag
    - the formal leader of the person who fitted the tag
Important

• Removing a danger tag without authorisation has the potential to create a serious hazard to the Network Total Workforce (NTW) or the general public. Ensure that the appropriate process has been followed and that the removal of a tag is part of an approved step process to change the status of the apparatus.

• Following this process will help to ensure that:
  o the removal of the tag will not put any person at risk
  o the removal of the tag will not affect any other work that is being performed
  o all people who are involved know that the tag has been removed

• For more on the application and removal of tags, see section 3.8 (Electrical tags) of the ESSR.

• If a tag is encountered in the work environment and it cannot be determined why it has been affixed, the following must occur before work proceeds.
  1. Identify and contact the person who placed the tag or, if unavailable, their team leader.
  2. Identify why the tag was placed on the equipment.
  3. Contact NOC to check if any work is being carried out on the system and if a permit is in existence for the apparatus.
  4. Be familiar with, and authorised to operate, that equipment (e.g. a switching operator).
  5. Check for any personnel working on the equipment or on any associated section of the network.
  6. Check the condition of the equipment and any associated section of the network.
  7. Remove the tag and record it in the appropriate system (as directed by NOC).
  8. Inform your formal leader of this event.
  9. Check equipment operates correctly with the use of the relevant commissioning checks.
Warning tags

“Out of Service” warning tag

- Prohibits the operation of apparatus, specifically to prevent damage to the apparatus or network and to ensure that personnel who may operate the apparatus are not endangered.
- Must be fitted to apparatus that is unserviceable, awaiting repair or being repaired.
- Must be used to indicate a General and Unusual Operating Instruction (GUOI).
- When an “Out of Service” warning tag is used and has been fitted for switching on primary apparatus, NOC must be advised.
- Must be applied directly to the defective component in a clearly visible position.
- Apparatus with remote control must be tagged at all control points.
- May be used for non-operational use (non-electrical or outside of NOC’s control) and does not have to be recorded with NOC.

Removing an “Out of service” warning tag

- This warning tag may only be removed in the following circumstances:
  - The apparatus that it is affixed to has been repaired and tested.
  - The apparatus has been replaced.

Staples reorder numbers: 18697730 (thick); 18697731 (thin)
The apparatus has been isolated from the system by removal of conductor/s or a piece of equipment and is deemed ‘Out of service’ by NOC.

Caution tags

“Information” caution tag

- Used for conditions that do not require a “Do Not Operate” danger tag, “Out of Service” warning tag or “Restricted Use” danger tag. The “Information” caution tag provides information about changed or unusual network operating conditions.
- Where an “Information” caution tag is attached to any equipment, all personnel that work on the equipment must comply with any instruction or information on the tag prior to commencing, and during, any tasks associated to the tagged equipment.
- Used for isolation on secondary non-network operational isolations.
- May be used for non-operational use.
- May be removed when the condition or status of the apparatus has changed, (this may include fitting a new “Information” caution tag with the updated status, if required).
Work Practices

Fitting and recording of tags

Fitting tags

• Only approved tags are permitted for use.
• For the tags to be effective, the following must be done:
  1. All relevant information must be filled out correctly and clearly.
  2. The tag must be placed in a visible location on the apparatus.
  3. The tag must remain in place for the duration of the condition indicated on the tag.
• Tags must be attached so that they can easily be seen and remain in place for the duration of the condition indicated on the tag.
• The tags may be attached using the hasp of a padlock through the hole in the tag, or attached to the equipment with string or cable ties.

Recording affixed tags

• Whenever a tag is fitted to network apparatus, it must be recorded:
  o on the switching schedule or by NOC when:
    – configuring the system for a permit
    – reinstating the system after the permit is relinquished
  o on the permit – for other isolations (e.g. confined space or Construction Authority Work Permit)
• Recording the details of an affixed tag may also be required when contacting NOC in relation to identifying an unknown tag.
• “Information” caution tags do not need to be reported to NOC. However, it may be necessary to record the details of an “Information” caution tag due to the extent of the information associated, or for management purposes of the apparatus.

Note:

Secondary systems and communication systems use other tags that are not covered in this work practice. These other tags must not be used on the primary network within a substation.
References

- Transmission Substation Work Practice Manual, Appendix 1 (Tags and signs)
- Electrical System Safety Rules:
  - Section 3.8 (Electrical tags)
  - Section 12.4 (Testing under an EAP for zone substation maintenance)
2.7 Pyrolysis in vehicle tyres

Purpose

This work practice defines tyre pyrolysis and outlines the causes, preventative measures and precautions to take if tyre pyrolysis is suspected. It also addresses what to do if a vehicle is struck by lightning or makes contact with overhead powerlines.

Overview

It is possible for the tyres on trucks, cranes and other heavy vehicles to catch on fire and explode; sometimes there are no external signs and combustion takes place inside the tyre.

Whenever excess heat is developed in, or applied to, a tyre, it can initiate a process within the tyre known as pyrolysis. Pyrolysis is the chemical decomposition of an organic material after it has been exposed to high temperatures. Flammable gases and pressure build up within the tyre, which can cause it to rupture or explode.

Important

Exploding tyres can propel parts of wheel rims and tyre fragments over long distances.

Causes

Pyrolysis in vehicle tyres can be caused by:

- a lightning strike
- contact with live high voltage apparatus
- defective or under-inflated tyres
- the application of heat (such as oxyacetylene or welding) on wheel rims with tyres attached
- overheated brakes
- close proximity to fire
Work Practices

Instructions

Before commencing work:

• conduct a risk assessment and job briefing (see work practice 2.15 (Job briefing process) in this manual)

• ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

Preventative measures

• Ensure that tyres are in good condition and are inflated to the correct pressure.

• Before raising any tray, crane jib, EWP boom or similar, look up to ensure clearance from overhead conductors.

• Remove all tyres when welding or carrying out any oxy-acetylene works on wheel rims.

• Report any suspected vehicle brake overheating to Fleet Services.

If tyre pyrolysis is suspected

• If there is a safety concern relating to tyre pyrolysis:
  o remove all personnel to a distance or protected area (approximately 100 m) that will mitigate any danger of an explosion of the tyre
  o secure and control entry to the site until the appropriate authorities have inspected and released the vehicle

• Update the risk assessment immediately after a vehicle’s tyres have been exposed to the effects of extreme heat.

• If practicable and safe, drive or tow the pyrolysis-affected vehicle into a nearby area that is clear.

Note:

Before moving or towing the vehicle, personnel must gain approval from the appropriate authorities e.g. Network Operations, their formal leader and Fleet Services. Ensure that the Western Power vehicle intended to be moved is identified to the authorities.
Vehicle contact with lightning or overhead powerlines

- If a vehicle is struck by lightning or makes contact with live overhead powerlines personnel must remain clear of plant until proved de-energised and earthed.
- If the conductor is touching the vehicle or plant and the driver appears to be injured, remain clear until the conductor is proven de-energised and earthed.
- The driver of a vehicle that is in contact with a powerline must remain in the vehicle until the electrical supply has been isolated.

Note:

- If the driver is alone, they should attempt to seek assistance using a mobile phone or radio.
- If there is an immediate risk of a fire or potential explosion, the driver should leave the vehicle by jumping clear with both feet together to put significant distance between their body and the vehicle. The driver must advise all other personnel or members of the public to stay clear.

- Arrange for the control centre to have the supply isolated and call 000 so that the Department of Fire and Emergency Services (DFES) can manage the risk of any potential fire (see Appendix 4 (Emergency contact information) in this manual).
- Once the supply has been isolated the driver may exit the vehicle and move outside the exclusion zone if one has been established.
- If the vehicle cannot be moved as deemed by the appropriate authorities, contact your formal leader to arrange for an exclusion zone to be established around the vehicle to a distance of at least 100 m and keep the vehicle isolated for 24 hours before approaching.

References

- Transmission Substation Work Practice Manual:
  - work practice 2.15 (Job briefing process)
  - section 3 (Personal protective equipment)
  - Appendix 4 (Emergency contact information)
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2.8 Temporary barriers and signs

Purpose

This work practice outlines the minimum requirements for installing and erecting temporary safety barriers or warning signs in transmission substations.

Instructions

• Conduct a risk assessment and job briefing (see work practice 2.15 (Job briefing process) in this manual). Assess the need for temporary safety barriers or warning signs.

• If the risk assessment identifies any hazard that would put personnel at risk of injury or harm, erect temporary safety barriers, warning signs and/or designate a person to direct personnel.

• Where practicable, install safe access ways through the immediate worksite, allowing personnel access. Alternatively, escort personnel through the immediate worksite.

• Position temporary safety barriers or warning signs so that they will not become a hazard or a worksite obstruction.

• On completion of work, remove all temporary signs and barriers.

Installation and erection

• The following are approved temporary safety barriers:
  o high-visibility mesh
  o high-visibility rope and flag
  o road safety barriers
  o temporary fencing
  o high-visibility road traffic management cones and bollards

• Appropriate warning or advisory signs are required to be erected in conjunction with these barriers. Walls, fences or other impassable permanent barriers may be used as part of a temporary safety barrier.

• If star pickets are used to support temporary safety barriers or warning signs, drive them into the ground firmly to a maximum depth of 600 mm.
Work Practices

Note:
Take care to avoid driving star pickets into underground services. For more on this, see work practice 5.23 (Excavation work in substations) in this manual. Cover the tops of the star pickets to prevent injury.

High-visibility barrier mesh

- Use high-visibility barrier mesh around excavations and exposed cables to stop members of the public from entering a hazardous worksite. A barrier mesh is not designed to prevent a fall into a trench.
- Erect this mesh to at least 900 mm from ground level.
- Attach high-visibility mesh to star pickets, ground screws, freestanding bollards or suitable permanent supports by star picket through the barrier mesh, making it secure by using a suitable fastener, or by using a suitable fastener directly against the selected support.
- Position star pickets, ground screws, or freestanding bollards no more than two metres apart to maintain the minimum height of 900 mm and prevent the barrier mesh from falling over.

High-visibility flag rope barriers

- Use high-visibility flag rope to safely guide personnel around, or through, a hazardous worksite.
- Use high-visibility rope in substations to indicate working, live, or safe areas.
- Tie high-visibility flag rope to star pickets, ground screws, freestanding bollards, suitable permanent supports, or selected supports using a suitable fastener.
- Position the high-visibility flag rope barrier between 900 mm and 1200 mm above the ground.
- Position star pickets, ground screws or freestanding bollards up to a maximum distance of three metres apart to prevent the flag rope from sagging below 900 mm.
- A flag rope is not designed to prevent a fall into a trench.
Plastic barriers

- Use plastic barriers to redirect pedestrian traffic away from a worksite. However, do not install them to provide a physical barrier between the travelled way and the work area.

Temporary fencing

- Use temporary fencing to prevent unauthorised entry to worksites.
- Install temporary fencing at a distance that will not create an additional hazard to the general public.
- Install temporary fencing where enclosures are required to stop unauthorised entry to electrical apparatus, plant, and equipment.
- Construct temporary fencing to a minimum height of 1,800 mm with the panel sections consisting of steel mesh, plastic fencing, chain wire or metal hoarding.
- If access gates are fitted, ensure that they can be locked.
- For increased security, attach barbed wire extensions to the top of the temporary fencing.

Note:

- All temporary metallic fences must be bonded to the earth of the substation or an independent earth.
- If any excavation is required, see work practice 5.23 (Excavation work in substations) of this manual.

Use of signs

- If the risk assessment process identifies a particular hazard, erect temporary warning or advisory signs in conjunction with temporary safety barriers.
- Warning or advisory signs that can be used on Western Power worksites include:
  - Power Line Work in Progress
  - Pedestrians This Way
  - Do Not Enter
  - Caution. Excavation Work in Progress
  - Danger. Live Cables
  - Authorised Entry Only
Work Practices

• Position warning and advisory signs where they are clearly visible and do not obstruct pedestrians and vehicular traffic.
• Ensure that all warning and advisory signs are legible and in good condition.

Emergency response generators

• Contact the Emergency Response Generators group for detailed standards on temporary fencing for emergency response generator, deployment and installation. This group can be contacted on:
  o 9441 1401
  o erg.requests@westernpower.com.au

References

• Transmission Substation Work Practice Manual:
  o work practice 2.15 (Job briefing process)
  o work practice 5.23 (Excavation work in substations)
• Emergency Response Generator Planned Deployment Booking System (DM# 3270950)
• Australian Standard 1743-2001: Road signs – Specifications
• WA Occupational Safety and Health Regulations 1996
2.9  Asbestos and fibreglass working procedures

Purpose

This work practice outlines the steps to be followed when working on equipment that contains, or is suspected of containing, asbestos materials. It also provides advice on working with fibreglass to ensure exposure standards are not exceeded.

Scope

This instruction applies to anyone working with ‘asbestos containing materials’ (ACMs) used in transmission and distribution assets. ACM includes:

- asbestos products such as Lebah and Zelemite meter boards
- porcelain fuse cartridge holders with asbestos braiding
- vinyl floor tiles in substations
- low voltage (LV) underground pillars
- cable ducts
- cable lagging.

This instruction does not cover working with or around thermal and acoustic insulation, roofing materials or automotive equipment containing or suspected of being ACM.

Specialist support and advice service

Unexpected disturbance of ACMs must be reported to the Incident Hotline on 1300 225 597.

For advice on ACMs or in situations that are outside the scope of this work practice:

Business hours
Safety, Health and Environment (SHE) – 9326 7900

After hours
Incident Hotline – 1300 225 597

Contractors who have queries about working with ACMs when planning work, must contact their designated Western Power representative who will then coordinate their enquiries.
Training and authorisation

Work on or near Western Power networks must be performed by personnel that hold a Network Authority Card (NAC), as a minimum.

There are no specific training requirements for the activities covered by this work practice. If you do not feel that you have the required knowledge, skills and training, discuss this with your formal leader and/or contact the relevant SHE business partner for your area.

Safety

An onsite risk assessment for the task must identify and record equipment that is, or is suspected of being, ACM. It must also include the control measures taken to minimise the release of, and exposure to, asbestos fibres.

Include other ACMs in the immediate vicinity of the work area, such as thermal and acoustic insulation, roofing materials, etc. in the risk assessment.

Personal protective equipment (PPE) must be worn for all work. For more on PPE, see section 3 (Personal protective equipment) of this manual.

When removing or working with ACM, the PPE worn must be in-line with what is in the risk assessment. The minimum PPE is, but is not limited to:

- Class P2 respirator,
- PVC disposable gloves, with extra wrist length protection
- Reusable dust-proof goggles
- Disposable coveralls.

Signage (Asbestos Related Work In Progress) and barriers to the area must be displayed for the duration of the task.

Note:

The Personal Protective Equipment Catalogue (DM#12821865) is Western Power’s primary list of approved equipment for personal protection. Other than speciality equipment for a specific task or custom prescription equipment, these items must be used by Western Power employees.

Western Power contractors must use PPE of the same specification.
Work Practices

Instructions

Any work with ACM poses some risk of disturbing asbestos strands that can become airborne and inhaled. Usually the asbestos material contained in moulded panels and other items remains passive until cut, drilled or sustains some type of damage. The friability (crumbliness) of ACM is also a factor, which is usually caused by weathering or abrasion. The following instructions must be followed to reduce the amount of airborne asbestos fibres to an acceptable level, that is less than 0.1 fibres/mL as outlined in the National code of practice for the management and control of asbestos in workplaces.

Danger

- **DO NOT** place fan-cooled instruments inside a meter enclosure. The dust disturbed by the fan may contain hazardous asbestos particles.
- **DO NOT** use brushes, brooms or compressed air to remove suspected asbestos-containing dust from the workplace.
- **DO NOT** use power tools for ACM work.
- **DO NOT** use sandpaper, rasps or any types of abrasives on ACM.

The use of wetting agents is an essential but temporary part of managing asbestos dust. Wetting agents include:

- wet cloths for wiping
- water spray bottles
- grease or petroleum jelly.

Wet cloths **must not** be rinsed and reused, as the water then becomes contaminated. They may be folded to expose a clean surface and reused. Wet cloths must be placed in the asbestos disposal bag immediately after use.

Electrical meter panels

Until July 1988, panels with asbestos products known as Zelemite, Lebah, and Asbestos were used. These panels can be identified by their appearance:

- They are black, bitumen, and approximately 12mm to 30mm thick.
- The material name (in most cases) will be stencilled on the back of the panel.
- These panels should not be confused with black Formica® panels (between 6mm and 10mm thick).
- Panels installed before 1988 must not be modified by cutting or drilling.
Work Practices

Panels containing, or suspected of containing, asbestos materials

1. Before removing meters, fuses, relays or any other electrical fittings, isolate the fittings from all sources of supply and prove de-energised. For more on isolating and removing meter panels, see work practice 8.15 (Replacing meter panels) in the Work Practice Manual (DM# 6999451).

2. Smear a small amount of grease or petroleum jelly the width of the device, just below its base, and then remove it.

3. Immediately after removing the device, place grease or petroleum jelly over the fixing holes.

4. Smear a small amount of grease or petroleum jelly around the device panel screws or fixings and then remove the panel.

5. Immediately after removing the panel, dampen it with a low pressure hand-held water spray.

6. Wipe away all dust and minor amounts of panel debris within the meter enclosure with a wet cloth.

7. Do not return the meter with a panel attached – always remove the meter from the panel.

8. Place the panel and the wet cloths into the small plastic bag, stock code (OC-3106) then seal it and place it in the large plastic bag, stock code (OC-3109) marked ‘Caution – Asbestos’.

9. When work is complete, place disposable coveralls, respirator and gloves into the large plastic bag.

Note:

Old meters may be replaced without changing the panel provided that:

- the replacement meter has an identical ‘footprint’
- no additional holes or cutting is required
- the work can be done without creating and releasing loose asbestos strands.
Porcelain fuse-bases and holders with asbestos braiding

Some porcelain fuse bases or holders that are attached to the older panels are likely to have asbestos braiding inside to prevent overheating.

1. Before removing porcelain fuse bases and holders, disconnect from all sources of supply (including the neutral) and prove de-energised.

2. Remove porcelain fuse bases and holders with asbestos braiding by leaving the fuses in the porcelain fuse bases and removing the panel according to the panel removal instructions.

Cable ducts

Cement fibre cable ducts are made of chrysotile white asbestos fibre cement and can be identified by either of the following:

- Light grey in colour, usually 100mm in diameter and approximately 4m in length.
- Channel-shaped 50mm duct mainly used in streetlight circuits in and around central business districts.

The asbestos materials in the cement fibre cable ducts usually remains passive until the duct deteriorates through age or gets damaged.

When removing and replacing ducts, take the following steps:

1. Disconnect all cables within the duct from all sources of supply and prove de-energised.

2. Dampen down the outside of the ducting with a low pressure water spray.

3. Apply a cable slipping compound to the cable duct (and cable) at the opposite end to the cable exit point, minimising the release and possible exposure to any released material.

4. Withdraw the cables and remove ducting, taking care not to cause any unnecessary damage that may release the asbestos fibres.

5. Place the cable ducting on heavy duty plastic sheeting (minimum thickness of 200µm) double wrap, seal, and mark ‘Caution – Asbestos’ (the writing must be at least 50mm high).

6. When work is complete, place disposable coveralls, respirator, and gloves into the large plastic bag, stock code (OC-3109) marked ‘Caution – Asbestos’.

Vinyl floor tiles

Some substations have ACM floor tiles on the floating floors. Where additional holes are required to be made in these tiles the following methods are to be used.
Small holes

- Use a hand drill to drill any holes in vinyl floor tiles. **Do not use** power tools or battery-operated tools.

Large holes

1. Mark the intended location for the hole.
2. Dampen down marked area and the area around it.
3. Cut the tile by hand outside the marked area. **Do not use** a rotating or reciprocating blade.
4. If required, heat the tile piece to be removed to soften the tile and glue.
5. Remove the cut-out section in the largest pieces possible and place in the small plastic bag, stock code (QC-3106). Then place into a second plastic bag marked “Caution – Asbestos”
6. Seal the edges of the cut tile with grease or petroleum jelly.
7. Wipe up any remaining moisture with a wet cloth and place in the small plastic bag with the tile pieces.
8. Cut the required hole in the timber portion without cutting into the tile.
9. Place the debris, wet cloths and used PPE into the small plastic bag, seal the bag and then place it into the large plastic bag, stock code (OC-3109) marked ‘Caution – Asbestos’.

10. An alternative method that does not require drilling or damaging (ACM) floor tiles, would be to remove the whole floor section and replace with a plywood insert of the same dimensions.

Storage and disposal

Bags containing asbestos waste must be taken to the depot for proper disposal. Place the bags marked “Caution – Asbestos” (containing panels, porcelain fuses and bases, asbestos braiding and contaminated PPE) into the designated receptacles at the local depot. Care must be taken not to puncture the bags when moving or handling bagged ACM.

- Large panels, pillars and cable ducts must be retained in the designated storage area.
- Ensure all bags and double-wrapped asbestos equipment and products are sealed and undamaged before placing them in the designated storage areas.
Additional bags can be obtained from Facilities Management. Facilities Management will ensure the removal of asbestos waste from the depots on a monthly basis. More frequent removal can be requested if required. For more on waste disposal, see Responsible Waste Disposal (1) (DM# 10038142).

Facilities can be contacted at: facilities.management@westernpower.com.au

**Fibreglass**

A risk assessment must be conducted before handling fibreglass equipment. If in doubt about risk and risk controls contact your SHE business partner. Contractors can raise issues via their designated Western Power Representative who will coordinate further queries. The Western Australian *Occupational Safety and Health Regulations 1996* set an exposure standard for all synthetic mineral fibres, including traditional fibreglass, as 0.5 fibres/mL.

The fibres may irritate the eyes, nose and throat and sting or itch when rubbed on the skin. This usually occurs in the folds of skin and around wristbands, collars and waistbands of clothing. Perspiration will aggravate the condition, but showering to remove the fibres will provide relief.

Fibreglass dust and fibres are eventually dissolved or expelled by the body and not known to cause long-term damage. Most people quickly develop tolerance, and any irritation should only be temporary.

- Where possible, polishing or damping down the fibreglass is effective in preventing fibres from becoming airborne.
- Wear appropriate eye protection and a Class P2 dust mask if fibres become airborne. Wear protective clothing to avoid skin irritation.
- Wash protective clothing that has been exposed to airborne fibreglass fibres.
- Wear suitable gloves, tucked under overall cuffs, to prevent hand irritation.
- Cover or wrap unwanted fibreglass equipment in a plastic bag or plastic wrapping, then place it into a designated container and dispose of it according to local depot or council regulations.
References

- Personal Protective Equipment Catalogue (DM#12821865)
- Responsible waste disposal (1) (DM# 10038142)
- SHE MS Asbestos Management Procedure (DM# 12758310)
- Transmission Substation Work Practice Manual, section 3 (Personal protective equipment)
- Work Practice Manual, work practice 8.15 (Meter panel replacement)
2.10 Electronic communications in vehicles and operational areas

Purpose

This instruction describes the requirements for using electronic communication equipment in vehicles and workplaces. Electronic communication equipment includes mobile phones, GPS, portable computers, etc.

Exclusions

This instruction does not apply to the use of mobile phones when performing remote end-to-end testing of pilot cables.

Instruction

- Operating or viewing portable devices and computers whilst driving a vehicle is a distraction and considered an at-risk behaviour.

Switch mobile phones off when:

- working on live electrical apparatus or put them in position whereby they are neither a distraction to anyone involved in the work, nor the safety observer
- operating or refuelling machinery
- driving a vehicle not equipped with a hands-free unit.

Note:

Western Power will not pay or refund any road traffic penalty imposed on an employee.
2.11 Height safety

Purpose

This work practice outlines the safety systems required when performing any elevated work.

Note:

This work practice provides the key safety requirements relevant to working at heights and does not attempt to replicate any detailed work practices contained in Worksafe WA’s Code of Practice, specific workplace instructions or training documents.

Training

- Personnel who perform work at heights on behalf of Western Power must:
  - meet the requirements of the unit of competence RIIOHS204D – Work safely at heights (or equivalent)
  - have a current Network Authority Card (NAC)
  - have current rescue training appropriate to the work at height risk potential
- Personnel who issue fall protection equipment must provide the user with instructions relating to the correct fitting, use, selection, testing, maintenance and storage of equipment. They must also explain the limitations of the equipment.

Instructions

- Before commencing work where a person or equipment could fall, conduct a risk assessment (see work practice 2.15 (Job briefing process) in this manual).
- Where the risk assessment identifies that a person could fall from one level to another, suitable fall prevention means must be implemented. Engineering controls include:
  - use of a fall arrest/prevention system
  - installing edge protection
- Other hazards considered during the risk assessment include but are not limited to:
  - slippery surfaces
o uneven surfaces
o narrow ledges
o uncomfortable work position
o poor weather conditions (e.g. hot, cold, wet, windy, low light)
o unsuitable equipment
o loose objects
o positioning and movement of mobile plant
o positioning and movement of mobile elevated work platforms (EWPs)
o use and positioning of ladders
o use and positioning of cranes
o third parties not associated with the work
o location and environment
o loose tools

- The work must be planned to minimise the amount of work that will take place in an elevated area.
- Certain high risk tasks will have a Safe Work Method Statement (SWMS) to guide the risk assessment process (see work practice 2.17 (Construction site hazard management forms) in this manual).
- Ensure that all personnel comply with personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual) for the minimum requirements.
- Before use, a fall protection system must be visually inspected for serviceability and to ensure the inspection tag is within date. For more on inspection and maintenance, see 2.13 (Fall prevention equipment) in this manual.

**Note:**

Personnel using fall arrest systems must not work alone.

**Risk controls**

**Fall injury prevention**

A fall injury prevention system must be used where a person could fall three metres or more (*WA Code of Practice: Prevention of Falls at Workplaces (2004)*).
In addition to other controls, employer approved fall prevention, fall restraint or fall arrest systems must be used to reduce the risk where there is a likelihood of a fall from height:

- **Fall prevention systems** – includes railings, barriers, guardrails or any other control attached to walkways or scaffolding which will prevent a fall
- **Fall arrest systems** – any form of harness worn by workers and using a lanyard (including a shock absorber system) attached to a fixed point to limit a fall to the extent of the lanyard
- **Fall restraint technique** – a combination of anchorage placement and correct lanyard or rope-grab length with harness which will prevent the wearer from reaching a fall risk position
- Harnesses, lanyards, shock absorbers, pole straps and karabiners must comply with the following standards:
  - *AS 1891.1-2007 Industrial fall-arrest systems and devices - Harnesses and ancillary equipment*
  - *AS 1891.3-1997 Industrial fall-arrest systems and devices - Fall arrest devices*
  - *AS 1891.4-2009 Industrial fall-arrest systems and devices - Selection, use and maintenance*
- Before attaching a fall arrest system, visually inspect the integrity of the attachment point. The attachment point must be capable of withstanding the loading that is likely to be placed on it in the event of a fall.
- Adjust (if possible) the lanyard length to ensure that:
  - the shortest possible distance is travelled in the event of a fall
  - the fall will be arrested before the level below is reached
- A lanyard must not allow a person to fall more than two metres.
- Use the fall arrest equipment as directed and ensure that lanyards are properly connected.

**Equipment and materials**

The following controls must be used to reduce the risk of an object falling:

- Lifting large or heavy loads – consider the safest method of lifting these into the elevated work area; do not exceed the safe working load (SWL) of the lifting device.
Secure loads – if using the EWP to lift large items, use slings or ropes that are suitably rated to hold the load.

Organise the EWP – limit the amount of equipment and tools that are taken into the EWP to only those items that are necessary to complete the task.

Tools – tool-bags and other equipment must be hung on the inside of the EWP. Where possible, attach heavy hand tools to prevent them from dropping.

**Note:**

Always consider alternative methods of raising equipment and materials into the elevated work area.

## Drop zone

- The drop zone is an exclusion zone that must be established below any elevated work or suspended load.
- Establish the drop zone before commencing work. The area of the drop zone will depend on the following:
  - type of work
  - size and weight of equipment and materials being used in the elevated work area
  - height of the work
- The boundary of the drop zone must be agreed on by all members of the crew during the job briefing process and must be noted on the risk assessment.
- Access to the drop zone must be controlled and the method of control is to be decided during the risk assessment.
- The drop zone will affect the positioning and movement of the following (if applicable):
  - all personnel onsite
  - safety observers
  - vehicles and moving EWPs
  - ladders and work platforms
  - barriers and/or signs to mark the perimeter of the drop zone
  - traffic management
Effective communication must be maintained between crew working aloft and ground staff.

**Note:**
If site conditions change, the drop zone must be reviewed and altered if required. Changes must be recorded on the risk assessment.

**Transformers**
- The top of a transformer may be used as a working platform if the risk controls are satisfactory. The risk controls must be in place before stepping onto the transformer.
- Before stepping onto the transformer, attach the fall arrest equipment to an attachment point.

**Note:**
Fall arrest equipment must be attached at all times during work.

- Use a ladder, elevated work platform or an approved means to ascend or descend the transformer.
- Depending on the risk of a fall, consider the use of a restraint line, maypoles or redirect anchors.

**Mobile elevated work platforms**
- Fall arrest systems must be worn and attached to the designated anchor point before ascending in an EWP.
- An EWP bucket should not cross beneath / above another unless the occupants of the higher bucket stop work while this movement is in progress.
- For additional information, see work practice 5.8 (Elevated work platform (EWP) safety) in this manual.

**Towers**
- When ascending or descending a tower, use a double lanyard fall-arrest system.

**Ladders**
- For additional information on ladders, see work practice 5.5 (Portable ladders) in this manual.
Scaffolding

- Whenever a person can fall two metres or more, install edge protection and a guardrail system.
- Never overload scaffolding.
- For additional information on scaffolding, see work practice 5.6 (Scaffolding) in this manual.

Note:

If it is required to climb to the work position:
- small hand tools may be carried in a tool-belt
- large tools, power tools and equipment should be elevated by a handline

When working above a drop zone:
- where possible, hand tools should be attached to prevent them dropping
- large tools, power tools and equipment should be attached by means of a suitable lanyard

References

- Transmission Substation Work Practice Manual:
  - work practice 2.13 (Fall prevention equipment)
  - work practice 2.15 (Job briefing process)
  - work practice 2.17 (Construction site hazard management forms)
  - work practice 5.5 (Portable ladders)
  - work practice 5.6 (Scaffolding)
  - work practice 5.8 (Elevated work platform (EWP) safety)
  - section 3 (Personal protective equipment)
- AS 1891.3-1997 Industrial fall-arrest systems and devices - Fall arrest devices
- AS 1891.1-2007 Industrial fall-arrest systems and devices - Harnesses and ancillary equipment
- AS 1891.4-2009 Industrial fall-arrest systems and devices - Selection, use and maintenance
2.12 HV insulated tools and equipment – testing and use for substations

Purpose

This instruction outlines the requirements for the testing and use of high voltage (HV) insulated tools and associated equipment in substations.

Scope

This instruction covers all HV insulated tools and associated equipment used by the Network Total Workforce.

Instructions

General

All HV insulated tools and associated equipment must be:

- rated and certified for use on the relevant voltage
- kept clean and dry
- stored and transported so that it is not exposed to excess moisture, dust, abrasion and other deteriorating effects
- checked and cleaned before use
- tagged out and removed from service if it is defective
- kept clear of deteriorating contaminants such as hand creams, sunscreens, paint solvents and hydraulic oil, which may affect or degrade insulating qualities of the equipment

Testing

- Prior to use, ensure that all HV insulated tools or associated equipment that have not previously been used have been tested.
- All HV insulated tools or associated equipment (substation equipment only) must be tested according to Table 1: Testing intervals for HV insulating sticks.
Table 1: Testing intervals for HV insulating sticks

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Testing intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulating sticks</td>
<td></td>
</tr>
<tr>
<td>dry</td>
<td>12 monthly</td>
</tr>
<tr>
<td>wet</td>
<td>24 monthly (or in accordance with the manufacturer’s recommendations)</td>
</tr>
</tbody>
</table>

For more information, see AS 5804.3:2010 (High voltage live working – Stick work).

- Western Power’s electrical testing section, or any other similar HV testing facility, must test all insulated tools and associated equipment to the relevant standard.

**Note:**
- Visual inspections of the insulated stick must be carried out prior to use. If any physical damage to the surface is reported it must undergo a stick leakage test.
- The Chance-type stick tester is suitable for pre-use testing but must not be a substitute for periodic testing by a test facility.

- All HV insulated tools and associated equipment must display an expiry test date 12 months forward from the date tested.
- The expiry date (month and year) must be clearly visible.
- Put the expiry date in the same position on the HV insulated tool or associated equipment each time it is tested.
- Do not use HV insulated tools or associated equipment after the expiry date. Equipment must be retested and correctly dated prior to use.

**References**
- AS 5804.3:2010 (High voltage live working – Stick work)
2.13 Fall arrest systems

Purpose

This work practice describes the requirements for inspecting and maintaining fall-prevention equipment.

Fall prevention equipment is required to avert a fall from height or to mitigate any risk identified during the risk assessment. As with personal protective equipment (PPE), fall arrest systems must not be used in isolation of other risk controls. For more on:

- height safety, see work practice 2.11 (Height safety)
- PPE, see section 3 (Personal protective equipment)

Training

Before inspecting a fall-arrest equipment, personnel must have to be deemed competent after completing a Nationally recognised competency RIIOHS204D – Work Safely at Heights. This training may be embedded in other courses, e.g. Emergency descent device (EDD).

Instructions

Inspect fall arrest systems before each use. Check the expiry date; if the label is illegible or the date cannot be determined, the item must be removed from service, tagged out and reported to your formal leader.

Important

- Fall arrest systems must be removed from service and destroyed 10 years from the date of manufacture.
- In the following situations, the item must be removed from service, tagged unserviceable and reported to your formal leader:
  - If a fall has occurred while wearing a fall arrest system or its shock absorber fall indicator has activated.
  - An item fails an inspection or is found defective.
Six-monthly inspections

- Inspections must be performed every six months using the following checklists.
  - Fall arrest systems – inspect while using *Fall arrest system inspection checklist* (DM# 6783836).
    
    See Appendix 2 (Standard forms) in this manual.
  
  - When performing a six-monthly inspection, the checklist must be saved for future reference. If the item meets the inspection criteria, attach a general inspection tag (see Appendix 1 (Tags and signs) in this manual).

Care and maintenance

Cleaning

If soiled by dirt or grit:

1. sponge down or hand wash with lukewarm tap water using pure soap or soap flakes. Harnesses can be machine washed on gentle cycle (D rings may damage machine).
2. thoroughly rinse and hang harness to dry at room temperature out of direct sunlight and not exposed to direct heat

If any other condition exists, consult manufacturer's inspection guide or contact the manufacturer.

References

- Work Practice Manual:
  - work practice 2.11 (Height safety)
  - section 3 (Personal protective equipment)
  - Appendix 1 (Tags and signs)
  - Appendix 2 (Standard forms)

- Fall arrest system checklist (DM# 6783836)
2.14 In-service safety inspection and testing of portable electrical equipment

Purpose
This instruction describes the minimum requirements when inspecting and testing portable electrical equipment before use, including:

- ensuring that all tools and equipment used by Western Power have residual current device (RCD) protection from the power source
- Low voltage and polyphase electrical equipment connected to the electrical supply by a flexible cord or connecting device, including equipment that is:
  - new and being placed into service for the first time
  - already in-service
  - serviced or repaired
  - returning to service from a second-hand sale
  - available for hire
- RCDs, except those within the scope of AS/NZS 3003:2011 Electrical Installations – Patient Areas and NZS 6115:2006 Electrical Installations – Mobile medical facilities, i.e. patient treatment areas of Hospitals, medical and dental practices and dialyzing locations.

Instructions
The following are typical examples of equipment covered by this instruction.

- Portable generator sets which must have RCD protected outlets.
- Portable, hand-held and stationary equipment, designed for connection to the low voltage supply by a supply cord, an appliance inlet or pins for insertion into a socket-outlet.
- Cord sets, cord extension sets and outlet devices (also known as electrical portable outlet devices (EPODs) or power boards).
- Flexible cords connected to fixed equipment in hostile environments.
- Portable power supplies (includes power adaptor/plug-pack, of both the safety isolating transformer and switch-mode types).
- Battery chargers, including those for commercial or industrial use.
Table 1: Indicative testing and inspection intervals for electrical equipment for all Western power substations, workshops and office areas

CAUTION: This table must be read in conjunction with AS/NZS 3760 as a whole, particularly clause 2.1

<table>
<thead>
<tr>
<th>Type of environment and/or equipment</th>
<th>Interval between inspection and tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equipment including Class I equipment, Class II equipment, cord sets, cord extension sets and EPODs</td>
</tr>
<tr>
<td></td>
<td>Push-button test by user</td>
</tr>
<tr>
<td>(a)</td>
<td>(b)</td>
</tr>
<tr>
<td>* Factories, workshops, places of: manufacture, assembly, maintenance or fabrication</td>
<td>6 months</td>
</tr>
<tr>
<td>Environment where the equipment or supply of flexible cord is NOT subject to flexing in normal use and is NOT open to abuse and is NOT in a hostile environment</td>
<td>5 years</td>
</tr>
</tbody>
</table>

(Source: AS/NZS 3760:2010 In-service inspection and testing of electrical equipment Table 4.)

* All Western Power substations, workshops, etc. fall in to this category.
Table 2: Indicative testing and inspection intervals for equipment used on construction sites

CAUTION: This table must be read in conjunction with AS/NZS3012:2010 as a whole, particularly clause 3.6.

<table>
<thead>
<tr>
<th>Environment</th>
<th>Transportable structures, Class I (earthed conductive parts) and Class II (doubled insulated) Electrical equipment</th>
<th>Transportable structures, fixed and transportable equipment and construction wiring including switchboards</th>
<th>Portable Equipment</th>
<th>Residual current devices (RCDs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pushbutton test (by user)</td>
<td>Operating time (RCD tester)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Portable</td>
<td>Portable</td>
<td>Non-Portable fixed</td>
<td>Non-Portable fixed</td>
</tr>
<tr>
<td>Construction and demolition sites in accordance with Clause 1.1</td>
<td>6 months</td>
<td>3 months</td>
<td>After connection to a socket or before connection of equipment, and at least once every day in use</td>
<td>1 month</td>
</tr>
</tbody>
</table>

(Source: AS/NZS 3012:2010 Electrical installations-Construction and Demolition Sites)
2.14 In-service safety inspection and testing of portable electrical equipment

References

- AS/NZS 3012 Electrical installation – Construction and demolition sites-testing of generator set RCDs and invertors
- AS/NZS 3760:2010 In-service inspection and testing of electrical equipment
- Occupational Safety and Health Regulations 1996, Division 6 “Electricity”, subsections:
  - 3.60 (Protection against earth leakage current when portable equipment in use)
  - 3.62 (Tester to record information on tag)
2.15  Job briefing process

Purpose

This work practice:

• provides a uniform methodology and minimum key requirements for the job briefing process, which must be done before every job commences

• outlines the roles and responsibilities of the worksite team leader and site coordinator

Scope

This work practice is applicable to:

• any team performing planned or unplanned work in Western Power transmission substations

• multiple teams working in the same transmission substation

Risk control

As part of the job briefing process, an onsite risk assessment must be performed to achieve the following.

• Identify the hazards – identify all of the hazards associated with the tasks and situations that could potentially cause harm.

• Assess the risks – consider what could happen (i.e. the consequence) if someone is exposed to a hazard and the likelihood of it happening.

• Control the risks – list appropriate control measures. The methods of controlling risks are ranked from the highest level of protection and reliability to the lowest.

1. Elimination (the most effective control measure) – the hazard or hazardous work practice is removed.

2. Substitution – the hazardous process or material is replaced with one that is less hazardous. This will reduce the hazard and so reduce the risk.

3. Isolation – isolating or separating the hazard or hazardous work practice from the people who are involved in the work, or the people in the general work area (e.g. install barriers, guards or covers)

4. Engineering – engineering control measures are used to minimise the risk.

5. Administrative – involves the use of safe work practices to control the risk.
6. Personal protective equipment (PPE) – the last resource of risk control which must never be used in isolation of other risk controls.

- Review the control measures – continually review the control measures implemented to control the risks. If necessary revisit the control measures:
  - when the control measure is not effective in controlling the risk
  - before there is a change at the worksite that is likely to cause a new or different hazard that the measure may not effectively control
  - if a new hazard is identified
  - if the result of consultation indicates that a review is necessary
  - if anyone who requests a review on behalf of their team or a member of their team finds circumstances where they believe that a control measure has not been adequately reviewed

**Instructions**

The job briefing process must be performed before the commencement of any task and as required throughout the duration of the task. The process of thinking through a task in advance improves efficiency and can result in decisions that will prevent serious injuries and/or damage.

This process outlines the tasks that are to be accomplished, the location, tools, equipment and material requirements, and safety rules or procedures that apply.

Key elements of the job briefing process include:

- adherence to permit procedures and energy source controls
- task procedures that are involved
- roles of each team member and task allocation
- allocate identification armbands
  - worksite team leader – blue armband (optional)
  - safety observer – green armband
  - site coordinator – orange armband
- hazards associated with the task and the control measures
- work area establishment and set up
- emergency response plan
Worksite team leader

The worksite team leader directs team members to accomplish a task safely, efficiently and within the constraints of the relevant standards, procedures and practices.

Worksite team leaders are appointed based on their assessed competence and suitability for the role; they must understand the role responsibilities and obligations, and lead the team effectively.

The worksite team leader at any substation:

- may wear a blue, ‘Team Leader’ armband for the duration of work
- must do the following:
  - Meet with the site coordinator and record the site coordinator’s name and contact number on the risk assessment.
  - Ensure that all team members actively participate in the job briefing process.
  - Ensure that all team members hold current competencies and authorisations to perform the task.
  - Provide supervision and coaching where required.
  - Identify the hazards and associated risk controls and document this information in the risk assessment, which is then signed by all of the team members.
  - Where a Safe Work Method Statement (SWMS) for a specific task is available, any hazards that are not identified by the SWMS must be recorded on the risk assessment.
    For more on SWMS, see work practice 2.17 (Construction site hazard management forms) in this manual.
  - Appoint a safety observer, if required, and issue them with a green, safety observer armband (see work practice 5.13 (Safety observer role) in this manual).
  - Ensure that team members are wearing the required PPE and that they use it properly.
  - Ensure that permit procedures are followed, if required.
  - Make safe work practices the main priority at the worksite.
Work Practices

- Confirm that all tools and items of equipment are within test dates and are safe to use.
- Report any incidents immediately by calling 1300 225 597.

**Site coordinator**

Whenever work is being done at a Western Power substation where more than one team is present, one worksite team leader must act as the site coordinator.

‘Team’ refers to a group of two or more people working on the same task at a worksite.

**Single team onsite**

If there is only one team onsite, the worksite team leader is the default site coordinator.

**Multiple teams onsite**

- When more than one team is working on any substation site, the site coordinator is determined by the following criteria.
  - If there is a single work team onsite and other team/s arrive later – the initial worksite team leader will be the site coordinator and will maintain these duties unless otherwise agreed to by the worksite team leaders. They will remain the site coordinator until they have completed their work and intend to permanently leave the worksite.
  - If more than one team attends a worksite at the same time – the team leader of the team that will remain onsite for the longest amount of time will be the site coordinator unless an alternative arrangement is agreed to by the worksite team leaders.
  - If the initial site coordinator’s team intends to permanently leave the worksite, they must consult the remaining worksite team leaders and reassign the site coordinator role.
  - The new site coordinator must be:
    - informed of the change and accept the role
    - briefed by the outgoing site coordinator

- This applies equally to all members of the Network Total Workforce (NTW). No preference is to be assumed by either Western Power or contractors.
- The site coordinator role may be rotated during tasks/projects of long duration.
Note

• The site coordinator does not take charge of other teams or their work.
• Worksite team leaders must still delegate specific tasks or duties within the team and ensure that their teams adhere to all the mandatory safety requirements such as permits and risk assessments.
• When any of these roles are transferred to another person a formal handover must take place between all of the personnel involved.

Small teams and switching operators’ onsite

Small teams are required to be part of the collective group at a worksite, but are not required to perform site coordinator duties. The leader of a small team may wear the blue ‘Team Leader’ armband. A small team consists of:

• two people
• two switching operators performing switching activities

Site coordinator responsibilities

The site coordinator must:

• wear the orange ‘Site Coordinator’ armband for the duration of their role
• coordinate with the other worksite team leaders and discuss the following site specific details.
  o Type of permits that are in place.
  o Individual team tasks (what, where, how) and schedules.
  o Contact details (worksite team leaders, local emergency services).
  o Any special/abnormal conditions (specialised plant, visitors, and deliveries).
• have their name recorded on each team’s risk assessment
• be available onsite at all times when anyone else is onsite
• respond to or escalate queries by other worksite team leaders in regard to the overall task/project
• be familiar with site access requirements
• display their name and contact details at the gate of the substation (this is in addition to the existing contractor signage requirements)
Visitors to the site

- All people requiring entry to a substation must comply with the following work practices in this manual:
  - 5.2 (Substation entry requirements)
  - 5.18 (Site security)
  - 5.25 (Construction site access)
- When dealing with visitors, the site coordinator will either:
  - request that the visitor wait offsite and then the site coordinator will call the relevant worksite team leader to come and take charge of the visitor and perform a site induction
  - perform a site induction and then direct the visitor to the relevant worksite team leader
- Where a site induction is required, the site coordinator or their delegate (e.g. a team leader) must:
  - use the Substation Entry Induction Form (DM# 6036654) to complete the site induction
  - update the risk assessment to include any additional hazards and controls that may arise from the arrival of inducted personnel
- If there is no valid reason for the visitor to be onsite, the site coordinator has the authority to refuse access to the substation. This applies to all visitors, including Western Power personnel.

References

- Transmission Substation Work Practice Manual:
  - work practice 2.17 (Construction site hazard management forms)
  - section 3 (Personal protective equipment)
  - work practice 5.2 (Substation entry requirements)
  - work practice 5.13 (Safety observer role)
  - work practice 5.18 (Site security)
  - work practice 5.25 (Construction site access)
- Substation Entry Induction Form (DM# 6036654)
• Workplace Risk Assessment Plan – available through Staples (stock code 18641873)
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2.16 Fire precautions during a total fire ban

Purpose

This work practice outlines the mandatory requirements for working during a total fire ban (TFB) and includes:

- Limited work activities that sit outside of the Department of Fire and Emergency Services (DFES) exemptions
- Emergency repairs, bush fire mitigation and maintenance essential to the safe operation of the electrical network covered by the DFES exemption.

Important

Bush Fire Mitigation and Essential Maintenance work must not be undertaken unless instructed in writing by Western Power Head of Function Works Program Planning.

When permitted, all work must be carried out in accordance with the DFES exemption requirements.

Scope

This work practice must be followed by personnel performing work during a TFB. The controls or DFES exemption used to eliminate or reduce the risk of fire, damage or harm must be recorded in the risk assessment.

Training

- Any person who works in areas where a TFB is in place must be trained in the use of the fire suppression equipment and bushfire awareness. Training can be obtained by completing one of the following:
  - ‘Basic fire extinguisher and bushfire awareness’ – provided by Power Training Services WA (PTS).
  - An equivalent course provided by a registered training organisation.
- Personnel who are required to operate a fire suppression unit (FSU) must also have been trained in the operation of that FSU.
### Table 1: Fire Danger Ratings

<table>
<thead>
<tr>
<th>Fire Danger Rating</th>
<th>Description</th>
<th>Level of fire suppression for operational vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATASTROPHIC</td>
<td></td>
<td>Level of suppression in accordance with DFES exemption</td>
</tr>
</tbody>
</table>
| FDI of 100+ Total Fire Ban | - These are the worst conditions for a bush or grass fire.  
- If a fire starts it will be extremely difficult to control.  
- Spot fires will start well ahead of the main fire and cause rapid spread of the fire.  
- The only safe place is away from the bushfire risk area. | |
| EXTREME            | Risk assess to determine level or Level 1 for substations (zone and terminal) and residential areas* | |
| FDI of 75-99       | | |
| SEVERE             | | |
| FDI of 50-74       | - These are very hot, dry and windy conditions for a bush or grass fire.  
- If a fire starts it will be unpredictable, move very fast and difficult to bring under control.  
- Spot fires will start and move quickly.  
- The only safe place is away from the bush fire risk area. | |
| VERY HIGH          | Level 1 | |
| FDI of 32-49       | - These are hot, dry and possible windy conditions for a bush or grass fire.  
- If a fire starts it may be hard to control. | |
| HIGH               | Level 1 | |
| FDI of 12-31       | - If a fire starts, it is likely to be controlled in these conditions.  
- Be aware how fires can start and reduce the risk. | |
| LOW-MODERATE       | | |
| FDI of 0-11        | | |

*Residential areas are paved/sealed suburban or built up areas where grass is green, reticulated and less than 5cm in height and where there is no combustible bush or grassland for a minimum radius of 100m of the worksite.
**Fire Danger Rating**

The Fire Danger Rating (FDR) is based on the forecast weather conditions and gives you advice about the level of bushfire threat on a particular day (see Table 1, above). As the FDR increases, the threat of a bushfire increases.

The Bureau of Meteorology (BOM) website ([www.bom.gov.au](http://www.bom.gov.au)) contains information on the daily FDR. The website can be used to obtain the FDR for specific areas within the Perth metropolitan and WA regional areas. The DFES website ([www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)) also provides information regarding the FDR (for severe and above) and for TFBs which have been issued for specific areas.

When the FDR is ‘Catastrophic’ (Fire Danger Index (FDI) of 100+) for an area, a TFB will automatically be issued. DFES may also issue a TFB for FDR ratings other than ‘Catastrophic’, depending on the resources available in that area.

The level of fire suppression in Table 1 is the minimum level required for the FDR. If unsure, or if conditions are expected to change, consider taking a higher level of fire suppression to site.

**Working during a total fire ban**

Western Power has been issued an exemption by DFES which permit the Network Total Workforce (NTW) to undertake particular types of activities during a TFB. Each of these includes specific precautions which must be adhered to when undertaking the activities addressed by the exemption.

Failure to comply with the conditions specified render the exemption null and void, exposing the individual to potential prosecution with substantial fines and/or jail terms as possible penalties (up to $25,000 or imprisonment for 12 months, or both).

If work is to proceed during a TFB then the work must be carried out in accordance with the DFES exemption or in accordance with ‘Limited planned work during a total fire ban’, as detailed below. No other work is permitted during a TFB.

Vehicles must not be used to enter paddocks or areas of bush during a TFB unless they are being used in accordance with the DFES exemption and must be equipped with the required level of fire suppression.

Non-operational light vehicles must not be used off-road during a TFB due to the limited fire suppression.

Vehicles can only be used on-road or in an area that has been sufficiently cleared of all flammable material.
Limited planned work during a total fire ban

During a TFB, scheduled or planned work that is not covered by the DFES exemption can continue but the activities undertaken must be limited to residential areas and to tasks that have no risk of causing a fire. This section describes the limits of this work and the requirements that must be met if the work is to go ahead.

These limitations are required because the *Bush Fires Act 1954 (WA)* states that during a TFB:

‘…a person must not carry out an activity in the open air that causes, or is likely to cause, a fire’.

Fines of up to $25,000 or imprisonment for 12 months, or both, is the penalty for failing to comply with this requirement.

Prior to undertaking any work during a TFB, always:

- carry out a risk assessment
- consider if the work is essential (i.e. the work is required to reinforce the network to prevent asset failure that may cause fire, injury or harm) or if the work can be postponed to another time when there is not a TFB in place.

Limited outdoor work in residential areas during a total fire ban

Working outdoors is restricted to paved/sealed residential (i.e. suburban or built-up areas) areas where grass is green, reticulated and less than 5cm in height. Work is only permitted when the following site conditions are met:

- There must be no combustible bush or grassland above 5cm in height for a radius of 100m of the worksite.
- There must be no flammable or combustible materials (e.g. rubbish, rags, stored fuel) within a 20m radius of the worksite.
  - A detailed onsite risk assessment must be completed to assess how the work will impact on the immediate worksite and the network outside of the worksite should an incident occur.
    - All risks and control measures must be recorded on the risk assessment.
    - The risk assessment must confirm that there is no risk of a spark or flame being generated by the work.
- No hot works, naked flames or spark-producing tools may be used.
- No petrol tools may be used, e.g. augurs, chainsaws, portable petrol generators.
• All operational vehicles must meet ‘Level 1 fire suppression’ requirements. For more on this, see ‘Fire suppression levels and requirements’ in work practice 2.19 (Fire precautions for field work) in this manual.

• Two operational fire extinguishers must be placed on the ground near the immediate work area in a readily accessible position.

• The site must be fully inspected for any potential fire activity and declared safe prior to the work team’s departure.

Limited work that does not meet the criteria above must be cancelled. Other work such as emergency repairs, bush fire mitigation and essential maintenance must be carried out in accordance with the DFES exemption.

**Working indoors during a total fire ban**

Working indoors (e.g. in switch rooms) is permitted during a TFB as long as the work being undertaken has no external effects on the network, e.g. switching operations.

**Working in substation yards during a total fire ban**

Due to the controlled nature and environment of substation grounds, working in substation yards during a TFB has the same limitations as those in the ’Limited outdoor work during a total fire ban’ section, above. In addition, the substation yard must meet all of the following requirements:

• completely enclosed by a fence or a wall
• controlled access via a key and communicating entry/exit with Network Operations
• there is no vegetation
• blue metal is in place
• all other surfaces are sealed or hard packed.

Work that has external effects on the network is not permitted e.g. switching operations.

**Risk factors to be considered**

• Sparks produced due to an unexpected incident which causes the live overhead lines to clash.
• Vicinity of underground assets and consequences if inadvertently struck when excavating or drilling, e.g. potential fire or explosion.
• Potential failure of plant, equipment or assets outside of the controlled work area, e.g. altering the load on adjacent structures.
**Operational work practice standards**

- Proximity to bush and grassland outside of the immediate work area.
- Is there adequate operational fire suppression onsite and is it easily accessible?
- Activities that could cause failure of any live equipment, conductors or assets which could produce a spark.
- When disconnecting or reconnecting customers from overhead or underground LV network, ensure all load current can be removed prior to disconnecting. The current service connection test form must be used when performing this task.

**Important**

Continually monitor and review the worksite and fire risk conditions for the duration of the work. Cancel the work if conditions change and the risk of a fire or to people’s health and safety can no longer be controlled.

**Prohibited activities**

- Use of a vehicle off-road where grass is above 5cm in height and not green or reticulated.
- Switching of live apparatus.
- HV live work.
- Cable jointing using heat shrink. Cold shrink joints are permitted.
- Excavating or directional drilling in the vicinity of live HV, LV cables and gas mains.
- Reinforcing poles.
- Tree pruning above or alongside live powerlines or where vegetation could come into contact with the live conductors.
- Transporting high loads where live conductors need to be lifted.
- Insulator washing or siliconing.
- Any other activity where there is a risk of starting a fire.

Although the activities above are not permitted as limited planned work during a TFB, they may be permitted in accordance with the DFES exemption. For more on this, see the ‘DFES total fire ban exemption requirements’ section of this work practice.
Responsibilities of the person in charge

- At the daily job briefing, ensure that the FDR and fire suppression requirements are discussed and recorded on the risk assessment. Information regarding fire suppression levels can be found in work practice 2.19 (Fire precautions for substation work) in this manual.
  - The DFES website can be checked the day before for TFB’s applicable to the work area. The website is updated every day at approximately 5pm.
  - SMS messages can be received from Network Operations which will identify areas/fire districts where a TFB is in effect. Information regarding fire district areas can be found in work practice 2.19 (Fire precautions for substation work) in this manual.
- Complete a risk assessment for the task and continue to monitor and review the worksite and fire risk conditions. Consider cancelling the work if there is a risk to people’s health and safety due to a potential bush fire.
- TFB and FDRs can also be monitored via:
  - Fire Danger Rating signs
  - DFES:
    - website: www.dfes.wa.gov.au
    - Twitter: @dfes_wa
    - DFES information line: 13 DFES (13 3337)
    - Total fire ban information line: 1800 709 355.
  - Bureau of Meteorology website (www.bom.gov.au)
  - ABC local radio
  - Local government and shire councils. For their contact details, see Appendix 4 (Emergency contact information) in this manual.
- Assess the conditions to ensure that the work can be done without the risk of starting a fire.
- Ensure that all fire suppression equipment has been checked and is working correctly prior to leaving for site.
- Ensure there is an effective means of communication available onsite. This will be essential in an emergency situation.
- Ensure that the correct fire suppression equipment for the conditions and location is available onsite prior to commencing work.
Operational work practice standards

- Ensure that all fire extinguishers are within their test date and that the pressure gauge is within the green bar, when fitted.
- Ensure that all personnel who are required to operate the fire suppression equipment have been trained in its use.
- Ensure that a worksite evacuation plan is discussed with the entire work team and is documented on the risk assessment.

Harvest and Vehicle Movement Ban

Harvest and Vehicle Movement Bans are generally enforced in conjunction with a DFES TFB, however they may also be issued in isolation. For more on this, see the ‘Harvest and Vehicle Movement Ban’ section in work practice 2.19 (Fire precautions for substation work) in this manual.

Switching of the overhead network during a total fire ban

If switching is to take place in locations where a TFB has been issued by DFES then Network Operations must complete the risk assessment form, *Fire Weather Day and Total Fire Ban Risk Management*, prior to de-energising or the restoration of any supply involving the overhead network.

To ensure consistency and to control the risk, Network Operations will make their final decision based on field feedback and the prevailing weather conditions in regards to the restoration of supply. If the risk of starting a fire is too high then the network will remain de-energised until the risk has reduced to an acceptable level. This will mean that customers may remain without supply for an extended period. The focus being on **not** starting a fire; the restoration of customers is a lower priority.

If the network has to remain de-energised for extended periods then it may be necessary to consider other options to minimise the impact on customers.

Switching operators must not perform any high voltage (HV) switching operations without first gaining approval from the Network Controller for each individual switching operation.
Switching operations during a total fire ban

Pole-top switches, HV or low voltage (LV) fuses and LV disconnectors must not be operated while energised unless the required fire suppression unit is onsite (as described in the DFES exemption). If the fire suppression unit is not available onsite then the operation must be performed under de-energised conditions e.g. isolating the supply by opening the feeder breaker or recloser.

DFES total fire ban exemption requirements

Prior to undertaking any work during a TFB, always:

- carry out a risk assessment
- consider if the work is essential (i.e. work to reinforce the network to prevent asset failure that may cause injury or harm) or if the work can be postponed to another time when there is not a TFB in place.
- Notify the correct authority as stipulated in the exemption (section 2 ‘Notification’) prior to undertaking any work.

Total fire ban exemption for emergency repairs, bush fire mitigation and essential maintenance

This exemption:

- was issued 23 December 2015 and expires on 30 June 2018, unless suspended or revoked.
- permits emergency repairs, bush fire mitigation and maintenance essential to safe operation of the electrical network during a TFB, subject to strict controls and conditions as stipulated in the exemption.
- Essential Maintenance work is only permitted under this exemption when the FDR is below ‘VERY HIGH’ (FDI below 32).

**Important**

Bush Fire Mitigation and Essential Maintenance work **must not** be undertaken unless instructed in writing by Western Power Head of Function Works Program Planning.

When permitted, all work must be carried out in accordance with the DFES exemption requirements.

A copy of the exemption is included, in this work practice.
Fire suppression requirements

Fire suppression levels in this exemption are dependent on the area and proximity to vegetation. A summary of the fire suppression requirements can be found below in Table 2 and Table 3, below.

The fire suppression operative must be:

- trained in extinguisher and unit operation
- wearing the appropriate personal protective clothing (PPC)
- dedicated solely to the detection and suppression of any fire.

Table 2: Sites outside the gazetted metropolitan area, regional cities and townships

<table>
<thead>
<tr>
<th>Minimum requirements for work during a total fire ban</th>
<th>Proximity of combustible vegetation to worksite</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>more than 100m</td>
</tr>
<tr>
<td>Wet down surrounding area and/or use welding screens to reduce possible spark ignition.</td>
<td>✓</td>
</tr>
<tr>
<td>Level 1 fire suppression extinguisher placed on the ground near the worksite.</td>
<td>✓</td>
</tr>
<tr>
<td>Level 3 fire suppression – <strong>800L</strong> of water.</td>
<td></td>
</tr>
<tr>
<td>Have at least two nominated fire suppression operatives per FSU onsite.</td>
<td>✓</td>
</tr>
<tr>
<td>Supervision of the site to remain for 30 minutes after fire risk activity has ceased – minimum of two people.</td>
<td>✓</td>
</tr>
<tr>
<td>Fully inspect the site for any potential fire activity and declare safe prior to departure.</td>
<td>✓</td>
</tr>
</tbody>
</table>
### Table 3: Sites within the gazetted metropolitan area, regional cities and townships

<table>
<thead>
<tr>
<th>Minimum requirements for work during a total fire ban</th>
<th>Proximity of combustible vegetation to worksite</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>More than 100m away</td>
</tr>
<tr>
<td>Wet down surrounding area and/or use welding screens to reduce possible spark ignition.</td>
<td>✓</td>
</tr>
<tr>
<td>Level 1 fire suppression extinguishers placed on the ground near the worksite.</td>
<td>✓</td>
</tr>
<tr>
<td>Level 2 fire suppression – <strong>400L</strong> of water</td>
<td></td>
</tr>
<tr>
<td>Level 3 fire suppression – <strong>800L</strong> of water</td>
<td></td>
</tr>
<tr>
<td>Have at least one nominated fire suppression operative per FSU onsite.</td>
<td></td>
</tr>
<tr>
<td>Have at least two nominated fire suppression operatives per FSU onsite.</td>
<td></td>
</tr>
<tr>
<td>Supervision of the site to remain for 30 minutes after fire risk activity has ceased.</td>
<td></td>
</tr>
<tr>
<td>Fully inspect the site for any potential fire activity and declare safe prior to departure.</td>
<td>✓</td>
</tr>
</tbody>
</table>

* 500m² of vegetation is roughly the size of two tennis courts.
FIRE PRECAUTIONS DURING A TOTAL FIRE BAN

2.16 Fire precautions during a total fire ban

Rev 12, Jan 16

BUSH FIRES ACT 1954

NOTICE OF EXEMPTION

TOTAL FIRE BAN

Section 22C

Lighting or use of fire, or carrying out activity in the open air that causes or is likely to cause fire, during a total fire ban.

Correspondence No. 12353

Department of Fire and Emergency Services

Pursuant to the powers delegated and sub delegated to the DFES Deputy Commissioner, I hereby exempt Electricity Network Corporation (T/as Western Power) under section 22C of the Bush Fires Act 1954, from the operation of the provisions of sections 22B and 46 of that Act, subject to compliance with the conditions specified hereunder.

This exemption applies to Western Power employees and its contractors for the conduct of emergency repairs, bush fire mitigation and maintenance essential to the safe operation of the electrical network including:

- the “off road” access by vehicles and equipment for the purpose of fault finding,
- the “off road” access by vehicles and equipment to its power network to conduct repairs and bush fire mitigation maintenance
- “hot works” (welding, cutting, grinding and heating) at substations, electricity generating stations and other infrastructure,
- operating the transmission system to ensure security of electricity supply,
- carrying out LV disconnection and re-connection of customer supplies,
- operating the distribution system’s overhead and ground mounted HV and LV switchgear to energise (restore power), isolating (turning off) the electrical network,
- essential maintenance of poles, wires and substation equipment
- repairs to fallen poles, wires and substation equipment, and
- removing vegetation contacting overhead powerlines

on their power supply network throughout Western Australia during a total fire ban declared for the local government area in which the work is to be undertaken.
SPECIFIED CONDITIONS

1. FIRE PREVENTION

1.1 This exemption does not apply for Essential Maintenance when there is in force a fire danger forecast issued for that place by the Bureau of Meteorology in Perth of “very high” or above.

1.2 This exemption only applies for work which cannot reasonably be postponed to a time with safer fire weather conditions.

1.3 Western Power management is to assess weather conditions and heed warnings, risk assess and limit all activities to that which can be undertaken safely.

1.4 The site is to be maintained in accordance with any local government fire break notice.

2. NOTIFICATION

2.1 If the work is to be conducted within the Metropolitan area the DFES State Situation Awareness Officer is to be notified, preferably by email sao@dfes.wa.gov.au, on the day and prior to these activities occurring during a total fire ban.

2.2 If the work is to be conducted outside of the Metropolitan area;

   2.2.1 the nearest Department of Fire and Emergency Services (DFES) Regional Office, and

   2.2.2 the Local Government in which district the work is to be undertaken.

   are to be notified on the day of and prior to these activities occurring during a total fire ban.

2.3 If the work is to be conducted within 3 kilometres of State Forest, the respective District Duty Officer of the Department of Parks and Wildlife is to be informed on the day and prior to works requiring this exemption commencing.

2.4 Where possible the landowner on who’s property the work is to be undertaken is to be advised prior to the activity occurring.
2.5 Any fire occurring at the work site, whether extinguished or not, must be reported to the DFES Communications Centre on 93 95 9210, or immediately via 000 if the fire cannot be controlled and/or suppressed.

3. SITES WITHIN GAZETTED METROPOLITAN AREA, REGIONAL CITIES AND TOWNSHIPS.

3.1 Where hot works are to be conducted at sites free from any area/s of combustible bush or grassland for a radius of not less than 100 metres.

3.1.1 Welding screens and/or the wetting down of surrounding area are required to reduce possible spark ignition around the immediate work site.

3.1.2 The provision of two operational fire extinguishers (16 litre knapsack spray or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.

3.1.3 The site is to be fully inspected for any potential fire activity and declared safe prior to their departure.

3.2 Where hot works are to be conducted at sites with area/s of combustible bush or grassland, (of less than 500 square metres and vegetation no higher than 20 centimetres) within a radius of 100 metres.

3.2.1 Welding screens and/or wetting down of surrounding area are required to reduce possible spark ignition around the immediate work site.

3.2.2 The provision of two operational fire extinguishers (16 litre knapsack sprays or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.

3.2.3 A fire suppression unit is to be on site, comprising a minimum of 400 litres of water, with an operational pump and 20 metres of 19 millimetres diameter hose (minimum), capable of delivering water through an adjustable nozzle.

3.2.4 At least one able bodied person (trained in extinguisher/unit operation) and wearing the appropriate ‘Personal Protective
Clothing (PPC) is to be in attendance and dedicated solely to the detection and suppression of any fire.

3.2.5 The site is to be fully inspected for any potential fire activity and declared safe prior to their departure. Supervision of site to remain for 30 minutes after fire risk activity has ceased.

3.3 Where hot works are to be conducted at sites with area/s of combustible bush or grassland, (of greater than 500 square metres and/or vegetation higher than 20 centimetres) within a radius of 100 metres.

3.3.1 Welding screens and/or wetting down of surrounding area are required to reduce possible spark ignition around the immediate work site.

3.3.2 The provision of two operational fire extinguishers (16 litre knapsack sprays or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.

3.3.3 A single, or multiple, fire suppression units are to be on site, comprising a minimum of 800 litres of water, with operational pumps and 20 metres of 19 millimetres diameter hose (minimum), capable of delivering water through an adjustable nozzle).

3.3.4 Each fire unit is to be crewed by at least two able bodied persons (trained in extinguisher/unit operation) and wearing appropriate ‘Personal Protective Clothing (PPC)’ and dedicated solely to the detection and suppression of any fire.

3.3.5 The site is to be fully inspected for any potential fire activity and declared safe prior to their departure. Supervision of the site to remain for 30 minutes after fire risk activity has ceased.
4. SITES OUTSIDE OF GAZETTED METROPOLITAN AREA, REGIONAL CITIES AND TOWNSHIP.

4.1 Where hot works are to be conducted at sites free from any area/s of combustible bush or grassland for a radius of not less than 100 metres.

4.1.1 Welding screens and/or the wetting down of surrounding area are required to reduce possible spark ignition around the immediate work site.

4.1.2 The provision of two operational fire extinguishers (16 litre knapsack sprays or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.

4.1.3 The site is to be fully inspected for any potential fire activity and declared safe prior to their departure.

4.2 Where hot works are to be conducted at sites with area/s of combustible bush or grassland within a radius of 100 metres.

4.2.1 Welding screens and/or wetting down of surrounding area are required to reduce possible spark ignition around the immediate work site.

4.2.2 The provision of two operational fire extinguishers (16 litre knapsack sprays or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.

4.2.3 A single or multiple fire suppression units are to be on site, comprising a minimum of 800 litres of water, with operational pumps and 20 metres of 19 millimetres diameter hose (minimum), capable of delivering water through an adjustable nozzle.

4.2.4 Each Fire unit is to be crewed with at least two able bodied persons (trained in extinguisher/unit operation) and wearing the appropriate ‘Personal Protective Clothing (PPC) and dedicated solely to the detection and suppression of any fire.

4.2.5 At least two able bodied people are to remain at the work site for at least 30 minutes after the works have been completed to...
ensure the site remains safe and the site is to be fully inspected for any potential fire activity prior to their departure.

5. “Off Road” Access for bush fire mitigation, essential maintenance and fault finding for emergency repairs.

5.1 If proceeding off road for the purposes of undertaking a preliminary assessment of the safety or condition of the power transmission or distribution network there must be a minimum of the following present;

- A mobile fire suppression unit, to be crewed by two able bodied and trained persons, comprising a minimum of 400 litres of water, with an operational pump and 20 metres of 19 millimetres diameter hose (minimum), capable of delivering water through an adjustable nozzle.

6. Power Re-instatement of overhead power lines —Non Identified Faults

Where a fault cannot be identified visually on the affected network the following shall apply;

6.1 A risk assessment must be completed prior to any reinstatement of power being conducted; or

6.2 Reinstatement of power is only to be undertaken on a falling Fire Danger Index (FDI) and not before the FDI falls below 32 (High rating 12 to 31); or

6.3 In an emergency, DFES may request the reinstatement of power by the network operator.

7. “Off Road” Use of Vehicles

7.1 All vehicles and stationary motors are to be inspected prior to leaving any formed road to ensure that the exhaust systems are in a sound condition.

7.2 All vehicles and stationary motors are to be refuelled on clear ground and in an appropriate method to avoid the release of static electricity.

7.3 The access to the worksite is to be checked to ensure that no vegetation can come into contact with exhaust or catalytic converters fitted to any vehicle.

7.4 The vehicles and plant are to be sited/parked in an area free from vegetation and combustible material.
Period of Exemption

This exemption is valid from date of approval through until 30 June 2018 unless suspended or revoked.

Fire weather warning information contacts

Obtain information on fire and weather warnings from:

- Network Operations:
  - Network Control Distribution (NCD): 9427 0636
  - Network Control Transmission (NCT): 9427 4287
  - via SMS.
- Fire Danger Rating signs
- DFES:
  - Twitter: @dfes_wa
  - DFES information line: 13 DFES (13 3337)
  - Total fire ban information line: 1800 709 355.
- ABC local radio
- Local government and shire councils. For their contact details, see Appendix 4 (Emergency contact information) in this manual.

References

- Bush Fires Act 1954 (WA)
- Fire Weather Day and Total Fire Ban Risk Management Form (DM# 11606337v5), 3 March 2015
- Work Practice Manual, Appendix 4 (Emergency contact information)
2.17  Construction site hazard management forms

Purpose
This instruction describes how to comply with Western Power requirements for the use of construction site hazard management forms. The objective is to create a safe working environment by systematically identifying and controlling hazards.

Scope
Controlling and recording hazards is a legal requirement. This instruction applies to any work performed on a Western Power construction site.

- Western Power employees must use the Workplace Risk Assessment Plan (WRAP) and any applicable Safe Work Methods Statement (SWMS).
  - WRAP* – a site specific hazard management form that must be filled out at the start of each task on a Western Power construction site and amended if the task or site conditions change
  - SWMS* – generic, task-specific, pre-filled hazard management sheets that must be used for high risk tasks
    - a WRAP must be filled out as well, in order to capture the site-specific risks

- Contractors and subcontractors may use:
  - the WRAP and any applicable SWMS, or
  - contractor supplied equivalents

* For the rest of this instruction, we refer only to the hazard management forms used by Western Power, i.e. WRAP and SWMS. If you are a contractor and choose to use an equivalent process, replace WRAP or SWMS with the name of the form you use in its place.

Training
Training in the use of hazard management processes must be completed by anyone responsible for construction site hazard management. This training, available through Power Training Services (PTS), covers the use of SWMS and the WRAP: PTS 773 – Distribution Hazard Identification SWMS and WRAP.
Instructions

The person responsible for the work must follow the hazard management process before, during and after the work.

The basic hazard management approach is:

1. Identify all hazards.
2. Assess the exposure to each hazard. (What harm/damage could this hazard cause?)
3. Determine control measures using the hierarchy of hazard control.
4. Implement control measures.
5. Monitor and review the effectiveness of the controls.
6. Always leave the site in a safe state.

Planning stage

- **Planned work**
  - Complete the following before departing to the construction site.
    - Refer to the work parcel and note down any hazards identified during the development stage.
    - If the job involves any high risk tasks, select the applicable SWMS.
      - If there is no SWMS for that high risk task, contact your formal leader to determine the appropriate procedure.
      - If there will be a safety observer for the task, they must familiarise themselves with the applicable SWMS.
    - Discuss the hazard controls.

- **Unplanned work**
  - Work resulting from such things as emergencies may require an immediate response to identified hazards. In these situations, it is acceptable to conduct the hazard management process without immediately completing a form. However, a WRAP must be completed without delay when the site has been made safe.

Construction site stage

- Where there is more than one person involved in the task, a job briefing must be carried out before the work begins, e.g. during tool box meetings.
Work Practices

- All team members must contribute to any discussion about the identified hazards of a job.
- Complete a WRAP.
  - If there is a SWMS for the task, the WRAP only needs to record the hazards and controls that are specific to the site and are not identified in the SWMS.
  - Where necessary, update the form during the task. This includes:
    - having any new personnel to the site sign onto the WRAP
    - assessing the possible hazards created when any new equipment / plant is introduced to the site and then determining the appropriate controls
- In the event of an unexpected hazard, it is acceptable to conduct the hazard management process without immediately updating the WRAP. However, a WRAP must be completed without delay when the site has been made safe.
- The person responsible for the construction site must confirm that roles and responsibilities are delegated and understood before the work begins.
- When new members of staff or plant arrive on the construction site, review, amend and sign onto the form to identify the possible hazards this may create.

**Review the job**

- Conduct a debriefing to discuss how well the work went and record the details of any improvements identified during the work.
- Confirm that the WRAP and SWMS are completed.
- File the WRAP and SWMS with the job parcel.

**Where to get the forms**

- WRAP books can be ordered from Corporate Express – stock code 18641873.
- SWMS are available on Depot Pack, busbar and the Western Power website.
2.18 Switching activities

Purpose

This work practice outlines the required actions and behaviours of personnel in an area where switching operations are taking place.

Scope

This work practice is applicable to:

- authorised and trainee switching operators
- all other members of the Network Total Workforce.

Safety

Important

Personnel must be aware that in-service breakers and switchgear could operate at any time. Operation could be due to:

- protection operation (trip and possible auto-reclose)
- automatic voltage management (capacitor circuit breakers)
- load shedding.

The switching operator must complete a risk assessment before starting switching operations, listing all the hazards associated with the particular switching task, and the control measures implemented. The risk assessment must include the following:

- Correct PPE required. For more on this, see section 3 (Personal protective equipment) in this manual.
- Appointed safety observer, if required. For more on this, see work practice 5.13 (Safety observer role) in this manual.
- A note that states if the safety observer is a trainee switching operator.
- Record if a trainee switching operator is switching under supervision.
- Identify any risk of arc flash and any additional PPE required. Ensure that only the switching operator who is operating the switchgear is within the arc flash envelope and all other personnel are outside of this boundary.
**Note:**

If other services attend the substation (e.g. Department of Fire and Emergency Services), the switching operator must advise the service’s team leader of the energised/de-energised status of all primary and secondary plant and limits of access.

**Instructions**

- The priority of switching operations is ordered as follows:
  - emergency switching takes precedence over all non-emergency work
  - programmed switching takes precedence over all non-programmed work
- When carrying out switching activities, the switching operator must implement control measures when operating switchgear in a zone or terminal substation. These control measures must include:
  - An approved warning sign placed in a clearly visible position on the main entrance gate with the switching operator’s contact phone number written in the space provided.
  - A request for non-switching personnel to vacate the area.
  - Personnel are not to distract the switching operator during the performance of switching duties unless in an emergency or if they arrive at the site gate, identify the warning sign and request further information before entry.
  - Confirm that applicable protection systems are in service.

**Note:**

If the Recipient in Charge (RIC) or Tester in Charge (TIC) is on site, discussions must take place to determine the control measures to secure the area. This will include any warning signs posted or requests by the switching officer to leave the switch room area when switching is in progress.
• Personnel who find themselves in an area where switching operations are to take place must:
  o adhere to requests by the switching operator
  o not enter the site (where a sign is displayed) unless given permission by the switching operator
  o vacate the immediate area
  o alert the switching operator to any abnormalities that may affect switching operations
  o alert the switching operator if any at-risk actions or situations are observed.

• Points of isolation and the position of program earths may only be confirmed to the RIC/TIC when the permit is being issued.

• Network Operations has primary control of the electricity systems.

• When planning to visit a Western Power substation, personnel must refer to:
  o work practice 5.2 (Substation entry requirements) in this manual

References

• Electrical System Safety Rules (ESSR)
• Network Operations Bulletin: Extra Safety Precautions Prior to Entering CBD and Remote Controlled HV Substations (DM# 8355258)
• Transmission Substation Work Practice Manual:
  o section 3 (Personal protective equipment)
  o work practice 5.2 (Substation entry requirements)
  o work practice 5.13 (Safety observer role)
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2.19 Fire precautions for substation work

Purpose

This work practice outlines the mandatory fire precautions for substation work.

For information regarding work during a total fire ban (TFB), see work practice 2.16 (Fire precautions during a total fire ban) in this manual.

Training

- Any person who works in areas where there is a possibility of a fire starting must be trained in the use of fire suppression equipment and bushfire awareness. Training can be obtained by completing one of the following:
  - ‘Basic fire extinguisher and bushfire awareness’ – provided by Power Training Services WA (PTS).
  - An equivalent course provided by a registered training organisation.

- Personnel who are required to operate a fire suppression unit (FSU) must also have been trained in the operation of that FSU.

Fire Danger Rating

The Fire Danger Rating (FDR) is based on the forecast weather conditions and gives advice about the level of bushfire threat on a particular day (see Table 1, below). As the FDR increases, the threat of a bushfire increases.

The Bureau of Meteorology (BOM) website (www.bom.gov.au) provides information about the daily FDR, including the FDR for specific areas within the Perth metropolitan and WA regional areas. The Department of Fire and Emergency Services (DFES) website (www.dfes.wa.gov.au) also provides information regarding the FDR (for severe and above) and for TFBs which have been issued for specific areas.

When the FDR is ‘Catastrophic’ (Fire Danger Index (FDI) of 100+) for an area, a TFB will automatically be issued. DFES may also issue a TFB for FDR ratings other than ‘Catastrophic’, depending on the resources available in that area.

For information regarding work during a TFB, see work practice 2.16 (Fire precautions during a total fire ban) in this manual.
Table 1: Fire Danger Ratings

<table>
<thead>
<tr>
<th>Fire Danger Rating</th>
<th>Description</th>
<th>Level of fire suppression for operational vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATASTROPHIC</td>
<td>• These are the worst conditions for a bush or grass fire.</td>
<td>Level of suppression in accordance with relevant DFES exemption</td>
</tr>
<tr>
<td>(FDI of 100+)</td>
<td>• If a fire starts it will be extremely difficult to control.</td>
<td></td>
</tr>
<tr>
<td>Total Fire Ban</td>
<td>• Spot fires will start well ahead of the main fire and cause rapid spread of the fire.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The only safe place is away from the bushfire risk area.</td>
<td></td>
</tr>
<tr>
<td>EXTREME</td>
<td>• These are very hot, dry and windy conditions for a bush or grass fire.</td>
<td>Risk assess to determine level or Level 1 for substations (zone and terminal) and residential areas*</td>
</tr>
<tr>
<td>(FDI of 75-99)</td>
<td>• If a fire starts it will be unpredictable, move very fast and difficult to bring under control.</td>
<td></td>
</tr>
<tr>
<td>SEVERE</td>
<td>• Spot fires will start and move quickly.</td>
<td></td>
</tr>
<tr>
<td>(FDI of 50-74)</td>
<td>• The only safe place is away from the bushfire risk area.</td>
<td></td>
</tr>
<tr>
<td>VERY HIGH</td>
<td>• These are hot, dry and possible windy conditions for a bush or grass fire.</td>
<td>Level 1</td>
</tr>
<tr>
<td>(FDI of 32-49)</td>
<td>• If a fire starts it may be hard to control.</td>
<td></td>
</tr>
<tr>
<td>HIGH</td>
<td>• If a fire starts, it is likely to be controlled in these conditions.</td>
<td>Level 1</td>
</tr>
<tr>
<td>(FDI of 12-31)</td>
<td>• Be aware how fires can start and reduce the risk.</td>
<td></td>
</tr>
<tr>
<td>LOW-MODERATE</td>
<td>• These are hot, dry and possible windy conditions for a bush or grass fire.</td>
<td>Level 1</td>
</tr>
<tr>
<td>(FDI of 0-11)</td>
<td>• If a fire starts it may be hard to control.</td>
<td></td>
</tr>
</tbody>
</table>

*Residential areas are paved/sealed suburban or built up areas where grass is green, reticulated and less than 5cm in height and where there is no combustible bush or grassland for a minimum radius of 100m of the worksite.
Responsibilities of the person in charge

At the daily job briefing and risk assessment:

- Ensure that the FDR is discussed for the location and/or area where the work is to be undertaken. Consider increasing the level of fire suppression if the risk assessment deems it necessary and record on the risk assessment.
- Ensure that all fire suppression equipment has been checked and is working correctly.
- Ensure that all fire extinguishers are within their test date and that the pressure gauge is within the green bar, when fitted.
- Ensure that all personnel who are required to operate fire suppression equipment have been trained in its use.
- Additional work planning and consideration may be required at certain substations (e.g. Milligan St, Hay St) that have multiple fire systems installed.

At the worksite:

- Assess the conditions to ensure that the work can be done without the risk of starting a fire.
- Complete a risk assessment for the task and continue to monitor and review the worksite and fire risk conditions. Consider cancelling the work if there is a risk to people’s health and safety due to a potential bushfire.
- Ensure that the correct fire suppression equipment for the conditions and location is available and ready to use should a fire start.

When the forecast FDR is 'Very High' and above, ensure that:

- A worksite evacuation plan is discussed with the entire work team and is documented on the risk assessment.
- Contact the local government or shire council, or check the DFES and BOM websites for restrictions applicable to the worksite/fire district. Fire district areas are shown in Figures 1 and 2 at the end of this work practice.
- Obtain information on FDRs, fire and weather warnings from the ‘Fire weather warning information’ section below.
- SMS messages can be received from Network Operations identifying areas where a TFB is in effect.
- Ensure there is an effective means of communication available onsite. This will be essential in an emergency situation.
The above actions may also be required for FDR’s lower than ‘Very High’ and must be determined as part of the onsite risk assessment.

General requirements

All vehicles primarily used for operational work (e.g. construction and/or maintenance on Western Power’s network) that are likely to travel off-road in a fire risk area must be fitted with ‘Level 1 fire suppression’ equipment, as a minimum. For more on this, see the ‘Fire suppression levels and requirements’ section, below. Fire suppression levels must be increased depending on the FDR or if there is a TFB in place.

- Where there is a requirement to wet down the surrounding area prior to starting work, extra water will need to be taken to site for this purpose. Water allocated to the fire suppression units must not be used for this purpose.
- Fire suppression units must not be installed on vehicles, such as crane borers and EWPs, that are unable to move around the worksite in the event of a fire.
- Where possible, before attempting to extinguish a fire that is likely to become out of control, immediately call 000.
- Any personnel who starts and then extinguishes a fire must advise the district’s local government or shire council. The local government or shire council will monitor the area in case of a subsequent flare up.
- Western Power has been a smoke-free workplace since 2009. Smoking is prohibited on all worksites and depots, including car parks and other outdoor areas.
- Do not use open flames or spark-producing tools and equipment in areas that contain combustible materials, unless proper precautions and control measures are implemented.
Fire suppression levels and requirements

The level of fire suppression in Table 1, is the **minimum** level required based on the FDR. If unsure, or if conditions are expected to change, consider taking a higher level of fire suppression to site.

**Non-operational light vehicles**

Light vehicles not used for construction and/or maintenance activities (e.g. scopers, assessors and visitors to site) that are required to travel off-road in a fire risk area must be fitted with at least one of the following as a minimum:

- 9L pressurised water fire extinguisher
- 16L knapsack spray
- 2.3kg dry chemical powder fire extinguisher.

Non-operational light vehicles must not be used off-road during a TFB due to the limited fire suppression. When the FDR is ‘Severe’ or ‘Extreme’ a risk assessment must be carried out prior to visiting site. Consider cancelling the site visit or making other arrangements if the risk is deemed to be too high.

**Level 1 fire suppression**

All operational vehicles must be fitted with a minimum of two extinguishers from the list below:

- 9L pressurised water fire extinguisher
- 16L knapsack spray.

**Levels 2 and 3 fire suppression**

- All operational vehicles must be fitted with Level 1 fire suppression. **plus**
- Each work team must have one or more fire suppression units (FSUs) onsite that:
  - can be moved around the worksite
  - have an operational pump
  - have a minimum 20m of 19mm diameter hose
  - are capable of delivering water through an adjustable nozzle
  - have the minimum amount of water according to the level of fire suppression:
    - Level 2 fire suppression – 400L
    - Level 3 fire suppression – 800L
Risk assessment and control measures

When the risk assessment for the work to be undertaken within a substation identifies that there is a potential to start a fire, then the following is required.

Working within the substation building

- When operating any equipment within a transmission substation building, one 9.6kg CO₂ or dry powder fire extinguisher must be located adjacent to the workplace.

Switching:

- When operating open switchgear, e.g. line isolators or gang switches, within a transmission substation, the following is required to be adjacent to the operator:
  - one 9L pressurised water fire extinguisher
  or
  - one 16L litre knapsack spray.

Grinding or the use of spark producing tools:

- At least one able-bodied person (trained in the use of fire extinguisher operation) must be in attendance and solely dedicated to the detection and suppression of any fire.
- An area with a radius of 5m and free from all flammable material must be established around the worksite. This area will need to be maintained for the duration of the hot work.
- Welding screens and the wetting down of the surrounding area is required to reduce the risk of spark ignition during the hot work.

Internal combustion engines, including generators and portable petrol engine driven drills or tools:

- An area with a radius of 5m and free from all flammable material must be established around the worksite. This area will need to be maintained for the duration of the work.
- The following is required to be adjacent to the plant:
  - one 9L pressurised water fire extinguisher
  or
  - one 16L litre knapsack spray.
Flame-producing equipment such as welding apparatus, cable jointing LPG gas equipment, oxy-acetylene apparatus:

- At least one able-bodied person (trained in the use of fire extinguisher operation) must be in attendance and solely dedicated to the detection and suppression of any fire.
- An area with a radius of 5m and free from all flammable material must be established around the work site. This area will need to be maintained for the duration of the hot work.
- Welding screens and the wetting down of the surrounding area is required to reduce the risk of spark ignition during the hot work.

**DFES fire seasons**

**Non-fire season – April to October**

Note: This period is subject to change by DFES

- As weather conditions are not as severe, the lighting of fires does not require a permit.
- Always take care when conducting activities that can cause a fire.
- During this period the risk of starting fires is greatly reduced but local conditions and fire danger ratings should still be monitored for change.
- If in any doubt contact the local government or shire council for more information on current FDR.

**Fire season – November to March**

Note: This period is subject to change by DFES

- As weather conditions can be severe, the lighting of fires requires a permit.
- Before leaving any formed road, inspect the vehicle’s exhaust system to ensure that it is in a sound condition. Remove any grass that is caught in or under the vehicle.
- Operators of vehicles equipped with a diesel particulate diffuser (DPD) must perform a manual regeneration (check the vehicle’s operating manual for the correct procedure) before travelling off formed roads to access the worksite where there is a fire risk.
Work Practices

Note:
During manual regeneration of the DPD, the muffler and exhaust pipe become extremely hot while the engine is running. Any dry grass, paper waste or other flammable material that is near the vehicle could catch fire.

- Exercise care when operating vehicles and plant in areas with dry grass or other combustible materials. Never leave the vehicle or plant unattended with the motor running.
- Vehicles and plant must be parked in an area that is free from vegetation and combustible materials.
- During fire season, do not use open flames or spark-producing tools in areas with dry grass or other combustible materials, unless the risk level can be reduced to ‘Low’ by implementing stringent control measures.

Harvest and Vehicle Movement Ban

Harvest and Vehicle Movement Bans are:

- issued by Fire Control Officers of the local government or shire council. For local government or shire council contact details, see Appendix 4 (Emergency contact information) in this manual
- generally enforced in conjunction with a DFES TFB however, they may also be issued in isolation.

Where work in an area covered by a Harvest and Vehicle Movement Ban is either off-road or on or near a road verge then the following applies:

- planned work must be cancelled
- emergency work, such as in fault situations where lives and property are at risk, must first be approved by the local Fire Control Officers. For more on this, see the ‘Emergency work during a Harvest and Vehicle Movement Ban’ section, below.
Emergency work during a Harvest and Vehicle Movement Ban

If emergency work must be done during a Harvest and Vehicle Movement Ban, contact the local Fire Control Officer to obtain permission. If permission is granted:

- specific conditions will apply
- agree with the Fire Control Officer on the minimum amount of fire suppression equipment that is required
- the following tasks may be undertaken:
  - Isolate supply to make safe.
  - Undertake repairs to fallen poles, powerlines and cables.
  - Remove vegetation that is touching overhead lines.
  - Line patrols for the purpose of fault finding.
  - Restoration of the power supply.

Switching of the overhead network when the FDR is ‘Very High’ and above

If switching is to take place in locations where the FDR for that day is ‘Very High’ and above (FDI of 32 or above), Network Operations must complete their risk assessment form, *Fire Weather Day and Total Fire Ban Risk Management*, prior to de-energising or for the restoration of any supply involving the overhead network.

To ensure consistency and to control the risk Network Operations will make their final decision based on field feedback and the prevailing weather conditions in regards to the restoration of supply. If the risk of starting a fire is too high then the network will remain de-energised until the risk has reduced to an acceptable level. This will mean that customers may remain without supply for an extended period. The focus being on not starting a fire; the restoration of customers is a lower priority.

If the network has to remain de-energised for extended periods then it may be necessary to consider other options to minimise the impact on customers.

Switching operators must not perform any high voltage switching operations without first gaining approval from the Network Controller for each individual switching operation.
Work Practices

Fire weather warning information

Obtain information on fire and weather warnings from:

- Network Operations:
  - Network Control Distribution (NCD): 9427 0636
  - Network Control Transmission (NCT): 9427 4287
  - via SMS.
- Fire Danger Rating signs
- DFES:
  - website: www.dfes.wa.gov.au
  - Twitter: @dfes_wa
  - DFES information line: 13 DFES (13 3337)
  - Total fire ban information line: 1800 709 355.
- Bureau of Meteorology website: www.bom.gov.au
- ABC local radio
- Local government or shire councils. For their contact details, see Appendix 4 (Emergency contact information) in this manual.
Figure 1: Western Australia Fire Weather Forecast Areas

Source: Bureau of Meteorology 2012, Western Australian Fire Forecast Areas Maps; used under the Creative Commons (CC) Attribution 3.0 Australia licence.
Figure 2: Southwest WA Fire Weather Forecast Areas

Source: Bureau of Meteorology 2012, Western Australian Fire Forecast Areas Maps; used under the Creative Commons (CC) Attribution 3.0 Australia licence.
References

- Bureau of Meteorology 2012, Western Australian Fire Forecast Areas Maps; used under the Creative Commons (CC) Attribution 3.0 Australia licence
- Fire Weather Day and Total Fire Ban Risk Management (DM# 11606337v5), 3 March 2015
- Transmission Substation Work Practice Manual, Appendix 4 (Emergency contact information)
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3.1 Clothing and personal protective equipment requirements

Purpose

This field instruction describes the selection, use and maintenance of approved personal protective equipment (PPE), including clothing (as prescribed in AS/NZS 4501.1:2008).

Scope

PPE reduces the risks associated with coming into contact with anything that may cause harm, injury or any identified risk.

This instruction:

- applies to everyone, including visitors, who enter a Western Power operational depot or construction site, or undertakes any work for Western Power
- excludes special PPE requirements for substations and gas or oil-filled equipment as defined in material safety data sheets or other specific safe work instructions

Requirements

- As with other PPE, protective clothing must not be used in isolation of other risk controls.
- Only PPE approved by Western Power may be used.

Selecting the correct PPE

Tables 1 and 2 (below) are used to select the correct level of PPE required when performing switching and/or working on different types of live electrical equipment. A higher level of clothing must be worn if the Safe Work Method Statement (SWMS), risk assessment or switching operator deem it necessary according to the circumstances (e.g. on or near live low voltage busbars/conductors, live low voltage cable jointing, load testing or when racking switchgear).
### Table 1: Minimum PPE for the Network Total Workforce (NTW) when switching/working on live Distribution electrical equipment

<table>
<thead>
<tr>
<th>Type of electrical equipment</th>
<th>PPE level</th>
<th>Personal protective equipment</th>
<th>Flame retardant (FR) cal rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level 1</td>
<td>Safety footwear plus hi-vis FR long-sleeved shirt and long trousers or overalls</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Level 2</td>
<td>Level 1 plus overalls plus face shield with safety glasses worn under</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Level 3</td>
<td>Level 1 plus FR switching jacket plus FR switching trousers plus face shield with safety glasses worn under</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Level 4</td>
<td>Level 1 plus FR switching jacket plus FR switching trousers plus FR hood with safety glasses worn under</td>
<td>37</td>
</tr>
</tbody>
</table>

- **HV O/H equipment**: ✓
- **LV O/H and underground equipment**: ✓
- **LV-pillar insulated live connections**: ✓
- **LV-pillar exposed live connections**: ✓
- **Transformer LV frame up to 315 kVA air insulated**: ✓
- **Transformer LV frame greater than 315 kVA air insulated**: ✓
- **HV RMU SF6 insulated**: ✓
- **HV RMU air insulated**: ✓
- **HV RMU oil insulated**: ✓

**Note:**
A risk assessment may determine the need for a higher level of PPE than the minimum requirement.
Table 2: Minimum PPE for the Network Total Workforce (NTW) when switching/working on live Transmission electrical equipment

<table>
<thead>
<tr>
<th>Type of electrical equipment</th>
<th>Personal protective equipment</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PPE level</td>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Safety footwear plus hi-vis FR long-sleeved shirt and long trousers or overalls</td>
<td>Level 1 plus overalls plus face shield with safety glasses worn under</td>
<td>Level 1 plus FR switching jacket plus FR switching trousers plus face shield with safety glasses worn under</td>
</tr>
<tr>
<td>Terminal and Zone substation outdoor equipment, air insulated</td>
<td>Flame retardant (FR) cal rating</td>
<td>7</td>
<td>14</td>
<td>37</td>
</tr>
<tr>
<td>Zone substation indoor equipment (Gas and vacuum)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone substation indoor equipment (Oil)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Flame retardant (FR) cal rating: 7, 14, 37, 37
Work Practices

Note:
It may be appropriate to wear a different level of PPE to that specified in the table above, based on the following situations:

- A risk assessment may determine that there is a need for a higher level of PPE than the minimum requirement.
- Some switching methods may allow the worker to be outside of physical contact with the electrical equipment. A comparison of the following may reveal that the level of PPE may be reduced (to a minimum of Level 1).
  - Distance between the worker and the electrical equipment for that switching method.
  - Relevant Substation Arc Flash Guidelines (see Appendix 5 (Western Power facilities information)) for that substation.

Minimum PPE

The minimum PPE for everyone visiting Western Power operational depots or construction sites in a non-operational capacity and remaining at all times outside of the three metre danger zone of any exposed electrical apparatus is:

- high-visibility clothing or high-visibility vest
- long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  overalls (buttoned to the wrist)
- enclosed footwear
- eye protection relevant to the risk
- head protection relevant to the risk

Level 0 – Clothing must be 100% cotton

The minimum PPE when carrying out operational, construction or maintenance activities and remaining at all times outside of the three metre danger zone of any exposed live electrical apparatus is:

- high-visibility clothing
  long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  overalls (buttoned to the wrist)
Work Practices

- safety footwear
- eye protection relevant to the risk
- gloves relevant to the risk
- head protection relevant to the risk

**Level 1 – Clothing must have flame retardant cal rating ≥ 7 cal/cm²**

The minimum PPE when carrying out operational, construction or maintenance activities inside the three metres danger zone of any exposed live electrical apparatus is:

- high visibility flame retardant clothing
  - long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  - overalls (buttoned to the wrist)
- safety footwear
- eye protection relevant to the risk
- gloves relevant to the risk
- head protection relevant to the risk

**Level 2 – Clothing must have flame retardant cal rating ≥ 14 cal/cm²**

The minimum PPE when carrying out operational, construction or maintenance activities (as described in Tables 1 and 2) is:

- high visibility flame retardant clothing
  - long-sleeved shirt (buttoned to the wrist) and long trousers
- flame retardant overalls over shirt and trousers
- face shield with safety glasses worn under it
- safety footwear
- gloves relevant to the risk
- head protection relevant to the risk
3.1 Clothing and personal protective equipment requirements

Level 3 – Clothing must have flame retardant cal rating ≥ 37 cal/cm²

The minimum PPE when carrying out operational, construction or maintenance activities (as described in Tables 1 and 2) is:

- high visibility flame retardant clothing
  - long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  - overalls (buttoned to the wrist)
- flame retardant switching jacket and trousers (cal rating = 30 cal/cm²)
- face shield with safety glasses worn under it
- safety footwear
- gloves relevant to the risk
- head protection relevant to the risk

Level 4 – Clothing must have flame retardant cal rating ≥ 37 cal/cm²

The minimum when carrying out operational, construction or maintenance activities (as described in Tables 1 and 2) is:

- high visibility flame retardant clothing
  - long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  - overalls (buttoned to the wrist)
- flame retardant switching jacket and trousers (cal rating = 30 cal/cm²)
- head protection with hood and safety glasses worn under it (cal rating = 40 cal/cm²)
- safety footwear
- gloves relevant to the risk

Wet weather, thermal clothing, undergarments and jewellery

- Wet weather and thermal protective garments obtained from Western Power authorised suppliers can be worn over the protective clothing.
- Non-natural fibre garments (e.g. nylon or polyester) are not recommended to be worn under protective clothing.
- Unnecessary metallic objects (e.g. neck chains, earrings, rings, watches, bracelets and other jewellery) must not be worn when undertaking live work.
## Arc flash protective clothing (switching suits)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>arc flash</strong></td>
<td>An arc flash is the heat and light energy released when an insulator fails and current flows through a normally non-conductive media such as air. The flash produced due to this breakdown is similar to the light radiation emitted by a commercial electrical arc welder. The heat that is released may cause severe burns, especially to unprotected flesh and eyes.</td>
</tr>
<tr>
<td><strong>blast</strong></td>
<td>A blast is an arc flash that yields an explosion (a massive amount of energy that rapidly vaporises metal conductors, blasting molten metal and superheated material (plasma) outward with extreme force). This violent event can cause destruction of switchgear and nearby equipment. The high velocities of molten metal particles can cause severe burns, blindness, internal organ damage or death through inhalation.</td>
</tr>
</tbody>
</table>

- Consider the level of arc flash protection clothing necessary when conducting switching operations.
- Before approaching any apparatus, assess the risks and consequences of a potential arc flash.
- Determine an emergency action plan based on a potential arc flash event.
- Consider using a safety observer.

The following contribute to the level of arc flash:

- fault current level
- working distance from the device
- insulation/construction of the device
- device environment
- weather

Face shield and safety glasses used at a LV frame.
Care and maintenance

- Inspect PPE before use and replace any item that is damaged or in poor condition.
- Do not alter any items of PPE, including clothing.

References

- Transmission Substation Work Practice Manual, Appendix 5 (Western Power facilities information)
- AS/NZS 4501.1:2008 (Occupational protective clothing – Guidelines on the selection, use, care and maintenance of protective clothing)
- Electrical System Safety Rules (ESSR), 3.2 (Electrical Hazards)
3.2 Glove protection

Purpose

This instruction outlines the minimum requirements for the use of gloves, as described in AS/NZS 2225 (Insulating gloves for electrical purposes), EN 388 (Protective gloves against mechanical risks) and AS 2161.10 (Occupational protective gloves – Protective gloves against chemicals and micro-organisms – Terminology and performance requirements), when working:

• on the high voltage (HV) network
• on the low voltage (LV) network
• with chemicals

Instructions

Maintenance

All types of gloves must be kept in a condition that is fit for purpose by maintaining them appropriately. There are specific requirements for electrically rated gloves.

Electrically rated gloves:

• do not have a shelf life, but must have the issue date recorded on them
• if rated over 3,300 V, must be electrically tested before initial use
• must be stored in an approved glove bag and/or a dry location
• must be tested every six months from date of issue
• must have the last tested date recorded on them

Inspection

Before using gloves:

1. check the last date the gloves were tested – if more than six months since the last test date, the gloves must pass a retest before they can be used
2. make sure that the gloves are in good condition – for electrically related and chemical gloves, use air pressure testing to check for any cuts or punctures
3. discard any gloves that:
   • are damaged or are in poor condition
   • fail the air pressure test
### Work Practices

#### Gloves worn during work on the overhead network

When working at heights on energised or de-energised HV or LV conductors, the worker must wear the approved gloves. For more on this, see AS/NZS 2225 (Insulating gloves for electrical purposes). They must wear the gloves from the time they leave the ground until they return to the ground, whether working from an elevated work platform or a ladder.

**Note:**

Gloves may only be removed when outside the minimum approach distance (MAD) and with approval of the safety observer.

<table>
<thead>
<tr>
<th>Working on live LV structures with a single voltage present</th>
<th>Wear 500 V rated gloves with approved wrist length mechanical protective gloves.</th>
</tr>
</thead>
</table>
| Working on isolated and earthed/shorted structures with a single voltage present | - Wear approved wrist length mechanical protective gloves.  
- If testing after earthing/shorting indicates inductive voltages are present, then a minimum of 500 V rated gloves with approved wrist length mechanical protective gloves must be worn. |
| Working on live HV structures with different voltage levels (glove and barrier) | - Comply with the MAD for all voltages.  
- Wear the gloves and outer protectors for the conductor voltage being worked on.  
- Wear rated gloves with outer protectors when entering the elevated work platform basket.  
- Before commencing work, the worker will indicate to the safety observer that he has his gloves on and is ready for work. The safety observer will then give the approval for the work to commence.  
- Should the worker want to remove their gloves, permission must be sought from the safety observer to do so (once outside the contact area).  
- The safety observer will only allow work to recommence when the worker has confirmed his gloves are back on. |
| Operating HV switchgear | 3,300 V minimum rated insulating gloves with approved wrist length arc flash mechanical protective gloves must be worn. |
Working on shared structures with different voltage levels

- When working on isolated and earthed/shorted conductors on shared voltage structures, 500 V rated gloves with approved wrist length mechanical protective gloves must be worn.
- Adhere to the MAD.
- If the MAD cannot be maintained, the conductors must be isolated and earthed or the work suspended.
- If testing after earthing/shorting indicates inductive voltages are present, minimum 500 V rated gloves with approved wrist length mechanical protective gloves must be worn.

Working where there is a knife cut hand injury risk

Wear a cut resistant glove rated 2542 or greater on the hand exposed to the cut risk (normally the left hand for a right-handed person).

Working where there is a hand injury risk (other than knife cut injury)

Wear approved wrist length mechanical protective gloves rated 3121 or greater.

Working with chemical or hazardous substances

Refer to the material safety data sheet (ChemAlert) for correct glove type.

Note: see field instruction 2.9 (Induced voltage) for more information.

Example of a cut resistant glove (rated 2542) is shown in the table below.

<table>
<thead>
<tr>
<th>Technical information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical features</strong></td>
</tr>
<tr>
<td>Abrasion</td>
</tr>
<tr>
<td>Cut resistance</td>
</tr>
<tr>
<td>Tear</td>
</tr>
<tr>
<td>Puncture</td>
</tr>
</tbody>
</table>

Legend

Performance level: 1 = low … 5 = high
References

- Work Practice Manual, field instruction 2.9 (Induced voltage)
- AS/NZS 2161.10.1:2005 (Occupational protective gloves - Protective gloves against chemicals and micro-organisms - Terminology and performance requirements)
- AS/NZS 2225: 1994 (Insulating gloves for electrical purposes)
- AS 2225-1994/Amdt 1-1996 : Insulating gloves for electrical purposes
- ChemAlert: http://www.chemalert.com/
- EN 388:2003 (Protective gloves against mechanical risks)
3.3 Head protection

Purpose

This instruction outlines the type of approved head protection that must be worn while carrying out work on the Western Power network.

Head protection is required to reduce the risk of injury from falling objects, arc flash burns and exposure to UV radiation.

As with any personal protective equipment (PPE), head protection must not be used in isolation of other risk controls.

Instructions

During the risk assessment process, the onsite person in charge has the authority to make decisions about head protection if there are circumstances that require specific measures.

Safety helmets

- All personnel must wear a Western Power approved safety helmet (see AS/NZS 1801:1997(Occupational protective helmets)) when:
  - there is a risk of a person:
    - being struck on the head by a falling object
    - hitting their head on a stationary object
  - the site displays a “Safety Helmet Area” sign
- Record the date of issue inside the safety helmet.
- Inspect the safety helmet before use.
- Secure the safety helmet with a chinstrap if there is a possibility that it may fall off.
- Immediately replace a safety helmet that is damaged or suspected of being damaged.
- Replace the safety helmet after two years service in an operational environment.
Arc flash visor
- Only wear approved visors as described in field instruction 3.1 (Clothing and personal protective equipment requirements) in this manual.
- Inspect the visor before use.
- Cracked or damaged visors must not be used.

Sun visor
- For maximum sun protection, use a plastic snap brim (Western Power stock code QC0114).

References
- Work Practice Manual, field instruction 3.1 (Clothing and personal protective equipment requirements)
- AS/NZS 1801:1997 (Occupational protective helmets)
3.4 Other personal protective equipment

Purpose

This work practice outlines the requirements for the use and maintenance of eye, face, hearing and respiratory protection. Eye, face, hearing and respiratory protection is required to eliminate the risks associated with flying particles, extreme heat radiation, extreme noise or any other risk which these types of personal protective equipment (PPE) may mitigate.

PPE must not be used in isolation of other risk controls in a safety management system.

Instructions

All safety equipment:

- must meet Western Power’s minimum safety requirements as outlined in this work practice
- should be purchased through a Western Power approved supplier. This can be done by:
  - Western Power personnel – via Ellipse
  - non-Western Power personnel – via your purchase system

Eye protection

- Eye protection must comply with AS/NZS 1337.1:2010 Personal eye protection – Eye and face protectors for occupational applications.
- Wear the eye protection that is appropriate for the hazard that is to be encountered:
  - Safety glasses – this is the minimum level of eye protection. Glasses must have:
    - at least a medium impact rating
    - frames made of a non-conductive, non-metallic material
  - Goggles – must be worn when:
    - advised by the material safety data sheet (MSDS) of the product being worked with
3.4 Other personal protective equipment

the risk assessment identifies that wearing goggles will mitigate a risk (e.g. when there are high concentrations of dust particles in the air or working with chemicals that may irritate the eye)

- Eye protection must be worn day and night:
  - in designated (signed) eye protection areas
  - as instructed in work practices, procedures, or by the site owner
  - when working on live electrical apparatus
  - when operating switchgear
  - in zone and terminal substations and power station switchyards
  - in workplaces where there are:
    - mechanical hazards, e.g. flying particles, sparks, molten metal splash, wire or conductor recoil
    - chemical hazards, e.g. splashes, fumes and dust
    - thermal and radiation hazards, e.g. heat, glare, ultraviolet rays, infrared rays

- For arc flash protection, wear eye protection underneath the face shield or arc flash hood.

- Before putting on eye protection, ensure that you are aware of the correct fitting technique for the type of eye protection that is being used.

- Prior to removing goggles, wipe over outside surface to remove contaminants.

**Note:**

For more on eye protection, see *AS/NZS 1337:2010 Personal eye protection – Eye and face protectors for occupational applications*.

**Face protection**

- Face protection must comply with *AS/NZS 1337.1:2010 Personal eye protection – Eye and face protectors for occupational applications*.

- Wear face protection (e.g. face shield, welding helmet) with safety glasses or goggles when:
  - grinding (e.g. bench, angle), cutting, brazing and welding
  - using a chainsaw or chipper
  - any machining tasks that produce flying particles
  - advised by the MSDS of the product being worked with
Work Practices

- the risk assessment identifies that the wearing of face protection will mitigate a risk

- Ensure that face protection:
  - has impact rated lenses
  - is not lifted when performing the task for which the protection is required (e.g. welding, cutting with a chainsaw)

- Before putting on face protection, ensure that you are aware of the correct fitting technique for the type of face protection being used.

Note:

For more on face protection, see AS/NZS 1337:2010 Personal eye protection – Eye and face protectors for occupational applications.

Hearing protection


- Wear the hearing protection that is appropriate for the decibel noise level that is to be encountered.

Hearing protection will have a class code on the packaging that relates to the decibel (dB) noise environment. The classes are stipulated for a specific dB(A) level. Use Table 1, below, to select the hearing protection related to the maximum dB level that you may be exposed to. If a decibel meter is not available, use the Perceived loudness column as a guide.

Table 1: Hearing protection – classes and ratings

<table>
<thead>
<tr>
<th>Class</th>
<th>Rating dB(A)</th>
<th>Perceived loudness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90</td>
<td>Diesel truck at 10 m</td>
</tr>
<tr>
<td>2</td>
<td>95</td>
<td>A subway train at 60 m</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>Disco, 1 m from speaker</td>
</tr>
<tr>
<td>4</td>
<td>105</td>
<td>Jet engine, take-off power at 60 m</td>
</tr>
<tr>
<td>5</td>
<td>110</td>
<td>Chainsaw at 1 m</td>
</tr>
</tbody>
</table>

Information taken from AS/NZS 1270:2002 Acoustics – Hearing protectors

- Before putting on hearing protection, ensure that you are aware of the correct fitting technique for the type of hearing protection that is being used.
Note:
For more on hearing protection, see *AS/NZS 1270:2002 Acoustics – Hearing protectors*.

**Respiratory protection**

- Respiratory protection must comply with both of the following:
  - *AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment*
  - *AS/NZS: 1716:2012 Respiratory protective devices*
- Wear the respiratory protection that is appropriate for the hazard that is to be encountered.
- Before putting on respiratory protection, ensure that you are aware of the correct fitting technique for the type of respiratory protection that is being used.

Note:
For more on respiratory protection, see *AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment*.

**Care and maintenance**

- Wear, use and maintain PPE in accordance with manufacturer’s guidelines and maintenance specifications.
- Inspect PPE before use and replace any damaged or unserviceable item.

**References**

- Work Manual, work practice 3.1 (Clothing and personal protective equipment requirements)
- *AS/NZS 1270:2002 Acoustics – Hearing protectors*
- *AS/NZS 1337.1:2010 Personal eye protection – Eye and face protectors for occupational applications*
- *AS/NZS 1337.1:2010/Amdt 1:2012 Personal eye protection – Eye and face protectors for occupational applications*
- *AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment*
- *AS/NZS: 1716:2012 Respiratory protective devices*
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5.1 Consumer site access

Purpose
This instruction outlines the considerations for working in consumer-owned substations and worksites.

Scope
This instruction applies to the Network Total Workforce (NTW) when access to consumer equipment for work-related activities and tasks is required. Such tasks and activities include:
- construction
- testing and commissioning
- operational work

Safety
When visiting a consumer’s site, the visitor must adhere to all the safety rules of that site. An induction may need to be completed before entering the consumer’s site.

Where the consumer’s safety rules and regulations are of a lower standard than Western Power’s, follow Western Power’s safety rules and regulations. These may be found in publications such as the Electrical System Safety Rules (ESSR) and work practice manuals as well as applicable standards, procedures and guidelines.

A risk assessment must be completed, with special attention paid to:
- unfamiliar site procedures
- additional or insufficient safety requirements
- unfamiliar inherent and created hazards
- unfamiliar apparatus and equipment
- other work teams onsite
- emergency procedures and contact details
- the possibility of induced voltages

Isolation and permit procedures must be at least equivalent to those of Western Power. If not, applicable Western Power procedures must be used.
Training and authorisation

All work must be undertaken by competent and authorised personnel.

Note:
There may be additional consumer-specific authorisations required by the consumer to work on their site or apparatus.

Instructions

In addition to the normal work planning processes, also consider, plan and arrange the following:

- Establish an appropriate point of contact with the consumer. Direct all correspondence through this person.
- Perform job-planning in cooperation with the consumer’s representatives. Record correspondence, decisions and plans.
- Determine property boundaries for the purpose of identifying responsibility for site control and management (e.g. permits, work practices, induction, and safety).
- Identify points of demarcation where operational control of equipment transfers from one authority to another. Such points of demarcation could exist on either Western Power’s or the consumer’s side of the property boundary.
- Identify shared equipment and establish a commissioning plan that outlines responsibilities and overlaps. Commissioning activities that involve the energisation of a new plant must be authorised and approved by the relevant operating authorities (Consumer, Western Power etc.).
- Determine the type of procedures and permits used onsite by the consumer and make sure that they meet Western Power’s requirements. If not, do not proceed with any work until this has been resolved.
- Determine if there is a need for an Operating Agreement between the Control Authority (SOCC/NOCC) and the consumer.
- Establish the existence of any environmental hazards at the site.
- If required, arrange for all Western Power employees to attend the consumer’s induction course.
- Ensure that all work is completed to Western Power’s minimum requirements.
Work Practices

When visiting a consumer’s site the consumer must be contacted before the visit as a matter of courtesy. This will foster a healthy working relationship and assist with security issues and access. For regular or fault visits to Western Power sites within the consumer’s boundaries, it may be possible to establish a standing arrangement with the consumer’s security.

Kwinana Industrial Strip

All staff entering a controlled or uncontrolled site in, or working in the vicinity of, the Kwinana Industrial Strip must comply with the SOCC CRI 00-11 ‘Kwinana Industrial Strip Emergency Response Procedure’ (DM# 1190718).

The procedure overview and map is also available in Appendix 8 (Kwinana industrial strip emergency response procedure) of this manual.

Water Corp

The Water Corp induction is valid for two years and the card must be carried when visiting any Water Corp site such as Baandee and Yerbillon. The induction and relevant FAQs are available online at http://watercorpinduction.com.au.

To get Water Corp keys, the induction must be completed and a copy of the certificate of completion must be forwarded with a completed Water Corp key request (DM# 3479792) to Network Operations, East Perth.

Desalination plants

Kwinana and Binningup desalination plants are separately operated entities and have their own site-specific induction processes. All visitors must report to the site office on arrival and attend a site induction before being allowed inside the plant. For after-hours visits, the following numbers are to be called before arriving:

**Kwinana**
- Control room (all hours) (08) 9410 5201
- Secondary number (after hours only) 0434 317 202

**Binningup**
- Control room (all hours) (08) 9720 0754
- Backup emergency number (electrical planner) 0487 970 033

Rail reserves

Any person proposing work on, above, below or within any rail reserve must submit a written application to the appropriate rail authority.

- Brookfield Rail head office (08) 92122800 (see Appendix 3 (Brookfield Rail data) for emergency and local contact numbers.)
• Public Transport Authority, Track Infrastructure Maintenance Manager, (08) 9326 2281
• The Pemberton Tram Company and The Hotham Valley, (08) 9776 1016
• Golden Mile Loop Line Tourist Railway, 0418 915 688, 0407 387 883 or 0400 196 997

For country areas contact the rail superintendent or inspector.

**Verve Energy**

When accessing substations on Verve sites, the site must be contacted before arrival to arrange an induction:

- Pinjar (08) 9424 1711 or alternatively (08) 9424 1905
- Muja (08) 9781 6777
- Kwinana/Cockburn (08) 9411 2649

**References**

- Transmission Substation Work Practice Manual:
  - Appendix 3 (Brookfield Rail data)
  - Appendix 8 (Kwinana industrial strip emergency response procedure) (DM# 9356454)
- Brookfield Rail website: www.brookfieldrail.com
5.2 Substation entry requirements

Purpose

This work practice outlines the requirements for all people who enter Western Power substations.

Scope

This work practice applies to Western Power zone and terminal substations where access is controlled by System Management. The personnel covered by this instruction are:

- operational personnel
- non-operational personnel
- visitors

Training and authorisation

To enter a substation, the following requirements must be met.

<table>
<thead>
<tr>
<th>Type of worker</th>
<th>Authorisation requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Western Power construction site (non-substation)</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Operational Worker | • NAC; or
• Exemption with Immediate supervision. |
| Non-Operational Worker or Visitor – as above or | • Outside danger zone – NAC; or direct supervision
• Inside danger zone – NAC or immediate supervision |
| **Western Power substation (other than pad-mounted distribution substations)** | |
| Operational Worker | • NAC + substation entry; or
• NAC + immediate supervision; or
• Exemption + Immediate supervision + site induction; |
| Non-Operational Worker and/or Visitor – as above or | • Outside danger zone plus 10m allowance for inadvertent movement of any tools, equipment etc. – direct supervision + site induction
• Inside danger zone plus 10m allowance for inadvertent movement of any tools, equipment etc. – immediate supervision + site induction |
**Work Practices**

**Note:**
- All network access authorisation levels are stated in Appendix 4 (Network access levels) of the Electrical System Safety Rules (ESSR).
- Anyone who has a NAC must carry it with them at all times when in a substation.

**Safety**
- Clothing and personal protective equipment (PPE) appropriate to the task and location must be worn. For more on this, see section 3 (Personal protective equipment) in this manual.
- Risk assessments must include any hazards and controls that may arise from the presence of non-authorised persons.
- Permitting processes must be observed. Non-authorised persons required to be in the work area covered by the permit must have an exemption from Network Authorisations (e.g. a visiting overseas specialist from an external company that would make it impractical to complete the normal authorisation process).
- When planning to visit a Western Power substation, personnel must refer to *Network Operations Bulletin: Extra Safety Precautions Prior to Entering CBD and Remote Controlled HV Substations* (DM# 8355258).

**Instructions**
- Authorised staff entering a CBD or remote controlled high voltage (HV) substation, zone substation or terminal substation must check-in before entry and check-out on departure.
  - **Checking into a substation**
    - Smart phone – SMS the word “Check-in” to 0417 631 629 to receive a link to the *Check In – Check Out* website. Click on the link and then select CHECK-IN. For the first login, save the link to favourites or bookmarks to easily access the site on future substation visits.
Note:
To use the smart phone check-in option, personnel must have a smart phone for which the mobile number:

- is listed under their name in Western Power’s corporate directory in *busbar*
  or
- has previously been used for a phone call check-in via the Western Power Contact Centre on 1300 884 149

- Phone – call the Western Power Contact Centre on 1300 884 149 and register the check-in and estimated check-out time.

  o **Checking out of a substation**
    - Smart phone – open the *Check In – Check Out* website and select CHECK-OUT.
    - SMS – send the word ‘Yes’ to 0417 631 629.
    - Phone – call the Western Power Contact Centre on 1300 884 149 and register the check-out.

Note:
- The preferred *Check In – Check Out* method is via the smart phone.
- If the individual that checked in does not check-out by the estimated check-out time, an escalation process will take place. If attempts to contact the individual and the individual’s formal leader fail, local crews could be dispatched to physically search for the individual.

- If there are other work parties in the substation, the new arrival must notify the recipient in charge (RIC) or site supervisor of their presence and the reason for their visit. For more on this, see work practice 2.15 (Job briefing process) in this manual.

- If operational work is being done it must be recorded in the substation logbook.

**Kwinana Industrial Strip Emergency Response Procedure**

All staff entering a controlled or uncontrolled site in, or working in the vicinity of, the Kwinana Industrial Strip must comply with the *Kwinana Industrial Strip Emergency Response Procedure* (DM# 1190718).
The procedure overview and map is also available in Appendix 8 (Kwinana industrial strip emergency response procedure) of this manual.

References

- Transmission Substation Work Practice Manual:
  - work practice 2.15 (Job briefing process)
  - section 3 (Personal protective equipment)
  - Appendix 8 (Kwinana industrial strip emergency response procedure)
- Electrical System Safety Rules, Appendix 4 (Network access levels)
- Network Operations Bulletin: Extra Safety Precautions Prior to Entering CBD and Remote Controlled HV Substations (DM# 8355258)
- Kwinana Industrial Strip Emergency Response Procedure (DM# 1190718)
- Worker Authorisation Standard (DM# 8214717)
5.3 Substation clearances

Purpose
This instruction describes the clearance requirements when working within substations over 1 kV alternating current (a.c.).

Definitions
The following definitions are taken from AS 2067:2008 (Substations and high voltage installations exceeding 1 kV a.c.).

Danger zone
Area limited by the non-flashover distance ($N$) around live parts that are without complete protection against direct contact.

Note:
Infringing the danger zone is considered the same as touching live parts.

Ground safety clearance ($G$)
The minimum distance required between the earthed end of any exposed insulator carrying or containing live parts and ground or the floor of permanent walkways used for normal inspection and operational functions. This distance is equivalent to the reach of a person at ground level (2440 mm), which includes an allowance of 300 mm for tools.

Horizontal work safety clearance ($H$)
- The minimum distance measured horizontally between live parts and the work object.
- Where work is to be carried out from a ladder or the equipment, the horizontal work safety clearance is applied from the extremities of the work object horizontally to the nearest live parts. This distance includes an allowance of 300 mm for tools.

Minimum phase to earth clearance
- Smallest permissible clearance in air between live parts and earth or between live parts and parts at earth potential.
The clearances to earth between live parts and earthed material apply to any structure or surface substantially at earth potential, including any fixed or portable screens which may be provided. Earthed material includes a poor conductor such as concrete.

**Minimum phase to phase clearance**
Smallest permissible clearance in air between live parts of different phases or between the same phase that are electrically separate from each other.

**Non-flashover distance (N)**
The minimum phase to earth clearance that includes a margin of 10% (for clearances of 1300 mm or less) and 6% (for clearances of greater than 1300 mm) to allow for variations in construction dimensions.

**Section safety clearance (S)**
Safety clearance required for access for operational purposes. The non-flashover distance (N) plus the ground safety clearance (G) measured along a taut string between the ground or operating platform and the live part.

**Taut string distance**
The distance between two parts measured along a taut string stretched the shortest way between those parts.

**Note:**
The taut string distance is used to measure the shortest distance away when measuring from the base of where a person is standing up and over guard rails and screens to the nearest live point.

**Vertical work safety clearance (V)**
- The minimum distance measured vertically between live parts and the highest part of the work object.
- Where work is to be carried out from a ladder or from the equipment, the vertical work safety clearance shall be applied from the highest parts of the work object vertically to the nearest live parts. This distance includes an allowance of 300 mm for tools.
Instructions

Safety clearances

The Section, Vertical and Horizontal work safety clearances are based on the principal that when a person is inspecting or operating live substation equipment or working on isolated equipment they should not be able to reach into any danger zone surrounding live equipment.

Table 1: Safety Clearances for $U_m$ less than 245kV

<table>
<thead>
<tr>
<th>Nominal Voltage (kV)</th>
<th>Conductor to structure clearance (mm)</th>
<th>Ground Safety Clearance (G) (mm)</th>
<th>Safety clearance for operational purposes and maintenance work (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phase to Earth Clearance</td>
<td>Phase to Phase Clearance</td>
<td>Non-Flashover Distance (N)</td>
</tr>
<tr>
<td>Up to 3.3</td>
<td>60</td>
<td>70</td>
<td>65</td>
</tr>
<tr>
<td>6.6</td>
<td>90</td>
<td>105</td>
<td>100</td>
</tr>
<tr>
<td>11</td>
<td>160</td>
<td>185</td>
<td>175</td>
</tr>
<tr>
<td>22</td>
<td>280</td>
<td>325</td>
<td>310</td>
</tr>
<tr>
<td>33</td>
<td>380</td>
<td>440</td>
<td>420</td>
</tr>
<tr>
<td>66</td>
<td>630</td>
<td>725</td>
<td>695</td>
</tr>
<tr>
<td>132</td>
<td>1300</td>
<td>1495</td>
<td>1430</td>
</tr>
<tr>
<td>220</td>
<td>1900</td>
<td>2185</td>
<td>2015</td>
</tr>
</tbody>
</table>

(AS 2067/Amdt 1-2010 – Table 3.1)

Table 2: Safety Clearances for $U_m$ greater than 245kV

<table>
<thead>
<tr>
<th>Nominal Voltage (kV)</th>
<th>Conductor to structure clearance (mm)</th>
<th>Ground Safety Clearance (G) (mm)</th>
<th>Safety clearance for operational purposes and maintenance work (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phase to Earth Clearance</td>
<td>Phase to Phase Clearance</td>
<td>Non-Flashover Distance (N)</td>
</tr>
<tr>
<td>330</td>
<td>2200</td>
<td>2530</td>
<td>2330</td>
</tr>
</tbody>
</table>

(AS 2067/Amdt 1-2010 – Table 3.2)
• A tall person holding a small hand tool or material up to 300 mm in length has a maximum reach of 2440 mm vertically or 1900 mm horizontally. This is illustrated in Figure 1 (Dimensions of tall operator or worker).

![Figure 1: Dimensions of tall operator or worker](image)

**NOTE:** Extreme dimensions include an allowance for small hand tools.

• Applying the principal described above, it follows that the distance to live equipment must always be at least the dimension of the danger zone plus the vertical or horizontal reach as appropriate.

• The way that the necessary clearances applicable to persons at ground level in a substation are calculated is illustrated in Figures 2-4, below.

![Figure 2: Dimension for access at ground level](image)
Figure 3: Protective barrier

**PROTECTION AGAINST DIRECT CONTACT BY PROACTIVE**
BARIERS/SCREENS WITHIN CLOSED ELECTRICAL OPERATING AREAS—WHERE
THE PROTECTIVE BARRIERS ARE SOLID WALLS WITHOUT OPENINGS

**DIMENSIONS IN MILLIMETRES**

\[ N = \text{Non Flashover Distance} \]
\[ S = \text{Section Safety Clearance (} G + N \text{)} \]
The way that the necessary clearances for maintenance works in a substation are calculated is illustrated in Figures 5-8, below. Care must be taken to ensure that worksite barricading does not allow personnel or machinery to breach the required clearances.
Work Practices

Figure 6: Safety clearances for maintenance work

$N = \text{non-flashover distance}$
$G = \text{ground safety clearance (2440)}$
$S = \text{section safety clearance (N + G)}$
$H = \text{horizontal work safety clearance (N + 1900)}$
$V = \text{vertical work safety clearance (N + 1540)}$

DIMENSIONS IN MILLIMETRES

Figure 7: Work sections in single busbar installation
Movement of vehicles and plant

When moving vehicles and plant, you must maintain the following clearances.

- **Section** safety clearance applies between the highest point on the vehicle where a person would normally sit or stand and any live conductor.
- **Horizontal** work safety clearance applies between the lateral extremities of the vehicle and any live conductor.
- Transport clearance \( T = N + 100 \text{ mm} \) (500 mm minimum) a between the highest point on the vehicle and any live conductor.
**Work Practices**

**Working from a platform**

When working from a platform, you must maintain the clearances described below, whether the platform you are working from is scaffolding or an elevated work platform (EWP).

- Section safety clearance applies:
  - vertically from the foot position to the nearest live parts
  - from the foot position on the platform to the nearest live parts, measured by taut string distance from the foot position, over the guard rail of scaffolding or EWP bucket to the nearest live part

- Horizontal work safety clearance applies from the extremities of the work object in any horizontal direction to the nearest live part.

![Diagram](image)

**Figure 10: Horizontal work safety clearance**

**References**

- AS 2067:2008 (Substations and high voltage installations exceeding 1 kV a.c.)
- AS 2067:2008/Amdt 1:2010 (Substations and high voltage installations exceeding 1 kV a.c.)
- Substations Safety Clearances: Seminar dossier Pg 4 (DM# 7077151)
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5.4 Secondary isolations

Purpose

The purpose of this work practice is to outline the minimum requirements for secondary isolations.

Scope

This work practice is applicable to Network Total Workforce (NTW) who are authorised to perform secondary system isolations in support of the issuing and receiving of primary and secondary system permits. For more detailed information refer to: Secondary Systems Safe Working Procedures (DM# 6672467).

Field Protection Services (FPS) is the delegated operating authority with respect to secondary systems (excluding communications, Supervisory Control and Data Acquisition (SCADA), DC chargers/batteries and fire alarm systems) in zone substations and terminal substations. This authority exists for either operational sites or ‘non-connectable’ plant/equipment/sites under the control of the Commissioning Authority.

This delegated authority does not cover secondary plant in:
- power stations, including generator step-up transformers
- gas turbine sites, including generator step-up transformers
- distribution circuits outside the zone substation boundary
- regional power station sites
- distribution line and cable apparatus

Training and authorisation

NTW personnel, who are required to issue or receive secondary systems Electrical Access Permits (EAPs) and Sanction to Test (STT) permits (see the Permits section, below), must be competent and appropriately authorised. This authorisation includes:
- an endorsement by FPS to those who are required to issue or receive EAP or STT permits on secondary systems, specifically:
  - pilot systems
  - protection systems
Work Practices

- metering circuits
- auxiliary systems
- commissioning sites

- applicable site access authority, refer to:
  - 5.1 (Consumer site access)
  - 5.17 (Vegetation management in substations)

- a Network Authority at the required level:
  - NA2 – Sign onto a permit as a recipient
  - NA3 – Recipient in charge for EAP
  - NA4 – Tester in charge for STT
  - NA5 – Secondary system issuing officer

Personnel who are required to receive or issue a secondary system permit on equipment that has a normal working voltage that exceeds 50 V AC or 120 V DC must hold a current and valid Electrical Worker’s Licence or be a Cert III Lineworker.

Safety

Before commencing work:

- conduct a risk assessment and job briefing (see work practice 2.15 (Job briefing process) in this manual). The risk assessment must include:
  - adjacent live circuits
  - non-lockable secondary system isolation points
  - possible system risks
  - other inherent and created hazards at the worksite

- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

Secondary system circuits extend to primary plant. FPS personnel should also give attention to additional hazards such as:

- back energising power transformers and voltage transformers (VTs)
- inadvertent operation of primary plant through release of stored energy (e.g. mechanical, pneumatic, hydraulic)
• system risk due to interconnected or overlapping secondary circuits (e.g. bus zone, parallel operation)

Instructions

Planning

Other than for emergency work, when there is no advance notice, Western Power personnel and contractors who require secondary isolations in order to perform planned work on operational equipment must complete the following:

• Request the secondary isolations by either contacting the FPS, Capital Expenditure (CAPEX) or Operational Expenditure (OPEX) schedulers.
  o Ensure that the request is made to FPS for Secondary System Isolations at least 15 days in advance.

• Lodge a Distribution Networks Access Reports/Request (DNAR) or Proposed Outage Plan (POP) via the Market Participant Interface (MPI). This is not required for a greenfield site.

For ‘non-connectable’ plant under the control of either a construction or commissioning authority:

• access requests must be made to the person in charge of the site
• Network Operations Control (NOC) do not need to be notified

Where the work is to be carried out by FPS on operational equipment:

• Notification to NOC will be done by the FPS work team
• the normal MPI process (either POP or DNAR) must be followed
• a person from the FPS work team that is suitably authorised may issue the permit

Isolation and making safe

The issuing officer usually carries out isolations. Both the secondary systems issuing officer and the Recipient in Charge (RIC) or Tester in Charge (TIC) have a responsibility to make sure the isolation has been performed correctly and is done according to the isolation request.
Wherever possible, isolation methods should be positive and visible. As a minimum, secondary isolation must be achieved by de-energising the relevant circuits through the following:

- Removing protection and control isolating fuses and trip-links.
- Switching (lockable) miniature circuit breakers to the OFF position.
- Ensuring CT secondary circuits are isolated and short-circuited by an approved method.

**Note:**
CT secondary circuits must never be open-circuited while in service.

- Interruption of VT secondary circuits by:
  - racking VTs out of service (preferred)
  - approved isolation methods
- Isolation of AC supplies (e.g. spring rewind and transformer auxiliaries).
- Removal of wires from terminals (last resort only).

Isolation must be maintained through the following:

- Using lockable fuse inserts, where possible.
- Locking miniature circuit-breakers in the OFF position, where possible.
- Applying ‘Do Not Operate’ tags at the points of isolation (see work practice 2.6 (Network tags) in this manual).

After isolation and tagging, the circuits must be proved de-energised using an approved tester and test method. This will ensure:

- the safety of personnel working on the equipment
- that risks to system security are reduced
Secondary Isolation Schedule

The completed Secondary Isolation Schedule (SIS) (DM# 1611982) provides the reader with information on the secondary isolations that have been performed, and assists with ensuring that all isolations are restored on completion of the task. Due to the complex nature of secondary isolations, an SIS is required in addition to, and in support of, other permits when:

- access is being provided for others
- isolations are complex
- a primary system permit is issued that requires secondary isolations
- a ‘Secondary Access Only’ permit is issued
- the work will last for more than one day
- there are other work teams working in the vicinity

The SIS must be attached to the permit. Reference to the secondary permit must be made on the primary permit. If a secondary permit is not issued, the SIS must then be attached to the primary permit. A copy of the SIS must always be left onsite with the permit.

Permits

The types of permits associated with secondary systems include the following:

- **Electrical Access Permit (EAP):**
  - for primary plant, plus a Secondary Isolation Schedule (SIS)
  - section three of the EAP endorsed ‘Secondary Isolation Only’ as no protective earthing is applied to secondary systems

- **Vicinity Authority (VA)** – for work near to secondary systems but no access.

- **Sanction to Test (STT)** – for work on non-isolated or operational secondary circuits, testing of primary circuits and removal of program earths for testing purposes. A SIS may be required.

A permit is not required for work on systems that operate at ‘extra low voltage’ (0–50 V AC; 0 – 120 V DC), although it is still a requirement to isolate and take other precautions. Systems operating at LV and above require a permit for access.
Logging of secondary system permits

When a secondary system permit is issued, the issuing officer must log the permit with the appropriate control centre. This is necessary so that:

- the controllers know that there is someone working on a particular item of secondary equipment and are aware of any implications to the power system, such as the risk of unwanted tripping
- if another person attempts to issue a permit on the same or associated equipment, then the controller can alert them to the existence of a current permit

Cancellation of secondary permits

On completion of the work for which the permit was issued, the secondary systems issuing officer must be satisfied that:

- all recipients have signed off the permit and are aware that they will no longer have access to the equipment
- the RIC/TIC has relinquished the permit
- the equipment is in the required condition for the next stage of the work

All isolations must then be restored to a normal state or set up for the next stage of the work. The issuing officer must cancel the permit and advise the appropriate control centre that the permit has been cancelled.

If applicable, the condition of the equipment must be noted on the subsequent STT permit (some, but possibly not all, secondary circuits might be re-energised). The SIS must also be:

- updated to reflect the revised status of the secondary isolations for the STT
- attached to the STT

Co-existence of primary EAP and secondary STT permits on the same apparatus

When a single apparatus is split into two ‘separate apparatus’ by electrical isolation, an STT can then be issued on the associated secondary equipment while an EAP is in force on the primary equipment. This can only be done if a secondary isolation schedule (SIS) is produced for the work and attached to all relevant permits, and both persons in charge:

- agree to the primary and secondary isolations to be applied
- maintain strict control and management of the worksites
• communicate effectively to ensure neither team can impact upon the other during the course of their activities

A typical situation when this would occur would be when the protection scheme for a line breaker is isolated from the associated line circuit breaker mechanism. If agreeable to both work teams, testing of the line protection schemes under a secondary system STT can occur while circuit breaker maintenance is being conducted under a primary system EAP.

**Teleprotection signalling (TPS) equipment**

An STT permit issued to communications staff for them to work on TPS equipment must:

• be accompanied by a secondary isolation schedule
• not to be issued remotely, but be issued personally to the TIC

**Conflict of responsibilities**

It is highly recommended that the roles of issuing officer and RIC/TIC are performed by different authorised individuals. In circumstances that prevent this:

• all the permit processes must be followed
• the individual must be authorised to issue and receive the permit. Extra care must be taken to ensure that isolation and checking is rigorous.

**References**

• Transmission Substation Work Practice Manual:
  o work practice 2.6 (Network tags)
  o work practice 2.15 (Job briefing process)
  o section 3 (Personal protective equipment)
  o work practice 5.1 (Customer site access)
  o work Practice 5.25 (Construction site access – minimum requirements)
• Secondary Isolation Schedule (SIS) (DM# 1611982)
• Secondary Systems Safe Working Procedures (DM# 6672467)
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5.5 Portable ladders

Purpose
This instruction outlines the use and maintenance of ladders within transmission substations.

Instructions

**DANGER**
- Never use metal ladders.
- Only use non-conductive ladders.
- Conduct a worksite risk assessment before commencing any ladder work.
- If required, install barriers or barricades.
- Ensure that all locking devices on the ladder are secure.
- If using a step and trestle ladder as a working platform, they must be in the fully open position.
- Stabilise and secure the ladder/s before ascending to the work platform or pole top.
- The ladder must be footed until it is secured via the head rope. If it is not possible to secure the ladder via a head rope then the ladder must be footed at all times.
- When positioning the ladder use the **4:1 rule** (e.g. if the distance between the ladder base and the supporting structure is 1 metre, the ladder should be supported approximately 4 metres from the ground).
- Do not use the rungs of the ladder to support scaffold planks.
- When the ladder is being used for access or egress, the ladder must extend at least 900 mm above the stepping-off point of the working platform.
- Do not move the ladder while a person is standing on the rungs.
- Only one person is allowed on the ladder at any time and they must be within the load rating of the ladder (unless in the event of a pole top rescue).
- There is no requirement for a fall arrest system when ascending or descending a portable ladder. However, fall protection must be in place when in position to perform work.
• Make sure that the full body harness and pole strap are in good condition and are attached correctly before starting work.
• During ascent and descent, face the ladder and maintain three points of contact with the ladder at all times.
• Do not carry tools or equipment while climbing up or down a ladder. Use tool belts, pouches or rope pulleys to carry equipment without compromising the three points of contact.
• When climbing up or down a ladder it is safer to grasp the ladder rungs rather than the sides of the ladder.
• Trestle ladders should be used for light duty work only. The minimum width of the working platform must not be less than 450 mm. Work performed on a trestle platform that is over two metres above ground level must have edge protection.

Restrictions when using ladders on porcelain insulators
• Do not place ladders against post insulators.
• Do not place ladder against surge diverters or lightning arresters.
• Do not use ladders with metallic reinforcement that may contact the porcelain unless protected from that contact.
• Do not use ladders against insulators not in a vertical aspect (i.e. horizontal).
• Do not use metallic or rigid ladder straps, unless specifically designed for a particular insulator.

Maintenance
• Inspect all new ladders before use and fill out an inspection label before attaching it to the ladder. The inspection label must record the following:
  o the worker’s name
  o the current date
  o the date that the ladder is next due to be inspected (see Appendix 1 (Tags and signs) in this manual).
• Inspect every ladder before climbing to check that it is safe to use. If it is unsafe, tag it out using the “Out of Service” warning tag (see Appendix 1 (Tags and signs) in this manual).
Work Practices

- Carry out a detailed inspection at least every six months, using the Ladder inspection checklist (see Appendix 2 (Standard forms), p9 in this manual).
- When defects are discovered during an inspection, tag the ladder out and return it to the supplier for repair, along with the completed Ladder inspection checklist (see Appendix 2 (Standard forms), p9 in this manual). When the ladder is not to be repaired, it must be destroyed (rendering it unusable) and removed from the asset register.
- When sending the ladder for repair, insert the Ladder inspection checklist into an adhesive document pouch and attach it to the bottom rung of the ladder.

Note:
If a ladder falls from a vehicle or structure, inspect it thoroughly before using it again. If you find or suspect any defects, follow the same procedure as above.

References
- Transmission Substation Work Practice Manual:
  - Appendix 1 (Tags and signs)
  - Appendix 2 (Standard forms), p9 – Ladder inspection checklist (DM# 4778786)

Related Documents
- Business Process – Management of Defective Plant or Equipment Non-Network Related (DM# 404243)
- AS/NZS 1892.5:2000 – Portable ladders – Selection, safe use and care
- Ladders on Insulators (DM# 4949077)
- OHSR 1996 – Regulation 3.26 – Portable ladder, duties of person using
- WorkSafe 2004, Code of Practice – Prevention of Falls at Workplaces
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5.6 Scaffolding

Purpose

This work practice outlines the minimum requirements for erecting, dismantling and maintaining scaffolding.

Instructions

General

- When carrying scaffolding (or any long items) beneath overhead electrical apparatus:
  - carry the scaffolding at or below shoulder height, parallel to the ground
  - the scaffolding sections should be carried using a person at each end.

- Before any scaffolding is erected:
  - conduct a risk assessment and job briefing. For more on this, see work practice 2.15 (Job briefing process) in this manual. The risk assessment must include the following, if relevant.
    - Serviceability of the scaffolding.
    - Safe working load (SWL) of the scaffolding.
    - Height safety. For more on this, see work practice 2.11 (Height safety) in this manual.
    - Maintain minimum approach distances (MADs) from live electrical apparatus. For more on this, see work practices 5.3 (Transmission substation clearances) and 5.13 (Safety observer role) in this manual.
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements. For more on this, see section 3 (Personal protective equipment) in this manual.

- Inspect all scaffolding to ensure that it is safe:
  - Scaffolding up to four metres must be inspected before climbing, using the Scaffold inspection checklist (DM# 5236891).
  - Scaffolding over four metres must be inspected, as outlined in the Scaffolding taller than 4m section below.
• If any scaffolding components are found to be damaged or defective, remove them from service and tag them out using an ‘Out of Service’ warning tag. For more on this, see Appendix 1 (Tags and signs) in this manual.

• Erect, dismantle and maintain all scaffolding according to the manufacturer's specifications.

• Stabilise scaffolding by:
  ○ tying the scaffold to the structure that is being worked on
  ○ adding backup bays to increase the base dimension
  ○ installing stabilisers or outriggers at a 3:1 ratio, providing a base with dimensions at the narrowest point of at least one-third the maximum work platform height
  ○ if the scaffold is set up on a surface that may move under the feet/casters when loaded (e.g. soft sand) – use stabiliser leg pads to provide a solid, sound surface.

• If scaffolding is left partially erected or unattended, warning signs must be placed on the scaffolding to discourage unauthorised access.

• Only use mobile scaffolding which has adequate strength and is set up on a level surface. It must be able to safely support the total load imposed by the weight of the scaffold, the people working on it and the materials used. For more on this, see the Mobile scaffolding section, below.

Be aware that, on some designs, the feet can fall out of the scaffold tube if the assembly is lifted off the surface.

Edge protection
If there is a possibility of someone falling more than two metres, install edge protection to the open sides of the working platform such as guardrails and toe boards, as outlined below.

Guardrails
• Securely fixed guardrails parallel to the working platform, 900–1100mm above the platform.
• No more than 100mm outside the edge of the working platform.
• Position midrails halfway between the guardrail and the toe board.

Toe boards
• On the exposed edges of the working platform (or any other place) where tools or materials could fall more than two metres.
Work Practices

- Securely fixed to the floor (or posts) and at least 150mm high. The gap between the toe board and the working platform must be no more than 10mm.

If edge protection cannot be installed, use a fall restraint or arrest system instead. For more on this, see work practice 2.11 (Height safety) in this manual.

Ensure that ground-based personnel are aware of the drop zone. If required, erect barriers or barricades around the base of the scaffolding. For more on this see work practice 2.11 (Height safety) in this manual.

Working platform

- Working platforms must:
  - have a slip-resistant surface
  - be carefully and routinely checked for faults
  - not be capable of uplift under working conditions
  - be level and free of tripping hazards.

- Ensure that the slope of the working platform does not exceed seven degrees from the horizontal.

- Use only full-width working platforms.

- Do not erect working platforms between adjacent mobile scaffolds.

- Do not use split-level working platforms.

Climbing to and from working platforms

- Use the ladder at a ratio of 4:1 and extend the top at least 900mm above the height of the working platform.

- Ensure that the ladder is footed or mechanically stabilised until it is secured.

- Before commencing work from the platform, secure the ladder to the scaffolding structure.

- Close the swivel gate guardrail after transferring from the ladder to the working platform.

- For tower scaffolds:
  - up to six metres – internal or external ladders may be used
  - over six metres – only internal ladders may be used.

- For mobile scaffolds – only internal ladders may be used that ascend through an approved landing with a hinged hatch.
Mobile scaffolding

- The height of a mobile scaffold must not exceed three times the length of its smallest base dimension.
- Do not exceed the manufacturer’s specified SWL.
- Do not modify components or use components that are not part of the original scaffold unless supplied by the manufacturer for that scaffold.
- Mobile scaffolding (fitted with castors) may only be used on a solid level surface and not within one metre of any slab edge or stepdown.
- Ensure that castors are locked and cannot be accidentally released when working from the scaffold.
- Do not release the wheel locks or relocate the scaffold unless the scaffold is unoccupied and all items on the scaffold have been secured against falling.
- Ensure that the castors cannot accidentally fall out of the scaffold tube if the assembly is lifted off the surface.

**Important**

Do not move the mobile scaffold while someone is on it.

Tower or independent scaffolding

- The height of the tower or independent scaffold must not exceed three times its smallest base width (unless specifically designed, and built per the manufacturer’s specifications).
- The minimum size of the base plates for independent scaffolding is:
  - square – 150mm x 150mm
  - circular – 170mm in diameter.

Insulated scaffolding

**Note**

Scaffolding made from an insulating material that has not been electrically tested, or is not within the test period, must be treated as non-insulated, but may still be used in an isolated and earthed environment.
Insulated scaffolding used for live working procedures must meet the following requirements.

- Must be approved fit for purpose and conform to AS 5804.1:2010 - 5804.3:2010 (referred to as platforms or towers in AS 5804:2010).

- Before erecting the scaffolding:
  - check that all scaffolding displays a test expiry date (month and year) and is within the expiry date
  - clean and dry then wipe it with a silicone-impregnated cloth.

- Store insulated scaffolding:
  - in a cool, dry area, free of chemicals, oils, solvents, damaging vapours, and fumes
  - ensuring there are no distortions and/or mechanical stress
  - out of direct sunlight.

- Test all insulated scaffolding as outlined in work practice 2.12 (High voltage tools and equipment – testing and use for substations) in this manual.

**Scaffolding taller than 4m**

- To erect or dismantle scaffolding that is more than four metres in height:
  - at least two personnel must be engaged in the process and
  - at least one of the personnel must be trained and certified in scaffolding with a have the following endorsements on their Network Authority Card (NAC):
    - trained and certified in scaffolding
    - a High Risk Work Licence (Scaffolding) classes (SB), (SI) or (SA).

  For more information on licence classes, see the Government of Western Australia, Department of Commerce website:

- Scaffolding may only be tagged as safe for use by a person who is:
  - trained and certified in scaffolding
  - a holder of a High Risk Work Licence (Scaffolding) classes (SB), (SI) or (SA), whichever is appropriate for the structure.
• Before assembly, determine the purpose and intended load of the scaffolding. This information must be included on a tag attached to the scaffolding and must be updated:
  ○ at least every 30 days
  ○ following any incident where the stability or adequacy of the scaffold is affected
  ○ following repairs
  ○ if a person or object could fall more than four meters off the scaffolding.
• Scaffolding tags must be attached at each access point and include the following details:
  ○ the date the scaffold was erected, altered or repaired
  ○ the name and signature of the person inspecting the scaffold
  ○ whether the scaffold is for light, medium or heavy duty use.
• Edge protection must be applied for scaffolds above four metres.

Periodic inspections

Carry out a detailed inspection of all scaffolding components at least every six months using the Scaffold inspection checklist (DM# 5236891).

References

• AS 5804.1-2010 – High-voltage live working – General
• AS 5804.2-2010 – High-voltage live working – Glove and barrier work
• AS 5804.3-2010 – High-voltage live working – Stick work
• Electrical System Safety Rules (ESSR), 2012 (DM# 9199327)
• Work Practice Manual:
  ○ work practice 2.11 (Height safety)
  ○ work practice 2.12 (HV insulated tools and equipment – testing and use for substations)
  ○ work practice 2.15 (Job briefing process)
  ○ work practice 5.3 (Transmission substation clearances)
  ○ work practice 5.13 (Safety observer role)
  ○ Appendix 1 (Tags and signs)
• Scaffold inspection checklist (DM# 5236891)
Further reading

- AS/NZS 1576.1: 2010 Scaffolding – General requirements.
- WA Occupational Safety and Health Regulations 1996, Part 3 (Workplace safety requirements), Division 7 (Scaffolds, gantries, hoardings and barricades and formwork).
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5.7 Construction Authority Work Permit

Purpose

This work practice outlines the requirements for the Network Total Workforce (NTW) to follow under the agreed conditions of a Construction Authority Work Permit (CAWP) when an operational permit is not appropriate.

Scope

This work practice applies to the NTW who install plant and equipment at Western Power construction sites.

Instructions

General

- All Western Power construction sites come under the control of the Construction Authority until handed over to Network Operations Control (NOC).
- The onsite person in charge must conduct a risk assessment and job briefing (see work practice 2.15 (Job briefing process) in this manual).
- The CAWP is used to record:
  - associated permits (if any) (see work practice 5.31 (Substation permits) in this manual)
  - nearest live apparatus (see work practice 5.3 (Substation clearances) in this manual)
  - barricades erected (see work practice 2.8 (Temporary barriers and signs) in this manual)
  - secondary isolations (see work practice 5.4 (Secondary isolations) in this manual)
  - working earths (see work practice 2.2 (Portable earthing/shorting equipment) in this manual)
  - personnel on the worksite
  - any other special conditions
- All equipment under the control of the Construction Authority must be barred off where practicable in accordance with work practice 2.8 (Temporary barriers and signs) in this manual.
Where the job is to take more than one day, the conditions of the CAWP must be reviewed with all personnel before starting work each day.

Where there is likely to be induced voltage, install working earths according to work practice 5.14 (Induced voltages in isolated conductors/apparatus), in this manual, and note the details on the CAWP.

### Issuing Construction Authority Work Permits

- The CAWP can be printed from DM (*Construction Authority Work Permit* (DM# 8689116)) or the *Forms* section on Depot Pack.
- The CAWP is completed/issued by the person in charge of the construction work for the work specified. It must be kept in the possession of the person in charge of the work or displayed at the entrance to the work area while work is being carried out.
- When completing the CAWP, the onsite person in charge must ensure that:
  - the conditions of the CAWP have been explained to the work team before starting the job
  - all members of the work team have signed onto the CAWP before beginning work
- Any personnel who permanently leave the construction site must sign off of the CAWP.
- Any personnel who temporarily leave the construction site must, on returning to the site and before recommencing work, check with the RIC to see if the conditions of the CAWP have changed.
- Any additional personnel arriving on the construction site must be told of the conditions, and must sign onto the CAWP before commencing work.
- The CAWP may be transferred between persons in charge. When this occurs the current person in charge must fully explain the conditions of the CAWP and be satisfied that they have been fully understood by the receiving person in charge.

### Cancelling Construction Authority Work Permits

Before signing off and cancelling the CAWP, the person in charge of the construction work must ensure that

- all members of the work team have signed off the CAWP
- all the items listed in the cancellation section of the CAWP have been checked
Testing and commissioning

- The CAWP must be cancelled when the newly installed plant and equipment is handed over to the Commissioning Authority. The issuing officer must issue a Sanction to Test (STT) permit is issued to the tester in charge (TIC).
- If, after testing, access to the plant or equipment is required for further work, a new CAWP must be issued.

**Note:**

- A CAWP and a STT permit must not co-exist on the same plant or apparatus at the same time.
- Where part of the new construction has been handed over to the Commissioning Authority, a new CAWP defining the new boundaries of the safe work area must be issued to the work team in accordance with this work practice.

**References**

- Transmission Substation Work Practice Manual:
  - work practice 2.2 (Portable earthing/shorting equipment)
  - work practice 2.8 (Temporary barriers and signs)
  - work practice 2.15 (Job briefing process)
  - work practice 5.3 (Substation clearances)
  - work practice 5.4 (Secondary isolations)
  - work practice 5.14 (Induced voltages in isolated conductors/apparatus)
  - work practice 5.31 (Substation permits)
- Electricity System Safety Rules (ESSR)
- Construction Authority Work Permit (DM# 8689116)

**Further reading**

- Work Process/Practice – Handover Certificate (DM# 8497265)
- 7.6 – Construction authority Work Permits for Substations (DM# 4062383)
- Handover certificate process (DM# 7675545)
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5.8 Mobile elevated work platform (EWP) safety

Purpose

This work practice outlines the safety requirements when working from and around an EWP while inside a transmission substation.

Instructions

EWP operators, occupants and safety observers

- All EWP operators must possess a *High Risk Work Licence* for the EWP being used.
- All EWP operators must be trained and competent in the use of emergency retrieval systems relevant to the EWP they are using (e.g. Leguan 110 has a manual recovery system).

**Note:**

Refresher training must be undertaken every 12 months – a grace period of six weeks applies at the end of the 12 month period.

- The EWP basket operator must be competent in emergency descent rescue.
- In addition to operational personal protective equipment, all occupants of the EWP basket must wear approved fall protection equipment.
- The EWP ground-based operator must be competent in the operation of the EWP.
- When a safety observer is appointed they must be:
  - competent in the recognition of all workplace hazards relevant to the task and the operation of the EWP
  - trained and competent in the use of emergency retrieval systems relevant to the EWP being observed.

For more information see work practice 5.13 (Safety observer role) in this manual.

The onsite person in charge must:

- observe substation entry requirements (see work practice 9.2 (Substation entry requirements) in this manual)
- record attendance in the substation logbook
- identify and issue any permit required for the task
Work Practices

- establish a worksite evacuation plan relevant to the task (see work practice 2.1 (Worksite evacuation plan) in this manual)
- conduct a risk assessment and job briefing. The risk assessment must record any safety observers. For more on:
  - job briefings, see work practice 2.15 (Job briefing process)
  - safety observers, see work practice 5.13 (Safety observer role).
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- ensure that a drop zone is established (see work practice 2.11 (Height safety) in this manual).

Using the EWP

- Perform the log book pre-start EWP operations check.
- Due to the proximity of uninsulated HV electrical apparatus within the substation a safety observer must be appointed:
  - while the EWP is being manoeuvred (this includes travelling inside the substation) and positioned into the work position
  - if the work requires the work platform to be repositioned at any time and there is a risk of encroaching on the safe working clearances.
    If safe clearances cannot be maintained, additional isolation must be carried out and the risk assessment revised.
- When travelling in a substation, all EWP booms must be kept in the stowed position.
- When travelling within a live substation, securely attach a trailing 10mm diameter bright or galvanised drag chain to the EWP (minimum 150mm of chain in contact with ground).
- The EWP must have an insulation rating equal to, or greater than, the voltage of any energised apparatus within the maximum reach of the boom and basket.
  - Insulated EWP’s must be electrically tested every six months (three week grace period) and the electrical test sticker in the cab of the vehicle must be replaced after the test is passed.
  - An insulated EWP that does not display a current electrical test sticker or carry an electrical test certificate is classified as non-insulating and must not be used on the network.
Note:

- A minimum 132kV insulated EWP must be used for 220kV and 330kV transmission line and associated works; however, it must be considered as an uninsulated EWP.
- Follow the clearances in work practice 5.3 (Substation clearances) in this manual.
- For vegetation works, see work practice 5.17(Vegetation management and weed control in substations) in this manual.

- The EWP must be fitted with an emergency descent device (EDD).
- Only operate an EWP when the wind velocity is less than 45 km/h.
- Do not exceed the EWP basket safe working load.
- Attach the fall protection harness to the EWP basket anchor point before operating the boom.
- Where possible, physical barriers must be used to prevent the EWP from entering the exclusion zone.
- Before operating an EWP, always ensure that:
  - the EWP vehicle is level
  - basket-bonding links have been removed.
- When performing any work, stay inside the basket and have at least one foot on the basket floor.
- If transferring between an EWP basket and a tower structure or an approved working platform, always remain attached while transferring. All work processes are prohibited during the transfer movement.
- When working near energised apparatus:
  - do not compromise the insulated fibreglass section of an EWP boom
  - ensure that portable earths are clear from the boom
  - ensure that extension leads for portable power tools are clear from the boom
  - cover any exposed live conductors
Note:

When the EWP is not being used for spray washing, ensure that the spray washing hose is disconnected to create a minimum 800mm gap across the insulated section of the boom.

**In an emergency**

- If an EWP has mechanical failure and cannot be lowered and the personnel are safe, they must remain in the bucket until a second EWP arrives onsite to effect a rescue.
- The EDD rope-style device is only to be used in time-critical, life threatening situations.
- Never tamper with the ‘deadman’ basket control to bypass its manual function.

**Travelling in EWP baskets**

- A risk assessment must first be undertaken to identify all foreseeable hazards and to ensure risk controls are implemented.
- EWP booms must be kept in the stowed position.
- The vehicle must not exceed the speed of 6km/h.
- Personnel travelling in the basket must wear a suitable safety harness and lifeline arrangement at all times (this excludes the scissor lift platform).

**Escorting a person in an EWP basket**

- An escorted person is defined as someone who is authorised to ascend in an EWP basket but is prohibited from performing any operational work. The escorted person:
  - may observe, take photographs or make a movie on behalf of Western Power
  - must not operate any EWP controls.
- An accredited EWP basket operator must accompany the escorted person.
- The EWP basket operator must:
  - provide the escorted person with an induction that includes the operation of the EWP and the correct use of the fall arrest harness
  - not allow the basket to encroach any safety clearances.
If, in the event of an EWP mechanical failure, the escorted person is not trained in the use of EDD, then the EDD must not be used. Lower the EWP basket by the base controls.

**Uninsulated EWPs**

- Uninsulated EWPs may only be used to work on apparatus that is isolated and earthed. Do not use uninsulated EWPs when working on or near live or de-energised apparatus.
- Uninsulated EWPs must not enter the safe working clearances (see work practice 5.3 (Substation clearances) in this manual).

**Insulated EWPs**

- Use an insulated EWP when it has been identified during the pre-planning or risk assessment process that the section safety clearance could be encroached on when work is carried out on de-energised and earthed apparatus.

**Scissor lift platforms**

- A fall arrest system is not required to be worn on a scissor lift platform, unless advised by the manufacturer or a person in control of the workplace. If a fall arrest system is required to be worn, a suitable anchor point must be provided.

**Ground approach distance (GAD)**

- Everyone involved in EWP operations must maintain a GAD around the base of the EWP (stabilisers/outriggers included) when used near live apparatus. See Table 1 and Figure 1, below.
- Where a GAD must be maintained, a barrier must be placed around an EWP prior to the boom operation where inadvertent electrical contact may occur. This is for the protection of personnel.
- Personnel must not enter the GAD if the apparatus being worked on is 66kV or above. For voltages of 33kV or below, personnel may only enter the GAD if they wear gloves rated to the voltage of the apparatus within the boom reach.

**Table 1: EWP ground approach distance (GAD)**

<table>
<thead>
<tr>
<th>Voltage of conductor</th>
<th>Ground approach distances (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low voltage</td>
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</tr>
<tr>
<td>High voltage 1kV up to 33kV</td>
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</tr>
</tbody>
</table>
### Work Practices

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<tr>
<td>132kV</td>
<td>1,800</td>
</tr>
<tr>
<td>Over 132kV</td>
<td>3,000</td>
</tr>
</tbody>
</table>

**Figure 1: Ground approach distance example**

**Earthing the EWP**

- The EWP must be earthed to the substation earth grid.
- Before use, inspect the earth lead and confirm:
  - that the test date is not expired
  - the tightness of bolted connections
  - the general condition of earthing leads.
- Earth leads must be a minimum of 150mm² aluminium when working in a substation.
- If more than one mobile plant is involved:
  - if they are within a distance of two metres of any part of each other – they must be connected (bonded) to a common earthing point
  - if they are separated by more than two metres – each mobile plant must have its own direct earth connection applied and there must be a minimum of five metres between the earth points.
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- The earth lead must be bolted to the vehicle or plant chassis or connected with a screw-on clamp. See Figures 2 and 3 for examples.

Figures 2 and 3: Examples of EWP earth connections

- A G-clamp must be used to securely connect the earth lead to the substation earth grid.

Note:
Spring loaded clamps must not be used to secure the earth lead to either the vehicle, temporary earth electrode or permanently installed earth point.

- Personnel must stand on an equipotential mat while operating base controls on a stationary vehicle or plant. Attach the earthing lead of the equipotential mat (either bolted or clamped) to the approved bonding point or a clean metal surface on the vehicle.

Cleaning and maintenance of EWPs

- Wash and clean the inside and outside of insulated EWP boom sections every six weeks, or more regularly if used in harsh conditions.
- Use recommended methods and substances to polish the fibreglass. Contact Western Power Fleet for advice on cleaning products.
- After cleaning, rinse well with water to remove any residue.
- Ensure the insulated EWP boom sections are completely dry before using for work on live equipment.
• Report cracks or damage found in the fibreglass section of an EWP boom to the formal leader. The EWP must be tagged with an ‘Out of service’ warning tag and must not be used until after it has been repaired, tested and approved for use.

Contract EWPs

A hired EWP operating on Western Power assets must be inspected prior to use in accordance with the *Plant hire sheet for contractor use* (DM# 6617609).

References

•  *AS 2550.10-2006 Cranes, hoists and winches - Safe use Part 10: Mobile elevating work platforms*
•  *Plant hire sheet for contractor use* (DM# 6617609)
•  *Transmission Substation Work Practice Manual*:
  o  work practice 2.2 (Use and management of overhead portable earthing / short circuiting equipment)
  o  work practice 2.11 (Height safety)
  o  work practice 2.15 (Job briefing process)
  o  section 3 (Personal protective equipment)
  o  work practice 5.3 (Substation clearances)
  o  work practice 5.13 (Safety observer role)
5.9 Crane use in substations

Purpose

This work practice outlines the safe work requirements when operating a crane in a substation.

Scope

This work practice is applicable to crane operators.

For information on the role of a dogger, including when a dogger is required on Western Power construction sites, see work practice 5.10 (Dogger – transmission substation) in this manual.

Authorisation and training

- The onsite person in charge must possess a Network Access level 3 (NA3) authorisation.
- The crane operator must:
  - be competent to perform the task
  - have a *High Risk Work Licence* for the crane they are operating
  - have a Network Authority Card (NAC)
  - have Network Access level 2 (NA2) or be directly supervised by a person with Network Access level 3 (NA3)

**Note:**

To use supplementary attachments such as the ones listed below, the crane operator must have completed the relevant additional training:

- pendulum borer
- hydraulic pole jacks
- screw anchors

This training is covered by courses such as *Crane operator supplementary*, supplied by Power Training Services WA (PTSWA).
Instructions

Before commencing work:
• ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
• ensure that a drop zone is established (see work practice 2.11 (Height safety) in this manual)

Important

• If any part of the crane or the load is at risk of encroaching into section or horizontal work safety clearances to live equipment, then the risk assessment must note this condition and the following controls must be implemented:
  o increased supervision
  o appointment of additional safety observers
  o attachment of additional (non-conductive) tag lines to the load
• Follow safety the clearances in work practice 5.3 (Substation clearances) in this manual.

The onsite person in charge must:
• observe substation entry requirements (see work practice 5.2 (Substation entry requirements) in this manual)
• observe applicable permitting processes
• record attendance in the substation logbook
• identify and issue any permit required for the task
• establish a worksite evacuation plan relevant to the task (see work practice 2.1 (Worksite evacuation plan) in this manual)
• conduct the risk assessment and job briefing. The risk assessment must record any safety observers. For more on
  o job briefings, see work practice 2.15 (Job briefing process)
  o safety observers, see work practice 5.13 (Safety observer role)
• confirm that all persons involved in the task understand the risk controls
• determine if a dogger is required
• position barriers and/or signs to mark the perimeter of the work area
The crane operator must:

- perform the logbook pre-start crane operation checks
- check and inspect all chains, slings and other lifting devices for wear, tear damage and counterfeit
- comply with the crane manufacturer’s specifications and recommendations
- ensure that the crane is suitable for the lift capacity and jib manoeuvrability
- never leave the crane unattended unless all safeguards have been implemented
- control any risks associated with step and touch potential by imposing a ground approach distance (GAD) in accordance with the *Ground approach distance* section, below
- earth the crane in accordance with the *Earthing of cranes* section, below
- where practicable, position the crane so that the maximum reach of the jib is unable to enter the minimum approach distance of live or de-energised apparatus. Consider inadvertent movement clearances.
- position the crane and outriggers on stable ground. Be aware of cable trenches.
- when using side controls:
  - stand on an equipotential mat electrically bonded to the vehicle. For more on this, see the *Earthing of cranes* section, below.
  - or
    - wear insulated gloves rated to at least the voltage of the nearby conductors
- attach non-conductive 16 mm tag lines to the suspended load to provide additional manoeuvring control
- stow the crane jib when travelling (except when performing pick and carry movements)
- only drive the crane across trafficable trench or cable covers
- only use the crane for lifting or supporting disconnected apparatus
- comply with the maximum 15 km/h speed restriction. When performing pick and carry movements, do not exceed walking speed.
- when travelling within a live substation, securely attach a trailing 10 mm diameter bright or galvanised drag chain to the crane (minimum 150 mm of chain in contact with ground)
when using chain shorteners:
  - the safe working load (SWL) of the chain is reduced. The specific chain load chart (which may be found on a plate attached to the device) for the lifting equipment must be checked before use. If the information cannot be sourced, do not use the chain shorteners.
  - ensure that claw-type shorteners are securely fitted, as any sideways pressure that is applied to the link may cause it to twist which could result in, the load falling

Note:
Chain shorteners must not be used when raising or lowering poles into ground holes.

Ground approach distance

- Everyone involved in crane operations must maintain a GAD around the base of the crane (stabilisers/outriggers included) when used near live apparatus. See Table 1 and Figure 1, below.
- Where a GAD must be maintained, a barrier must be placed around a EWP prior to the boom operation where inadvertent electrical contact may occur. This is for the protection of personnel.
- Personnel must not enter the GAD if the apparatus being worked on is 66 kV or above. For voltages of 33 kV or below, personnel may only enter the GAD if they wear gloves rated to the voltage of the apparatus within the boom reach.

Table 1: Crane ground approach distance (GAD)

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<td>Over 132 kV</td>
<td>3,000</td>
</tr>
</tbody>
</table>
Work Practices

Figure 1: Ground approach distance example

**Earthing of cranes**

- The crane must be bonded to the substation earth grid with an earth lead that is a minimum of 150 mm² aluminium.
- Before use, inspect the earth lead and confirm:
  - that the test date is not expired
  - the tightness of bolted connections
  - the general condition of earthing leads
- The earth lead must be bolted to the vehicle or plant chassis or connected with a screw-on clamp. See Figures 2 and 3 for examples.
- If more than one mobile plant is involved:
  - if they are within a distance of two metres of any part of each other – they must be connected (bonded) to a common earthing point
  - if they are separated by more than two metres – each mobile plant must have its own direct earth connection applied and there must be a minimum of five metres between the earth points.
- A G-clamp must be used to securely connect the earth lead to the substation earth grid.

**Note:**

Spring loaded clamps must not be used to secure the earth lead to either the vehicle, temporary earth electrode or permanently installed earth point.
Personnel must stand on an equipotential mat while operating base controls on a stationary vehicle or plant which is working on or near live HV overhead electrical apparatus. Attach the earthing lead of the equipotential mat (either bonded or clamped) to the approved bonding point or a clean metal surface on the vehicle.

Figures 2 and 3: Examples of earth connections

References

- Transmission Substation Work Practice Manual:
  - work practice 2.2 (Use and management of overhead portable earthing / short circuiting equipment)
  - work practice 2.15 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 5.2 (Substation entry requirements)
  - work practice 5.3 (Substation clearances)
  - work practice 5.10 (Dogger – transmission substation)
  - work practice 5.13 (Safety observer role)
5.10 Dogger – transmission substation

Purpose

This work practice outlines the requirements for doggers to sling and direct loads to be lifted by cranes on Western Power worksites.

The onsite person in charge must provide a dogger on a construction site wherever there is a requirement to:

- apply slinging techniques to a load, including:
  - calculating the safe angle for sling or chain
  - selecting the type of sling or chain to be used
  - selecting the correct method to secure the load
  - selecting the safe method to lift or turn the load
- direct the operator of a crane or hoist in the movement of a load when the load is out of the view of the operator

Authorisation

The dogger must:

- meet the requirements for worksite access. For more on this, see work practice 5.25 (Construction site access – minimum requirements) in this manual.
- possess a current High Risk Work Licence – DG
- when working near live conductors or apparatus, be authorised and qualified to work on that equipment or have a competent and authorised safety observer assigned

Safety

The onsite person in charge must ensure that the team carrying out the lift:

- participates in a risk assessment and job briefing (see work practice 2.15 (Job briefing process) in this manual)
- complies with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- is aware of any safety clearances that must be maintained for each lift (see work practice 5.3 (Substation clearances) in this manual)
- plans each crane lift appropriately
Instructions

Prior to any lift

- The onsite person in charge must ensure that:
  - the necessary tools and equipment required by a dogger are available for the task before a lift is carried out (e.g. communication device, barricades, and the appropriate slings, chains and shackles for the lift)
  - a drop zone is established. For more on this, see work practice 2.11 (Height safety) in this manual.

- The dogger and crane operator must work together to:
  - complete an assessment of the worksite and scope of the lift, including the safe working load (SWL) of lifting equipment. If required, they must develop a preliminary dogging plan.
  - apply all controls that are required to eliminate or reduce the risk of injury or damage
  - establish a communication system suitable for the environment such as:
    - voice
    - hand signals
    - whistle signals
    - two-way radio

- The dogger must:
  - inspect the required lifting gear and tag and remove any unserviceable equipment
  - calculate the approximate load weight and centre of gravity prior to the lift
  - ensure that the lifting gear is connected to the load in accordance with the manufacturer’s specifications

During the lift

- If at any time the load will be out of the crane operator’s view during the lift, the dogger must:
- direct the crane operator until the load is in its final position
- adopt a position where the dogger is able to view the load throughout the entire lift and can provide their undivided attention to the crane operator
Note:
Work must cease if the dogger’s view is impaired.

- ensure that the crane operator ceases all crane movements if, for any reason, the dogger has to leave their position
- stop the crane operation if an at-risk situation is imminent. The dogger or any member of the team can raise the alarm.

Chain shorteners

- Ensure that claw-type shorteners are securely fitted as any sideways pressure that is applied to the link may cause it to twist which could result in the load falling.
- When using chain shorteners, the SWL of the chain is reduced. The dogger must check the specific chain load chart (which may be found on a plate attached to the device) for the lifting equipment before use. If the information cannot be sourced, do not use the chain shorteners.
- Chain shorteners must not be used when raising or lowering poles into ground holes.

References

- Transmission Substation Work Practice Manual:
  - work practice 2.15 (Job briefing process)
  - work practice 2.11 (Height safety)
  - section 3 (Personal protective equipment)
  - work practice 5.3 (Substation clearances)
  - work practice 5.9 (Crane use in substations)
  - work practice 5.13 (Safety observer role)
  - work practice 5.25 (Construction site access – minimum requirements)

Related reading

- AS 2550.1-2011: Cranes, hoists and winches - Safe use - General requirements
5.11 Rigging

Purpose

This work practice outlines the minimum requirements for undertaking rigging work in transmission substations.

Safety

- Before commencing work:
  - conduct a risk assessment and job briefing (see work practice 2.15 (Job briefing process) in this manual)
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- If minimum approach distances (MADs) could be breached, a safety observer is required (see work practice 5.13 (Safety observer role) in this manual)
- Ensure that a drop zone is established (see work practice 2.11 (Height safety) in this manual).

Training and authorisation

A person undertaking rigging on a Western Power construction site must:

- (as a minimum) possess a current High Risk Work licence, Basic rigging ‘RB’
- meet the requirements for worksite access (see work practice 5.25 (Construction site access – minimum requirements) in this manual).

Rigging qualifications

Rigging license levels are listed in the National Standard for Licensing Persons Performing High Risk Work (2006), Schedule – Licence classes and definitions.

**Basic rigging (high risk endorsement ‘RB’)** – consists of dogging and rigging work involving:

- movement of plant and equipment
- steel erection
- hoists (including mast climbing hoists)
- placement of pre-cast concrete
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- safety nets and static lines
- perimeter safety screens and shutters
- cantilevered crane-loading platforms

**Intermediate rigging (high risk endorsement ‘RI’)** – consists of all basic rigging listed above and:
- cranes and excavators
- tilt slabs
- hoists with jibs and self-climbing hoists
- demolition
- dual lifts

**Advanced rigging (high risk endorsement ‘RA’)** – consists of all basic and intermediate rigging work outlined above and the following:
- gin poles and shear legs
- flying foxes and cableways
- guyed derricks and structures
- suspended and fabricated hung scaffolds

**General**

- All lifting activities relating to work that is done by the Network Total Workforce in a substation is to be overseen by an authorised Western Power representative. The authorised person must ensure that any lifting work is supervised and carried out by a competent, qualified person (e.g. rigger, dogger, or a crane operator).
- Any lifting work undertaken as part of a works contract must clearly be identified as part of the initial contract schedule.
- Lifting work which is undertaken on a new site under construction is to be assessed, reviewed and authorised by Western Power prior to commencement. Western Power may provide a suitable person to oversee this work.
**Instructions**

- Any rigger who undertakes dogging must do so in accordance with work practice 5.10 (Dogging – transmission substation) in this manual.
- Except for emergency stop signals (e.g. whistle of a safety observer), ensure that the crane operator responds only to the designated signal person.
- Stop a lift if an unsafe condition is suspected.
- Never exceed a component’s rated capacity.
- Inspect rigging equipment before, during and after using. If defective, immediately remove from service. Do not weld or alter any rigging or lifting devices.
- If the rigging equipment, lifting device, or crane has been shock-loaded, stop the work and inspect the equipment immediately.

**References**

- Transmission Substation Work Practice Manual:
  - work practice 2.15 (Job briefing process)
  - work practice 2.11 (Height safety)
  - section 3 (Personal protective equipment)
  - work practice 5.10 (Dogger - transmission substation)
  - work practice 5.13 (Safety observer role)
  - work practice 5.25 (Construction site access – minimum requirements)

**Further reading**

- Safe Work Australia - National Standard for Licensing Persons Performing High Risk Work
- Occupational Safety and Health Regulations 1996 – REG 3.23 (Material etc. being lifted etc. by crane etc. at construction site, duties of main contractor etc. as to)
- Department of Commerce, Government of Western Australia, High Risk Work – Classes of Licence.
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5.12 Storage, handling, transport and disposal of sulphur hexafluoride (SF₆) gas

Purpose
Describe the minimum requirements for safe handling, storage, maintenance, repair, transport and disposal of equipment containing SF₆ gas.

Safety aspects and implications
SF₆ gas is colourless, odourless, tasteless, non-toxic and non-combustible. However, SF₆ gas can be a risk to human health due to toxic by-products and its potential to displace oxygen in confined spaces.

DANGER
Sulphur hexafluoride (SF₆) gas is five times heavier than air. Escaped SF₆ gas will displace oxygen at ground level, especially in confined spaces. If SF₆ gas is present, it could present a danger of asphyxiation due to oxygen deficiency to anyone working in enclosed areas, including a vehicle’s cab or cargo-carrying area.

Environmental aspects and implications
SF₆ gas is a greenhouse gas with a global warming potential 23,000 times more than carbon dioxide.

Instructions
• Follow the manufacturer’s instructions and the SF₆ Material Safety Data Sheet (MSDS) to handle, store, maintain, repair, transport and dispose of SF₆ filled equipment.
• Ensure that SF₆ does not leak into the atmosphere.

Safety
• When working with equipment containing SF₆ gas, wear personal protective equipment (PPE). See field instruction 3.1 (Clothing and personal protective equipment requirements) in this manual. The minimum PPE is Level 1, in addition to specialist PPE according to the task (see AS 2791 (High-voltage...
switchgear and controlgear – Use and handling of sulphur hexafluoride (SF₆) in high-voltage switchgear and controlgear, Annex E). This may include:

- SF₆ coveralls with hood (WP stock code GZ9254)
- disposable gloves (preferably nitrile or neoprene)
- full-face respirator fitted with organic vapour canister, e.g. filter 510 (WP stock code GZ9256) or gas filter against organics (WP stock code GZ9257). Alternatively, a suitable respirator and chemical type industrial goggles may be used.
- safety footwear covers.

- A Confined Space Entry permit is required when working in confined spaces (see field instruction 2.5 (Confined space safety)).

- Wherever there is high volume SF₆-filled equipment, the following requirements must be met.
  - If any enclosure, e.g. cable trenches and pits, near the equipment has been identified as a confined space, permanent exhaust fans must be installed to evacuate gas from the confined space.
  - Fit exhaust fans with an inlet pipe extending to the lowest level of the space, ensuring the removal of SF₆ from the work area is to an open or well-ventilated area.
  - If the equipment is in an enclosed or partially enclosed area, the area must be adequately ventilated before doing any work.

Handling and recovery

- Anyone working with equipment containing SF₆ gas must:
  - be trained and found competent to operate SF₆ evacuation and filling devices
  - follow the safety recommendations contained in the SF₆ MSDS
  - ensure that the gas does not come in contact with heat, sparks, open flames or other ignition sources as it can produce toxic by-products

- During planned maintenance or repair work, use a SF₆ evacuation and filling device to reclaim and process SF₆ and return the withdrawn SF₆ into the equipment being maintained or repaired.

- A circuit breaker must be evacuated and filled according to the manufacturer’s instructions.
• Any SF₆ that is recovered but not returned into equipment must be returned to a either of the following Western Power depots
  o Kewdale
  o Jandakot
• Maintenance on SF₆ equipment must be done in a ventilated area.
• Neutralise by-products, e.g. with hydrolysed lime, and extract with a Hazmat-rated vacuum cleaner.

Storage

• The storage compound for SF₆ cylinders must be:
  o well ventilated and preferably located outdoors
  o free from fire risks and away from sources of heat and ignition
  o kept clear and access restricted to authorised personnel only
  o clearly labelled as a cylinder store and the appropriate hazard warning signs displayed
• Smoking and naked flames are not allowed near the cylinder storage compound.
• Cylinders must be:
  o clearly labelled as containing new or used gas
  o separated into groups of new (i.e. full cylinders), used (i.e. partially full cylinders) and empty
  o arranged so that oldest stock is used first
  o stored upright and correctly secured to prevent toppling. The cylinder valves must be tightly closed and, where appropriate, valve outlets capped or plugged.
  o where possible, standing on an open galvanised steel grid to reduce corrosion of the cylinder base
  o periodically checked for general condition and leakage
Transporting

The following transport requirements must be followed.

- Before loading the vehicle:
  - ensure that the cylinders are manufacturer-approved, and free from defect or modification
  - remove any regulators or other equipment – the cylinder must not be transported with these attached
  - firmly tighten (do not over-tighten) the cylinder valve handwheel and check that it is properly closed. Use the valve outlet sealing nut when available.
  - carefully check for gas leakage using leak detection fluid (see your gas supplier)
- Cylinders must not be transported in the cab of the vehicle.
- Never transport a cylinder if a leak has been detected during loading.
- Do not remove any valve protection device (if fitted) during transport.
- Because ventilation and cooling decreases considerably when the vehicle is stopped or parked:
  - do not leave cylinders for long periods (more than 1 hour) in the sun (heat build-up)
  - do not store in closed vehicles parked overnight (gas leak)
  - unload the cylinders immediately upon arrival at your destination
- Cylinders must be removed from the vehicle and secured upright before attaching regulators and subsequent use.

Transporting cylinders in a utility vehicle

In addition to the requirements already listed, there are special requirements to follow when transporting SF₆ gas cylinders in a utility vehicle under 3.5 ton gross laden weight. The total weight of the cylinders must not exceed 250 kg.

- Vehicles without a canopy – preferred method
  - Transporting cylinders upright against a headboard is the preferred and safer method.
  - Restrain the cylinders by containing them in a purpose-built frame (preferably) or lashing them to the vehicle body.
Work Practices

Secure tightly with at least two horizontal straps, as shown below.

Vehicles with a canopy

- If transporting cylinders lying down in a utility vehicle that has a canopy, do the following.
- Ensure that the area where the cylinder is stowed is very well ventilated.
- Place the cylinders:
  - on a purpose-built cradle (preferably) or chocks on the deck, as shown in the diagram below
  - lengthwise on the deck with the base blocked against the headboard or another strong part of the load and with the valves facing rearwards
- Secure tightly with at least one strap to prevent the cylinders from rolling or sliding, as shown below.


Disposal

- Recover all the remaining SF\(_6\) before disposing of SF\(_6\)-filled equipment.
5.12 Storage, handling, transport and disposal of sulphur hexafluoride (SF₆) gas

- Neutralise all failed or decommissioned equipment previously filled with SF₆ before disposal, salvage or repair.

- Treat all of the following as 'controlled waste':
  - failed or decommissioned equipment containing SF₆ gas
  - by-products
  - SF₆ gas requiring treatment for re-use

References

- Transmission Substation Work Practice Manual, field instructions:
  - 2.5 (Confined space safety)
  - 3.1 (Clothing and personal protective equipment requirements)
- AS 2791-1996 (High-voltage switchgear and controlgear – Use and handling of sulphur hexafluoride (SF₆) in high-voltage switchgear and controlgear)
5.13 Safety observer role

Purpose

This work practice describes the role of the safety observer within Western Power and covers the following:

- Definitions applicable to this work practice.
- Tasks that require a safety observer.
- Identifying the need for a safety observer through risk assessment.
- Safety observer requirements.
- Appointing a safety observer.
- Responsibilities of the safety observer.
- Responsibilities of the person in charge (PIC).
- Responsibilities of the workers being observed.
- Responsibilities of plant operators.
- Spotters.
- Rescue person.

Scope

This work practice describes the process for identifying when a safety observer is required when carrying out work on or near the Western Power Network. A safety observer is mandatory for certain tasks and is subject to a risk assessment for others.

Definitions applicable to this work practice

The following terms are used within this work practice:

- **Working-live** – moving and/or manipulating energised low voltage (LV) or high voltage (HV) uninsulated conductors, lines or apparatus.
- **Working-on** – using insulated tools and the appropriate Personal Protective Equipment (PPE) to work on fixed uninsulated energised LV equipment (i.e. terminal screws) where no uninsulated energised conductors or apparatus are moved or manipulated.
- **Testing** – using approved insulated test equipment, along with the appropriate PPE, for the purpose of testing only.
Work Practices

- **Near** – outside the minimum approach distance (MAD) but where there is a potential risk of persons, plant, tools or equipment coming within the MAD.

**Tasks that require a safety observer**

The following is a list of high risk tasks and situations where it is **mandatory** to appoint a safety observer prior to commencing work:

- Working-live HV using Glove and Barrier (G&B), Distribution Insulated Stick (DIS) or Transmission Insulated Stick (TIS) methods.
- Working in substations near live uninsulated HV electrical apparatus.
- Working-live, working-on or near uninsulated energised LV overhead lines or apparatus.
- Working-live on any uninsulated energised LV.
- Working near uninsulated live HV overhead lines or apparatus.
- Where any part of uninsulated plant has the potential to breach Minimum Approach Distances (MADs) to live uninsulated HV and LV overhead lines and/or apparatus.
- Vegetation management work near energised overhead conductors.
- For the load height indicator stick, when escorting high loads (restricted access vehicles).
- Where there are contract-specific requirements.

The safety observer matrix can be used to assist with determining if a safety observer must be appointed or whether the task can be risk assessed to determine if a safety observer is or is not required. See Table 1 in this work practice.

**Identifying the need for a safety observer through risk assessment**

There are tasks where it is mandatory to appoint a safety observer, as stated in this work practice. All other tasks must be risk assessed to determine if a safety observer will be required. If unsure or in doubt, appoint a safety observer.

The individual, work team and person in charge have the responsibility to decide if a safety observer or multiple safety observers need to be appointed. This must be identified at the job briefing and site risk assessment prior to commencing work.

As part of the risk assessment always consider the system protection, proximity to the point of supply and the potential fault current of the equipment that you will be working-on or near.
Factors to consider when determining if a safety observer is not required

Other than the mandatory requirements, the PIC is responsible for determining if a safety observer is not required through risk assessment.

Working near and/or moving and manipulating live totally insulated LV (e.g. LV ABC with no exposed parts) must be risk assessed to determine if a safety observer is required.

All testing must be carried out using approved insulated test equipment, the appropriate PPE and be risk assessed to determine if a safety observer is required.

A risk assessment must be used to determine if a safety observer is required when working-on or near energised uninsulated LV other than overhead lines. The following are some control measures that can be considered as part of the risk assessment and used to mitigate the need for a safety observer:

- Ensure that there are fixed barriers in place to protect against accidental contact.
- Temporary insulation (tape and end caps, etc.) has been fitted to uninsulated live parts.
- Ensuring adequate separation can be maintained between uninsulated live parts and personnel, plant, tools and equipment.
  - Allow for inadvertent movement when considering this.
- De-energising and/or isolating all or part of the live uninsulated apparatus.

The above should always be used in conjunction with the correct level of approved PPE. PPE must never be used as the primary control measure and must be considered as a secondary control or last line of defence should the primary control measure fail.

Note:

A safety observer is not required when working-live on Extra Low Voltage (less than 50V AC or less than 120V DC nominal) unless the risk assessment determines otherwise.

The site risk assessment must be used to record the following information:

- All control measures that have been implemented and that negate the need for a safety observer to be appointed.
- The name of the safety observer or observers.
Work Practices

- Each time the safety observer is rotated (changed).
- The method of general communication (e.g. two-way radios or mobile phones) if voice alone is not adequate due to the environment.

**Safety observer requirements**

The role of the safety observer carries a high level of responsibility. The safety observer must have a high regard for safety, be familiar with the task and be fully aware of the potential risks and hazards associated with the work being performed. In addition, the safety observer may also need:

- specific authorisation and/or qualification for certain high-risk work
- to have been trained in any specific rescue procedures relevant to the task
- to be trained and authorised in the operation of any plant and machinery that is required for rescue purposes
- to be familiar in the use of any onsite communication system.

**Appointing a safety observer**

It is the responsibility of the PIC to assign the safety observer role to a member of the working party. The PICs decision must be based on the team member having:

- sufficient knowledge and experience of the work being undertaken
- an understanding of how the work is to be executed
- knowledge of the applicable MADs to anticipate the range of possible movements
- training in any applicable rescue methods required for the work being observed
- authorisations where required to perform the role (e.g. G&B and DIS).

The designated safety observer or observers must be recorded on the site risk assessment.

More than one safety observer may need to be appointed depending on the task being undertaken.

The appointment of the safety observer must not be regarded as the sole control measure for the high risk work. Additional site specific control measures for the high risk work must be recorded on the site risk assessment.
Note:
An apprentice cannot act as a safety observer unsupervised. For more information on the level of supervision required refer to On-the-job supervision of Certificate III Electrotechnology and Electricity Supply Industry Apprentices (DM# 6741943).

Responsibilities of the safety observer

The safety observer is responsible for observing and warning the working party of any potential hazards, unsafe conditions and where applicable lack of compliance with approved work practices, procedures and principles.

The safety observer must:

- Give undivided attention to those performing the work.
- Not undertake any other work activities while performing the safety observer role.
- Wear the approved green safety observer arm band and lanyard with whistle around the neck at all times while performing the safety observer role.
- Monitor the work activity being carried out and have the authority to suspend the work at any time.
- Use one sharp blast of the whistle to stop work and warn personnel of imminent risk, hazard or non-compliance.
- Immediately stop the work for any imminent risk situation that could result in an incident, and instruct when it is safe to proceed.
- Give timely warnings of any risk or non-compliance with safe work procedures.
- Not observe more than one work team or plant at any time.
- Maintain effective communication with the work team at all times.
- Not use communication devices, such as mobile phones and radios, unless they are the agreed communication method to be used with the working party being observed.
- Be in position prior to the working party commencing work.
- Fully understand and be comfortable with the role that they are performing.
- Not have any known temporary or permanent disabilities that would prevent them from properly performing the role.
Work Practices

- Rotate if fatigue becomes a risk factor. If there is no other safety observer to rotate with, work must be suspended until the safety observer is rested and can resume with their duties.
- Notify the person in charge of fatigue before focus is lost.
- Conduct a handover (record on site risk assessment) by discussing the task with the new safety observer and those being observed when replaced (rotated).
- Instruct the workers being observed to pause work whenever the safety observer becomes distracted.
- Be positioned at a suitable location to effectively observe both the work being performed and plant being used.
- Remain outside of the minimum approach distance (MAD). For more on this, see Electrical System Safety Rules, section 6 ‘Approach to electrical apparatus’.
- Be trained, prepared and ready to perform a rescue, if required,
- Provide an eyewitness account of a worksite incident, if required.

Note:
A Recipient in Charge (RIC) or Tester in Charge (TIC) may also be a safety observer but they must not carry out both roles at the same time. For example:

- Work must be suspended if the RIC/TIC who is acting as the safety observer needs to induct additional recipients to site. Work cannot continue until the RIC/TIC can give their full undivided attention to the safety observer role.

There must always be a clear distinction and communication when switching between the responsibilities of these two roles.

Responsibilities of the person in charge

The onsite person in charge must:

- Confirm that the safety observer to be appointed understands the hazards involved with the high risk work to be undertaken and where applicable the relevant work practices, procedures and principles.
- Ensure the safety observer has the necessary rescue training and/or authorisation, where required.
- Appoint and instruct the safety observer in their duties.
- Clearly define the work activity that is to be observed.
• Ensure that there are sufficient ground personnel so that the safety observer is not distracted while performing their duty.

• Establish and ensure sufficient barriers/cones and/or spotters to control the drop zone.

• Provide sufficient safety observers for rotation during tasks that take place over extended periods or when heat stress is a factor.

• Provide any tools and equipment required by a safety observer, e.g. whistle, two-way radio, pole top rescue kit.

Responsibilities of the workers being observed

The workers being observed must:

• Acknowledge that the safety observer has the authority to suspend the work at any time.

• Verbally respond to the safety observer to confirm their understanding of any instructions or warnings.

• Inform the safety observer if there is a change to the previously agreed scope of work.

• Stop work immediately when they hear the safety observer’s whistle and communicate with the safety observer.

• During live work only – pause work and stay outside of the MAD when the safety observer has to change position or is being replaced.

Responsibilities of plant operators

When the site risk assessment has identified the need for a safety observer, to warn against possible breaches of the MADs by plant, then the plant operator has the following responsibilities:

• Ensure that the safety observer has been appointed and is in position prior to commencing work.

• Ensure that the safety observer fully understands the task to be undertaken.

• Maintain effective communication with the safety observer at all times.

• Listen and actively follow instructions given by the safety observer.

• Ensure MADs are not breached.

• Stop work immediately when they hear the safety observer’s whistle and communicate with the safety observer.
Spotters

A ‘spotter’ is not a ‘safety observer’ as a spotter does not have the same level of responsibility as a safety observer.

It is the responsibility of the individual, team and PIC to determine if a spotter needs to be appointed. This must be identified at the job briefing and site risk assessment prior to commencing work.

The following are some examples of where a spotter will be required:
- Controlling the drop zone.
- Controlling the Ground Approach Distance (GAD) to vehicles and plant.
- Restricting access to the work site.
- Escorting members of the public around the work site.
- When working in excavations.
- Reversing of heavy vehicles.
- Watching an excavator working close to HV underground cables.

Rescue person

The safety observer or spotter may also be the rescue person as long as they have been trained in the rescue method required for the task.

It is mandatory to appoint a rescue person for certain high risk tasks. The following are some examples of tasks where it is mandatory to appoint a rescue person:
- Live LV cable jointing.
- Working-live, working-on or near energised LV overhead conductors from a ladder (pole-top rescue).
- Confined space work.
- Working in excavations of 1.5m or greater depth.

The selection and appointment of a rescue person is the responsibility of the PIC. This must be identified at the job briefing and recorded on the site risk assessment prior to commencing work.
### Work Practices

#### Table 1: Safety observer matrix

<table>
<thead>
<tr>
<th>Working live</th>
<th>High Voltage - live or de-energised</th>
<th>Low Voltage - live or de-energised</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Un-Insulated</td>
<td>All Other</td>
</tr>
<tr>
<td></td>
<td>Overhead Lines</td>
<td>Insulated</td>
</tr>
<tr>
<td>working live</td>
<td>Safety observer required</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>Working on</td>
<td>Not Applicable - as per definition</td>
<td>Not Applicable - as per definition</td>
</tr>
<tr>
<td>Working near</td>
<td>Safety observer required</td>
<td>Safety observer required</td>
</tr>
<tr>
<td>Testing</td>
<td>Risk assessment</td>
<td>Risk assessment</td>
</tr>
</tbody>
</table>

**Definitions**

- **Working live**: Moving and/or manipulating energised LV or HV uninsulated conductors, lines or apparatus.
- **Working on**: Using insulated tools and the appropriate PPE to work on fixed uninsulated energised LV equipment.
- **Working near**: Outside the minimum approach distance (MAD) but where there is a potential risk of personnel, plant, tools or equipment coming within the MAD.
- **Testing**: Using approved insulated test equipment along with the appropriate PPE for the purpose of testing only.
- **All Other**: All conductors and electrical apparatus other than overhead lines.
- **Totally Insulated**: Insulated conductors with no exposed uninsulated parts. Such as LV ABC, XPLE service cable and Hendorx (not touch safe).

**Key**

- **Safety observer required**: HV live worker (C&I, DIS and TSS). Trained and fully authorised HV live worker to be appointed as safety observer.
- **Risk assessment**: Conduct risk assessment to consider hazards and controls - appoint safety observer if risk assessment deems necessary.

**References**

- *Electrical System Safety Rules (ESSR)*
- *High Voltage Live Work Manual*
- *On-the-job supervision of Certificate III Electrotechnology and Electricity Supply Industry Apprentices* (DM# 6741943)
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5.14  Induced voltage in isolated conductors/apparatus

**Purpose**

This work practice describes induced voltage and how personnel can identify and control induced voltage.

**Scope**

This work practice applies to all personnel who work on behalf of Western Power and must be complied with at all times when working:

- on or near the Western Power Network
- away from the Western Power Network (e.g. construction projects).

Following their own safety management system, contractors must meet or exceed the requirements of this work practice.

**Induced voltage**

Induced voltage can arise from electromagnetic or capacitive induction.  

*Electromagnetic induction* occurs from currents flowing in a nearby energised powerline. These currents produce a magnetic field that influences the other conductor system and thereby generates current.

The closer the powerlines and the longer the distances over which the powerlines run close together, the greater the induced current. Where there is a fault current flowing in the in-service powerline, induced currents can be many times larger than the load current effect. Induced currents flow where there are closed electrical circuits formed by, for example, earthing systems. Figure 1 illustrates the concept of electromagnetic induction.

*Capacitive induction* occurs where the voltage on a nearby powerline produces an electrical field which ‘charges-up’ other metallic parts or conductors. Figure 2 shows how a capacitive induced voltage is created from a transmission powerline into another powerline.

*Transferred voltages* occur under system earth fault or system switching conditions, where large currents can flow via the earthing system to the supply transformer. As the earthing system has a definite resistance in relation to the general earth mass, the passage of current through this resistance will cause the earthing system and all conductors connected to it, to rise in voltage relative to the general earth mass. Where conductors are insulated, the voltage rise will be transferred along the cable e.g. sheaths of cables.
5.14 Induced voltage in isolated conductors/apparatus

Figure 1: Electromagnetic induced voltage from an overhead powerline into a de-energised powerline

Figure 2: Capacitive induced voltage from a transmission powerline into a de-energised powerline
Sources of induced voltage

Electrical charges may appear on de-energised conductors due to one, or a combination of, the following factors:

- Induced voltage produced by electric or magnetic field coupling.
- Adjacent de-energised powerlines that have been accidentally energised.
- Significant load changes on adjacent energised powerlines.
- Static charge induced onto de-energised conductors.
- Fault current on adjacent powerlines.
- Lightning strikes on adjacent powerlines.

Note

Higher voltages, higher currents and longer areas of close proximity between energised and de-energised conductors/cables, all contribute to increasing the risk and severity of induction on the de-energised conductors/cables.

Pre-job planning

Identify any energised circuits that may run parallel at any point along the entire length of the circuit to be worked on by checking:

- drawings and network diagrams associated with the job
- surrounding circuits.

Ensure that any possible source of induced voltage, identified during the pre-job planning, is managed.

Worksite risk assessment

The risk assessment must include a test for induced voltage. The principle method is to use a non-contact proximity tester, starting on the highest setting and gradually reducing to the lowest setting.

- Perform safety tests as follows:
  1. Ensure that the non-contact proximity tester is operating correctly by testing it on the phase conductor or using the self-test function.
  2. Confirm isolated apparatus is de-energised.
  3. Test the non-contact proximity sensing device again on energised apparatus or using self-test function.

To confirm the presence of electromagnetic induction use an ammeter, wearing the appropriate insulated gloves.
Working on conductors exposed to induced voltage

To ensure no potential difference exists across the worker’s body, and all personnel are fully protected from induced voltage, evaluate from the risk assessment the appropriate action using one or more of these methods:

- Apply earths, as specified in work practice 2.2 (Use and management of portable earthing and short circuiting equipment) in this manual.
- Where induction is suspected or detected:
  - apply equipotential bonding methods
  - use insulating techniques.

**Important**

When working on de-energised powerlines, the installation of remote programmed earths may not always protect the workers from the dangers of induced voltage. Always maintain working earths within five metres of the worksite on each incoming powerline (box in) or as close as practicable to the worksite.

Figure 3 below shows a powerline that has induced voltage with programmed earths applied. The voltage curve shows how induced voltage increases as you approach the centre of the earthed powerline.

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![Diagram of powerline with induced voltage](image_url)

**Figure 3: Induced voltage with programmed earths applied**
Figure 4 below shows a powerline which has induced voltage with programmed earths applied. The voltage curve shows how applying working earths at the immediate worksite (within five metres) reduces the voltage to ground potential.

![Diagram of powerline with induced voltage and programmed earths applied](image)

**Figure 4: Induced voltage with programmed earths and working earths applied**
Equipotential bonding methods

Equipotential bonding methods make the work area and circuit at the same potential as the worker, by using bonding conductors that connect metal surfaces and ground at an equal potential. A way of doing this is to use one of the following items in a configuration, as shown in Figure 5.

- Approved portable earthing equipment that is rated for the application.
- Braided wire, flat tinned, 25mm, duplex (stock code EW0008, used on flexible parts for pole-top switch handles) is used to bond standard earth leads which have already been fitted (only to be used for bonding earths).
- Bonding vehicles
  - Vehicles such as EWPs and cranes must be bonded to:
    - a permanent ground earth point, if within 30m
    - a temporary common earth point, if outside of 30m.
  - If high levels of induction are present and an insulated bucket is used, a metallic grid must be in the bottom of the bucket and bonded to the conductor.
  - When working aloft using an uninsulated EWP device (including a cage), the bucket or cage must be bonded to the conductor using a quick release device.

An example of a typical quick release device used for this application would be a, ‘Rat trap tower earth’ customised by the manufacturer for the specific task.
Figure 5: Earthing when induced voltages are present

- Connect bonding between working earths and vehicles if within 30m
- Connect EWP to earth point
- Earths fixed within 5m
- Pole to be worked on
Insulating technique

Where equipotential bonding cannot be used, use insulated material as a barrier between the worker and the apparatus affected by induced voltage.

Breaking or connecting overhead conductors

When breaking or connecting conductors, ensure the following:

- Jumper across before breaking or connecting an overhead conductor and earth, as shown in Figure 6.

or

- Bond to a common earth point before breaking or making a connection, as shown in Figure 7.

Note:

Equipotential bonding may be used via the substation’s earth mat grid as long as both working earths each side of the worksite are connected directly to the same terminal/zone substation earth.

Figure 6: Jumper across breaks before breaking
Figure 7: Bonding to a common earth point

**Multiple worksites**

Figure 8 below shows a powerline that has induced voltage with programmed earths applied. Working earths have been applied incorrectly to cover a large worksite, potentially inducing lethal voltages into the worksite.

![Diagram of incorrect working earths](image)

**Figure 8: Working earths applied incorrectly to cover multiple worksites**
Figure 9 below shows a powerline that has induced voltage with programmed earths applied. Working earths have been applied correctly to protect workers from induced voltage at multiple worksites under the same permit.

**Figure 9: Working earths applied correctly to cover multiple worksites**

Figure 10 depicts a typical installation of the equipotential earth mats, that must be used when working at ground level, with either distribution or transmission overhead networks.

**Figure 10: Mats – structure equipotential bonded to a common earth electrode**
Earth matting

Entry and exit points to the working area must be provided, with an insulated mat bridging the edge of the earth matting. The insulated mat must be at least one metre wide (i.e. wider than the typical step of a human) so that personnel cannot receive a step potential shock by straddling the earth matted area and the non-earth matted area.

Stringing conductors near energised powerlines

Ensure the following practices are carried out when stringing conductors near energised powerlines.

- The cable drum/trailer earthing must be earthed, according to work practice 5.8 (Mobile elevated work platform (EWP) safety) in this manual.
- The area surrounding the cable drum/trailer must be fenced, to ensure that members of the public are not able to come into contact with the trailer or conductor.
- While operating the cable drum/brake trailer, personnel must:
  - stand on an equipotential mat
  - wear gloves rated at 500V and approved, wrist-length mechanical protective gloves, according to work practice 3.2 (Glove protection) in this manual.
- A rolling earth roller, bonded to earth via a rated portable earthing lead, must be fitted to the running blocks used during the installation of the high voltage (HV) conductors. This must be done on the first pole and then every fourth pole. For more on portable earthing leads, see work practice 2.2 (Use and management of portable earthing/short circuiting equipment) in this manual.
- When stringing HV conductors, the conductor must be controlled with captive rollers.

While stringing conductors, a safety observer must track the connection point of the conductor to the drum trailer tow rope while the conductor is being pulled through the captive rollers. They must also alert the team when the tow rope is:

- out of track
- approaching angle structures
- outside of its safety clearances.

To alert the cable drum trailer operators of any hazards have an appropriate communication device, preferably an ultra-high frequency (UHF) handheld radio.
Transmission powerlines entering substations

When disconnecting an incoming transmission powerline from the substation, establish an equipotential zone using the techniques below:

- Bond the powerline outside the substation to the first tower or to the running earth.
- Bond the tower or running earth to the substation earth grid (see Figure 11, below).
- Use bridging conductors when breaking a conductor.
- Situate working earths within five metres of each side of the work area.

Another measure to consider is an earth mat around the base of the tower if the risk assessment indicates a high risk of induced voltage.

Figure 11: Example of a matted area where disconnecting or stringing a new conductor into a substation
Sections within a transmission substation

Isolated equipment and overhead bus sections, contained only within a substation, can cause a secondary incident due to the presence of induced voltage. For example, a worker who receives a low energy shock may drop something onto workers below.

For the reasons stated above, it is recommended equipotential bonding is used between the EWP and the equipment to be worked on. This can be done by bonding the EWP bucket to the powerline or equipment to be worked on before making contact.

If the equipment being worked on is directly connected to an incoming or outgoing powerline, equipotential bonding must be carried out.

Earthing the EWP

- When travelling in a live substation, securely attach a trailing 10mm diameter bright or galvanised drag chain to the EWP (minimum 150mm of chain in contact with ground).
- Earth the EWP to the substation earth grid.
- Before use, inspect the earth lead and confirm:
  - that the test date is not expired
  - the tightness of bolted connections
  - the general condition of earthing leads.
- Earth leads must be a minimum of 150mm² aluminium when working in a substation.

Note:
When using multiple uninsulated access equipment (EWPs and scaffolding) ensure all pieces of equipment are bonded together.

Brownfield construction sites at a transmission substation

When constructing new works at a brownfield construction site, consideration must be given to the difference in potential between the existing energised site and the construction site due to induced voltage. The construction of the new earth grid in the brownfield site has the possibility to create an area at a different potential to the existing energised equipment (e.g. fences and earth connections).
So that personnel cannot bridge the gap between the existing and new equipment, use one of the following construction methods:

- barriers
- equipotential bonding of the two sites.

The transmission substation design drawings will show the best construction method based on earthing studies of the area.

**Underground high voltage cables**

When working on high voltage cables that are affected by induced voltages, one or both of the following control methods must be implemented:

- Bonded to an equipotential earth system (BEES).
- Isolated and insulated (ISIN).

BEES is the preferred method. Only use the ISIN method when BEES cannot be implemented.

**Bonded to an equipotential earth system (BEES) method**

A worksite setup using the BEES method ensures that all electrical apparatus and conductive materials within the work area are equipotential bonded and earthed to a common point. For an example, see Figure 12.

The BEES method has the following requirements.

- Where conductive materials are at different potentials they must be insulated rather than bonded to earth.
- The earthing grid must be extended outside the work area at the point of access for at least one metre. All exposed metallic parts unable to be bonded to the common earth of the worksite must be insulated. If the work area has no permanent earth point, the common earth bar must be connected to a temporary earth electrode. Any subsequent earthing to the cable at this point of work must be taken from that bar.
- All metallic parts of the cable must be treated as energised due to the potential difference that may exist even when the cable's metal parts are:
  - earthed at the remote ends or at earth pits along the cable
  - disconnected at their terminals or any other point along the cable.
- When outside or adjacent to the cable worksite and performing work on equipment that has metallic parts, the metallic parts must be connected to an independent earth.
Figure 12: Typical jointing bay setup using the BEES method
Isolated and insulated (ISIN) method

A worksite setup using the ISIN method ensures that all exposed and conductive materials within the working area must be isolated and insulated from personnel by the use of:

- insulated gloves (minimum Class 2 rating) with approved outers
- insulated tools rated at 20kV AC
- one of the following:
  - an insulated platform
  - an insulated mat or sheet that has first passed a ‘30kV AC for one minute’ test.

As shown in Figure 12, an ISIN bay includes all the above plus insulating the internal walls of the BEES bay.

**Note**

Only use the ISIN method when BEES cannot be implemented.

**Bonding cables**

**Repairing and making straight joints**

When repairing or making straight joints, if the cable does not need to be cut, the ISIN method must be used as described below.

1. As soon as the metallic sheath is exposed using the ISIN method, bond both sides of the proposed cut to earth by earth leads and/or a bridling bar.
2. After a metallic sheath ring has been removed from the cable that is earthed using the ISIN method, use temporary insulation to cover all bonding ends of the metallic fittings.
3. Immediately after removing the insulation, using the ISIN method, earth the cable core at both sides of the proposed point to be cut.
4. Use the BEES method when metallic sheaths and cable cores are connected to the same potential.
5. Apply 15kV rated temporary insulation materials to cover exposed metallic parts of equipment and plant which can be touched from the insulated platform while in contact with unearthed metallic parts of a cable to be worked on.
6. When all insulation layers are removed, bond the joint between cores and the ferrule earth (do not use calliper clamps). The reverse process for earthing must be followed to joint all metallic sheaths and insulation layers.

![Figure 13: HV cable with metallic parts and core bonded to earth](image)

7. Disconnect the earth lead from the ferrule after breaking its continuity from the common earth plug-board. This work must be performed with insulated gloves (minimum Class 2 rating) with approved outers.

**Work on linking boxes and pits**

- Care must be taken when choosing the working methods for linking in or on boxes.
- Use the BEES method when it is possible to maintain an earth connection to all terminals in the link box being worked on.
- Use the ISIN method when removing the earth connection from terminal pillars within the link box being worked on.

**Making a sealing end**

1. Effectively bond the sealing end supporting structure and all exposed metallic parts on the local earth grid before commencing the work. See Figure 14, below.

2. Prepare the cable end according to the manufacturer’s procedures.

3. Ensure that the BEES method is in place.
4. Keep all earth bonds to metallic parts of the structure throughout all trimming, taping and screening operations until the bushing is in position and ready to be lowered over the cable head.

5. Before removing the original core earths, make a bonding lead connection to the core passing up through the bushing, as shown in Figure 14.
   - The bonding lead connections must be maintained until electrical contact is made with the top bushing fitting and this fitting is solidly earthed.
   - The cable core earth must not be disconnected until standard construction earthing equipment is applied.

6. If it is not possible to comply with Step 5 because of the sealing end design, the sealing end earth may be removed and the bushing lowered into position using the ISIN method. Replace the earth as soon as possible and carry out the remainder of the work under the BEES method.

![Figure 14: Sealing end](image)
References

- Electrical System Safety Rules (ESSR), 2012, (DM# 9199327)
- Transmission Substation Work Practice Manual, work practices:
  - 2.2 (Use and management of portable earthing / short circuiting equipment)
  - 2.12 (HV insulated tools and equipment – testing and use for substations)
  - 2.3 (Electrical storms)
  - 2.14 (In-service safety inspection and testing of portable electrical equipment)
  - 2.15 (Job briefing process)
  - 3.2 (Glove protection)
  - 5.29 (Instruments testing and calibration)
- Work Practice Manual, work practices:
  - 2.9 (Induced voltages in isolated conductors/apparatus)
  - 7.9 (Identifying and proving of HV cables)

Further reading

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5.15 Pitch removal

Purpose

This instruction outlines the requirements for the removal of pitch from cable boxes.

Scope

Pitch must only be removed using the melt-out process which is described in this instruction. This instruction does not address electrical isolations, cable preparation or repacking of the cable box.

Training

All personnel who are required to remove pitch must have attended and successfully completed the course PTS 711 – Cable Box Pitch Removal.

Safety

- All personnel who are required to remove pitch must wear personal protective equipment (PPE). For more on this, see section 3 (Personal protective equipment) in this manual. PPE may include, but is not limited to:
  - safety glasses or a face shield
  - nitrile, PVC or leather gloves
  - a leather or PVC protective apron (or disposable overalls may be worn)
- Key controls:
  - no naked flames on pitch
  - electrical isolations performed
  - ventilation must be in place during the melting activities
- All personnel who are required to remove pitch must be familiar with the following documents:
Instructions

Equipment

The approved equipment that is required to perform a melt-out of a pitch box is:

- heat lamp box assembly
- pitch troughs (2)
- aluminium chutes (2)
- grease for lining troughs and chutes
- aluminium fold-up scaffold
- ventilation system
- LPG gas torch, hose and gas bottle
- 10 amp 1-phase extension leads (3)
- RCD power box
- wooden mallet
- rags and kerosene
- pitch waste drum (1 x 200 litre drum with securable lid)
- fire extinguisher (CO₂)
- electric heat gun

Preliminary arrangements for pitch removal in substations

Prior to setting up for a pitch melt-out, a risk assessment must be conducted and the following arrangements must be made:

- contact the Asset Management branch and obtain details about:
  - the replacement insulator medium that is required for the cable box
  - any other materials that are required
- carry out an assessment on:
  - scaffold installation
  - ventilation system placement
  - adjacent apparatus that may affect, or be affected by, the pitch melt-out process. This could include preventing the fumes from the pitch melt-out affecting adjacent vented equipment by placing a solid barrier between the vented equipment and the melt-out position
Pitch removal process

Permits and outage
Prepare the apparatus for work by:
• ensuring that any electrical hazards are removed by switching, earthing and/or racking
• completing all necessary permits
• ensuring that any pitch removal equipment can be positioned without encroaching on any other adjacent electrical hazards

Scaffold
• Position scaffold in front of the cable box and adjust the legs to ensure that the platform is level.
• Place the removable platform section to a lower rung level for the pitch trough support so that it is suitable to catch the molten pitch from below the cable box.

Pitch box preparation and ventilation
• Place the pitch trough on the platform.
• Set up chute sections between the pitch box and the trough.
• Grease the inside of the trough at least 2/3 of the way up from the bottom of the trough.
• Loosen all the nuts that are securing the cable box lid.
• Connect the sections of exhaust system together so that the hood end is on the air suction side and is ready to hang on the scaffold opposite the end where people enter the scaffold.
• Tie the hood to a scaffold rail approximately 1.5–2 metres from the pitch box at about one metre higher than the box. The opening must be facing the box.
• The exhaust end of the ducting must be positioned at least two metres outside the nearest door opening with the duct running alongside the building wall.
• Connect the exhaust system to a local power outlet. Switch on and leave on for the duration of the work.
• Using a gas torch, heat the lid exterior to break the inside bond between the pitch and the lid. The bond can be loosened by tapping or levering the lid off. Take care not to damage the lid.
DANGER

Items associated with this process may become hot. The use of appropriate PPE is required.

Heat lamps

- Adjust the telescopic mast for attachment of the heat lamp box. The box must have its bottom side level with the bottom of the pitch cable box, and be positioned approximately 100 mm from the box face.
- Connect the heat lamp box to an RCD protected power outlet. Switch on and check the operation of all lamps.

Pitch melt-out

- When initial pitch flow commences, carry out a visual check to ensure that the chute and pitch trough are catching all the pitch.
- The melt-out time will vary depending on the box size. Ambient temperature and air movement in the pitch box vicinity can also affect the melt-out time.
- Check the box for melt-out progress every 15 minutes. The work site must not be left unattended at any time.
- For larger pitch boxes, anticipate replacing the trough with a second (greased) trough before the half melt-out stage.

Clean up

- At the completion of the full melt-out stage, switch off the heat lamps and allow to cool before removing the lamp box.
- While the pitch remnants are still hot, use an electric heat gun on medium setting (approx 300 °C) and rags dipped in kerosene to remove any remaining traces of pitch from the bushings and corners of the box.
- Remove the pitch troughs to a safe and well ventilated area to cool and harden (two people are required to lift the trough).

Refilling and disposal

- Perform any cable tests or replacement changes.
- Leave the ventilation system operating while the emptied pitch box is being repacked with the new insulating medium.
Work Practices

- On a hard surface, turn the pitch box over and tap the underside with a timber mallet to release the pitch.
- When released, place the pitch blocks in pitch waste drums and secure the lids.
- Return the pitch waste and drums to the hazardous waste area at the depot for collection (notify Facilities Management).

References

- Transmission Substation Work Practice Manual, section 3 (Personal protective equipment)
- Material Safety Data Sheet (MSDS) for insulating pitch available on the ChemAlert website: http://www.chemalert.com
- Safety and incident reporting in accordance with the Western Power Website: http://www.westernpower.com.au/networkcontractors/Safety.html
5.16 This work practice has intentionally been left blank

Details on the *Handover Certificate* have been moved and can now be found in work practice 5.31 (Substation permits) in this manual.
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5.17  Vegetation management and weed control in substations

**Purpose**

This instruction outlines the minimum safe working requirements for undertaking:

- vegetation management work near live and/or de-energised conductors in and around transmission substations
- weed control in transmission substations

**Note:**

This field instruction must be read in conjunction with field instruction 5.3 (Substation clearances) in this manual.

If doing any vegetation management work (not weed control), this field instruction must also be read in conjunction with section 10 (Vegetation management work) in the Work Practice Manual.

**Training**

The minimum requirements to do these tasks are listed below.

**Weed control**

- Successfully complete Substation entry level 1 (re-assessed two-yearly). For more on this, see field instruction 5.2 (Substation entry requirements) in this manual.
- Possess a Network Authority Card (NAC) issued by Western Power. For more on this, see field instruction 5.28 (Network Authority Card) in this manual.

**Vegetation management**

- In addition to meeting the requirements for being able to carry out weed control, anyone doing vegetation management work inside of the substation compound must either:
  - meet the specific training requirements for a High Voltage vegetation management worker as stated in the Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines (July 2012)
  - be a Cert. III (or equivalent) qualified line worker
Work Practices

Safety

- Clothing and personal protective equipment (PPE) appropriate to the task and location must be worn. For vegetation management work in transmission substations, the minimum PPE is level 1. For more on this, see section 3 (Personal protective equipment) in this manual.
- Complete the job briefing process for working on a transmission worksite. For more on this, see field instruction 2.15 (Job briefing process) in this manual.
- A risk assessment must be done before doing any vegetation work. The risk assessment must consider the site conditions, personnel safety, materials, mobile plant, permits, tools and equipment.
- Depending on the situation, ensure that you consider the use of temporary barriers and signs (see field instruction 2.8 (Temporary barriers and signs) in this manual).
- Comply with all general safety requirements of field instruction 10.1 (Vegetation management near powerlines) in the Work Practice Manual.
- If the task requires the use of an elevated work platform (EWP), all requirements of field instruction 5.8 (Elevated work platform safety) in this manual must be applied.

Safety observer

A safety observer must be appointed when carrying out vegetation management inside the compound of the transmission substations. For details on safety observers, including their training requirements, see:
- field instruction 5.13 (Safety observer role) in this manual
- Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines (July 2012)

Instructions

General

- All cut vegetation must be removed from site.
Inside the substation

Safety clearances

- Vegetation management in substations differs from vegetation management near overhead powerlines. Substation clearances must be adhered to when working in substations. For more on this, see the following tables in field instruction 5.3 (Substation clearances) in this manual.
  - Table 1: Safety Clearances for $U_m$ less than 245 kV
  - Table 2: Safety Clearances for $U_m$ greater than 245 kV
- Never breach the section (S) safety clearance when inside a substation unless covered under a permit. The applicable permits are described in Table 1 (Substation clearances and permits) below.

<table>
<thead>
<tr>
<th>Clearance</th>
<th>Permit required</th>
<th>Other requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than work safety clearances vertical and horizontal (V or H)</td>
<td>Electrical Access Permit (EAP)</td>
<td>Apparatus must be isolated and earthed</td>
</tr>
<tr>
<td>Between V or H and S</td>
<td>Vicinity Authority (VA)</td>
<td>–</td>
</tr>
<tr>
<td>Greater than S</td>
<td>No permit required</td>
<td>–</td>
</tr>
</tbody>
</table>

Weed control

- Use Glyphosate weed killer to retard growth.

Vegetation management

- Cut down all vegetation.

Outside the substation

Note:

When vegetation is cut outside of the substation fence all safety and minimum approach distance requirements of section 10 (Vegetation management work) in the Work Practice Manual must be adhered to.
Work Practices

Vegetation management

- A minimum three metre gap must be maintained between vegetation and the substation boundary (e.g. fence).
- The vegetation must be cut back to a distance so that it cannot be climbed and used to access the substation.
- Lower tree branches must be pruned at least two metres off the ground to stop surface fires spreading to trees.

References

- Transmission Substation Work Practice Manual:
  - field instruction 2.8 (Temporary barrier and signs)
  - field instruction 2.15 (Job briefing process)
  - section 3 (Personal protective equipment)
  - field instruction 5.13 (Safety observer role)
  - field instruction 5.2 (Substation entry requirements)
  - field instruction 5.3 (Substation clearances)
  - field instruction 5.8 (Elevated work platform safety)
  - field instruction 5.28 (Network Authority Card (NAC))
  - Work Practice Manual, Section 10 (Vegetation management work)
- Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines (July 2012)
5.18 Site security

Purpose

This work practice outlines the security requirements when entering and exiting Western Power transmission substations.

Instructions

- For details on substation entry requirements (e.g. authorisation requirements, the Check In – Check Out system) see work practice 5.2 (Substation entry requirements) in this manual.

- All external gates must be left closed and locked when not being used to enter or exit the site. The only exception is when there is a person standing at the gate who opens, closes and locks it, e.g. for when vehicles arrive onsite.

- Disarm any alarm systems and electric fences on entry. For more on this, see Alarm systems and electric fences, below.

- The following practices are not permitted:
  - using private locks
  - unauthorised multiple locking of substation external perimeter fencing

- When departing the substation, ensure that:
  - the alarm system is armed (if applicable)
  - all gates are closed and locked
  - the electric fences are armed (if applicable).

Alarm systems and electric fences

- The following substations have electric fences and security alarms in the relay rooms. The alarm systems are monitored and guards will respond if alarms are activated.
  - Southern Terminal
  - Northern Terminal and Malaga Substation
  - Medina Substation
  - Neerabup Terminal
  - Rockingham Substation (photoelectric beams with electric fencing)
Work Practices

- Always assume that electric fences are energised at all times. Always check the status of the fence before opening gates. If in doubt, disarm it as described below.

**Disarming and rearming electric fences**

- Treat the fence as energised at all times.
- Before entering the site:
  - check-in via the *Check In – Check Out* system
  - disarm the electric fence before opening the gate to enter the substation
  - if the electric fence is to remained disarmed – secure tags/signs to keypads
- Perform and complete the work and then remove own tags/signs
- When departing the site:
  - arm the electric fence (if there are no tags/signs for other personnel) after closing the gate and ensure the substation is secure
  - check-out via the *Check In – Check Out* system and report any issues

**References**

- Transmission Substation Work Practice Manual, work practice 5.2 (Substation entry requirements)
5.19 Unauthorised access

**Purpose**

- This field instruction outlines the requirements for the Network Total Workforce when arriving at a transmission substation to find unauthorised person(s) inside the perimeter fence or suspicious activity around the perimeter of the substation.
- It also applies when the Network Total Workforce feel their personal safety is threatened.

**Instructions**

**Safety of personnel at substations**

- Personnel must, at all times when entering a substation, be mindful of their safety.
- Personnel when arriving at site must be observant and exercise caution to ensure their safety against unauthorised person(s) in substations, or of suspicious activities outside/around the substations.
- If unauthorised person(s) are found inside the substation:
  - Move to a safe location.
  - Call SOCC (bulk Transmission 9427 7064 or Regional Transmission 9427 7014) requesting security/police attendance and advise of details.
  - From a safe location, observe the unauthorised person(s) or activities in the substation, if possible.
  - Advise SOCC if switching action is required for safety, due to the nature of the activities of the unauthorised person(s).
- If suspicious activities are detected outside or around the perimeter of the substation:
  - Move to a safe location.
  - Call SOCC and advise of details.
  - From a safe location, observe the unauthorised person(s) or activities, if possible.
Note:
SOCC will, depending on the nature of the suspicious activity reported, determine whether to call the police or security services.

Situations that may require security escorts

- Personnel called up after hours to investigate faults or to perform emergency work need to feel safe when performing work and are entitled to a security escort when feeling threatened.
- Security may be requested for, but not be limited to:
  - personnel who are instructed to go to an isolated location or to an area that is a known trouble spot
  - when there are reasons to believe that the fault(s) were caused by unauthorised person(s) who may still be on-site
  - persons who feel threatened and consider it appropriate to call security.

Contacting the security firm

- The security firm will provide an escort, when required. Whenever a person requires a security escort (decided through consultation between SOCC and the person), SOCC shall contact the security firm.
- Details of the location and the name of the person requiring a security escort are to be given to the security firm; and the firm will provide an estimated time of arrival (ETA). SOCC shall pass this information on to the person concerned; who will coordinate their activities with the ETA.
- Some delays may be experienced at specific substations due to the security firm not directly covering all areas. These substations are:
  - Darlington
  - Mandurah
  - Muchea
  - Mundaring Weir
  - Sawyer’s Valley.
Work Practices

Note:
- There are approximately twenty (20) metropolitan substations that are not patrolled by the security firm. The firm can be called upon to attend to these substations by providing them with the address.
- None of the country substations are being patrolled. For country substations the standby person in that area should be contacted.

Procedures to follow on arrival at a substation
- Personnel must immediately inform SOCC upon arrival of the security escort or upon arrival at the affected site (if the security escort has already arrived).
- The security escort must remain with the person until it is considered safe for the escort to leave. The person must then contact the SOCC to inform them that the escort is no longer required.

Evidence of unauthorised access
- Evidence of unauthorised access includes breaches to substations’ external fencing, damage to apparatus and graffiti to substation buildings. This must be reported immediately.
- SOCC Bulk Transmission Desk  9427 7064
- SOCC Regional Transmission Desk 9427 7014
5.20 Substation insulator spray-washing

Purpose
This field instruction provides guidance on the safe use of spray-washing equipment when washing substation primary plant insulators, either in a live or de-energised state.

Safety aspects and implications
- Anyone performing this task must observe Western Power’s general safety requirements.
- Proper risk assessment and risk control measures must be implemented, including the completion of the Live Substation Insulator Washing Quality Verification Sheet (DM# 519022)
- A Vicinity Authority (VA) permit (auto-reclose set to single shot) must be used for live apparatus.
- De-energised apparatus must be treated as live.
- A VA is also required for de-energised (but not earthed) apparatus.

Worksite personal protective equipment (PPE) requirements
- Approved PPE (Level 1) must be worn at all times when washing high voltage (HV) insulators. For more on this see field instruction 3.1 (Clothing and personal protective equipment requirements) in this manual.
- Do not use gloves while using:
  - HV live line sticks (hot sticks)
  - HV insulated washing wand

Scope
This field instruction applies to all insulator washing work performed by certified people on:
- live or de-energised HV apparatus from 6.6 kV up to and including 132 kV
- de-energised washing of 220 kV and 330 kV terminal station equipment
Training and Authorisation

To perform live substation insulator washing, personnel must:
- have completed PTS 012 (Electrical substation insulator washing)
- hold a valid Western Power authorisation for the task
- hold a current Network Authority Card (NAC)

Non-trade people and electrical apprentices:
- must not perform live substation insulator washing, and are restricted to providing assistance only in performing the task
- who have successfully completed PTS 012 (Electrical substation insulator washing) training and are competent and accredited may wash in substations that are in a de-energised state

Instructions

Test and equipment criteria

- Testing of insulated sticks associated with the washing wand:
  - Dry test every six months.
  - See field instruction 2.12 (High voltage insulated tools and equipment – testing and use for substations) in this manual for testing methods and requirements. However, ignore the dry test frequency described in field instruction 2.12 and keep to the six-monthly testing frequency mentioned above.
  - Do not use insulated sticks if the six-monthly due date for the next test has expired.

- Earthing:
  - Earthing leads must be within their inspection dates. For more on this, see field instruction 2.2 (Portable earthing/shorting equipment) in this manual.
  - Earth the spray-washing unit and/or vehicle on which it is mounted to the substation earthing system.

The washing environment

- Spray washing on energised apparatus must not continue in adverse weather conditions such as rain, heavy mist and fog or in thunderstorm activity.
- Work with caution when winds exceed 30 km/h.
• Work must not be done when winds exceed 45 km/h.

**Water and pump criteria**

• Ensure that the water container is free of contamination and flush out with low conductivity water before use.
• Water must be tested using a conductivity meter. Conductivity must be no higher than two millisiemens/metre.
• Before washing commences check the following:
  o All hoses are connected and there are no leaks.
  o Working pressure on high-pressure wand is suitable (max 2,800 kPa).
  o There is sufficient water in the tank to complete the task.

**Insulators that may be high pressure washed live**

Only certain porcelain/ceramic insulators can be high pressure washed, including:

• circuit breaker lower insulators (non-circuit interrupting portions)
• upper (circuit interrupter) portions – this offers a marginally increased risk in relation to safety and asset integrity
• post insulators
• isolator insulators
• current transformer and voltage transformer porcelain sections

**Limitations:**

• Circuit breaker breathers, site glasses, gauges, seals, insulator section gaskets/flanges or other perforations must not be subjected to pressurised water.
• The insulator must be free of cracks, chips, deteriorated glazing or other surface defects (perform visual check and record on risk assessment).

**Insulators that must be de-energised before high pressure washing**

• 220 kV and 330 kV terminal station equipment.
• Some insulators such as older designed ‘stacked’ insulators or surge arrester insulators.
• Older designed circuit breakers (typically ones rated 33 kV and below) with arcing horns installed across the lower and upper insulators.
Note:
At sites that encounter a high rate of surface pollution, the upper portion of the breaker can still be washed live by accredited operators, staying well clear of the head section. However, it is recommended that this washing be done while de-energised.

Insulators that must not be high pressure washed
Irrespective of the type of equipment (e.g. isolators, circuit breakers, transformer bushings, instrument transformers), the following insulator types **must not** be high pressure washed:
- silicon-coated porcelain insulators
- composite (polymeric) insulators
- epoxy design insulators – (prone to deep surface cracking)

Note:
Circuit breaker pole insulator assembly flanges must be avoided, with washing beginning and terminating one full skirt away from any flange or gasket.

Washing the insulators
1. Obtain a VA permit. The location of the spray washing needs to be clearly recorded on the VA permit.
2. At least two people, both trained in the correct washing techniques and procedures, are required per washing unit.
3. Conduct a risk assessment.
4. Ensure that equipment which has automatic reclosing facilities is made inoperative for the duration of the work (i.e. so no reclose is possible).
5. Perform pre-use inspections on insulated sticks, earth leads and other equipment to be used. Damaged items must be tagged with an “Out of Service” warning tag.
6. Clean the fibreglass washing wand with a silicone-impregnated cloth.
7. Maintain a clearance of 450 mm between the nozzle of the wand and the live apparatus and ensure that water pressure does not exceed 2,800 kPa.
8. During washing, one of the team must fulfill the role of safety observer to monitor and warn of:
• breaches of minimum clearances
• change in wind direction
• any other hazards

For a full description of the approved washing technique, see Live Substation Insulator Washing Procedure (DM# 700585).

References

• Transmission Substation Work Practice Manual
  o 2.2 (Portable earthing/shorting equipment)
  o 2.12 (High voltage insulated tools and equipment – testing and use for substations)
  o 3.1 (Clothing and personal protective equipment requirements)
• PTS 012 (Electrical substation insulator washing)
• Live Substation Insulator Washing Quality Verification Sheet (DM# 519022)
• Substation Insulator Washing Maintenance Procedure (DM# 700585)

Related documents

• IEEE 957 – Guide for cleaning insulators
• Live high voltage substation insulator washing review (DM# 3450710)
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5.21 Pilot protection systems

Purpose

This instruction outlines the minimum requirements for the Network Total Workforce (NTW) to safely access pilot protection installations.

Scope

This instruction is applicable to anyone required to access any part of a pilot protection scheme.

Safety

Before the commencement of any work, a risk assessment must be done to cover hazards and appropriate control measures such as:

- **High voltages and induction** – personal protective equipment (PPE) must be worn, with the addition of approved eye protection, full-face shield and gloves when working within two metres of live in-service pilot equipment. For more on this, see section 3 (Personal protective equipment) in this manual.

- **Working at heights** – see field instruction 2.11 (Height safety) in this manual when climbing above two metres.

- **Working in an earth-free environment** – stand on portable high voltage Class 2 insulated mats and do not introduce grounded equipment within two metres of live in-service pilot equipment. For more on this, see field instruction 2.12 (High voltage insulated tools and equipment – testing and use) in this manual.

Training and authorisation

Before working on a pilot cable termination link or pilot isolation transformer box, all personnel must do the following.

- Complete and meet the outcomes of PTS 709 – Pilot Cable Systems.

- Be in possession of the appropriate authorisation as issued by Field Protection Services (FPS).
Work Practices

- Be an authorised Recipient in Charge / Tester in Charge, or recipient for any or all of the following permits:
  - Vicinity Authority (VA)
  - Electrical Access Permit (EAP)
  - Sanction to Test (STT)

Instructions

In order to perform work on pilot protection installations safely, the following instructions must be followed as a minimum. These are in addition to the instructions mentioned above under ‘Safety’.

- Isolation, earthing, issue and registration of permits for access to pilot cables is performed by certified issuing officers for pilot cables.
- **Do not** work on pilot equipment if there is electrical thunderstorm activity within a 30 km radius of any part of the inter-connected pilot system.
- If the pilot cable is an overhead circuit, examine its route and determine the exposure it has to live high voltage (HV) lines. If necessary, request an outage on the line of concern.
- Do not encroach into the Minimum Approach Distances (MAD) of other electrical apparatus unless an appropriate permit has been issued allowing this.
- Ensure effective communication with personnel along, or at the other end of the pilot cable route.

Maintain an ‘earth-free’ exclusion zone around the pilot cable installation by using:

- 16 kV rated barriers and shrouds to cover any equipment held at earth potential that is within two metres of the installation
- isolation transformers (rated for 16 kV) when bringing power cords into the exclusion zone
- double-insulated electrical equipment within the exclusion zone
References

- Transmission Substation Work Practice Manual:
  - field instruction 3.1 (Clothing and personal protective equipment requirements)
  - field instruction 2.11 (Height safety)
  - field instruction 2.12 (High voltage insulated tools and equipment – testing and use for substations)

Related documents

- Work Practice Manual, field instruction 2.8 (Minimum approach distances)
- Electrical System Safety Rules (ESSR) (DM# 9199327)
- PTS 077 – Recipient in Charge for Work Permits
- PTS 714 – Tester in Charge
- PTS 709 – Pilot Cable Systems
- Secondary Systems Safe Working Procedures (DM# 6672467)
5.22 Batteries, battery chargers and DC/DC converters

Purpose
This work practice outlines the requirements for personnel who work on batteries, battery chargers and DC/DC converters in transmission substations.

Background
- Direct Current (DC) Systems are installed in transmission substations to supply power for protection systems, Supervisory Control and Data Acquisition (SCADA) equipment and other critical auxiliary circuits.
- The DC voltages used within substations, depending upon equipment requirements, are 32V, 50V, 110V and 230V.

Safety
- There are a number of hazards present when working with DC Systems in substations, including:
  - electrical shock – DC voltages and large currents (regular and fault) may cause severe burns or electrocution
  - acids and alkalis – direct contact with corrosive electrolytes found in batteries can cause burns to the skin and serious eye injury
  - hazardous workspaces – gases from vented battery cells can accumulate and create an explosive environment. Ensure adequate ventilation of batteries particularly whilst batteries are in boost charge condition. Ensure no naked flames or sparks are produced.
- For more on hazard awareness for DC Systems and guidance on the completion of the risk assessment during work planning, see the Transmission Safe Work Method Statement (SWMS), *Live DC and Chargers* (DM# 10696920).

**Important**
The stored electrical energy in a battery can cause severe consequences under fault or short circuit conditions. It is mandatory that only insulated tools and equipment are used for battery work to prevent any unwanted events.
Instructions

• Before commencing work:
  o conduct a risk assessment and job briefing. For more on this, see:
    — Transmission SWMS, *Live DC and Chargers* (DM# 10696920)
    — work practice 2.15 (Job briefing process) in this manual.
  o all personnel must comply with the minimum personal protective equipment (PPE) requirements for the task. For more on this, see section 3 (Personal protective equipment) in this manual.
  Additional approved PPE is required while working on vented or wet cell batteries. Depending on the installation type, items could include:
    — corrosion-resistant gloves
    — apron
    — boots
    — face shield.

• Approval is required from Network Operations Control (NOC) before changing the operational status of the batteries, battery chargers, DC/DC converters or their associated alarms that have direct control of the transmission substation primary assets.

• Work in a well-ventilated area. Confirm the ventilation system in the battery room is working correctly, especially where vented or wet cell batteries are installed. Check the operation of the exhaust fan and/or input and output vents. Ensure there are no obstructions.

• When working on batteries housed in battery cabinets, open all the cabinet doors to allow a continuous airflow to minimise the accumulation of hydrogen. This will significantly reduce the risk of an explosion. It is recommended additional ventilation be added or provided when working on batteries which may be venting due to a boost or equalise charge taking place.

• Adequate eyewash facilities must be available when working on vented batteries (i.e. batteries having liquid electrolyte).
  o If an eyewash station is installed, ensure it is in good operational order and accessible.
  o Diphtherine® spray/wash for treating chemical burns may be used as a substitute for an eyewash station. Information on this product can be found in *Diphtherine product guide* (DM# 7550666).
Work Practices

- Only use insulated tools and equipment. Check their condition before use.
- Only use a dampened cloth when cleaning batteries to prevent the build up of electrostatic charges.
- In event of a spillage of electrolyte, report the incident to both of the following within an hour of the incident happening:
  - your formal leader
  - the Incident Hotline on 1300 CALL WP (1300 2255 97).
  For more on this, see work practice 6.7 (Oil and chemical spills) in this manual.
- Keep battery rooms clean.
- All equipment (tools, hydrometer, etc.) that comes into contact with electrolyte must be thoroughly washed before being stored.

Battery types

Transmission substation DC Systems batteries may be lead-acid (LA) or nickel cadmium (NiCd), each with its own characteristics.

- The external appearance of LA and NiCd batteries can be similar. A label is on the battery container to indicate its type. Examine the battery bank data sheet provided by the manufacturer/supplier to confirm the type and size of the battery banks.
- The electrolytes of the two types of battery are not interchangeable, nor should they be mixed, as an unstable chemical reaction could result.
- Cross contamination of electrolyte between LA and NiCd batteries will cause serious degradation to the performance of the batteries.
- **Do not** use the same battery maintenance equipment on both types of battery (to prevent cross-contamination between NiCd electrolyte (potassium hydroxide) and the sulphuric acid in LA cells).
- Battery maintenance equipment should be separately stored and must be labelled clearly to designate on which type of battery it is to be used.
Lead acid (LA) batteries

There are two types of LA batteries.

Vented Lead Acid (VLA) batteries

- The term 'vented' is used because the charging process produces gasses of hydrogen and oxygen, which need to be able to escape (i.e. be vented) from the confines of the battery case. Due to the gassing, the electrolyte levels need to be topped up with distilled water to maintain them at the correct levels.
- The term 'wet cell' or 'flooded cell' is used because of the liquid electrolyte used in VLA battery cells.
- Use a hydrometer (dedicated to LA batteries) to measure the specific gravity of the cells in VLA batteries. This indicates the state of charge for the battery.

Important

Vented LA batteries must be housed in an enclosed area/room specifically designed for that purpose.

Valve Regulated Lead Acid (VRLA) batteries

- VRLA batteries are designed so that during normal operation approximately 99% of gases produced are recombined and re-enter the battery as water.
- When pressure from gases produced in VRLA batteries builds up, the gas will be released via a valve that regulates the pressure in the battery case, hence the term 'valve regulated'.
- VRLA batteries have a ‘gel’ electrolyte in Pasted Plate type of battery architecture and ‘liquid’ electrolyte, which is absorbed in a glass mat in Absorbed Glass Mat (AGM) type.
- Topping up VRLA batteries with water is not possible.
- VRLA batteries do not have to be placed in an intrinsically safe environment if the associated battery charger has a correctly operating Over Voltage Shut-Down function.

Nickel Cadmium batteries

- NiCd battery banks are housed either in a battery room or in a battery cabinet.
• Elevated levels of oxygen and hydrogen are released through the vents during boost or equalisation charging, so the electrolyte levels may be required to be topped up with distilled water.

• The specific gravity of NiCd cells is largely unchanged by the charge-discharge process.

Battery chargers and DC/DC converters

• Only personnel from the Transmission Substation DC Systems team or competent persons under the appropriate level of DC Systems supervision are to carry out tasks on transmission substation battery chargers or DC/DC converters that have direct control of transmission substation primary assets. They must:
  o notify NOC of intended work during pre-job planning
  o obtain approval from NOC before changing the operational and/or alarm status of the battery charger or DC/DC converter
  o advise NOC as soon as possible of any battery charger or DC/DC converter faults or conditions likely to adversely affect the DC System supply
  o where practicable, only work on battery chargers or DC/DC converters after all connected AC mains and DC voltage supplies are isolated and tagged
  o insulate live components where the isolation of supplies is not possible prior to working on battery chargers or DC/DC converter. Insulation medium may be insulation matting or covers, preferably both.
  o after completing work on the battery chargers or DC/DC converters, notify NOC of the current operational and alarm status of the associated DC Systems.

• The Transmission Substation DC Systems team (part of Substation Maintenance Services) is responsible for batteries, and repairing battery chargers and DC/DC converters that have direct control of the transmission substation primary assets. Their 24-hour call out phone number is 9441 3434.
Table 1: General battery information

<table>
<thead>
<tr>
<th></th>
<th>Lead acid battery</th>
<th>NiCd battery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrolyte</td>
<td>Sulphuric acid (H₂SO₄)</td>
<td>Potassium hydroxide</td>
</tr>
<tr>
<td>Nominal cell voltage</td>
<td>2V</td>
<td>1.2V</td>
</tr>
<tr>
<td>Float charge cell voltage*</td>
<td>2.15–2.27V</td>
<td>1.40–1.45V</td>
</tr>
<tr>
<td>Boost charge cell voltage*</td>
<td>2.30–2.50V</td>
<td>1.55–1.65V</td>
</tr>
<tr>
<td>Specific gravity (SG) for fully charged cell*</td>
<td>1.240–1.260 at 25°C</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

* Refer to manufacturer’s specifications.

References

- Diphoterine product guide (DM# 7550666)
- Transmission Substation Work Practice Manual:
  - work practice 2.15 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 6.7 (Oil and chemical spills)
- Transmission SWMS, Live DC and Chargers (DM# 10696920)
5.23 Excavation work in substations

Purpose

This work practice outlines the minimum requirements on how to perform excavation work in substations in a way that avoids causing damage to existing underground systems. This work practice has been developed to be in line with Code of Practice – Excavation (Commission for Occupational Safety and Health, Government of Western Australia, 2005).

Scope

This work practice applies to personnel performing excavation in any Western Power substation. Excavation includes any process that removes soil to install an item (e.g. erect poles, lay cables).

Training and authorisation

- Personnel who enter into a substation must comply with entry requirements of the work practice 5.2 (Substation entry requirements) in this manual.
- To perform:
  - minor excavation work (e.g. potholing) down to 600 mm – personnel must hold a NAC
  - any other excavation work – personnel must hold a NAC with the qualification, Lay underground electrical cables (delivered by Power Training Services WA (PTSWA)), or equivalent

For more on the NAC, see work practice 5.28 (Network Authority Card (NAC)) in this manual.

- To install trench shoring at a depth greater than 1.5 m:
  - personnel must hold a current qualification in the national competency unit, Install trench support, or an approved equivalent
  - an engineer is required to oversee the work. If the engineer is not able to be onsite to oversee the work, the work team must include a worker who is deemed competent to implement the engineer’s advice.
  - a safety observer is required. For more on this, see work practice 5.13 (Safety observer role) in this manual.
Instructions

Excavation work must be performed according to the 4P method:

- Plan
- Pothole
- Protect
- Proceed

Plan

- Before commencing work:
  - conduct a risk assessment and job briefing. For more on this, see work practice 2.15 (Job briefing process) in this manual.
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements. For more on this, see section 3 (Personal protective equipment) in this manual.
- Identify the location of all underground utilities in the vicinity of the proposed excavation (e.g. cables, earthing conductors, ducts and communication cables). This must include contacting the Western Power nominated representative (e.g. project manager, construction manager) to verify cable locations. If information is not available, use a location device or engage a location service provider.

Note:

Dial Before You Dig cannot determine the location of underground cables or assets inside a substation.

- A permit (e.g. Vicinity Authority (VA), Electrical Access Permit (EAP)) may be required, depending on how close the excavation is to network apparatus. If a permit is required, it must be issued to the Recipient in Charge before work can begin.
- Install appropriate worksite safety barriers.
- Where excavation work may damage underground utilities or undermine a structure, contact the utility or structure owner and request the implementation of appropriate risk controls.
Work Practices

Pothole

- Based on the risk assessment, decide on appropriate means of potholing. Hand digging or vacuum excavating is a safer alternative to mechanical digging.
- Maintain all clearances (to both underground and above ground electrical apparatus) when potholing, as outlined in work practice 5.3 (Substation clearances) in this manual.
- Ensure that mobile plant is earthed as outlined in work practice 2.2 (Use and management of portable earthing/short circuiting equipment) in this manual.
- Do not use mechanical excavators until all underground utilities have been located and identified. Excavator operators must comply with the clearances for specific underground utilities.
- Mechanical excavation is not permitted within 500 mm in any direction of any underground electrical cables or gas pipes.
- When using a small excavator, attach a smooth edge bucket or a rounded tooth bucket for clay/rock excavation and take off layers of a maximum of 50 mm at a time.
- Indicate underground utilities and their routes with spray paint, pegs or flagging tape. Where practical, mark the depth of underground utilities.

Protect

- Assign a competent safety observer to monitor plant used to excavate (if identified as necessary in the risk assessment).
- Ensure that mobile plant is earthed as outlined in work practice 2.2 (Use and management of portable earthing/short circuiting equipment) in this manual.
- Install trench shoring if it is possible that the soil may collapse due to vibration, instability, fine sand, water saturation, etc. For specific shoring requirements, see Code of Practice – Excavation. Consult an engineer when shoring trenches deeper than 1.5 metres, as outlined in the Training and authorisation section, above.
- Reinforce any structure that is likely to fall into any excavation by installing sheet piling, shoring, bracing, guying or using another appropriate means. If the risk cannot be controlled, stop the work.
Proceed

- To avoid cross-contamination of each layer, remove the blue metal, the limestone and the subgrade soil onto separate plastic sheeting tarpaulins.
- Excavator operators must comply with the clearances (to both underground and above ground electrical apparatus). For more on this, see work practice 5.3 (Substation clearances) in this manual.
- When using a small excavator, attach a smooth edge bucket or a rounded tooth bucket for clay/rock excavation and take off layers of a maximum of 50 mm at a time.
- Install covers or an approved barrier to prevent damage to other underground utilities during the excavation process.
- Conduct a visual inspection for physical damages to underground utilities
- If work is being done under a VA, return the protection systems to normal conditions upon completion of the work.
- The onsite person in charge must immediately report to the Western Power nominated representative if underground assets are damaged. If any non-Western Power assets are damaged, the utility owner must be asked to attend the worksite.
- Backfill open trenches once work has been completed. Reinstall the subgrade soil, the limestone and blue metal onto their original place and technical specifications. Compaction must meet the requirements outlined in Code of Practice – Excavation.
- Remove any waste from the worksite and leave the worksite in a safe and clean condition.

References

- Transmission Substation Work Practice Manual:
  - work practice 2.2 (Use and management of portable earthing / short circuiting equipment)
  - work practice 2.15 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 5.2 (Substation entry requirements)
  - work practice 5.28 (Network Authority Card (NAC))
Work Practices

- work practice 5.3 (Substation clearances)
- work practice 5.13 (Safety observer role)


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5.24 LV ground work rescue procedures

Purpose

This work practice outlines how to do the following tasks when personnel are performing live low voltage (LV) work at ground level or below:

- Set up the worksite so that live LV hazards are controlled.
- Rescue personnel when they are working on live LV apparatus.

Training

Personnel working on live LV apparatus must:

- be trained in LV rescue procedures
- hold a current qualification in UETTDFF06B – Perform rescue from a live LV panel (renewed annually).

Setting up the worksite to control hazards

- Perform a risk assessment as described in the Instructions section of work practice 2.17 (Construction site hazard management forms) in this manual. Particular items to include when preparing for live LV work are listed below.
  - Nominate a:
    - safety observer if required. For more on this, see work practice 5.13 (Safety observer role) in this manual.
    - rescuer who meets the requirements listed in Training, above. This could be the safety observer or another person who will not be carrying out the live LV work.
  - Discuss the rescue plan:
    - Identify adjacent live apparatus and isolation points that will require isolation in the case that a rescue must be performed. Attach an ‘Information’ caution tag to the isolator (see Appendix 1 (Tags and signs) in this manual).
    - Identify where insulated covers, mats and barriers are required to reduce the risk of inadvertent contact with live LV.
Work Practices

- Wear appropriate clothing and personal protective equipment (PPE) for the task. For more on this, see section 3 (Personal protective equipment) in this manual. This applies to:
  - personnel performing the live LV work
  - the nominated rescuer – in addition to the minimum PPE for the worksite, the rescuer must also have 500V electrically insulated gloves and protective outers, which are a part of the rescue kit (described below)

  **Note:**
  These gloves must be worn by the rescuer at all times.

- Before starting live LV work, assemble a rescue kit that includes the following:
  - first aid kit
  - 500V electrically insulated gloves and protective outers
  - insulated crook
  - fire blanket
  - wound dressing
  - torch (where relevant).

  **Note:**
  - The rescue and first aid kits must be inspected prior to job commencement to ensure that all contents are present and in good condition. Damaged or out-of-date equipment must be replaced.
  - The rescue kit must be kept close to the worksite.

- Barricade the worksite and post signage around it (where applicable).
- Personnel carrying out the live work must stand on an insulated ground mat which:
  - is within its test date (not exceeding six months)
  - complies to testing described in *AS/NZS 2978:1995 Insulating mats for electrical purposes.*
Performing a rescue

If a worker comes into contact with live LV apparatus, the rescuer must act as outlined below.

**Important**

- During the rescue, the rescuer must not make any direct contact with any live apparatus or the casualty. The rescuer must only make direct contact with the casualty to administer first aid once they have been removed from the electrical hazard.
- At 75mA and above, the victim undergoes ventricular fibrillation (very rapid, ineffective heartbeat). This condition can cause death within a few minutes, so obtaining expert medical attention as soon as possible is vital.
- Take control of the situation.
- If a third person is available, instruct them to call 000 for an ambulance.
- Isolate supply at the previously fitted ‘Information’ caution tag.
- If the supply cannot be isolated immediately, wearing insulated gloves with protective outers, use the rescue crook to break contact where the casualty is in contact with live apparatus.
- The rescuer must not make any direct contact with the casualty until they have removed them from the hazard, and must never make contact with any live apparatus.
- Once the casualty has been removed from the hazard, immediately call 000 for an ambulance (if this has not already been done).
- Provide first aid treatment to the casualty (see Appendix 6 (First aid information) in this manual).
- The casualty must be given a professional medical examination, even if they say that they feel fine. If the casualty is not handed over to medical staff (e.g. ambulance paramedics) at the worksite, take the casualty to a medical facility for an examination as soon as possible. Do not allow the casualty to drive, return to work or operate any plant.
**Important**

- Disturbance of the site where the incident took place must be kept to a minimum.
- The worksite must be made safe before final departure.

- Within an hour of the incident happening, report the incident to:
  - your formal leader
  - the Incident Hotline on 1300 CALL WP (1300 2255 97).

**Note:**
If you are tending to the casualty and there is no other person present to report the incident, report the incident as soon as is practical.

- Note down details of the incident while they are fresh in your mind, as this will be valuable when the incident is investigated.

**References**

- *AS/NZS 2978:1995 Insulating mats for electrical purposes*
- *Electrical System Safety Rules (ESSR)*:
  - 11.2 Procedure for LV switching
  - 11.3 Minimum rules for work on live LV.
  - work practice 2.17 (Construction site hazard management forms)
  - section 3 (Personal protective equipment)
  - work practice 5.13 (Safety observer role)
  - Appendix 1 (Tags and signs)
  - Appendix 6 (First aid information).

**Related reading**

- *AS/NZS 4836:2011 Safe working on or near low-voltage electrical installations and equipment*
5.25 Construction site access – minimum requirements

Purpose

This instruction outlines the minimum requirements for persons when entering a Western Power construction site.

Scope

Persons requiring access must have meet Western Power’s requirements to work on the site, visit or deliver/pick up items.

- Workers on the site must have the minimum NTW requirements or current exemption from the OTX Authorisations group.
- All visitors; whether picking up/delivering items or viewing, must meet the requirements listed for visitors.

Instructions

Minimum Western Power Network Total Workforce (NTW) requirements

- A Western Power Network Authority Card (NAC)
  - A current basic first aid certificate (HLTFA201B) – refresher training every three (3) years.
  - A current resuscitation certificate (HLTCPR201B) – refresher training every 12 months.
- A Construction Safety Awareness Card.
- Personal protective equipment (PPE) as per Field instruction 3.1 (Clothing and personal protective equipment requirements).
- For lineworkers: current Pole top rescue (PTR) and Emergency descent device training (EDD)
- Those who work in remote locations may require (HLTFA302B Provide first aid in remote situation) – refresher training every three (3) years.
Visitors entering a Western Power construction site must:

- Have permission from the site person in charge to enter.
- Have a site induction if entering any danger zones/areas of excavation,
- be escorted under immediate supervision by a person with a NAC card,
- wear the minimum PPE requirements as per Field instruction 3.1.

For substation access this must be read in conjunction with Field instruction 5.2 (Substation entry authority requirements).

References/related information

- Western Power Work Practice Manual:
  - Field instruction 3.1 Clothing and personal protective equipment requirements
  - Appendix 6 First Aid Information
- Worker Authorisation Standard (DM# 8214717)
- Australian Resuscitation Council Guidelines (online) at www.resus.org.au
5.26 Dangerous and explosive goods safety

Purpose

This work practice outlines safe methods for handling, storing, transporting and disposing of dangerous and explosive goods.

Overview

Dangerous and explosive goods include, but are not limited to:
- compressed oxygen, sulphur hexafluoride (SF₆) or other gases
- explosives
- flammable liquids, i.e. petrol and other fuels
- toxic and infectious substances including organochlorine pesticides, arsenic trioxide and chlorpyrifos
- batteries and corrosive substances such as caustic soda and hydrochloric acid
- miscellaneous dangerous goods and articles including polychlorinated biphenyl (PCB) and asbestos
- mineral insulating oil, e.g. transformer oil.

The relevant material safety data sheet (MSDS) for each dangerous or explosive good must be read before it is handled, stored, transported or disposed of.

Emergency manifest

An emergency manifest is to be stored in a weatherproof cylinder at the main entrance of all zone and terminal substations, depots and worksites where dangerous and explosive goods are stored in excess of licensed quantities (100,000L transformer oil and/or 10,000L SF₆ gas).

An emergency manifest must be accessible to emergency services personnel and include the following:
- A list of the dangerous, explosive and hazardous goods stored at the depot or worksite (along with accompanying dangerous and hazardous goods codes).
- Maximum quantities stored.
- A map of the site (with symbols) identifying the stored goods and their locations, at the depot or worksite.
Further detail on the preparation of manifests and site plans is provided in the *Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007* (WA).

**Instructions**

**Prerequisites**

- Complete an appropriate training course before transporting dangerous and/or explosive goods.
- When working with dangerous and/or explosive goods, refer to ChemAlert or the MSDS for the required personal protective equipment, safe handling information and precautionary advice. Also refer to section 3 (Personal protective equipment) in this manual.

**Packing and storage of dangerous goods**

- Make sure all packages and containers are clearly marked.
- Check all dangerous and/or explosive goods are packaged and stored in accordance with the requirements in the MSDS.
- Ensure all storage areas in environmentally sensitive areas are bunded.

**Transporting dangerous goods**

- The following requirements apply to transporting dangerous goods loads in excess of 250kg or 250L, i.e. 25% of a dangerous goods placard load. They do not apply to C1 Combustible Liquids, e.g. transformer oil or diesel.
- Use an appropriate dangerous goods transport contractor when transporting dangerous goods in excess of 250kg or 250L, or consult SHE to determine whether a driver and/or vehicle licence is required to transport the goods.
- Ensure all transported dangerous and explosive goods are packed and restrained in a manner suitable for their safe haulage and within the limits stated in the MSDS.
- Ensure vehicles contain all required safety equipment such as fire extinguishers and portable warning devices.
• Always carry transport documentation. For more information on transport documentation, see the *Dangerous Goods Safety Guidance Note* – *Dangerous goods transport documents*.

• Dangerous goods must not be loaded onto a transporting vehicle that has a false or misleading placard.

• A person must not knowingly load a dangerous good onto a transport vehicle that has an incorrect placard.

• The transporting vehicle must display appropriate placard when transporting:
  o dangerous goods in bulk
  o packaged dangerous goods
  and/or
  o explosive goods.

• Ensure the emergency information panel relating to the goods is readable and clearly marked.

**Note**

If the above requirements are breached, companies and individuals may be subject to serious legal consequences and significant fines.

**Disposal of dangerous goods**

• Disposal of dangerous and explosive goods must be in accordance with the manufacturer's recommendations and in line with controlled waste regulations.
References

- ChemAlert link to the Western Power account – Busbar > Quick links > General > ChemAlert
- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007 (WA)
- Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007(WA)
5.27 Use of pesticides and herbicides

Purpose

This instruction outlines the requirements when using pesticides and herbicides on or near the Western Power network.

Licensing

Certain pesticides and herbicides require that their application be carried out only by a licensed individual.

Instructions

• Follow label and material safety data sheet (MSDS) directions to identify proper safety equipment, handling and application for the pesticides and herbicides and note any health concerns.

• As appropriate, or as recommended on the label, wear the following personal protective equipment when handling, mixing, or applying pesticides and herbicides. Refer to Field instruction 3.1 (Clothing and protective personal equipment requirements) Level 0 requirements:
  • long-sleeved shirt and full-length trousers or long-sleeved coveralls
  • non-canvas or non-porous shoes or boots
  • safety glasses or face shield
  • neoprene gloves.

• Ensure respiratory protection is based upon MSDS, exposure assessment, and work practices.

• Ensure applicators adhere to the following guidelines for the caring of personal protective equipment:

  After each day’s use:

  • Launder reusable clothing.
  • Do not launder contaminated clothing together with normal household clothing.
  • Discard disposable clothing.
  • Do not handle contaminated clothing with unprotected hands.
Wash reusable personal protective equipment with detergent and clean water.

Dry the equipment in a clean, dry place.

After eight (8) hours of use, or more frequently if the odour of the pesticide and herbicide can be detected while wearing the item, replace pesticide respirator cartridges.

For several scheduled applications at different locations in a single day, disposable clothing may be reused, providing the garment is in reasonably good condition (that is, not soiled, saturated, or torn areas).

To minimise or eliminate potential personal exposure to pesticides and herbicides through inhalation, ingestion, and/or skin absorption:

Never eat, drink, or smoke when handling pesticides and herbicides.

Remove all jewellery before handling pesticides and herbicides.

Wash hands with soap and water after handling, mixing or applying pesticides and herbicides.

If an accidental exposure occurs:

Follow the first aid guidelines given on the manufacturer’s label and/or MSDS.

Contact a local safety and health professional and call the Poisons Information Centre on 13 11 26.

References


Guidance Note for the Assessment of Health Risks Arising from Hazardous Substances in the Workplace [NOHSC:3017(1994)]
5.28 Network Authority Card (NAC)

Purpose

This work practice gives an overview of the rules and procedures for applying for and holding a Network Authority Card (NAC).

In the constant pursuit of zero harm for the entire Network Total Workforce (i.e. Western Power employees, contractors and alliance partners) and the general public, Western Power has formalised the minimum competencies and skill sets required to work on or near the Western Power Network.

Scope

This work practice applies to anyone working on a Western Power construction site, as defined in WA Occupational Safety and Health Regulations 1996.

Note

Anyone working for Western Power on a Western Power construction site must hold a current NAC.

About the NAC

The NAC was developed to help Western Power meet its legal responsibility and duty of care to ensure that individuals employed, and any contracted companies, are qualified and competent to carry out their responsibilities in a safe and compliant manner.

The NAC:

• is mandatory for the Network Total Workforce (NTW)
• is issued by Western Power as evidence of a person’s authority to work on, or near, a Western Power construction site
• provides written and photographic identification that a person has completed the Western Power Operational Induction.

All Authorised Persons carrying out work should carry their Western Power approved Worker Authorisation (i.e. NAC) on site to be presented on request. If a Worker is unable to produce his/her NAC upon request, he / she may be required to produce the card for sighting within 48 hours. For more on this see Worker Authorisation Standard (DM# 8214717).
Training requirements

All NAC applicants must have completed the following courses.

- **Induction for Operational Personnel**
  Provided by Western Power’s in-house training department, Power Training Services WA (PTS), this course can be booked online at [pts-training.com.au](http://pts-training.com.au).

- **Provide Basic Emergency life support** (HLTAID002 Provide Basic Emergency life support) or **Provide First Aid** (HLTAID003 Provide First Aid). These courses must be renewed every three years.

  Both courses contain the unit, **Provide Cardiopulmonary Resuscitation** (HLTAID001 Provide cardiopulmonary resuscitation), which must be renewed every 12 months.

- **Construction Induction Card** (CPCCOHS1001A) (Blue/White card)
  This is obtained by completing an online course, provided by Worksafe WA. For more on this visit [http://www.commerce.wa.gov.au/worksafe/who-needs-undertake-construction-induction-training](http://www.commerce.wa.gov.au/worksafe/who-needs-undertake-construction-induction-training).

Western Power also requires that during the previous 12 months, all personnel, where it is relevant to the work, must have received appropriate instruction in approved procedures for release and rescue from live electrical apparatus.

**Note**

The authorisation process, rules and requirements are the same for all workers. By granting authorisation, Western Power makes the worker and the approved Service Provider accountable. Work carried out by an Authorised Person is subject to review and assessment by Western Power.

Network Authorisation aims to ensure that any work performed on or near Western Power’s Network is carried out by suitably qualified licensed workers and in accordance with the appropriate standards and rules applicable at the time.

**Personnel not requiring a Worker Authorisation**

Personnel who do not require a Worker Authorisation must be escorted on Western Power construction sites by an Authorised Person and includes:

- personnel accessing the construction site in a non-operational capacity and staying outside of the Danger Zone of any electrical apparatus
• personnel accessing the construction site in an operational capacity with a current exemption approval from the Authorising Body.

While not requiring authorisation, the above does not remove the requirement for the persons to be appropriately trained, competent and licensed to carry out Authorised Work.

The following table is indicative of authorisation requirements and can be used as a guide when access to a construction site or a substation is required.

**Table 1: Construction site authorisation requirements**

<table>
<thead>
<tr>
<th>Type of worker</th>
<th>Authorisation requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Western Power construction site (non-substation)</strong></td>
<td></td>
</tr>
<tr>
<td>Operational Worker</td>
<td>• NAC; or</td>
</tr>
<tr>
<td></td>
<td>• Exemption with Immediate supervision.</td>
</tr>
<tr>
<td>Non-Operational Worker or Visitor – as above or</td>
<td>• Outside danger zone – NAC; or direct supervision</td>
</tr>
<tr>
<td></td>
<td>• Inside danger zone – NAC or immediate supervision</td>
</tr>
<tr>
<td><strong>Western Power substation (other than pad-mounted distribution substations)</strong></td>
<td></td>
</tr>
<tr>
<td>Operational Worker</td>
<td>• NAC + substation entry; or</td>
</tr>
<tr>
<td></td>
<td>• NAC + immediate supervision; or</td>
</tr>
<tr>
<td></td>
<td>• Exemption + Immediate supervision + site induction;</td>
</tr>
<tr>
<td>Non-Operational Worker and/or Visitor – as above or</td>
<td>• Outside danger zone plus 10m allowance for inadvertent movement of any tools, equipment etc. – direct supervision + site induction</td>
</tr>
<tr>
<td></td>
<td>• Inside danger zone plus 10m allowance for inadvertent movement of any tools, equipment etc. – immediate supervision + site induction</td>
</tr>
</tbody>
</table>

Exemption approval may be sought as outlined in ‘Appendix C – Worker Authorisation – Guidance on Inclusions and Exclusions’ in *Worker Authorisation Standard* (DM# 8214717).
Instructions

New application

1. Complete the Worker Authorisation Application Form (DM# 8190052). The form must be signed by both applicant and their Service Provider’s details (e.g. worker’s employer). This form is also available on Western Power’s website: westernpower.com.au/network-contractors.html
2. Scan the application and email it, along with the supporting documentation listed below, to ptsadmin@pts-training.com.au

Supporting documentation:
- Evidence of current qualification and licence for each category of authorisation being applied for.
- Proof of identity, e.g. drivers licence, passport or birth certificate.
- Portrait photo in JPEG format.
- Evidence that the following NAC minimum requirements have been met:
  - Induction for Operational Personnel.
  - Provide Basic Emergency Life Support or Provided First Aid. Provide Cardiopulmonary Resuscitation may need to be included if previous is more than 12 months old.
  - Construction Induction Card.

For more on this, see the Training requirements section, above.

New authorisation

1. Complete the Worker Authorisation Application Form (DM# 8190052). The form must be signed by both applicant and their manager or formal leader. This form is also available on Western Power’s website: westernpower.com.au/network-contractors.html
2. Scan the application and email it, along with evidence of current qualification and licence for each category of authorisation being applied for, to: ptsadmin@pts-training.com.au

The Authorising Body will:
- Notify the applicant and his/her employer (where applicable) in writing of the outcome of the application.
• If Worker Authorisation is granted, issue to the Worker an authorisation letter to allow commencement of work pending the arrival of the NAC.

Authorisation updates and maintenance

• Periodic refresher training or competency assessments are required for the renewal of specific authorisations.
• Application for refresher training and assessment should be made a minimum of four weeks in advance of any expiry dates.
• The card holder must provide satisfactory evidence of having attended and completed the training, along with any associated assessment, before Network Authorisations will issue an update.
• Authorisation may be suspended if the authorisation is not renewed on or before the due date.
• For any change to the following details, notify Network Authorisations at ptsadmin@pts-training.com.au:
  o Address
  o Contact details
  o Employer details
  o Licence status
  o Employment status
  o Any other information/issue which may be relevant to, or affect, Western Power’s authorisation records.

Exemptions

A Service Provider seeking an exemption from the Worker Authorisation requirements under the *Workers Authorisation Standard* must apply in writing to the Authorisation Body.

• A Service Provider must provide the following in writing to the Authorising Body:
  o Name.
  o Title.
  o Location of work.
  o Authorisation type.
Work Practices

- Reason for seeking an exemption.
- Period required for the exemption.

- The Authorising Body has the right to refuse any request for exemption.
- The Authorising Body has the right to suspend or cancel any exemption at any time without notice.

Applicant

Supply the following information to Network Authorisations at ptsadmin@pts-training.com.au:

- Name.
- Title.
- Exemption type.
- Location of work.
- Reason for seeking an exemption.
- Period required for exemption.

Network Authorisations team

1. Network Authorisations Compliance Officer assesses the application for exemption. If there are any issues with the application, the Compliance Officer must communicate with the applicant in writing (email only) to obtain a resolution.
2. If the exemption is granted, the Compliance Officer must email the exemption to the applicant and, if necessary, their employer.
3. When working under an exemption, see Table 1, above, for the level of supervision required.

Suspension and reinstatement

Network Authorisation may be restricted or suspended (flagged). For more on this, see ‘14. Suspension and Reinstatement’ in Worker Authorisation Standard (DM# 8214717).

Appeals

Workers and/or Service Providers may appeal a decision by the Authorising Body to refuse, suspend or cancel a Worker Authorisation. Where an appeal is lodged,
the decision will be reviewed and assessed by the Appeals Committee, separate to the Authorising Body.

Appeals must be submitted in writing to the Authorising Body within 10 working days of the date of notification of refusal or suspension and must state the grounds for appeal.

The timeframes and process for dealing with any appeal will be determined by the Appeals Committee reviewing the appeal and will be communicated to the Worker or Service Provider making the appeal within 10 working days of receiving the appeal.

The Authorised Person will also be advised of the right to be represented by his/her union during the appeal.

For more on this see, *Worker Authorisation Standard* (DM# 8214717).

**References**

- Worker Authorisation Application Form (DM# 8190052v3A). 4 Mar 2015.
- Worker Authorisation Standard (DM# 8214717v5). 29 Apr 2015.

**Further reading**

5.29  Instruments – testing and calibration

Purpose

This work practice outlines the minimum standard for test instruments and their recalibration requirements.

Scope

- This work practice applies to the Network Total Workforce and in particular to those who may be required to use test instruments on high voltage (HV) or low voltage (LV) systems.
- The minimum acceptable standard for test instruments used on LV systems is: Category III – 1,000 volts, or Category IV – 600 volts.
- Test instruments not meeting these minimum standards can only be used on LV systems on receipt of approval to do so from the Work Practice Development & Training function.

Instructions

- Non-standard voltage testers and test lamps are no longer approved instruments.
- Staff assigned with the responsibility of managing test instruments must ensure regular testing and recalibration takes place and appropriate records are kept.
- Inspect any new instruments or test equipment before use.
- New test instruments must have a valid calibration certificate.
- Carry out annual inspections and calibrations on all instruments or test equipment used for commissioning purposes, per the National Association of Testing Authorities (NATA) recommendations.
- Document and file calibration process for auditing purposes.
- Tag out defective or unsafe equipment with an “Out of Service” warning tag.
Using instruments

- The operator of the test instrument must check the validity of the date of calibration.
- If the date has passed or is not shown, the operator must seek direction from the formal leader. The formal leader must check the database or records to determine the calibration status of the test instrument.
- When the calibration status is current – the test instrument can be used.
- When the calibration status is not current – the test instrument must be tagged using an “Out of Service” warning tag and calibration arranged.
5.30 Lifting slings

Purpose
The purpose of this document is to outline the usage and inspection requirements for slings.

Scope
This field instruction applies to all personnel who are authorised to use, and are responsible for, lifting slings in the Western Power environment. Such slings include:

- chain slings
- fibre rope slings
- wire rope slings
- flat synthetic webbing slings

Note:
This field instruction does not cover every aspect of the use and care of slings. Users must refer to the manufacturer’s instructions and appropriate Australian standards as referenced.

Safety

- All work must be preceded by a risk assessment and any control measures that are identified must be implemented.
- All personnel who are required to use slings must wear appropriate personal protective equipment (PPE), with emphasis on head, hand and foot protection. For more on this, see section 3 (Personal protective equipment) in this manual.
- In addition to pre-use inspections, periodic inspections of slings must be performed by third party competent persons and recorded. In high-usage or harsh conditions, the recorded inspections may be more frequent.

Instructions

Inspection and testing

- Testing will be performed by an external preferred vendor (PV).
• Slings that are used frequently and/or in severe conditions may need more frequent inspection and testing.

• See Table 1 (Minimum inspection and testing frequencies) below for recordable (formal) inspection and testing frequencies in addition to pre-use inspections.

Table 1: Minimum inspection and testing frequencies

<table>
<thead>
<tr>
<th>Sling type</th>
<th>Action</th>
<th>3 months</th>
<th>6 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat synthetic</td>
<td>Inspect</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Chain</td>
<td>Inspect</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Wire rope</td>
<td>Inspect</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Fibre rope</td>
<td>Inspect</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• Slings that are deemed not fit for use must be tagged with an “Out of service” warning tag and set aside for discard or repair.

• All lifting operations must be discussed and planned so that the most suitable equipment and best methods are chosen for the task.

• A pre use inspection of the slings must be performed by the crane operator, dogman or authorised person.

• Ensure that:
  o the Working load limit (WLL) tag and inspection tag is attached to the sling (No tag – No use)
  o there are no bent or broken components
  o there is no excessive wear
  o the next inspection date has not been exceeded

• Before and during the task work, ensure that the slings:
  o do not have knots in them
  o are not shock-loaded
  o are not adjusted or moved while under load
  o are not used for any other purpose

• Stay within the safe working load (SWL) and working load limits.
Work Practices

- Once it is determined which sling/s will be used for the job, read the following information on the different types of slings before commencing work.
- Ensure that the load is placed so that it does not rest on the slings.
- Ensure that loads are placed so that slings are easily removed on completion of lifting operations.

Flat synthetic webbing slings – AS 1353.1 and AS 1353.2

Flat synthetic-webbing lifting slings afford a high degree of flexibility in use as they support the load with a smooth contact surface. The support area in contact with the load is relatively large, which minimises localised pressure that is applied by the sling to the load.

- Sharp corners (less than 10 mm radius) must be avoided, or suitable padding must be used to protect the sling from damage
- Reference must be made to WLL and SWL charts to ensure that slings will not be overloaded. If charts are not available from the sling manufacturer, see AS 1353.2 (Flat synthetic webbing slings – Care and use):
- The colour of the sling leg is used to identify its WLL and the following colour code must be referred to before commencing work (see Table 2 (Sling colour codes) below).

Table 2: Sling colour codes

<table>
<thead>
<tr>
<th>Working load limit (tonnes)</th>
<th>Colour of sling</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Violet</td>
</tr>
<tr>
<td>2</td>
<td>Green</td>
</tr>
<tr>
<td>3</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>Grey</td>
</tr>
<tr>
<td>5</td>
<td>Red</td>
</tr>
<tr>
<td>6</td>
<td>Brown</td>
</tr>
<tr>
<td>8</td>
<td>Blue</td>
</tr>
<tr>
<td>≥ 10</td>
<td>Orange</td>
</tr>
</tbody>
</table>
Work Practices

- Flat synthetic webbing slings can be made from the materials listed below.
  - Nylon – green label
  - Polyester – blue label
  - Polypropylene – brown label
  - Aramid polyamide – yellow label

  **Note:**
  Consult the manufacturer for information on the properties of each material.

**Labelling**

- Each sling must be permanently and legibly tagged or labelled with the following information:
  - manufacturer’s identification
  - WLL or SWL (The SWL for various lifting configurations and the SWL of multi-leg slings must be stated on the tag attached to the master link)
  - month and year of manufacture
  - identification marking to correlate the sling to a test certificate or batch number
  - fibre material type

  **Note:**
  Where multi-leg sling assemblies are configured, ensure that there is no confusion between the WLL of each leg and the SWL of the whole assembly.

**Periodic inspections**

- Periodic inspections must be performed at least every three months by a competent third party person. Where conditions are severe, these intervals should be shorter.
- The inspection for any signs of damage must cover all surfaces along the full length of the slings.

For more on this, see AS 1353.2 (section 9.4.1 – Periodic inspection, general)

- For each sling, the details of periodic inspections must be kept for the life of the sling. The record must include:
  - the date of purchase
Work Practices

- the date of introduction to service
- general details of the service

For more on this, see AS 1353.2 (section 9.5 – Inspection records)

**Discard criteria**

Flat webbing slings must be discarded when:

- the label for the sling is missing or is illegible, and the sling cannot be positively identified
- the sling has been shock-loaded
- a sling has lost 10% or more of its minimum breaking strength (when tested)
- any of the load-bearing fibres are cut, damaged or frayed
- fibres of a protective cover are fused or glazed by friction in a choke hitch, or by externally applied heat
- the sling has sustained chemical damage
- any coupling components or fittings are distorted, cracked, fractured or excessively worn or corroded.
- if any other dangerous condition is confirmed

For more on this, see AS 1353.2 (section 11 – Discard criteria).

**Storage and care**

- If slings are not adequately cared for during use, the service life may be considerably shortened. The following precautions must be taken while using slings.
  - Avoid contact with hot surfaces and exposure to hot gases.
  - Avoid exposure to damaging conditions, such as prolonged exposure to sunlight, dust or chemicals (spray, mist or fume).
  - Discard lifting slings if they have come into contact with acids or alkalis.
  - Slings that have become wet in use, or as the result of cleaning, should be hung up and allowed to dry naturally.
  - Consult the manufacturer for advice on cleaning flat synthetic webbing slings
- Flat webbing slings are best stored:
  - in dry, well ventilated locations
Work Practices

- hanging from pegs
- out of direct sunlight or other sources of heat

- Flat webbing slings should not be stored in contact with chemically degrading materials or liquids, or in a degrading atmosphere (fumes).

Chain slings – AS 3775.1 and AS 3775.2

Chain slings offer little protection to the surface of items being lifted. Although very flexible, care must be taken when rigging as they can appear to be secure and then slip when under load.

- Before use, the visual inspection must check the following as a minimum:
  - the WLL tag is attached to the sling
  - there are no bent or broken components
  - there is no excessive wear

- Damaged slings must tagged "Out-of-service" and not be used.

- Before use, reference must be made to Working Load Limit (WLL) charts to ensure that slings will not be overloaded. If a chart is not available from the chain sling manufacturer, then refer to AS 3775.2 (Chain slings—Grade T, Part 2: Care and use), Table 1, (Working load limit) for a definitive load chart

- Some shortening devices, such as grab hooks, de-rate the WLL for the sling by 25%. Other devices, such as shortening hooks and cradle-grab hooks, may not de-rate the WLL for the sling. Advice regarding the appropriate de-rating should be sought from the manufacturer.

- Chain shorteners must not be used when planting poles or extracting poles from holes.

Periodic inspections

Periodic inspections must be performed every 12 months and recorded by a third party competent person. For more information see AS 3775.2 (Section 9 – Inspection).
Wire rope slings – AS 1666.1 and AS 1666.2

Wire rope slings, although flexible, are susceptible to damage and birdcaging if their maximum bend radii are exceeded.

- General precautions when using wire rope slings include:
  - selecting the correct slinging method
  - inspecting before use
  - not overloading, abusing or hammering into place
  - protecting against damage from sharp corners (bend radius must not be less than rope diameter for a bend of more than 90° and not less than five times the diameter for a bend of less than 90°)
  - ensuring that any ferrules or splices are not subject to bending stress or are placed so that the load is resting on them

- Reference must be made to WLL charts to ensure that slings will not be overloaded. See AS 1666.2 (Appendix C – Working load limits for slings with ferrule-secured eyes) for definitive load charts if they are not available from the sling manufacturer.

Labelling

- Each sling and each sling assembly must be permanently and legibly marked or tagged with the following information:
  - Manufacturer’s identification.
  - WLL for single-leg slings, or SWL for applicable angles of multileg slings.
  - Identification marking to correlate the sling to a test certificate. For multiple identical slings, check that the batch identification number meets this requirement.

- Before use the following must be checked:
  - presence and legibility of markings/tags
  - load-bearing points (where damage could occur)
  - the entire length of the sling for broken strands (open rope as much as possible to check the surfaces of internal strands)
  - end fittings and attachments are not distorted, cracked, fractured or excessively worn or corroded
Periodic inspections

- Periodic inspection must be conducted 12-monthly by a third party competent person, and appropriate records must be kept. Criteria for the inspection are outlined in AS 1666.2 (Wire-rope slings, Part 2: Care and use), Clauses/sections 11 and 12.

**Fibre rope slings – AS 1380.1 and AS 1380.2**

Fibre rope slings have largely been replaced by flat webbing slings, and are seldom found in the workplace.

- Fibre rope slings can be made from the materials listed below.
  - Manila rope
  - Sisal rope
  - Polypropylene rope
  - Polyester rope
  - Polyamide rope

- All of the above are susceptible to damage, abrasion and wear as a result of misuse or use in a hostile environment. Before use, the user must be satisfied that the sling does not show any signs of damage that could affect its safe use.

- Reference must be made to WLL charts to ensure that slings are not overloaded. See AS 1380.2 (Fibre rope slings, Part 2: Care and use), Appendix B (Sling load charts) for definitive load charts if they are not available from the sling manufacturer.

**Labelling**

- Each sling must be permanently and legibly tagged or labelled with the following information:
  - manufacturer’s identification
  - WLL for single-leg slings, or SWL for applicable angles of multileg slings
  - identification marking to correlate the sling to a test certificate
  - rope material type

**Periodic inspections**

- Periodic inspections must be performed and recorded at least every three months, where conditions are severe these intervals should be shorter.
Work Practices

- Slings must be inspected by a third party competent person.
- Slings must be discarded if:
  - the label for the sling is missing or is illegible, and the sling cannot be positively identified
  - the sling has been subject to heavy impact load
  - more than 10% of the fibres are damaged, fused or glazed in any way
  - there is heavy ingress of dirt
  - the sling has sustained chemical damage
  - any coupling components or fittings are distorted, cracked, fractured or excessively worn or corroded
- Inspection records: For each sling, a record of every evaluation by a competent person and the details of the periodic inspections shall be kept for the life of the sling.

For more information see AS 1380.2.2 (section 9 – Inspection).
References

- Transmission Substation Work Practice Manual, Section 3 (Personal protective equipment)
- Amendment No.1 to AS 1353.1—1997 – Flat synthetic–webbing slings, Part 1: Product specification
- AS 1353.2—1997 – Flat synthetic–webbing slings, Part 2: Care and use
- AS 1353.2—1997 – Flat synthetic webbing slings – Care and use
- AS 1380.2—1998 – Fibre rope slings, Part 2: Care and use
- AS 1666.2—2009 – Wire-rope slings, Part 2: Care and use
- AS 3775.1—2004 – Chain slings—Grade T, Part 1: Product specification
- Amendment No.1 to AS 3775.2—2004 – Chain slings—Grade T, Part 1: Product specification
- AS 3775.2—1997 – Chain slings—Grade T, Part 2: Care and use
- Amendment No.1 to AS 1353.1—2004 – Chain slings—Grade T, Part 2: Care and use
5.31 Substation permits

Purpose

This work practice outlines the use of permits to work in Western Power transmission substations. It must be read in conjunction with work practice 5.4 (Secondary isolations) in this manual.

This work practice covers permits, operating agreements (OA) and Handover Certificates to work on, or change authority over, Western Power transmission substations, transmission lines and pilot cables. This also covers work related to Verve Energy, private power generators (PPG) and important customers at 66 kV and above.

Scope

This work practice applies to trained and authorised personnel working on both primary and secondary systems.

Systems

There are two types of systems that make up the Western Power transmission network – primary systems and secondary systems. Working on each of these systems requires a separate permit.

Primary systems

Primary systems incorporate all plant and equipment that can be connected to high voltage (HV) levels of a substation. The key components of primary systems are:

- circuit breaker
- voltage transformer
- current transformer
- isolator or disconnector
- earth switch
- surge diverter
- power transformer
- transmission line
- capacitor
Work Practices

- reactor

Primary plant also includes any equipment directly associated with the substation’s HV plant, such as:
- Buchholz relays on transformers
- SF₆ gas pressure switches on circuit breakers

Secondary systems

Secondary systems incorporate all plant and equipment that cannot be connected to HV levels of a substation.

This work practice only relates to the secondary systems that are under the control of Field Protection Services (FPS). This includes:
- pilot systems
- protection circuits
- metering circuits
- auxiliary systems
- Tele Protection Signalling (TPS) communications

The following secondary systems are not relevant to this work practice:
- communications
- supervisory control and data acquisition (SCADA)
- DC chargers/batteries
- fire alarm systems
- secondary plant in:
  - power stations, including generator step-up transformers
  - gas turbine sites, including generator step-up transformers
  - distribution circuits outside the zone substation boundary
  - regional power station sites
  - distribution line and cable apparatus

Permit issuers and recipients

There are certain requirements that a person must meet in order to receive a permit and, once granted, the permit recipient also has specific responsibilities. This section
also describes some of the responsibilities of the person issuing the permit, who is known as the Issuing Officer (IO).

**Permit recipients – primary and secondary systems**

In order to work on primary and secondary systems, a person must have received a permit from an IO. Depending on the situation and type of permit, a person who has received a permit is known as a:

- Recipient in Charge (RIC)
- Tester in Charge (TIC)
- recipient or tester

To be eligible to receive a permit, a person must be appropriately trained, familiar with Western Power procedures and have a Network Authority Card (NAC) with the following authorisations:

- NA2T – Sign onto a permit as a recipient
- NA3T – RIC for Vicinity Authority (VA) or Electrical Access Permit (EAP)
- NA4T – TIC for Sanction To Test (STT)
- NA5T – Secondary System Issuing Officer

For more on the NAC, see work practice 5.28 (Network Authority Card (NAC)) in this manual.

**Permit recipients – secondary systems only**

In addition to the requirements listed above, a person must also have the following in order to work on secondary systems:

- meet the requirements for working on primary systems
- possess a Secondary Systems Certificate of Competency
  
  This certificate is issued and endorsed by FPS to a person who has successfully completed work modules, practical assessments and familiarisation on FPS requirements for secondary systems. For more on this, see work practice 7.1 (Secondary systems training and authorisation) in this manual.

- if required to receive or issue a Secondary System Permit on equipment that has a normal working voltage that exceeds 50 V AC or 120 V DC, personnel must hold a current and valid:
  
  o WA Electrical Worker’s Licence
or
  o  Cert. III in ESI – Distribution lineworker qualification (or equivalent)

Note:
A permit is not required to work on systems that operate at extra low voltage (i.e. 0–50 V AC or 0–120 V DC) although it is still a requirement to isolate and take other precautions (always treat as live). Systems operating at LV and above do require a permit for access.

Permit recipient responsibilities
It is highly recommended that the role of the IO and the RIC or TIC is performed by different individuals. In circumstances that prevent this, extra care must be taken to ensure that isolation and checking are rigorously done.

The RIC and TIC have the responsibility to ensure that each member of their working team fully understands the boundaries of the work area, conditions of access and the duty of care required. It is also their responsibility to ensure that the personnel under their control are adequately trained and competent for the required work.

FPS permit recipients must be certified for receiving permits on pilot cables for the purposes of testing, or any other work.

Issuing Officer responsibilities
Logging of secondary systems permits
When a secondary system permit is issued, the IO must log the permit with the appropriate control centre before the work begins. This is necessary so that:

- the control centre knows that people are working on a particular item of secondary equipment and are aware of any implications to the power system, such as the risk of unwanted tripping
- the control centre can alert the IO if another person attempts to issue a permit on the same or associated equipment. This is particularly important with permits on pilot cables where it is possible that someone may access a pilot junction box at the same time as HV testing is being carried out.

Cancellation of secondary systems permits
Upon completion of the work for which the permit was issued, the secondary systems IO must:
1. ensure that:
   a. all recipients have signed off of the permit and acknowledged that they will no longer have access to the equipment
   b. the RIC or TIC has relinquished the permit
   c. the equipment is in the required condition for the next stage of the work

2. restore all isolations back to a normal state or set up for the next stage of the work

3. cancel the permit and advise the respective control centre that the permit has been cancelled

If the condition of equipment is changed (i.e. re-energising some, part or all secondary circuits):
   - the condition must be noted on the STT
   - the Secondary Isolation Schedule (SIS) must be updated accordingly and attached to the STT

**Work permit types and handover certificates**

As described in the Electrical Systems Safety Rules (ESSR), there are a variety of permits that cover work in transmission substations, issued according to the situation. There is also a *Handover Certificate* that is used when transferring control between the Construction and the Commissioning Authorities.

**Vicinity Authority (VA)**

A VA is issued by Western Power and authorises work near live electrical apparatus by authorised persons where there is a possibility of encroachment into the minimum approach distance (MAD), such as:
   - primary systems – vegetation management work near transmission lines and substations
   - secondary systems – work near (but no access required to) secondary systems

**Electrical Access Permit (EAP)**

An EAP is issued by Western Power and authorises access to, and work on, an electrical apparatus that has been made safe through isolating and earthing (HV) or short-circuiting (LV), such as:
   - primary systems – work on plant such as lines, cables and transformers
secondary systems:
  o work on protection, control and metering circuits
  o EAP for primary plant plus a SIS
  o EAP for secondary systems, with Section 3 on the EAP endorsed by ‘Secondary Isolation Only’ as no protective earthing is applied to secondary systems

Note:
When access to secondary plant is authorised by a primary plant EAP, the isolated secondary plant might not be earthed. This may be because it is extra LV and so does not need to be earthed, or it is to remain live for operational maintenance purposes. Both of these need suitable isolations to primary plant.

If a primary plant permit requires secondary isolations, the primary plant permit Issuing Officer (IO) must state the isolations in the respective section of the permit for the secondary Isolation Officer.

Access to secondary plant is permitted after the required secondary plant isolations have been completed by the secondary Isolations Officer and the RIC has been instructed on the conditions of the access. These conditions must be attached to the SIS of the EAP.

In the case of a Secondary EAP, the Issuing officer must write “Isolations per attached SIS” and give instruction according to the conditions of access.

Sanction to Test (STT)
An STT is issued by Western Power and authorises access to Western Power’s network for the purpose of testing, commissioning and energising its electrical apparatus:
  • primary systems – testing of primary circuits and removal of program earths for testing purposes
  • secondary systems – work on non-isolated, operational or secondary circuits. An SIS may be required.
Note:

An EAP and STT must not be simultaneously issued on the same side of the equipment, on either the primary or secondary side of plant. However, when working on opposite sides of plant, an EAP must be issued for primary plant and an STT for secondary plant. In this case both the EAP and STT are bound by an OA. The OA details must be recorded on both permits.

In the case of remedial repair or construction work on an item of primary plant which only requires an STT, all workers must work under the safety instructions of the STT and the control of the TIC.

Tele Protection Signalling (TPS) equipment

An STT issued to communications personnel to work on TPS equipment must:

- be accompanied by a SIS. For more on this, see the Use of Secondary Isolation Schedule (SIS) with permits section later on in this work practice.
- be issued to the TIC in person, i.e. it must not to be issued remotely

Construction Authority Work Permit (CAWP)

A CAWP is issued by the Construction Authority and authorises personnel to work on new, non-operational systems that are not connected to Western Power’s network.

Issuing a CAWP

- The permit is issued for only the work specified. It must be kept in the possession of the person in charge of the work or displayed at the entrance to the work area while work is being carried out.
- When issuing the CAWP, the onsite person in charge must ensure that:
  - the terms and conditions of the CAWP have been explained to the work team before starting the job
  - all team members have signed onto the CAWP before beginning the work
- Any team members who permanently leaves the construction site must sign off of the CAWP.
- Any team member who temporarily leaves the construction site must, on returning to the site and before recommencing work, check with the onsite person in charge to find out if the conditions of the CAWP have changed.
Work Practices

- The CAWP may be transferred from one RIC to another. When this occurs, the first RIC must fully explain to the second RIC the conditions of the CAWP and ensure that both of them have fully understood the conditions.
- If the job takes more than one day, the conditions of the CAWP must be reviewed with all team members before starting work on the following day.

Cancellation of a CAWP

When the job is finished, the RIC must ensure that:
- all installed working earths for the task have been removed
- all members of the work team have signed off of the CAWP
- testing and commissioning has been completed
- all installed barriers by the Construction Authority have been removed

Note:

- A CAWP may be issued for construction work to be done in an operational switchyard when the work area is not in or near the MAD of any existing electrical apparatus. If the work encroaches on the MAD of existing live electrical apparatus, a VA, EAP or STT is required.
- In areas outside of the MADs a CAWP and an STT must not be issued on the same plant or equipment at the same time.
- After part of the new construction has been handed over to the Commissioning Authority, a new CAWP defining the new boundaries of the remaining working area must be issued to the work team.

Handover Certificate

When transferring control between the Construction and the Commissioning Authorities, a Handover Certificate must be used as outlined in Work Process/Practice – Handover Certificate. This applies to:
- greenfield and brownfield sites
- asset replacement
- rapid response transformers

For more on this, see:
- Work process/practice – Handover Certificate (DM# 8497265)
- Handover Certificate (DM# 8527604)
Operating authorities

Operating authorities have clearly defined areas of responsibility within Western Power's network for approving and timing outages.

Network Operations Control (NOC)

NOC controls the transmission system from HV terminals of the generator step-up transformers to the distribution network.

NOC is also responsible for:

- organising HV outages to private customers and private power generators (PPG’s)
- managing primary work permits within its Operating Authority boundaries

Note:

Permits to work in transmission substations must be logged with NOC.

Field Protection Services (FPS)

FPS is the operating authority for secondary systems (excluding communications, SCADA, DC chargers/batteries and fire alarm systems) in zone substations and terminal substations. This authority has control of operational sites and ‘non-connectable’ plant, equipment and sites under the control of the Commissioning Authority.

FPS is also responsible for:

- commissioning, maintaining, metering and controlling protection systems
- coordination and commissioning of all operational primary plant
- managing the overarching systems and processes for access to Secondary System Equipment for other groups

Power station authorities

Verve Energy and other privately run power stations, in consultation with System Management, are responsible for approving and timing outages in their power stations. Their authority is from the generator to the HV terminals of step-up transformers and including any associated LV systems.
Network Management Centre (NMC)

NMC is responsible for communication, operation, maintenance, approving and timing planned outages on the communications network. Work permits and access to the network is managed by the Communications Systems Planned Activity Request (CSPAR).

Operating Agreement (OA)

An OA is not a permit. Rather, it is an agreement between two operating authorities and used to confirm that the state of an operational electrical apparatus will be held in an agreed state until the OA is cancelled. An OA is applied:

- to equipment owned by Western Power and another company
  When a customer plant requires maintenance, construction upgrade and/or tests, they request to isolate their plant from WP network and vice versa to re-connect it. These two isolation scenarios are made by an OA in each case

- on the Western Power network
  When maintenance is required on one of two parallel transmission lines installed on the same structures, an OA is required for work before and during line maintenance until it is restored back to normal conditions.

- to pilot cable schemes in the Western Power network
  When work must be done on a pilot cable that requires other apparatus on the network to be de-energised, an OA is required for work before and during the work until the other apparatus is restored back to normal conditions.

Example

The following is an example of how an OA is organised for work on a pilot cable scheme.

It is mandatory for safety reasons to switch off the powerlines above the pilot cable on the same structure. This is to avoid induced voltage in the pilot cable by those powerlines.

This is started by sending a Notice of Intention to Work (NOIW) to NOC for scheduling the respective isolation switching program for the transmission line. FPS then requests that NOC isolate the transmission line.
The OA must clearly indicate the line’s pick ID of the equipment and its isolation points which must be locked off, tagged off and acknowledged by FPS. The OA number must be referenced on the Secondary System permit.

In this case, Secondary Systems use an EAP or a VA permit of their own to work on the pilot cable.

**Permits to access assets not owned by Western Power**

To work on assets that are not owned by Western Power, the permit is issued by the body responsible for the asset.

**Note:**

For more on working on non-Western Power assets, see work practice 5.1 (Consumer site access) in this manual.

**Maintenance Access Permit (MAP)**

A MAP is issued by Verve Energy and authorises work on sites that they own and control. In order to obtain a MAP, a person must:

- be eligible to work on Verve Energy’s equipment
- have successfully completed Verve’s L2 and L3 inductions (to be allowed entry to the Verve Energy site)

A MAP is also required when Western Power requests isolation on Verve Energy’s site to work on the Western Power network.

**Use of Secondary Isolation Schedule (SIS) with permits**

When a single apparatus is split into two ‘separate apparatus’ by electrical isolation, an STT can then be issued on the associated secondary equipment while an EAP is in force on the primary equipment. This can only be done if an SIS is made for the work and attached to both relevant permits. Both onsite persons in charge must:

- agree with applying the primary and secondary isolations
- maintain strict control and management of their worksite
- effectively communicate to ensure that neither team can impact upon the other during the course of their activities

A typical situation is when the protection scheme for a line breaker is isolated from the associated line circuit breaker mechanism. If primary and secondary work teams
are in agreement to test the line protection schemes under a secondary system STT while the primary side of the breaker is being maintained under an EAP, primary and secondary systems must be bound by an OA.

References

- **Transmission Substation Work Practice Manual:**
  - work practice 2.5 (Confined space safety)
  - section 3 (Personal protective equipment)
  - work practice 5.1 (Consumer site access)
  - work practice 5.4 (Secondary isolations)
  - work practice 5.24 (LV ground rescue procedures)
  - work practice 5.25 (Construction site access – minimum requirements)
  - work practice 5.28 (Network Authority Card (NAC))
  - work practice 7.1 (Secondary systems training and authorisation)

- **Electrical System Safety Rules document (ESSR), Section 7.1**

- **Work Process/Practice – Handover Certificate (DM# 8497265)**

- **Handover Certificate (DM# 8527604)**

**Further reading**

- **Secondary Systems Safe Working Procedures (DM# 6672467)**

- **Permit to Work Standard (DM# 8765020)**
5.32 Load restraint on vehicles

Purpose
This work practice outlines the minimum requirements for restraining loads being transported on vehicles used by the Network Total Workforce (NTW).

Scope
This work practice applies when transporting equipment such as cable drums, transformers, wooden pole sections and small items on the load-carrying platform of vehicles (e.g. truck flatbed, trailer). This work practice has been developed to be in line with Load Restraint Guide – Guidelines and Performance Standards for the Safe Carriage of Loads on Road Vehicles.

Instructions
- Before commencing work:
  - conduct a risk assessment. The risk assessment must include:
    - risks associated with restraining devices (refer to manufacturer’s instructions)
    - risk of damage to items being tied incorrectly
    - ensuring that the centre of mass of the load is over the centre-line of the vehicle
    - the total weight, shape, length and height of the load that is to be transported
    - the route and type of road Consider the travel speed, corners, roundabouts, hills, rough surfaces and the camber of roads.
    - weather conditions
    - determining the appropriate load restraint method
    - control measures to minimise any risk during the attachment of restraints.
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements. For more on this, see section 3 (Personal protective equipment) in this manual.
Work Practices

- conduct a job briefing. For more on this, see work practice 2.15 (Job briefing process) in this manual.
  The job briefing must be based on the principle that the loads being transported on a vehicle must be loaded and restrained in a manner that will avoid causing injury to personnel/public and damage to property.

- Loads must be restrained on the vehicle to prevent any movement during transport. This can be achieved by ensuring that:
  - the size of the load-bearing platform (e.g. flatbed) and load-bearing capacity of the truck is appropriate to transport the load
  - the stability of the vehicle and load is maintained when accelerating/braking, turning corners, roundabouts, hills, chambers and rough roads
  - small items are transported in an enclosed container that is permanently attached to the vehicle or temporarily attached to the flatbed of the vehicle (i.e. restrained to the vehicle’s load attachment points with chains or straps)
  - large items are restrained from moving horizontally or vertically. For more on this, see the *Large load restraint methods* section below.

- For details on transporting specific types of loads, see the following work practices in this manual:
  - 5.12 (Storage, handling, transport and disposal of sulphur hexafluoride (SF₆) gas)
  - 5.26 (Dangerous and explosive goods safety)
  - 6.1 (Oil-filled electrical equipment)
  - 6.5 (Handling of treated poles and contaminated soil around poles)

**Large load restraint methods**

**Cable drums – without a cradle**

Restrain the cable drum using chains and wedges at both ends of the drum, as outlined below (see Figures 1 and 2, below).

- Rest wedges on a rubber mat to increase the friction between the wedges and the load-carrying surface.
- Position wedges at both ends of the drum.
• Secure the wedges together by wrapping a strap around them and tension them so that they sit snugly against the drum.

• Thread appropriately rated steel chains through the centre hole of the drum and restrain both ends of each chain to the vehicle’s load attachment points.

• Tension the chains with devices suitably rated for the load.

Figure 1: Cable drum without a cradle – rear view

Figure 2: Cable drum without a cradle – side view

Cable drums – in a cradle

• Rest the cradle on a rubber mat to increase the friction between the cradle and the flatbed.

• Attach the cradle to the vehicle’s load attachment points with appropriately rated steel chains (see Figures 3 and 4, below).

• Tension the chains with devices suitably rated for the load.

• Fix the cable drum in the middle of the cradle shaft so that the cable drum is unable to rotate.

• Fix the shaft so that it is unable to rotate or move.
5.32 Load restraint on vehicles

New power transformers – up to 865kg

- Rest the transformer on a rubber mat (see Figures 5 and 6, below).
- Attach the transformer by its lifting lugs to the vehicle’s load attachment points using suitably rated steel chains.
- Tension the straps or chains with devices suitably rated for the load.

New power transformers – from 950kg to 1800kg

- Rest the transformer on a rubber mat (see Figures 7 and 8, below).
- Attach the transformer by its restraining lugs to the vehicle’s load attachment points using suitably rated steel chains.
- Tension the chains with devices suitably rated for the load.
Work Practices

Current and voltage transformers – without a crate

- Rest the transformer on a rubber mat.
- Attach the transformer by its restraining/lifting lugs to the vehicle’s load attachment points using suitably rated steel chains.
- Tension the chains with devices suitably rated for the load.

Current and voltage transformers – in a crate

- Attach the transformer’s crate to the vehicle’s load attachment points by passing appropriately rated straps/chains through the gaps of the crate from one side to the other.
- Position rubber mats between the strap/chain and the timber slats of the crate to prevent damage (see Figure 9, below).
- Tension the straps/chains with devices suitably rated for the load.

Figure 7: New power transformer from 950kg to 1800kg – front view

Figure 8: New power transformer from 950kg to 1800kg – side view

Figure 9: Current transformer in a crate – right front view
Work Practices

Pole sections

- Lay square/rectangular cross-sectioned support timbers across the vehicle’s flatbed so that when the pole sections are loaded:
  - one support timber will be under each end of the longest pole section
  - one support timber will be under the middle of the longest pole section
  - the support timbers do not protrude beyond the edge.

See Figures 10 to 12, below.

![Figure 10: Pole resting on support timbers](image)

- Each pole section must be resting on at least two support timbers, or resting on top of a pole section that is resting on at least two support timbers. For pole sections longer than two metres, use three or more support timbers.
- Place the pole sections onto the support timbers starting from one side of the flatbed of the vehicle.
- Load the heaviest section of the pole close to the headboard of the flatbed.
- Use at least two appropriately rated webbing ratchet straps to restrain pole sections. For pole sections longer than two metres, use three or more webbing ratchet-straps.
- Place ratchet-straps at approximately equal distances along the length of the load.

![Figure 11: Pole sections – rear view](image)  ![Figure 12: Pole sections – left rear view](image)
Transporting complete disconnector frames

Personnel who prepare disconnectors for transport must disassemble all complete disconnector frames prior to transporting to prevent loss of the load due to insulation failure. To avoid shock and vibration, which may result in failure, transport the individual porcelain rotating insulator sections:

- horizontally
- supported along their length
- secured from rolling and moving.

References


- Transmission Substation Work Practice Manual:
  - work practice 2.15 (Job briefing process)
  - section 3 (Personal protective equipment)
  - 5.12 (Storage, handling, transport and disposal of sulphur hexafluoride (SF₆) gas)
  - 5.26 (Dangerous and explosive goods safety)
  - 6.1 (Leaking oil-filled electrical equipment)
  - 6.5 (Handling of treated poles and contaminated soil around poles)
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5.33 Degassing of XLPE cables

Purpose

This work practice outlines how to degas high voltage (HV) cross-linked polyethylene (XLPE) cables before using electric or hydraulic cutters to cut the cable. This allows methane gas that may be built up in the cable to vent into the atmosphere before cutting.

Scope

This work practice applies to personnel cutting HV (11–330 kV) XLPE cables which have been in storage.

This work practice does not apply to personnel cutting:

- low voltage cables or XLPE cables which are already installed on the network
- any cable fitted with a pressure relief valve on the cable cap. For more on this, see the Cable caps with pressure relief valve section, below.

Background

XLPE cables generate methane gas during the manufacturing process and may continue to generate methane gas when stored at temperatures over 30°C. Methane gas is highly flammable and incidents have been known to occur where the gas has ignited during cable cutting, causing an explosion.

Instructions

Before cutting any XLPE cable with an end cap, personnel must do the following (as shown in Figure 1):

1. Slowly cut off the very tip of the end cap (avoid cutting the cable) using a hacksaw.
2. Allow the cable to vent for five minutes to allow any trapped gas to escape.
3. Before cutting the cable at the other end, mark where you need to cut the cable and slowly make two shallow cuts through the sheath at that mark (one on each side of the cable). To do this, use a hacksaw, taking care not to cut through the metallic screen.
4. Allow the cable to vent for five minutes to allow any trapped gas to escape.
5. The cable may now be cut with electric or hydraulic cutters.
Figure 1: Cable degassing procedure (diagram)

**Note:**

Authorised cable jointers can use alternative approved safe methods for cutting the end cap and sheath.

**Cable caps with pressure relief valve**

In the future, XLPE cables may be delivered with cable caps that have a pressure relief valve (see Figure 2). This device allows the automatic venting of any gas generated in the cable. Cables fitted with these caps do not need to be degassed via the above procedure.
6.1 Oil-filled electrical equipment

Purpose

This work practice outlines how to remove oil-filled electrical equipment, including equipment suspected to contain PCB, from transmission substations. This includes, but is not limited to, transformers, instrument transformers, switchgear and capacitors. The instructions for the removal of this equipment include: leak treatment, handling, transportation, and storage.

Scope

This work practice covers all Western Power personnel and contractors who treat, handle, transport and store oil-filled electrical equipment.

Instructions

Personal protective equipment

The minimum personal protective equipment (PPE) requirements for handling oil-filled electrical equipment are detailed below.

- Level 0 PPE in section 3 (Personal protective equipment) in this manual.

and

- One of the following chemical resistant gloves:
  - nitrile rubber gloves with gauntlets
  - PVC polymer 45cm gloves

Identified or suspected PCB oil-filled electrical equipment

Additional PPE is required when dealing with oil-filled equipment suspected of containing PCB, or pre-1980 oil-filled electrical equipment. If there is a risk of splashes, mists or sprays developing, PPE additional to the basic requirements apply. This information is detailed in Table 1.

Some of this PPE can be found in the ‘Contaminated land/asbestos PPE kit’.
Table 1: PPE for PCB oil-filled equipment

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goggles</td>
<td>Goggles with wide vision, clear lens, vented and able to fit over prescription spectacles.</td>
</tr>
<tr>
<td>Gloves</td>
<td>Chemical resistant nitrile rubber gloves with gauntlets <strong>not</strong> gloves made from PVC.</td>
</tr>
<tr>
<td>Coveralls*</td>
<td>Disposable single use coveralls (type 5/6) with elasticised hood, waist, wrist and ankles.</td>
</tr>
<tr>
<td>Over boots*</td>
<td>Disposable single use elasticised over boots that cover the entire boot.</td>
</tr>
</tbody>
</table>

**Additional PPE, where there is a risk of splashes, mists or sprays.**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face shield</td>
<td>Full face shield that guards the chin, has a lift up design and an anti-fog coating.</td>
</tr>
<tr>
<td>Respirator</td>
<td>Half face respirator with a multi-gas/vapour (organic) cartridge.</td>
</tr>
</tbody>
</table>

* Item *in the ‘Contaminated land/asbestos PPE kit’

The ‘Contaminated land/asbestos PPE kit’ also contains a clear heavy duty plastic bag used for bagging any contaminated clothing or materials.

**Note:**

- The **2015 Personal Protective Equipment Catalogue (DM# 12821865)** is a list of approved PPE which must be used by Western Power employees. Contractors must use PPE of equivalent specifications and ratings, as described in the catalogue.
- Specific tasks may require custom equipment not included in the catalogue.

Ensure the following, to manage potential contact with oil during and after working with oil-filled equipment:

- Maintain a good level of hygiene while working and after the work has been completed.
- If the oil gets in eyes, flush with clean water for 15 minutes and seek advice from your Safety, Health and Environment (SHE) Business Partner.
- If the oil gets on the skin wash the affected area with soap and water and seek advice from your SHE Business Partner.
Note:
Suspected or known PCB oil must be stored separately from PCB free oil.

See relevant sections in the Responsible Waste Poster (DM# 10038142).

Identify PCB oil-filled electrical equipment

The following needs to be treated as potentially containing PCBs:

- Oil-filled electrical equipment dated pre-1980.
- Unknown manufacturer date.
- Grading capacitors fitted to circuit breakers must be assessed separately.
- All instrument transformers manufactured by Conelectric (e.g. post type, current and voltage transformers) must be treated as being 'suspected PCB' regardless of age due to oil cross-contamination.

Affix a 'Contains suspected PCB' label (Ariba code 18831391) to the oil-filled electrical equipment when removed from service. Figure 1, below, shows an example of this label.

![Figure 1: ‘Contains suspected PCB’ label](image)

Repair leaking oil-filled electrical equipment

Leaking oil-filled electrical equipment must be repaired prior to transportation making sure that:

- the entire exterior surface of the oil-filled electrical equipment is cleaned to ensure it is free of any oil residue
- the patch repair epoxy kit is used (available from ADAPT Australia). The two parts must be mixed and applied to the prepared surface.
Note:
Refer to work practice 6.7 (Oil and chemical spills) in this manual for guidance on how to respond to spills.

Used PPE and absorbent materials from equipment suspected of containing PCBs must be:
- placed in separate sealed plastic disposal bags (found in the ‘Contaminated land/asbestos PPE kit’) and
- placed in designated containers at the Western Power Kewdale Depot.
Alternatively, dispose of the used PPE and absorbent materials directly through Western power’s preferred supplier for the disposal and treatment of PCB.

Handle and transport oil-filled electrical equipment

The handling and transport of oil-filled electrical equipment has different requirements depending on the location.

Note:
Transport of leaking oil-filled equipment is NOT permitted.
Metropolitan locations

PCB free oil-filled equipment

Transport directly Western Power’s Kewdale depot for repair, refurbishment or scrapping with a ‘PCB free’ label (Ariba code 18831389) affixed to the oil-filled electrical equipment. Figure 2, below, shows an example of this label.

![Figure 2: ‘PCB free’ label](image)

Refer to ‘Drainage of oil-filled electrical equipment’ in this work practice for guidance on drainage and disposal of mineral oil.

Suspected PCB oil-filled equipment

Equipment may be physically disconnected, if required, however it must remain within the substation boundary until the oil test results are known.

Transport the oil-filled electrical equipment with a ‘Contains suspected PCB’ label (Ariba code 18831391). Figure 1 shows an example of this label.

Arrange for a specialist contractor to sample the oil in the suspected PCB oil-filled equipment. Refer to your formal leader for contractor details. The contractor will arrange for laboratory analysis of the oil samples at an accredited National Association of Testing Authorities (NATA) laboratory.

If the tests results are:

- **PCB free**
  
  Refer to ‘PCB free oil-filled equipment’ instruction above.

- **Contains PCB**
  
  Arrange for a Western Power preferred supplier for PCB treatment and disposal (Hansen Environmental 1300 426 736 or Toxfree 1300 869 373) to collect from the substation and transport to a licensed facility.
All oil-filled electrical equipment must be labelled with a ‘Contains PCB’ sticker (Ariba code 18831392) as shown in Figure 3, below.

![CAUTION]

Figure 3: ‘Contains PCB’ label

Include on the sticker the PCB level (obtained from the laboratory test results). If unsure contact your formal leader.

Note:

Truck spill kits must be available during transportation. If a spill or leak occurs, refer to work practice 6.7 (Oil and chemical spills) within this manual for guidance on how to respond to spills.
Country locations

PCB free oil-filled equipment

Transport directly to Western Power’s Kewdale depot for repair, refurbishment or scrapping with a ‘PCB free’ label (Ariba code 18831389) affixed to the oil-filled electrical equipment. Figure 2 shows an example of this label.

Refer to ‘Drainage of oil-filled electrical equipment’ in this work practice for guidance on the drainage and disposal of mineral oil.

Suspect PCB oil-filled equipment – no further use

- Label oil-filled electrical equipment with a ‘Contains suspected PCB’ sticker. Figure 1 provides an example of this sticker (Ariba code 18831391)
- Arrange for a Western Power preferred supplier for PCB treatment and disposal (Hansen Environmental 1300 426 736 or Toxfree 1300 869 373) to collect from the substation and transport to a licenced facility.

Suspect PCB oil-filled equipment – potential re-use

Label oil-filled electrical equipment with a ‘Contains suspected PCB’ sticker prior to transporting equipment to Western Power’s Kewdale depot. Figure 1 provides an example of this sticker (Ariba code 18831391). At Kewdale depot the oil-filled electrical equipment must be temporarily stored in a clearly marked undercover bunded area until testing can take place and the results of the PCB samples are available.

Arrange for a specialist contractor to sample the oil in the suspected PCB equipment. Refer to your formal leader for contractor details. The contractor will arrange for laboratory analysis of the oil samples at an accredited National Association of Testing Authorities (NATA) laboratory.

If the tests results are:

- **PCB free**
  Refer to ‘PCB free oil-filled equipment’ instruction above.

- **Contains PCB**
  Arrange for a Western Power preferred supplier for PCB treatment and disposal (Hansen Environmental 1300 426 736 or Toxfree 1300 869 373) to collect from the substation and transport to a licensed facility.
All oil-filled electrical equipment must be labelled with a ‘Contains PCB’ sticker. Figure 3 provides an example of this label (Ariba code 18831392). Include on the label the PCB level which has been obtained from the laboratory test results. If unsure contact your formal leader.

**Note:**

Truck spill kits must be available during transportation. If a spill or leak occurs, refer to work practice 6.7 (Oil and chemical spills) within this manual for guidance on how to respond to spills.

**Drainage of oil-filled electrical equipment**

**Note:**

Only drainage of PCB free oil-filled electrical equipment is permitted.

Oil-filled electrical equipment must be drained within the dedicated bund available at Kewdale depot with the exception of circuit breakers which are drained onsite. Mineral oil drained from equipment that was contained within the bund must be pumped to an appropriate drum or tank for disposal.

If a spill occurs, refer to work practice 6.7 (Oil and chemical spills) within this manual for guidance on how to respond to spills.

Disposal of mineral oil must be conducted by Facilities Management in accordance with *Disposal of Controlled and General Waste* (DM# 7808253).

**References**

- Disposal of Controlled and General Waste (DM# 7808253)
- Responsible Waste Poster (DM# 10038142)
- Personal Protective Equipment Catalogue (DM# 12821865)
- Transmission Substation Work Practice Manual:
  - section 3 (Personal Protective Equipment)
  - work practice 6.7 (Oil and chemical spills)
6.2 Substations adjacent to environmentally sensitive areas

Purpose

This work practice outlines the minimum requirements for any work undertaken in substations that are within or adjacent to environmentally sensitive areas.

Scope

All Western Power employees and contractors who plan or undertake construction and maintenance activities in substations that are within, or adjacent to, environmentally sensitive areas are responsible for complying with this work practice.

Overview

The Western Power Environmentally Sensitive Areas Program provides special procedures that must be used before and during works in environmentally sensitive areas at Western Power worksites, facilities or adjacent land. Over 500 locations are protected and are marked with red polygons in Western Power’s GIS systems.

Environmentally sensitive areas are clearly defined by the placement of reflective green signs and strips on poles and gates in or near those areas.

Environmentally sensitive areas can contain the following:
- Rare fauna habitats.
- Declared rare and priority listed flora.
- Threatened ecological communities.
- Declared weeds.
- Certified organic farms.
- Parks and conservation covenants.
- Dieback (*Phytophthora cinnamomi*).

Planning Work

Environmentally sensitive area procedures must be obtained from the Safety, Health and Environment Function (SHE) at environment@westernpower.com.au, between six months and ideally one month of the work commencing. Email requests must include the following information:
Work Practices

- Details of the type of work.
- Work location.
- Site-specific environmentally sensitive area number.

If the site-specific procedures provided by SHE require consultation with the Department of Parks and Wildlife (DPaW) ensure the following:

- Notify DPaW at least four weeks before the job commences.
- Provide a clear description of the scope of work, location, proposed time, duration and any vegetation clearing required.

**Note:**

Written site-specific environmentally sensitive area procedures must be obtained prior to any work commencing in or near an environmentally sensitive area.

When **entering** a substation which is within or adjacent to an environmentally sensitive area ensure the following:

- Follow instructions issued by SHE. The SHE instructions will determine whether additional DPaW instructions are applicable.
- Comply with all requirements for clean vehicles, equipment and footwear.
- Minimise disturbance of native vegetation.
- Minimise disturbance and movement of vegetation and soil.
- Avoid using any chemicals.
- If replacing a pole that has an environmentally sensitive sign attached, remove the sign from the old pole and place it on the new installed pole.

When **leaving** an environmentally sensitive area ensure the following:

- Follow instructions issued by SHE. The SHE instructions will determine whether additional DPaW instructions are applicable.
- If the environmentally sensitive area contains declared weeds or dieback, clean down vehicles, equipment and footwear to remove all soil and vegetation.

For further information, contact SHE on environment@westernpower.com.au or 0419 987 954. Contractors must contact their designated Western Power representative who will coordinate the enquiries.
Emergency work

Seek assistance from SHE when conducting emergency or unplanned construction work, or maintenance activities on substations within or adjacent to an environmentally sensitive area:

- T: 0419 987 954
- E: environment@westernpower.com.au

Contractors must contact their designated Western Power representative who will coordinate any enquiries.

If SHE is not contactable on the above details, e.g. due to the job having to be responded to immediately out of hours, ensure the following:

- Clean vehicles, equipment and footwear.
- Minimise disturbance of native vegetation.
- Minimise disturbance and movement of soil.
- Avoid using any chemicals.
- If replacing a pole that has an environmentally sensitive sign attached, remove the sign from the old pole and place it on the new installed pole.
- Contact SHE within 10 working days of the job being completed.

Incidents

If there is any impact or potential impact to an environmentally sensitive area, e.g. spills or an impact on rare plants, report the incident to the Incident Hotline on 1300 2255 97 (1300 CALL WP) within 60 minutes of the incident occurring.

Substations

There are currently four substations that have environmentally sensitive area requirements.

Kemerton Substation

**Procedures for ESA:** F104

**Environmental issue:** Rare plants

**Procedure for access to this Substation:**

- Use only the existing limestone track. Under no circumstances is any off-track driving to occur.
Cannington Terminal

Procedures for ESA: C444

Environmental issue: Conservation wetland, rare plants and threatened ecological communities

Procedure for access to this Substation:
- Ensure that no disturbance occurs to the wetlands and or native vegetation to the north and east of the substation fence.

Cataby Substation

Procedures for ESA: D474

Environmental issue: Dieback (*Phytophthora cinnamomi*).

The Tronox (formally Tiwest) Cooljarloo mineral sands mine operates under a Dieback management plan that requires all vehicles and machinery to enter the site clean (i.e. free from dirt, mud and plant material). Vehicles must not deviate from the Western Power corridor.

Restricted Access:
- PJR – ENB 81/CTB – ENB/EMD 82 line - No disturbance to vegetation or driving under these lines. Use the spur access from the adjacent transmission line track.

Procedure for access to this Substation:
- Washdown is not required on entry and exit if the vehicle and equipment are clean and are accessing Cataby Substation only.
- If vehicles or equipment are dirty or further access outside the substation and into the surrounding bushland (a known Dieback infested area) is required, then the vehicles and equipment is to be washed down.

Bridgetown Substation

Procedures for ESA: N510

Environmental issue: Declared weed – Patterson’s curse (purple flower).

Western Power sprays the substation site annually to eradicate the weed.

When leaving Bridgetown Substation:
- Brush down boots, vehicles and any equipment that may have come into contact with the weed.
6.3 Dewatering

Purpose

This instruction provides guidance on groundwater extraction and discharge of water for dewatering purposes. It provides considerations for planning work and sets minimum requirements when dewatering for construction, including excavation work.

Responsibilities

Anyone who requests a dewatering service, or is involved with dewatering, must comply with this instruction.

Instructions

Pre-construction check list

A desktop assessment must be completed before starting a project to determine if dewatering is required. The desktop assessment must consider:

- presence of acid sulfate soils or a contaminated site
- identification of any Aboriginal heritage issues
- identification of Public Drinking Water Source Areas
- impact of water discharged on native vegetation

If assistance is needed with any of the above, contact the Environment, Community and Approvals branch for advice:

- environment@westernpower.com.au
- 9326 6294

Note:

A dewatering management plan is required where a project presents a risk to the environment and/or public safety. Contact the Environment, Community and Approvals branch if advice is required.

In addition to a desktop assessment, the following must be considered:

- project specific requirements (e.g. dewatering management plan, condition of a licence or approval)
- discharge option and approval (see Dewatering discharge options, below)
• inform local residents, landowners or businesses likely to be affected during dewatering

**Groundwater extraction**

Western Power is exempt from requiring a license to extract groundwater (including for dewatering purposes). However, groundwater extraction:
• must be kept to a minimum (time, extraction rate and total volume)
• is not permitted within river banks

**Dewatering discharge options**

Before discharging water:
• obtain approval from regulatory agencies, water treatment facility or landowner
• where possible, assess groundwater quality (groundwater sample taken and analysed at a laboratory) to ensure appropriate controls are in place

There are three recommended options for discharge (described in further detail below):
• onsite infiltration (preferred option)
• discharge into drains
• offsite disposal

**Onsite infiltration (preferred option)**

Onsite infiltration is discharging in the vicinity of the work area where the water can infiltrate in the surrounding soil after treatment and monitoring.

When planning for onsite infiltration, the following must be considered:
• approval from the property owner
• infiltration rates will be sufficient to avoid flooding
• site contours (if slope is present onsite, ensure controls are in place, e.g. build a bund or barrier)
• sediment controls are in place (e.g. geotextil barriers installed near drains, roads, pathways)
• any other aspects that can cause an incident (see ‘Management during construction’, below)
Work Practices

Discharge into drains

Where discharge is proposed into a drain, written approval is required from the relevant regulatory body or agency before starting works (see Table 1 (Regulatory body or agency approval requirements) below). Be aware that:

- at least a month must be allowed to obtain the approval
- baseline groundwater data and a treatment strategy (if required) is likely to be required as part of the approval process

Table 1: Regulatory body or agency approval requirements

<table>
<thead>
<tr>
<th>Discharge point</th>
<th>Regulatory body or agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stormwater drain</td>
<td>Water Corporation or designated water service provider</td>
</tr>
<tr>
<td>Local drain</td>
<td>Local Council</td>
</tr>
<tr>
<td>Sewer</td>
<td>Water Corporation</td>
</tr>
</tbody>
</table>

Note:
Discharge into water bodies (e.g. wetland, creek, river) is not supported as the approval process is extensive and requires post-construction monitoring.

Offsite disposal

Where extracted water is required to be disposed of offsite, approval from a licensed treatment facility must be obtained before works commence to ensure correct disposal.

Extracted water must be tanked onsite and disposed of at a licensed treatment facility as soon as possible.

Reuse of extracted water (e.g. dust suppression) is possible. However, extensive groundwater analysis must be done beforehand to ensure that the water quality is acceptable and does not present a risk to human health and the environment.

Management during construction

If a dewatering management plan is required, any conditions must be complied with before starting the works. The plan must also be retained onsite and communicated to site personnel.
Dewatering must be monitored to ensure that the following do not occur during discharge:

- local flooding
- erosion
- pollution (e.g. discharge of contaminated water)
- offsite impact (i.e. area outside the designated work area)
- water entering drains or water bodies (e.g. wetland, creek, river) without approval
- discharge onto any native vegetation
- sediment buildup in drains or water bodies
- discharge outside the water quality criteria as detailed in that specific project’s dewatering management plan

**IMPORTANT**

If any of the above is observed during construction, immediately:

1. call the Western Power Incident Hotline on 1300 CALL WP (1300 22 55 97)
2. request that the incident be escalated to the Environment, Community and Approvals branch

**References**

- Department of Water, Water Quality Protection Note 13 - Dewatering of Soil at Construction Sites
6.4  This section has been left blank intentionally

Details on the safe use of dangerous and explosive goods have been moved and can now be found in field instruction 5.26 (Dangerous and explosive goods safety) in this manual.
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6.5 Handling of treated poles and contaminated soil around poles

Purpose

This instruction outlines the minimum requirements for the handling, transportation, storage and disposal of chemically treated wood poles, pole butts, cattle care collars, pole ash and associated contaminated soil.

Overview

To prevent wood rot and termite attacks, Western Power historically used or currently uses the following chemicals to treat wood poles:

- Tar – used from 1940s to 1976.
- Pole mix (aldrin/dieldrin, pentachlorophenol and diesel mixture) – used from mid 1970s to early 1980s.
- Creosote (coal tar) – used from 1980 to 1986.
- CCA (copper chromium arsenate) – used since early 1980s.
- Preschem polesaver rods – used since 1993.

As a result of treating poles with these chemicals, pole ash and soil around the base of wood poles may be contaminated.

Responsibilities

- It is the responsibility of the formal leader to ensure that this instruction is read and understood by those persons that this instruction impacts.
- It is the responsibility of the onsite person in charge to ensure that this instruction is complied with.
- It is the responsibility of all personnel who are required to handle, transport, store and dispose of wood pole, pole butts, pole ash and associated contaminated soils to comply with this instruction.

Instructions

- When removing a pole, a minimum PPE of Level 0 must be worn, as described in field instruction 3.1 (Clothing and personal protective equipment requirements).
- Where possible, avoid the generation of wood or contaminated soil dust. If required by personal risk assessment, wear a FFP2 dust mask to avoid breathing in the dust.
Work Practices

- Avoid skin contact with pole butts, pole ash and contaminated soil surrounding the poles.

Handling of wood poles and pole butts
- Cut off the butts of poles that have been treated with pole mix or Preschem polesaver rods 300 mm above the pole mix stain or rod holes.
- Remove excess soil attached to pole butt before transportation and place it in the bottom of the hole.
- If removal of excess soil is not possible, wrap the pole butt in heavy duty plastic prior to transportation.

Note:
If required by the landowner or Department of Parks and Wildlife, wood poles may be cut off at ground level and the pole butt left in the ground to avoid disturbing native vegetation. The height at which they are cut off will be determined by agreement with the landowner or Department of Parks and Wildlife.

Transportation
- Remove treated poles, including pole butts, from the site the same day that they are pulled out. If same day removal is not possible, ensure that access to pole butt is restricted.
- Transport poles and pole butts to the nearest depot for storage and disposal unless otherwise stated in the contractor’s contract or project-specific environmental management plan.

Removal and disposal of steel stays
- Steel stays must be detached from wood poles prior to disposal and placed in steel skip bins that are available at each depot for recycling, unless otherwise stated in the contractor’s contract or project-specific environmental management plan.

Handling, storage and disposal at Western Power depots
- Before handling and disposing of pole butts, remove excess soil and place it in dedicated drums labelled with a ‘Waste’ sticker (sticker code: 18831388, see Figure 1: ‘Waste’ sticker).
- Cut treated poles into sections suitable for disposal in skip bins.
- Place treated poles and pole butts in dedicated skip bins located at each depot.
Store the contaminated soil in a drum at the designated area in the depot.

Facilities Management provide pole butt skips and soil drums. If required, contact the Environmental Operation Advisor for your region or Facilities Management for advice.

Final disposal

- Facilities Management manage waste disposal at Western Power depots in accordance with *Disposing of General and Controlled Waste* (DM# 7808253).
- Contractors must dispose of wood poles, pole butts, pole ash, cattle care collars and potentially contaminated soils in accordance with the contract, or project-specific environmental management plan when specified.

**Note:**

Poles must **not be burnt** as inhalation of the smoke may present a health risk.

Removal and handling of pole ash

- Stay upwind of burning treated poles to avoid smoke inhalation.
- Do not touch or disturb burnt parts of treated poles, if possible.
- Do not drive or walk through pole ash, if possible.
- If it is necessary, make saw cuts on burnt pole in the unburnt sections, where possible.
- If pole ash is found in an environmentally sensitive area or where customer complaints are likely, lightly wet down the ash with water.
- Remove all pole ash and place it into a suitable sealed container.

**Note:**

Do not remove or handle the pole if it is still burning.

Transportation of pole ash

- Place pole ash in a suitable sealed container (i.e. 205 L drum).
- Transport the pole ash to the nearest Western Power depot unless otherwise stated in the contractor’s contract or project-specific environmental management plan.

Storage of pole ash at depots

- Place ash in a labelled drum.
- Store the drum in a designated area in the depot.
6.5 Handling of treated poles and contaminated soil around poles

Contact Facilities Management for appropriate disposal.

Facilities Management provide drums and stickers. If required, contact the Environmental Operation Advisor for your region or Facilities Management for advice.

**Disposal of pole ash**

- Facilities Management manage waste disposal at Western Power depots in accordance with *Disposing of General and Controlled Waste* (DM# 7808253).
- Contractors must dispose of pole ash in accordance with the contract, or project-specific environmental management plan when specified.

**Cattle care collars**

- When safe to do so, cattle care collars must be removed from site when the pole butt is removed to allow the pole hole to be backfilled (see ‘Handling of associated contaminated soil after removing a pole’ below).
- Removed cattle care collars must be returned to the nearest depot unless otherwise stated in the contractor’s contract or project-specific environmental management plan.

**Note:**

If requested by the landowner, cattle care collars can be left on the ground provided the pole butt is not removed (see ‘Handling of wood poles and pole butts’ below) and collar is not relocated or disturbed.

**Handling of associated contaminated soil after removing a pole**

See Figure 1: Backfilling instruction after pole removal, for a visual depiction of the following steps.

- Dig out the soil immediately around the hole to a depth of 300 mm and to a width of:
  - distribution poles – 400 mm from the hole
  - transmission poles – 1000 mm from the hole
- Shovel the excavated soil back into the pole hole and compact every 300 mm to within 300 mm of the top.
- Fill the remaining 300 mm with clean soil (from elsewhere onsite if agreed with the landowner or from a warehouse that supplies certified clean fill) and compact it until the soil is slightly raised.
If the excavated soil cannot be placed into the pole hole or could be reached by animals or humans:
- place soil into a sealable container or plastic bag
- transport the soil:
  - to the nearest depot and store it in the environmental shelter as described in ‘Final disposal of contaminated soil’ section, below
  - as stated in the contractor’s contract or project-specific environmental management plan

Note:
If removed pole is located within a (potential) wetland or water body, or removed pole location will became part of a future residential development, contact the Environmental Section at environment@westernpower.com.au.

Final disposal of contaminated soil
- At the Western Power depot, store soil in a sealed drum labelled with a ‘Waste’ sticker (sticker code: 18831388, see Figure 2: ‘Waste’ sticker) and contact Facilities Management for disposal.
- Facilities Management manage waste disposal at Western Power depots in accordance with Disposing of General and Controlled Waste (DM# 7808253).
- Contractors must dispose of contaminated soil in accordance with the contract, or project-specific environmental management plan when specified.

References
- Disposing of General and Controlled Waste (DM# 7808253)
- ‘Waste’ sticker (sticker code: 18831388)
6.5 Handling of treated poles and contaminated soil around poles

**Figure 1: Backfilling instruction after pole removal**

**Figure 2: ‘Waste’ sticker**
6.6 Lamp and fluorescent tube disposal

Purpose

This instruction provides the minimum requirements for the handling, packaging and storage of globes, lamps and fluorescent tubes. This includes but is not limited to, mercury vapour globes, high pressure sodium lamps, metal halide lamps, fluorescent tubes and compact fluorescent lights (CFL). For the purposes of the Environmental Protection (Controlled Waste) Regulations 2004, globes, lamps and fluorescents tubes are considered controlled waste.

Instructions

• All personnel who are required to handle fluorescent lamps and tubes must wear the following personal protective equipment; as per Field instruction 3.1 (Clothing and personal protective equipment requirements) level 0 requirements,

Packaging

• Waste lamps, globes and fluorescent tubes shall be placed in the box supplied with the replacement or the original package.
• If the original package is not available or if the globe, lamp or fluorescent tube is broken, it shall be placed into a plastic globe bag and sealed (stock code: OC3107).
• The boxed or bagged globes, lamps and fluorescent tubes shall be secured for transportation.

Storage at depot

• Excluding Streetlight Services Section, all bagged globes, lamps or fluorescent tubes shall be stored in a labelled ‘Globes, Lamps and Fluorescent Tubes’ drum (sticker code: 18831394) located within the environmental shelter at the depot.
• All four and five feet fluorescent tubes shall be stored in cardboard boxes (stock code: UA3163) within the environmental shelter at the depot.
Disposal

- When the designated globe recycling drum within the environmental shelter at the depot is three-quarters full, Facilities Management must be contacted to arrange pick up and recycling of the content.
- Streetlight Services Section are responsible for the removal of bulk quantities of globes, lamps and fluorescent tubes and shall facilitate the transport of globes, lamps and fluorescent tubes to an approved Recovery Centre as soon as practicable.

Reference

- ‘Globes, lamps and fluorescent tubes’ sticker (sticker code: 18831394)
6.7 Oil and chemical spills

Purpose

This work practice provides instructions on how to respond to oil and chemical spills and leaking oil-filled electrical equipment to minimise harm to:

- the environment
- risk to public safety
- human health.

Instructions

1. Personal protective equipment

The following personal protective equipment (PPE) must be worn when responding to a spill.

- Level 0 PPE in section 3 (Personal protective equipment) in this manual.

and

- One of the following chemical resistant gloves:
  - nitrile rubber gloves with gauntlets
  - PVC polymer 45cm gloves.

PPE must be sourced from the 2015 Personal Protective Equipment Catalogue (DM# 12821865), a list of approved PPE which must be used by Western Power employees. Contractors must use PPE of equivalent specifications and ratings, as described in the catalogue. Specific tasks may require custom equipment not included in the catalogue.

Note:

- For additional information on PPE required for specific spilt products, view the material safety data sheet on ChemAlert (busbar > Quick links > ChemAlert).
- Additional or specific PPE is required when dealing with oil-filled equipment suspected of containing PCB, or pre-1980 oil-filled electrical equipment. For more on this, see work practice 6.1 (Oil-filled electrical equipment) in this manual.
2. **Make the area safe**

Make the area as safe as possible by:
- controlling the spill (i.e. stop or isolate the source)
- containing the spill (follow spill kit instruction for guidance). Spill kits and instructions are located in depots, substations and selected vehicles.

3. **Report the spill**

All spills and leaks will be logged into *Guardian* by the Customer Service Centre as an environmental incident. The incident will be escalated if considered an emergency. Use the contact details in Figure 1, below.

![Figure 1: Oil/chemical spill reporting information](image)

4. **Spill clean-up, waste disposal and spill kit content replacement**

- Specific spill kit instructions are available within the vehicle, depot and substation spill kits.
- Used absorbent material (e.g. peat, booms/pads) must be collected, removed from site and disposed of into an appropriate labelled drum (Ariba code 18831393) available at the nearest depot. An example of the label is shown in Figure 2, below.
Figure 2: ‘Contaminated absorbent material from spill clean-up’ label

- Do not remove the resulting contaminated soil from site unless advised by a Western Power Safety, Health and Environment Business Partner.
- Contact Facilities if a dedicated bin/drum is not available.
- Spill kit contents must be re-ordered and replaced once used. Relevant contents and stock codes are available in the spill kit instructions.

Note:
Do not mix used peat with other used absorbent material. Used absorbent material must be placed in dedicated labelled drums and stored in the environmental shelter at the depot.

References

- Transmission Substation Work Practice Manual:
  - section 3 (Personal protective equipment)
  - work practice 6.1 (Oil-filled electrical equipment)
- ChemAlert busbar > Quick links > ChemAlert
References

- Western Power Distribution Pole Inspection Manual
- ‘Waste’ sticker (sticker code: 18831388)
6.8 Aboriginal artefacts

Purpose
This instruction outlines the appropriate steps to take when, during ground and excavation activities, objects are discovered which might be Aboriginal in origin.

Instructions
- When an object which may be Aboriginal in origin is discovered, immediately inform the onsite person in charge.
- The onsite person in charge must establish a no work zone around the site, large enough to ensure the discovery will not be disturbed.

Note:
Work may continue outside the no work zone.
- The onsite person in charge must contact the Incident Hotline on 1300 225 597 (1300 CALL WP) to advise of the discovery.
- In turn, the Customer Service Centre must contact the ECA Branch who will take over management of the discovery and provide the onsite person in charge with the appropriate management procedures to follow.
- The onsite person in charge must inform all personnel onsite of the ECA Branch procedures to follow.
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6.9 PCBs in lighting capacitors and chokes

Purpose

These instructions provide the minimum requirements for the handling, packaging and storage of lighting capacitors and chokes. All capacitors and chokes are considered to contain polychlorinated biphenyls (PCBs). For the purposes of the Environmental Protection (Controlled Waste) Regulations 2004 all capacitors and chokes are considered controlled waste.

Instructions

Personal protective equipment (PPE)

When removing, handling and/or storing capacitors and chokes containing PCBs the following PPE must be worn, as per Field instruction 3.1 (Clothing and personal protective equipment requirements) Level 0 requirements, and additional:

- nitrile or PVC gloves.

Packaging

- When removing capacitors and chokes from service, the capacitor and choke shall be placed into a heavy duty plastic bag and sealed. The bag must be labelled with ‘Contains Suspected PCB’ (sticker code: 18831391).
- The plastic bag containing the capacitors and/or chokes shall be secured for transportation.

Storage at depot

- All plastic bags containing capacitors and chokes shall be stored in the dedicated ‘Contains Suspected PCB’ labelled drum (sticker code: 18831391) located within the environmental shelter at the depot.
- The PCB labelled drum shall be pre-lined with a plastic bag and kept sealed and secure after use.

Disposal

- When the PCB labelled drum is three-quarters full, Facilities Management must be contacted to arrange pick up and disposal of the contents.
Reference

- ‘Contains suspected PCB’ sticker (sticker code: 18831391)
6.10 Fauna

Purpose
This instruction outlines the requirements for dealing with fauna encountered during field activities.

Scope
This work instruction has been written for Western Power employees, contractors and alliance partners who undertake construction and maintenance activities.

Instructions

Field Activities

Note:
When undertaking work in the field, perform surrounding area checks prior to starting work to determine if any fauna and/or habitats may be encountered. This can be documented in the risk assessment process.

Nesting and dwelling places

- If nesting or dwelling places are identified that may be impacted by the work, stop the activity and contact Western Power’s Environment Section.

- Before relocating a bird’s nest check to see if it has eggs or chicks. If either is present wait until the chicks have left the nest. If the nest is unoccupied, place it on the ground so that the bird can rebuild the nest in another area.

Possums, bats and other nesting fauna

- Large peppermint trees are a habitat for the threatened Western Ringtail Possum and should not be removed if possible. Trees can be selectively pruned to meet the electrical safety clearances. If a peppermint tree is to be pruned or removed, inspect for possums. Shaking the tree is acceptable to encourage the possum to evacuate.

- For possums, bats and other nesting fauna, if the nest is unoccupied it may be removed. If young are present, stop the activity and contact Western Power’s Environment Section.

- Remove stockpiled vegetation regularly as wildlife may shelter in it. Field staff should be prepared for any wildlife encounters.
Bird nests

- If a bird nest reappears on Western Power infrastructure, a bird spike installation may be an alternative. For advice on this, contact Western Power’s Environment Section.

Malleefowl

- When travelling in the Wheatbelt region, take care to avoid running over Malleefowl nests. If you encounter Malleefowl or their nests, contact Western Power’s Environment Section.

Snake encounters

- If you encounter a snake, do not aggravate it in anyway as this is when snake bites occur. Step away slowly to allow the snake as much room as possible to escape. Snakes are sensitive to ground vibration so stamping your feet may assist in sending them away from you. Snakes are more active in the summer months so take care when working in grassy and bushland areas and wear enclosed shoes and long trousers.

- If a snake is found in a substation or confined area, contact the Wildcare hotline or Department of Environment and Conservation to arrange removal.

Note:
Remember all snakes are protected.

Emergency response

- If a bird’s nest is discovered during an emergency response or unplanned maintenance and it contains eggs or chicks and the work cannot be delayed, contact the Wildcare hotline to organise for a wildlife carer to remove the eggs/chicks.

Reporting fauna incidents

- For sick, injured or stranded native fauna, contact the Wildcare hotline.

- Report injured fauna to the Incident hotline. This does not include vehicle collisions with native fauna on public roads.

- If a known or suspected threatened fauna species has been injured or killed notify the Incident hotline or Western Power’s Environment Section.
• If fauna deterrents such as bird diverters or pole guards are perished or damaged notify Western Power’s Environment Section.

Contact details

• Western Power’s Environment Section: 0419 987 954 environment@westernpower.com.au
• Wildcare hotline (24 hours, 7 days) (08) 9474 9055
• Department of Environment and Conservation (08) 9334 0292
• Incident hotline 1300 225 597

References

• Work Practice Manual, field instruction 5.10 (Land access – private property)
• Environmental Field Guide – for photos and further guidance on fauna issues related to field activities. This guide is available on DM (DM# 9900082) and Depot Pack (on the Safety and Standards page).
6.11 Erosion

Purpose
This instruction outlines how to minimise erosion and soil disturbance for planned or unplanned construction or maintenance works.

Overview
Erosion occurs when soil becomes unstable and is mobilised. This mostly occurs on steep slopes or unstable soil. Environmental harm can occur in the area where soil is eroded and in the area where the mobilised soil is deposited.

Instructions
- Follow an approved environmental management plan for new transmission or distribution works.
- For works that do not require an environmental management plan, such as some maintenance activities:
  - Keep the area of disturbance as small as possible.
  - Reinstall all excavations immediately following completion of works.
  - Only use established tracks for site access.
  - If there is no established vehicular track, use a four-wheel drive for site access and avoid areas where vehicle may be susceptible to bogging.
  - Do not disturb existing vegetation.
  - Minimise vehicle movements to avoid soil compaction.
  - Drive slowly and consistently and avoid excessive wheel rotations.
  - Avoid visibly eroded areas, particularly embankments.
  - If erosion could affect Western Power assets or stakeholder properties, notify the Environment, Community and Approvals Branch at environment@westernpower.com.au as soon as possible.
- Do not light or cause fires to be lit.
- Follow any extra requirements for erosion control issued by a Western Power environmental officer.
Work Practices

Work near water bodies

When conducting works around water bodies:

- Be extra cautious when working close to the edge of the water body, as soils in these areas are less stable.
- Avoid areas where vehicles may be susceptible to bogging.
- Cross all rivers and streams via existing bridges.
- Drive slowly and avoid excessive wheel rotations.
- If crossing a water body by vehicle is unavoidable, use existing vehicle track crossings.

References

- Work Practice Manual (DM# 6999451), field instruction 5.10 (Land access – private property)
6.12 Native vegetation clearing and maintenance

Purpose

This work instruction provides information to ensure all regulatory and statutory obligations are met when doing work that may cause vegetation disturbance or removal. This includes vegetation maintenance work that is not specifically covered by a Western Power approved Environmental Management Plan (EMP) or approved environmental conditions.

Overview

- Vegetation clearing is any removal, damage or destruction of WA native vegetation or non-native vegetation which is considered to be a habitat for threatened species. Clearing can include activities such as driving on vegetation or any other activities that disturb vegetation.
- Unauthorised clearing of native vegetation can result in prosecution under the Environmental Protection Act 1986, the Environment Protection and Biodiversity Conservation Act 1999 and the Wildlife Conservation Act 1950.
- ‘Vegetation maintenance’ is work that keeps vegetation clear of powerlines and other assets.

Instructions

Read the works package and distribution design documents

- Familiarise yourself with the work required and the area in which the work is to be carried out.

Note:

A clearing permit must be obtained before native vegetation clearing can commence.

Obtain a permit

- A clearing permit is required for all new works affecting native vegetation. Exemptions cover vegetation maintenance around existing powerlines and facilities. If the work has the potential to cause removal, substantial damage or destruction of vegetation, including driving over vegetation, severing or ringbarking of trunks or stems, ensure advice has been sought from the
Environment Section of the Environment, Community and Approvals (ECA) Branch and a clearing permit has been obtained if necessary.

- In some areas special conditions require the protection of black cockatoo nesting sites or rare flora.
- If work is subject to a Western Power approved EMP and/or other agreed environmental conditions, ensure all activities are conducted in accordance with these.
- Clearing must not exceed the approved area described in the relevant documentation including: line maps; design diagrams; EMP or the clearing permit.
- Any changes to the proposed clearing area must be approved by the Environment Section and the relevant changes made to the line maps, design diagrams, EMP or the clearing permit prior to the clearing being undertaken.
- All personnel must abide by Western Power’s demarcation of the working areas. Demarcation will be by way of flagging tape in the field or by another agreed method. Significant plants/areas may be demarcated with flagging tape prior to clearing operations to exclude them from clearing or access.

Vegetation maintenance work

- A clearing permit is not required for maintaining safety clearances of vegetation to existing infrastructure that has live electrical conductors, equipment, facilities and access routes.
- Damage to rare plants or Black Cockatoo habitat trees is not exempted but these are managed through the Environmentally Sensitive Area (ESA) process (see below) or special conditions.
- If vegetation is required to be cleared outside of the Vegetation Management Zone or outside of the established access routes, the Environment Section must be contacted prior to clearing occurring, as a clearing permit may be necessary for these areas.

Environmentally Sensitive Areas (ESA)

- Where there are important environmental attributes near existing assets Western Power employs an Environmentally Sensitive Area (ESA) system.
- Assets within ESAs are demarcated in Western Power’s GIS, asset databases and through signage in the field. It is necessary to gain the procedures for operating within an ESA prior to entering it and complying with...
those procedures. See field instruction 6.2 (Substations adjacent to environmentally sensitive areas) in this manual.

**Conduct field activities**

- Prior to working within road reserves, consultation may be required with Main Roads WA, the local government authority and/or the Department of Parks and Wildlife (DPaW) for the location of any protected environmental sites, in particular where threatened flora exists.

- These areas are termed Special Environmental Areas (SEAs) and are often delineated by yellow markers (Figure 1) but this may not be the case and any information identifying a SEA must be verified before proceeding with the work. Advice on locations and requirements can be obtained from DPaW or Main Roads WA.

![Figure 1: SEA markers](image)

- Any disturbance of these areas can result in prosecution under the *Environmental Protection Act 1986, Environment Protection and Biodiversity Conservation Act 1999* and the *Wildlife Conservation Act 1950*.

- Topsoil and rootstock present within all cleared areas is to be left as undisturbed as possible to help in regeneration of native vegetation.

- Trees should be left untouched whenever possible. Do not remove old debris as standing and fallen dead trees and branches can provide significant fauna habitats.
Work Practices

- Do not dispose of vegetation debris in such a way that it may smother or crush existing vegetation. Each work package should define how cuttings are to be treated. In the absence of this, the local authority and/or the Environment Section must be consulted as the disposal method must consider local conditions and environmental implications such as dieback and smoke pollution.

- Do not park or drive vehicles, plant or machinery on non-designated access tracks or areas that contain native vegetation at any time. Equipment and materials must not be stored outside the approved clearing areas or within native vegetation.

- Where required, comply with the EMP or instructions on the design drawing or within the clearing permit, such as reporting the period when the clearing was undertaken, before and after photographs and whether the clearing met or exceeded the permit bounds.

Incidents

For any of the following situations, call the Incident Hotline 1300 2255 97 (1300 CALL WP).

- Clearing without a clearing permit.
- Clearing rare plants within the Vegetation Management Zone protected by the Environmentally Sensitive Area system.
- Clearing outside of the designated area.
- Clearing that does not follow a Western Power EMP or agreed environmental conditions.
- Actions that do not follow this instruction.

Obtain help

- Assistance with clearing permits or compiling with procedures, email or contact the numbers below.

<table>
<thead>
<tr>
<th>Incident Hotline</th>
<th>1300 2255 97 (1300 CALL WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment, Community and Approvals Branch</td>
<td><a href="mailto:environment@westernpower.com.au">environment@westernpower.com.au</a></td>
</tr>
<tr>
<td>Environmentally Sensitive Area</td>
<td>0419 987 954</td>
</tr>
</tbody>
</table>
6.13 Biosecurity

Purpose

This work practice identifies biosecurity mitigation activities to reduce the risk of moving weeds or plant diseases. These are the minimum requirements for biosecurity as prescribed by the Biosecurity and Agricultural Management Act 2007 when working on agricultural properties, and in and around native vegetation and water bodies.

This work practice also provides the minimum requirements when entering land managed by the Department of Parks and Wildlife (DPaW), referred to as conservation estate. These areas include special areas known as Disease Risk Areas (DRA).

Overview

When Western Power staff and contractors move through agricultural regions and the conservation estate, vehicles and equipment have the potential to move seeds, plant, soil and animal material. As a result, weeds and plant diseases can be moved between, or introduced to, agricultural properties or across the conservation estate. The objective of this work practice is to prevent the spread of declared plants, weeds and plant disease.

Biosecurity threats to agriculture and natural environments include:

- weeds
- declared plants
- plant diseases (e.g. dieback)
- pests
- stock disease including ticks, lice and other parasites
- genetically modified crops (e.g. canola)

Instructions

- If assistance is needed with using this work practice, contact your Safety, Health and Environment Business Partner for advice (see the Contact details section at the end of this work practice).
Planning and scheduling

<table>
<thead>
<tr>
<th>Agricultural property</th>
<th>Conservation estate / Disease Risk Area (DRA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan work located within crops to occur after the harvest and not during the growing season (late July-December) where possible.</td>
<td>• Plan work to occur under dry soil conditions where possible.</td>
</tr>
<tr>
<td></td>
<td>• Some forest areas can only be accessed under dry soil conditions and with a clean vehicle and equipment. Liaise with the DPaW to plan work in these areas. Consult with your Safety, Health and Environment Business Partner for advice.</td>
</tr>
<tr>
<td></td>
<td>• Schedule works in dieback susceptible areas during the dry season (November to April) to prevent movement of plant diseases.</td>
</tr>
<tr>
<td>If work cannot be rescheduled and is planned to occur during wet soil conditions, mobile washdown equipment should be utilised, if available.</td>
<td></td>
</tr>
</tbody>
</table>

Implementing biosecurity

<table>
<thead>
<tr>
<th>Agricultural property</th>
<th>Conservation estate / Disease Risk Area (DRA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before leaving the depot (Planned Work)</td>
<td></td>
</tr>
<tr>
<td>Notify the landholder/manager of proposed access.</td>
<td>• Notify the local DPaW office of entry into conservation estate or DRA at least 10 working days before entry.</td>
</tr>
</tbody>
</table>
Ask if there are any biosecurity issues.

- Assess if you will be travelling through dieback-free forest.
- Plan inspection and cleandown locations with DPaW.
- Determine if mobile washdown equipment will be required to complete the work.
- To access DRA, obtain DRA permits for all vehicles/trailers and retain while onsite.

Inspect vehicle/equipment for plant, animal and soil material before leaving the depot. If required, clean vehicle/equipment to ensure they are free of plant, animal and soil material.

Dispose of plant seeds into a sealed container or sealable plastic bag and place in the general waste bin at the depot.

Upon arrival at job site

Upon arrival at worksite/agricultural property, inspect and clean the vehicle/equipment as required before entering to ensure that it is free of plant, animal and soil material.
<table>
<thead>
<tr>
<th>Agricultural property</th>
<th>Conservation estate / Disease Risk Area (DRA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before leaving job site</strong></td>
<td></td>
</tr>
<tr>
<td>If working in a genetically modified crop (e.g. canola), ensure the vehicle/equipment is free of all plant material (e.g. flowers, roots, leaves) on exiting the property.</td>
<td>Clean vehicle/equipment on exiting conservation estate and DRA worksites.</td>
</tr>
<tr>
<td>If you will be moving on to another property, ensure vehicle/equipment will be clean on entry for the next property.</td>
<td></td>
</tr>
<tr>
<td>Clean vehicle/equipment at the depot ready for the next shift, if time permits.</td>
<td></td>
</tr>
<tr>
<td>Report any biosecurity incidents on Western Power’s Incident Hotline: 1300 225 597</td>
<td></td>
</tr>
</tbody>
</table>

**Important**

Vehicles and equipment entering an agricultural property, conservation estate or DRA must be clean on entry, i.e. free of plant, animal and soil material. Vehicles and equipment must also be clean on exiting the work site.

**Inspect and clean down for weeds**

Upon arrival at the job site, inspect your vehicle/equipment and if plant, animal or soil material is found, clean it by using the following methods.

- If seeds such as doublegees or caltrop are found in vehicle tyres:
  1. hand pick or use the scraper tool to pick all the seeds out of the tyres, and brush/collect into dustpan (use gloves to avoid prickles)
  2. roll the tyres forward just enough to pick out the remainder of seeds stuck in the tyres and brush/collect into dustpan
  3. put all seeds collected in the dustpan into a seed container or sealable plastic bag
  4. dispose of the sealed container in a general waste bin at the depot
If seeds such as doublegees or caltrop are found on the cab floor, underbody, trays or stabilisers:

1. use a dust pan and brush to collect the seeds or handpick the seeds and dispose of them in a sealed container/plastic bag. Check boots for seeds too.
2. put all seeds collected in the dustpan into a seed container or sealable plastic bag
3. dispose of the sealed container in a general waste bin at the depot

If plant, animal or soil material is found on the tyres or underbody, or on your footwear, use a stiff brush to remove it.

Note:

- During wet conditions, a washdown will make it easier to ensure that equipment is free of plant, animal and soil material.
- As access to environmentally sensitive areas and organic farms should only be done during dry conditions, such work should be planned to avoid wet conditions.

Inspect and clean down for dieback

Before leaving the depot

Use the washdown bay to remove all plant, animal or soil material from tyres, wheel arches, underbody, trays and equipment such as augers.

Before entry to site

- Inspect your vehicle/equipment. If you have picked up plant, animal or soil material, brush down with a stiff brush. Where available, use existing washdown stations. Pay particular attention to tyres, wheel arches, underbody, trays, and equipment such as augers.
- Check footwear for plant and soil material. Brush footwear with a stiff brush from the biosecurity kit.

During wet conditions

Works in dieback susceptible areas of native vegetation should only be scheduled during the dry season (November–April) to prevent movement of this soil-borne plant disease. Where this is not possible, washdown is required to ensure that vehicles and equipment are free of soil and plant material.
Fault and emergency work

- When working in fault and emergency conditions, make the best effort to:
  - work in dry conditions
  - follow the requirements of this work practice
- Conservation estate – attempt to contact DPaW before entry. Where this is not possible, contact DPaW after the work has been done.

Contacts

For advice on how to use this work practice, contact:

- your formal leader
- the relevant Safety, Health and Environment Business Partner for your area
  or
- the Safety, Health and Environment Function:
  - T: 9326 7900
  - E: she@westernpower.com.au

References

- Biosecurity and Agricultural Management Act 2007
6.14  This section has been left blank intentionally

Details on the use of pesticides and herbicides have been moved and can now be found in field instruction 5.27 (Use of pesticides and herbicides) in this manual.
This page has been left intentionally blank.
Secondary Systems
Safety LifeSavers are essential safe work practices designed to protect you and others from serious injury or death.

1. **Planning and Risk Assessment**: Before you start, make sure you plan the job and all members of the work team understand their roles and responsibilities. A Job Risk Assessment must be completed for all operational jobs.

2. **Personal Protective Equipment**: Always wear the appropriate personal protective equipment and clothing at the work site and for the job.

3. **Working at Heights**: Comply with all the requirements of working at heights when using equipment such as a ladder, harness, lanyard or scaffold.

4. **WorksiteHazards**: Provide adequate control to manage all hazards, excavations, traffic and public safety.

5. **Testing and Commissioning**: Test before you touch. Test all conductors as live until YULU prove they are de-energized and made dead. Confirm your work and follow the correct work instructions.

6. **Permits and Documents**: The relevant permits or programs must be issued before work starts. Make sure the correct isolations are made and the proper tags are used for the job.

7. **Earththing**: Use the approved insulating mats and covers to prevent accidental contact.

---

**Think Safe**

**Work Safe**

**Live Safe**

---

**Earththing**

- Apply appropriate earthing where required. Use visible earthing in the work area.

**Vehicle Operation**

- Always drive safely, obey traffic laws, secure loads and conduct regular safety checks.

---

Breach of Safety LifeSavers or concealing breaches can result in disciplinary action and may lead to termination of employment.
Secondary systems field instructions

Introduction

Western Power is committed to meeting all legal obligations in relation to legislative, regulatory and environmental requirements.

The field instructions contained in this manual have been developed to ensure standardisation of work practices and procedures for the Network Total Workforce (NTW). They ensure that the NTW is aware of their roles and responsibilities in creating and maintaining a safer and more efficient working environment.

These instructions, which set the minimum standards, must be issued to all relevant staff and followed at all times except when:

- in the opinion of the employee, a life threatening situation dictates alternate action
- written authorisation for an alternative practice has been obtained, in advance, from OTX Work Practices

Background

- The Transmission System is made up of both primary and secondary equipment.
- The System Management Division is the Operating Authority for the Transmission System.
- Due to the specialised nature of the equipment utilised on secondary systems, System Management Division has delegated Secondary Systems Section to be the Operating Authority for secondary systems, which consist mainly of protection equipment. Secondary Systems Section is also the Operating Authority for the pilot systems.

Relevance

Because Secondary Systems’ work is largely performed in zone and terminal substations, all the field instructions in Sections 1–6 of the Transmission Substation Work Practice Manual are also applicable to Secondary Systems personnel. The ones that are most relevant are listed in the following section, ‘Secondary Systems relevant field instructions’.
Additional and complementary field instructions specific to secondary systems can be found in section 7 (Secondary systems) in this manual.

Secondary systems personnel must also be familiar with the content of ‘Secondary Systems Safe Working Procedures’ (DM# 6672467).

**Version control**

It is the **user's responsibility** to:
- update and maintain their own hard copy manual

It is the **formal leader's responsibility** to:
- ensure that employees are using the current version of the Transmission Substation Work Practice Manual

**Note:**

Use the electronic version (e.g. on *busbar*, Depot Pack or the Western Power website) wherever possible. This will help to ensure that the most up to date version of the manual is being used.

**Feedback**

The Work Practice Development team strives for continual improvement of systems, procedures, processes and instructions. We value feedback, and encourage any suggestions or recommendations for changes, alterations or inclusions.

Feedback must be submitted to a formal leader for review, and then they can forward it on to us at:

[operational.standards@westernpower.com.au](mailto:operational.standards@westernpower.com.au)
Hierarchy of documentation

The Transmission Substation Work Practice Manual supersedes all other documentation covered in the manual for transmission work practices and procedures.


References

- Secondary Systems Safe Working Procedures (DM# 6672467)
Secondary Systems relevant field instructions

In addition to all of Section 7, the following documents from this manual are relevant to secondary systems.

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<td>Section 2 – Safety</td>
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<td>2.1 Provisional emergency and evacuation procedures</td>
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<td>2.3 Electrical storms</td>
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<td>2.4 Hazardous workspace safety</td>
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<td>2.6 Network tags</td>
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<td>2.8 Temporary barriers and signs</td>
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<td>2.9 Asbestos and fibreglass working procedures</td>
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<td>2.13 Fall prevention equipment</td>
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<td>2.14 In service safety inspection and testing of portable electrical equipment</td>
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<td>2.15 Job briefing process</td>
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<td>2.17 Construction site hazard management forms</td>
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<td>2.18 Switching activities</td>
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<td>3.3 Head protection</td>
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<td>3.4 Other personal protective equipment</td>
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<tr>
<td>Section 4 – Electrical System Safety Rules (ESSR) 2012</td>
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<td>Section 5 – General</td>
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<td>5.2 Substation entry requirements</td>
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<td>5.3 Substation clearances</td>
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</table>
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5.5 Portable ladders
5.8 Mobile elevated work platform (EWP) safety
5.13 Safety observer role
5.14 Induced voltages
5.16 Transmission – Handover certificates
5.18 Site security
5.19 Unauthorised access
5.21 Pilot cable boxes
5.23 Excavation work in substations
5.24 Low voltage ground work rescue procedures
5.25 Construction site access – minimum requirements

Section 6 – Environmental

6.2 Substations adjacent to environmentally sensitive areas

Appendices

Appendix 1 Tags and signs
Appendix 2 Standard forms
Appendix 3 Brookfield Rail data
Appendix 4 Emergency contact information
Appendix 5 Western Power facilities information
Appendix 6 First aid information
Appendix 7 List of documents relevant to this manual
Appendix 8 Kwinana industrial strip emergency response procedure

Field instruction revision status

<table>
<thead>
<tr>
<th>Instruct no.</th>
<th>Title</th>
<th>Revision</th>
<th>Issue date</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>Secondary systems training and authorisation</td>
<td>0</td>
<td>08/2012</td>
</tr>
<tr>
<td>7.2</td>
<td>Work in remote or isolated areas</td>
<td>0</td>
<td>08/2012</td>
</tr>
</tbody>
</table>
**Secondary Systems field instruction references (Sections 1–6)**

<table>
<thead>
<tr>
<th>Section 1 – Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common terms are defined in this section and must be referred to for clarity.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2 – Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.1 Provisional emergency and evacuation procedures</strong></td>
</tr>
<tr>
<td>The purpose of this instruction is to inform the onsite person in charge of the requirement to develop, implement and communicate a provisional workplace emergency and/or evacuation procedure.</td>
</tr>
</tbody>
</table>

| **2.3 Electrical storms** |
| This instruction describes the safe systems of work when working near electrical storm activity within transmission substations. |

| **2.4 Hazardous workspace safety** |
| This instruction outlines the safe system of work associated with the entry and activities performed by any person working on behalf of Western Power who enter a hazardous workspace. |

| **2.6 Network tags** |
| This instruction outlines the minimum requirements of Western Power’s electrical tagging system by explaining the application and use of the four approved operational tags on Western Power’s network apparatus. |

| **2.8 Temporary barriers and signs** |
| This instruction outlines the minimum requirements for the installation and erection of temporary safety barriers and warning signs within transmission substations. This must be used in instances where a worksite or people require separation or protection. |

| **2.9 Asbestos and fibreglass working procedures** |
| This instruction outlines the steps to be followed when working on equipment that contains, or is suspected of containing, asbestos materials. It also provides advice on working with fibreglass to ensure that exposure standards are not exceeded. |

| **2.11 Height safety** |
| This instruction outlines the minimum safety requirements for performing work more than two metres above floor/ground level. |
2.13 Fall prevention equipment

This instruction describes the requirements for inspecting and maintaining fall prevention equipment. Fall prevention equipment is required to avert a fall from height or to mitigate any risks identified during the risk assessment. As with any personal protective equipment, fall protection equipment must not be used in isolation of other risk controls.

2.14 In-service safety inspection and testing of portable electrical equipment

This instruction describes the minimum requirements when inspecting and testing portable electrical equipment before use, including:

- ensuring that all tools and equipment used by Western Power have residual current device (RCD) protection from the power source
- low voltage and polyphase electrical equipment connected to the electrical supply by a flexible cord or connecting device, including equipment that is:
  - new and being placed into service for the first time
  - already in-service
  - serviced or repaired
  - returning to service from a second-hand sale
  - available for hire
- RCDs (except those within the scope of AS/NZS 3003:2011 Electrical Installations – Patient Areas and NZS 6115:2006 Electrical Installations – Mobile medical facilities, i.e. patient treatment areas of Hospitals, medical and dental practices and dialyzing locations).

2.15 Job briefing process

This instruction provides a uniform methodology and outlines the key points for the onsite job briefing process which is undertaken prior to the job commencing.

2.16 Fire precautions for transmission substations

This instruction outlines the required fire precautions when performing work where there is a risk of starting a fire. It is mandatory to comply with the requirements described in this instruction and to record in the risk assessment the controls required to eliminate or reduce the risk of damage or harm.
### Work Practices

#### 2.17 Construction site hazard management forms

This instruction describes how to comply with Western Power requirements for the use of construction site hazard management forms. The objective is to create a safe working environment by systematically identifying and controlling hazards.

#### 2.18 Switching activities

This field instruction outlines the required actions and behaviours of personnel in an area where switching operations are taking place.

### Section 3 – Personal protective equipment

#### 3.1 Clothing and personal protective equipment requirements

This instruction outlines the selection, use and maintenance of approved personal protective equipment (PPE), including clothing (as prescribed in AS/NZS 4501.1:2008).

#### 3.2 Glove protection

This instruction outlines the minimum requirements for the use of gloves, as described in AS/NZS 2225 (Insulating gloves for electrical purposes), EN 388 (Protective gloves against mechanical risks) and AS 2161.10 (Occupational protective gloves – Protective gloves against chemicals and micro-organisms – Terminology and performance requirements), when working:
- on the high voltage (HV) network
- on the low voltage (LV) network
- with chemicals

#### 3.3 Head protection

This instruction outlines the type of approved head protection that must be worn while carrying out work on the Western Power network.

Head protection is required to reduce the risk of injury from falling objects, arc flash burns and exposure to UV radiation.

As with any personal protective equipment (PPE), head protection must not be used in isolation of other risk controls.
## Section 4 – Electrical System Safety Rules (ESSR) 2012

The intention of the ESSR is to provide Western Power with a standard set of rules and procedures that govern all access to the network.

The rules within the ESSR are intended for all persons who work on or near the Western Power Electrical System.

The Western Power Electrical System incorporates the transmission and distribution networks in their entirety, but specifically excludes extra low voltage (ELV) systems (as defined in AS/NZS 3000:2007 Wiring Rules), street lighting appliances and metering services.

## Section 5 – General

### 5.1 Consumer site access

This instruction outlines the considerations for working in consumer-owned substations and worksites.

### 5.2 Substation entry requirements

This instruction outlines the minimum induction requirements for all persons who enter Western Power substations for operational and non-operational activities.

**Note:**

Authorised staff entering a CBD or remote controlled high voltage (HV) substation, zone substation or terminal substation must inform Substation Access Tracker (1300 884 149) on arrival and departure.

### 5.3 Substation clearances

This instruction describes the clearance requirements when working within substations over 1 kV alternating current (a.c.).

### 5.4 Secondary Isolation

The purpose of this field instruction is to outline the minimum requirements for secondary system isolations.

### 5.5 Portable ladders

This instruction outlines the use and maintenance of ladders within transmission substations.
5.8 Mobile elevated work platform (EWP) safety
This instruction describes the key safety requirements when working from an
elevated work platform (EWP) inside a transmission substation.

5.13 Safety observer role
This instruction describes the role of a safety observer on any Western Power
worksite; it provides the key points relevant to a safety observer role but does not
attempt to define the role for all work situations.

5.14 Induced voltages
This instruction outlines the minimum requirements for working on isolated and
earthed overhead conductors/apparatus that could have voltages induced into
them by nearby energised overhead conductors/apparatus. It includes an
explanation of, and advice on, how to reduce or eliminate the risk of electrical
induction on the isolated conductor/apparatus.

**DANGER**
Induced voltages may vary from a few volts to many kV and could be
hazardous or life threatening if the correct procedures are not followed.

**Note:**
- An induced voltage is often referred to as induction.
- All people performing work must comply with the minimum personal
  protective equipment (PPE) requirements. For more on this, see section 3
  (Personal protective equipment) in this manual.

5.16 Transmission – Handover Certificate
This instruction informs the Network Total Workforce of the Handover Certificate
process. This process describes the requirements when transferring control
between the Construction and the Commissioning Authorities.

5.18 Site security
This field instruction outlines the requirements for the Network Total Workforce
when entering and exiting Western Power transmission substations.
## Work Practices

### 5.19 Unauthorised access
This field instruction outlines the requirements for the Network Total Workforce when arriving at a transmission substation to find unauthorised person(s) inside the perimeter fence or suspicious activity around the perimeter of the substation. It also applies when the Network Total Workforce feel their personal safety is threatened.

### 5.21 Pilot protection systems
This instruction outlines the minimum requirements for the Network Total Workforce (NTW) to safely access pilot protection installations.

### 5.23 Excavation work in substations
This instruction:
- applies to any authorised excavations on any Western Power worksite – excavation includes, but is not limited to, any process that removes soil to erect poles, lay cables or install any Western Power structure
- describes the safe systems of work that include the avoidance of any existing underground services
- only provides the key points relevant to Western Power worksites and does not attempt to replicate the WorkSafe WA Code of Practice – Excavation (2005) or any detailed work practices included in training manuals.

### 5.24 Low voltage work rescue procedures
This field instruction outlines the rescue procedures for personnel working on live low voltage (LV) apparatus within Transmission substations.

### 5.25 Construction site access – minimum requirements
This instruction outlines the minimum requirements for anyone entering a Western Power construction site.

### Section 6 – Environmental

#### 6.2 Substations adjacent to environmentally sensitive areas
This instruction outlines the minimum requirements for any work undertaken in substations that are within or adjacent to environmentally sensitive areas.
7.1 Secondary Systems training and authorisation

Purpose

This work practice outlines the minimum requirements for Field Protection Services (FPS) personnel to be authorised to work on Western Power Secondary Systems. This work practice has been developed to be in line with Secondary Systems Safe Working Procedures (DM# 6672467).

Scope

This work practice applies to work carried out on Secondary Systems, i.e.:
• pilot systems
• protection systems
• metering circuits
• auxiliary systems
• commissioning sites

Note:

This work practice does not apply to work on Secondary Systems extra low voltage (ELV) assets, i.e.:
• 0–50 V AC
• 0–120 V DC

Training and authorisation

To be authorised to work on Western Power Secondary Systems, personnel must hold a current Secondary Systems Certificate of Competency.

Certificates of Competency:
• are issued by FPS, which is part of the Major Capital Area in the Works Management Function
• show the relevant competencies and limitations of the certificate holder
• are valid for two years
To apply for a Certificate of Competency, personnel must be current holders of the following:

- WA Full Electrician’s Licence
- Network Authority Card (NAC) with a network access (NA) level of NA1 to NA4. For more on:
  - the NAC, see work practice 5.28 (Network Authority Card (NAC)) in this manual
  - NA levels, see *Electrical System Safety Rules (ESSR)*, Appendix 4: Network Access levels, Table 9: Network access levels
- Computer Based Training (CBT) provided by Secondary Systems
- Pilot Training Course required for Pilot Work Endorsement
- Recipient in Charge (RIC) or Tester in Charge (TIC)

**Note:**

FPS may issue some personnel with a restricted Certificate of Competency if that person cannot currently meet all of the requirements. Personnel issued with a restricted Certificate of Competency may only perform work on Secondary Systems when accompanied by personnel that hold an unrestricted Certificate of Competency.

**References**

- Transmission Substation Work Practice Manual, work practice 5.28 (Network Authority Card (NAC))
- Electric Systems Safety Rules (ESSR), Appendix: Network access levels, Table 9: Network access levels
- Secondary Systems Safe Working Procedures (DM# 6672467)
7.2 Work in isolated areas

Purpose

This work practice outlines how to plan for work in isolated areas so that:

• regular contact can be maintained with the depot and/or supervisor
• immediate contact can be made in case of emergency

Scope

This work practice applies to personnel who are required to travel to, or work in, isolated areas, and their supervisors.

Instructions

Isolated sites

• Isolated sites are defined as areas:
  o beyond a 40 km radius from Perth’s central business district (CBD)
  o beyond a 10 km radius from towns with greater than 10,000 inhabitants, e.g. Mandurah, Kalgoorlie, Bunbury, Albany, Geraldton
  o beyond a 5 km radius from towns with greater than 500 inhabitants, e.g. Busselton, Harvey
  o beyond 5 km from primary roads shown on the West Australian Travellers Atlas (each vehicle has a copy)

• The substations listed in Table 1 are in isolated locations.

Table 1: Isolated substations

<table>
<thead>
<tr>
<th>North country</th>
<th>South country</th>
<th>Goldfields</th>
<th>North west (Horizon Power)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eneabba Terminal</td>
<td>Beenup</td>
<td>Black Flag</td>
<td>Cape Lambert</td>
</tr>
<tr>
<td>Golden Grove</td>
<td>Shotts</td>
<td>Bounty</td>
<td>Goldsworthy</td>
</tr>
<tr>
<td>Karara Mine Site</td>
<td></td>
<td>Carrabin</td>
<td>Harding River Dam</td>
</tr>
<tr>
<td>Mungarrah</td>
<td></td>
<td></td>
<td>Lambert Power Station</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pannawonica</td>
</tr>
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<td></td>
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<td>Paraburdoo</td>
</tr>
</tbody>
</table>
An employee working alone in a substation can also be considered to be isolated.

Travel to and from isolated areas

Use the Check In – Check Out system when:

- travelling to or from an isolated site
- entering or departing a substation (when alone or in a group). For more on substation entry requirements, see work practice 5.2 (Substation entry requirements) in this manual.

Check In – Check Out system

Checking in

- Smart phone – SMS the word “Check-in” to 0417 631 629 to receive a link to the Check In – Check Out website. Click on the link and then select CHECK-IN. For the first login, save the link to favourites or bookmarks to easily access the site on future journeys or substation visits.

Note:

To use the smart phone check-in option, personnel must have a smart phone for which the mobile number:

- is listed under their name in Western Power's corporate directory in busbar

or

- has previously been used for a phone call check-in via the Western Power Contact Centre on 1300 884 149

Phone – call the Western Power Contact Centre on 1300 884 149 and register the check-in and estimated check-out time.

Checking out

- Smart phone – open the Check In – Check Out website and select CHECK-OUT.
- SMS – send the word ‘Yes’ to 0417 631 629.
- Phone – call the Western Power Contact Centre on 1300 884 149 and register the check-out.
Work Practices

Note:

- The preferred *Check In – Check Out* method is via the smart phone.
- If the isolated site does not have a landline phone and is out of mobile phone coverage, use the satellite phone to check-out via the Western Power Contact Centre.
- If the individual that checked in does not check-out by the estimated check-out time, an escalation process will take place. If attempts to contact the individual and the individual's formal leader fail, local crews could be dispatched to physically search for the individual.

**Emergency communication method**

When working at isolated sites, there must be a means of communication in the event of an emergency.

- Isolated sites may not have a landline phone and do not usually have mobile phone coverage. Alternative communication methods include:
  - two-way radio
  - satellite phone
  - Emergency Position Indicating Radio Beacon (EPIRB)

Note:

As the EPIRB system utilises third-party rescue it should only be used as a last resort in the event of an emergency, where life or limb is endangered. Under no other circumstances should the system be activated.

- Substations usually have a landline phone. If not, an alternative communication method must be arranged.
Travel planning

The following actions must be undertaken before travel to isolated sites.

- Establish an effective means to communicate with emergency services in the event of an emergency.
- If a satellite phone, two-way radio and/or EPIRB are required:
  - check their serviceability
  - ensure familiarity in their use
- Obtain the direct phone numbers of local hospitals and doctors when working in country areas. For more on this, see Appendix 4 (Emergency contact information) in this manual.

**Note:**

If a non-phone communication device (e.g. two-way radio) is chosen in step 3:
- obtain the contact details of local emergency services as appropriate to the device
- ensure that all team members know how to use the device

- Plan the route to be taken.
- Calculate the estimated time of arrival, allowing for rest breaks and stops.
- Determine the contact method to be used, keeping in mind that the site may be out of mobile phone and internet coverage.

**References**

- Transmission Substation Work Practice Manual, work practice 5.2 (Substation entry requirements)
7.3 Working alone on secondary systems

Purpose

This work practice outlines the requirements for Field Protection Services (FPS) personnel who are working alone on secondary systems, typically in a substation environment.

This work practice has been developed to be in line with Occupational Safety and Health Regulations 1996, part 3 (Workplace safety requirements):

- 3.1 (Identification of hazards, and assessing and addressing risks, at workplaces)
- 3.3 (Communication with isolated employees)

Scope

This work practice applies to FPS personnel who are performing non-invasive work while alone, i.e. when they are on their own, cannot be seen or heard by another person or when they do not expect a visit from another person for two hours or more. A person is also considered to be alone when they are on their own and working at a substation or travelling between locations.

Definitions

For Secondary Systems, work is generally divided into two types:

- **Invasive work** – typically requires tools or injection test equipment, e.g. relay testing or replacement, fault finding. May require a permit.

  **Important**

  Invasive work must not be done while working alone.

- **Non-invasive work** – typically does not require tools or injection test equipment e.g. front port data communication, simple isolations by removing fuses or links, viewing relay data via relay menu, relay flag or log book data collection.
Instructions

Pre-job planning (before travelling to the worksite)

- Conduct a risk assessment and consider the following points:
  - Urgency of the task (must it be done immediately, or can it wait until travel and fatigue risks are lower?)
  - Travel to and from the worksite. For more on this, see Journey/Transport Safety, Health and Environment Management Standard (DM# 12250652). Overnight stays are encouraged where long drives, or driving following long hours of work, are involved.
  - Fatigue (see Fatigue Management Standard (DM# 10232185)).
  - Availability of food and drink.
  - Time of day or night.
  - Physiological issues (e.g. night blindness).
  - Personal issues (e.g. family or personal problems).
- Decide on the appropriate communication methods. For more on this, see the Communication requirements section, below.
- Ensure the following before departure:
  - Communication devices are functioning correctly
  - Car-chargers are suitable and functional
  - Battery-operated communication devices are fully charged
- Ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual).

Risk assessment at the worksite

- The risk assessment must identify the hazards and list the control measures to reduce the likelihood of injury. Hazard concerns must be discussed with the formal leader. If it is unsafe, we don’t do it.
- When working alone, the only tasks that may be performed are those with a Low risk rating, as described in Risk Assessment Criteria (DM# 3536273).
**Important**

Any task with a risk rating of *Medium, High or Extreme* must not be performed while alone.

- Tasks that must not be performed when alone include:
  - invasive work in live AC or DC distribution boards, marshalling boxes, mechanism boxes or control cubicles
  - testing pilot cables
  - any climbing, other than on designated access ways
  - primary injection of circuits
  - injection testing of secondary equipment

- If the scope of the task changes or if the task becomes more hazardous, stop the task and reassess the hazards and controls on the risk assessment. If the task is now assessed as having a risk rating of *Medium* or higher:
  - seek assistance (if possible) from someone else working at the site who is able to act as a safety observer. For more on this, see work practice 5.13 (Safety observer role) in this manual.
  - or
  - stop the task and seek advice from your formal leader or Network Operations Control (NOC)

**Communication procedure**

When working or travelling alone there must be a:

- procedure for regular communication
- means of communication in an emergency

**Regular communication**

Personnel must use the *Check-in, Check-out* system when:

- travelling on any journey that is expected to last for two hours or more, as required by *Journey/Transport Safety, Health and Environment Management Standard* (DM# 12250652). For more on this, see work practice 7.2 (Work in isolated areas) in this manual.
• working in a substation. For more on this, see work practice 5.2 (Substation entry requirements) in this manual. When working alone in a substation, the following additional requirements apply:
  o Set the initial Check-in, Check-out period to one hour or less.
  o Use the appropriate Check-in, Check-out postponement method (e.g. a “NO” response text message) to extend the substation visit by 30 minute increments until completion of the task.
• Ensure that the following are recorded in the Check-in, Check-out system:
  o any alternate contact methods and details (e.g. satellite phone and its phone number)
  o an ‘In case of emergency’ number of a nominated person (e.g. formal leader) to contact if the worker fails to respond to reminder texts/calls from the Check-in, Check-out system

Note:
Failure to respond to reminder texts/calls from the Check-in, Check-out system will initiate an escalation process that will result in a search for the missing person.

Emergency communication
• A means of two-way communication appropriate for the terrain, location and environment must be established and could include:
  o landline phone
  o mobile phone
  o satellite phone
  o two-way radio
  o emergency beacon
• Substations usually have a landline phone. If not, an alternative communication method must be arranged.
• When planning to travel over poorly constructed or inadequately signposted roads, an emergency beacon should be carried in the vehicle as a means of calling for assistance in case of emergency.
• Emergency beacons are devices that can be activated to emit a signal that can be tracked by emergency services.
  o Emergency position indication radio beacon (EPIRB)
Work Practices

- Emergency locator transmitter (ELT)
- Personal locator beacon (PLB)

**Note:**

- Certain emergency beacons have registration requirements. The user must ensure that these are current.
- EPIRBs, ELTs and PLBs must only be activated in life-threatening situations.

**References**

- Transmission Substation Work Practice Manual:
  - section 3 (Personal protective equipment)
  - work practice 5.2 (Substation entry requirements)
  - work practice 5.13 (Safety observer role)
  - work practice 7.2 (Work in isolated areas)
- Fatigue Management Standard (DM# 10232185)
- Journey/Transport Safety, Health and Environment Management Standard (DM# 12250652)
- Western Power Risk Assessment Criteria (DM# 3536273)
- Occupational Safety and Health Regulations 1996, part 3 (Workplace safety requirements):
  - 3.1 (Identification of hazards, and assessing and addressing risks, at workplaces)
  - 3.3 (Communication with isolated employees)

**Further reading**

- Safety And Health Procedure - Working Alone or in Remote Locations (DM# 4769338)
7.4 Uncommissioned and decommissioned secondary system cable conditioning

**Purpose**

This work practice outlines the condition that all uncommissioned and decommissioned secondary system cabling must be left in on completion of works.

**Scope**

This work practice applies to personnel working on secondary cable in transmission substations.

**Safety**

- Before commencing work:
  - conduct a risk assessment and job briefing. For more on this, see the following work practices in this manual:
    - 2.15 (Job briefing process)
    - 2.17 (Construction site hazard management forms).
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements. For more on this, see section 3 (Personal protective equipment) in this manual.
  - Never assume exposed cable is de-energised.
- Always test before you touch.
- Always confirm that secondary system cables are isolated and tagged or disconnected at both ends before cutting.
- Use barriers, insulated tools and insulated gloves when working in the vicinity of exposed energised apparatus. For more on this, see ‘4.1 Inherent hazards’ in Secondary Systems Safe Working Procedures.

**Instructions**

To ensure the safety of all personnel working in a substation, all secondary cables must be terminated in approved terminations or properly insulated. This is to prevent accidental electric shock while working on any operational secondary systems.
Pre-job planning

Field Protection Services (FPS) is the delegated operating authority with respect to secondary systems in transmission substations. Their authority excludes: communications, Supervisory Control and Data Acquisition (SCADA), DC chargers/batteries and fire alarm systems.

Personnel must do the following via FPS before working on secondary low voltage (LV) operational cable systems:

- Obtain the relevant permits. For more on this, see work practice 5.4 (Secondary isolations) in this manual.
- Evaluate any significant impact to the network and ensure that isolations are planned to occur in a systematic manner to maintain system security. To do this, use a SIS (Secondary Isolation Schedule) (DM# 1611982).

Any permanent changes to secondary system cables must be made to drawings or recorded appropriately so that future work involving secondary cables can be planned accurately. Temporary cable changes must have ‘Information’ caution tags attached at the temporary ends.

Onsite

Exposed cable and removed apparatus

- Energised cables must never be left exposed.
- Secondary system cables with exposed ends must be left as described below, to ensure cables with exposed ends cannot be energised locally or from a remote location:
  - De-energised and left in a shorted state.
  - Labelled at the source using an ‘Information’ caution tag. For more on this, see work practice 2.6 (Network tags) in this manual.
  - Fuse holders only – ‘Danger’ tape placed across removed fuse holders.

Newly installed circuits for future use

Power circuits (AC and DC)

When installing new power circuits, the supply/source end of the cable should only be terminated if the load end has already been connected and proven to be safe.
Control or alarm circuits

When installing new control or alarm circuits, any cable ends that cannot be terminated into in-service equipment must be left in a shorted state.

Decommissioning

Wherever possible, completely remove decommissioned redundant secondary cables. If this is impractical, the cable must:

- be cut or pulled back to the safest position
- be left in a shorted state
- have an ‘Information’ caution tag applied to each end of the cable.

Identified energised exposed apparatus or cable

If a suspected exposed energised cable end is identified, make it safe and contact FPS. If the exposed cable or apparatus presents a safety risk to personnel, report the incident following the incident reporting process.

References

- Transmission Substation Work Practice Manual:
  - section 3 (Personal protective equipment)

Further reading

This page has intentionally been left blank.
Appendix 1 – Tags and signs

Danger tags

“Do not operate” danger tag

![Danger tag image]

Staples reorder numbers: 18697727 (thick), 18697728 (thin)

“Restricted use” danger tag

![Restricted use tag image]

Staples reorder number: 18697732

Warning tag

“Out of service” warning tag

![Warning tag image]

Staples reorder numbers: 18697730 (thick), 18697731 (thin)
Caution tag

“Information” caution tag

Staples reorder number: 18697729

Scaffolding tag

General inspection tags

Stock code: UA1609
Ladder inspection tags

Treated against termites sign

Stock code: HG2102

Stock code: CZ0327
Evidence tag

**Evidence tag**

Do not remove tag from evidence
Use permanent marking pen
Fix securely - this face outwards

**Staples reorder number:** 87222421

**Evidence tag information holder**

Stock code: CZ5013
Appendix 2 – Standard forms

Important

Once a form is filled out, it must be kept and controlled in order to comply to quality control requirements, auditing and aid in future investigations. Methods of control include:

- saving or scanning into an electronic system (e.g. Western Power’s DM)
- filing the hardcopy

Contact Records Management for more information (records.management@westernpower.com.au.)

<table>
<thead>
<tr>
<th>Document</th>
<th>DM# / UA# / NetXpress code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confined Space Entry Permit</td>
<td>DM# 6460100</td>
</tr>
<tr>
<td>Construction Authority Work Permit</td>
<td>DM# 8689116</td>
</tr>
<tr>
<td>Electrical Access Permit (EAP)</td>
<td>NetXpress code 87074751</td>
</tr>
<tr>
<td>Fall arrest system inspection checklist</td>
<td>DM# 6783836</td>
</tr>
<tr>
<td>Handover Certificate</td>
<td>DM# 8527604</td>
</tr>
<tr>
<td>Hazardous Workspace Entry Authority ( Permit)</td>
<td>DM# 5236790</td>
</tr>
<tr>
<td>Ladder inspection checklist</td>
<td>DM# 12034207</td>
</tr>
<tr>
<td>Network access levels</td>
<td>N/A</td>
</tr>
<tr>
<td>Telstra notification of new HV earth installation (Form)</td>
<td>DM# 5237319</td>
</tr>
<tr>
<td>Operating Agreement</td>
<td>NetXpress code 18719578</td>
</tr>
<tr>
<td>Plant hire sheet for contractors</td>
<td>DM# 6617609</td>
</tr>
<tr>
<td>Sanction to Test (STT) Permit</td>
<td>NetXpress code 86881918</td>
</tr>
<tr>
<td>Scaffold inspection checklist</td>
<td>DM# 5236891</td>
</tr>
<tr>
<td>Substation Entry Induction Form</td>
<td>DM# 6036654</td>
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<td>Document</td>
<td>DM# / UA# / NetXpress code</td>
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</tr>
<tr>
<td>Vicinity Authority (VA) permit</td>
<td>NetXpress code 86879279</td>
</tr>
<tr>
<td>Workplace Risk Assessment Plan (WRAP)</td>
<td>NetXpress code 18641873</td>
</tr>
</tbody>
</table>
Appendix 3 – Brookfield rail data

(Brookfield Rail website: www.brookfieldrail.com)
## Brookfield Rail contact details

| In case of Emergency | |  
|----------------------|------------------|---|
| Call 000 from a landline | Call 112 from your mobile phone |  

| Brookfield Rail Head Office | Midland |  
|-----------------------------|---------|---|
| 2-10 Adams Drive, Welshpool WA 6106 | Brookfield Rail Depot Yelverton Drive Midland WA 6056 |  
| GPO Box S1411, Perth WA 6845 | Phone: (08) 9274 9733 | Fax: (08) 9274 9734 |  
| Phone: (08) 9212 2800 | Email: info@brookfieldrail.com |  

| Kalgoorlie | Narrogin |  
|------------|----------|---|
| Forrest Street | 1 Francis Street |  
| Kalgoorlie WA 6430 | Narrogin WA 6312 |  
| Phone: (08) 9022 0632 | Phone: (08) 9881 3063 | Fax: (08) 9881 0137 |  
| Fax: (08) 9022 0647 |  |  

| Kewdale | Northam |  
|---------|---------|---|
| 12 Aitken Way | Brookfield Rail Administration Building Peel Terrace Northam WA 6401 |  
| Kewdale WA 6105 | Phone: (08) 9622 4632 | Fax: (08) 9621 2475 |  
| Phone: (08) 6274 4444 |  |  
| Fax: (08) 6274 4459 |  |  

| Kwinana | Narngulu |  
|---------|---------|---|
| Butcher Street | 510 Edward Road |  
| Kwinana WA 6167 | Narngulu WA 6530 |  
| Phone: (08) 9419 0936 | Phone: (08) 9964 0332 | Fax: (08) 9964 0346 |  
| Fax: (08) 9419 0934 |  |  

| Merredin | Picton |  
|----------|-------|---|
| Merredin Rail Complex | Picton Rail Complex |  
| Great Eastern Highway South West Highway |  |  
| Merredin WA 6415 | Picton WA 6229 |  
| Phone: (08) 9041 0651 | Phone: (08) 9725 5532 | Fax: (08) 9725 5599 |  
| Fax: (08) 9041 0699 |  |  


Appendix 4 – Emergency contact information

**Important**

- If dialling from an internal phone, remember to dial 0 first.
- Numbers beginning with 1300/1800 and the 132 500 number for SES assistance are not available through all satellite phone service providers. Contact your service provider for more information.

**Note:**

<table>
<thead>
<tr>
<th>Service</th>
<th>Number</th>
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<tbody>
<tr>
<td>Emergency – Fire, Police, Ambulance</td>
<td>000</td>
</tr>
<tr>
<td>Police switchboard (non-emergency)</td>
<td>131 444</td>
</tr>
<tr>
<td>Poisons Information Centre (24 hours)</td>
<td>131 126</td>
</tr>
<tr>
<td>Department of Fire &amp; Emergency Services (DFES)</td>
<td>9395 9300</td>
</tr>
<tr>
<td>DFES public information line</td>
<td>1300 657 209</td>
</tr>
<tr>
<td>State Emergency Service (SES) assistance</td>
<td>132 500</td>
</tr>
<tr>
<td>One call (Dial Before you Dig)</td>
<td>1100</td>
</tr>
<tr>
<td>Alinta Gas</td>
<td>13 13 52</td>
</tr>
<tr>
<td>Main Roads Western Australia</td>
<td>138 138</td>
</tr>
<tr>
<td>Telstra</td>
<td>13 22 03</td>
</tr>
<tr>
<td>Water Corporation</td>
<td>13 13 75</td>
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</tbody>
</table>
## Government departments

<table>
<thead>
<tr>
<th>Department</th>
<th>Phone</th>
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</thead>
<tbody>
<tr>
<td>Bureau of Meteorology (BoM)</td>
<td>1300 659 213</td>
</tr>
<tr>
<td>DFES head office</td>
<td>9323 9300</td>
</tr>
<tr>
<td>Department of Parks and Wildlife</td>
<td>9219 9000</td>
</tr>
<tr>
<td>Wildcare helpline</td>
<td>9474 9055</td>
</tr>
<tr>
<td>(for sick, injured or orphaned native animals, or snake removal)</td>
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</tr>
<tr>
<td>Wildcare watch</td>
<td>1800 449 453</td>
</tr>
<tr>
<td>(to report illegal wildlife activity)</td>
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## Network Operations Control (NOC) (previously known as NOCC/SOCC)

<table>
<thead>
<tr>
<th>For emergency switching to stop injury or damage – <em>during the emergency</em></th>
<th>9427 0626</th>
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<tbody>
<tr>
<td>Network Operations</td>
<td></td>
</tr>
<tr>
<td>To report an incident – <em>after the emergency has passed</em></td>
<td>1300 CALL WP</td>
</tr>
<tr>
<td>Incident Hotline</td>
<td>(1300 2255 97)</td>
</tr>
</tbody>
</table>
## Emergency – Metro depots

<table>
<thead>
<tr>
<th>Depot</th>
<th>Doctor</th>
<th>Hospital</th>
<th>Police</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bentley</strong></td>
<td>Cannington Medical Centre 8-10 Hamilton Street Cannington WA 6107 (08) 6298 9999</td>
<td>Royal Perth Hospital (Public) Wellington St Perth 9224 2244</td>
<td>1325 Albany Hwy, Cannington 9451 0000</td>
</tr>
<tr>
<td><strong>East Perth (NOCC/SOCC)</strong></td>
<td>East Perth Medical Centre 168 Adelaide Terrace East Perth WA 6004 Get directions (08) 9221 4242</td>
<td>Royal Perth Hospital (Public) Wellington St Perth 9224 2244</td>
<td>2 Adelaide Terrace East Perth WA 6004 Get directions (08) 9222 1111</td>
</tr>
<tr>
<td><strong>Forrestfield</strong></td>
<td>Forrestfield Medical Centre 1/76 Hale Rd Forrestfield 9359 1822</td>
<td>Royal Perth Hospital (Public) Wellington St Perth 9224 2244</td>
<td>40 Strelitzia Ave Forrestfield 9359 1033</td>
</tr>
<tr>
<td><strong>Fremantle</strong></td>
<td>Fremantle Family Doctors 15/115 Lefroy Road Beaconsfield WA 6162 (08) 9331 7479</td>
<td>Fremantle Hospital Alma Street Fremantle WA 6160 (08) 9431 3333</td>
<td>88 High Street Fremantle WA 6160 (08) 9430 1222</td>
</tr>
<tr>
<td><strong>Jandakot (Hope Road)</strong></td>
<td>Jandakot Medical Centre 1/5 Berrigan Drv South Lake 9417 3233</td>
<td>St John Of God Health Care Murdoch (Private) 100 Murdoch Drv Murdoch 9366 1111</td>
<td>120 Murdoch Drv Murdoch 9313 9000</td>
</tr>
<tr>
<td><strong>Jandakot (Prinsep Road)</strong></td>
<td>Jandakot Medical Centre 1/5 Berrigan Drv South Lake 9417 3233</td>
<td>St John Of God Health Care Murdoch (Private) 100 Murdoch Drv Murdoch 9366 1111</td>
<td>120 Murdoch Drv Murdoch 9313 9000</td>
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<tr>
<td><strong>Kewdale</strong></td>
<td>Healthpoint Belmont Medical Centre 4/321 Abernethy Rd Cloverdale 9479 1555</td>
<td>Royal Perth Hospital (Public) Wellington St Perth 9224 2244</td>
<td>273 Abernethy Rd Belmont 9424 2700</td>
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<tr>
<td><strong>Mandurah</strong></td>
<td>Dudley Park Medical Centre 265 Pinjarra Rd Mandurah 9535 4644</td>
<td>Peel Health Campus (Private &amp; Public) 110 Lakes Rd Mandurah 9531 8000</td>
<td>333 Pinjarra Rd Mandurah 9581 0222</td>
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</tbody>
</table>
## Work Practices

### Emergency contact information

<table>
<thead>
<tr>
<th>Depot</th>
<th>Doctor</th>
<th>Hospital</th>
<th>Police</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mount Claremont</strong></td>
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<td>Sir Charles Gairdner Hospital (Private)</td>
<td>166 Curtin Ave Cottesloe 9286 7777</td>
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<td></td>
<td>32 Strickland St Mt Claremont</td>
<td>Hospital Ave Nedlands</td>
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<td>9384 0950</td>
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<tr>
<td><strong>Perth International</strong></td>
<td>Stirk Medical Group</td>
<td>Royal Perth Hospital (Public)</td>
<td>273 Abermethy Road Cloverdale WA 6105</td>
</tr>
<tr>
<td>Airport (Fleet Services)</td>
<td>32 Newburn Road High Wycombe WA 6057</td>
<td>Wellington St Perth</td>
<td>(08) 9424 2700</td>
</tr>
<tr>
<td></td>
<td>(08) 9454 7981</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power Training</strong></td>
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<td>St John Of God Health Care</td>
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<td></td>
<td>Murdoch                                     9366 1111</td>
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<tr>
<td><strong>Stirling / Balcatta</strong></td>
<td>Stirling Central Medical Group</td>
<td>Royal Perth Hospital (Public)</td>
<td>50 Chesterfield Rd Mirrabooka 9345 9000</td>
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<td>Victoria Rd (cnr Wanneroo Rd) Balcatta</td>
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<td>9440 5300</td>
<td>9224 2244</td>
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<tr>
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### Emergency – North Country depots

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<td><a href="mailto:cgobby@armadale.wa.gov.au">cgobby@armadale.wa.gov.au</a></td>
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<tr>
<td>Bassendean</td>
<td>9377 9000</td>
<td><a href="mailto:cmann@bassendean.wa.gov.au">cmann@bassendean.wa.gov.au</a></td>
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<tr>
<td>Bayswater</td>
<td>9272 0622</td>
<td><a href="mailto:mail@bayswater.wa.gov.au">mail@bayswater.wa.gov.au</a></td>
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<tr>
<td>Belmont</td>
<td>9477 7101</td>
<td><a href="mailto:gary.davis@belmont.wa.gov.au">gary.davis@belmont.wa.gov.au</a></td>
</tr>
<tr>
<td>Cambridge</td>
<td>9347 6000</td>
<td><a href="mailto:mail@cambridge.wa.gov.au">mail@cambridge.wa.gov.au</a></td>
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<tr>
<td>Canning</td>
<td>9231 0744</td>
<td><a href="mailto:iedgell@canning.wa.gov.au">iedgell@canning.wa.gov.au</a></td>
</tr>
<tr>
<td>Chittering</td>
<td>9576 4600</td>
<td><a href="mailto:chatter@chittering.wa.gov.au">chatter@chittering.wa.gov.au</a></td>
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<tr>
<td>Claremont</td>
<td>9340 4391</td>
<td><a href="mailto:jelliott@claremont.wa.gov.au">jelliott@claremont.wa.gov.au</a></td>
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<tr>
<td>Cockburn</td>
<td>9411 3444</td>
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<tr>
<td>Cottesloe</td>
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<tr>
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<tr>
<td>Kalamunda</td>
<td>9527 9828</td>
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<td>Kwinana</td>
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<td>Mandurah</td>
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### Shire council contact numbers

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## Work Practices

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## Appendix 5 – Western Power facilities information

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## Substation locations (refer to DM# 1189644)

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## Work Practices

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# Work Practices

## Substation arc flash PPE guidelines

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## Work Practices

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For more information, see: Transmission Substation and Location Register (DM# 1189644)
Instructions

First aid

When possible, the person with the best first aid knowledge should stay with the casualty while someone else calls for emergency assistance.

- To call for the Ambulance, Police or Fire Service, use 000 from all phones (including mobiles). If you are using a digital mobile phone and 000 fails, call 112 unless your service provider has advised otherwise.
- When the emergency operator answers, state clearly which service is required.
- Stay calm and speak clearly to convey the message. Be ready to answer any questions.
- State the following:
  - the exact address or location with any clear landmarks or closest street cross reference
  - an outline of the emergency
  - the number of victims involved
  - any information about the condition of the victims
  - any hazards relevant to the area, such as fire, chemical, spills, fumes
  - the telephone number where the caller can be contacted in case further information is needed.
- Wait until the operator tells you to hang up.
- Ask someone to stay in a prominent position to direct the emergency service vehicle to the correct area.

Secondary survey

Once a primary survey has been carried out and the breathing, circulation and severe bleeding has been controlled, a secondary survey is required.

A secondary survey is designed to determine if the casualty is suffering from any other injuries that require treatment. Complete a full secondary survey of a casualty before treating the injuries so that injuries may be prioritised.

- Always wear rubber gloves and check hands regularly for blood or fluid.
- Do not allow the casualty to move during the survey.
• Speak calmly and reassuringly to the casualty and find out:
  o what happened and enquire if the casualty has any previous injuries
  o if they have any allergies (check for medical alert bracelet/necklace).
  o if they are on any medication
  o check the pulse rate and note the breathing rate and characteristics
  o check the casualty’s back for injuries and/or bleeding

Recovery position

The recovery position helps a semiconscious or unconscious person breathe and permits fluids to drain from the nose and throat. If a casualty is unconscious or semi-conscious, move them into the recovery position while waiting for help to arrive.

1. Kneel next to the person. Place the arm closest to you straight out from the body. Position the far arm with the back of the hand against the near cheek.
2. Grab and bend the person's far knee.
3. Protecting the head with one hand, gently roll the person toward you by pulling the far knee over and to the ground.
4. Tilt the head up slightly so that the airway is open. Make sure that the hand is under the cheek. Place a blanket or coat over the person (unless he or she has a heat illness or fever) and stay close until help arrives.

Note:
If rolling a casualty into the recovery position, ensure that keys and other objects from pockets have been removed so that further damage or injury is not caused.
Chain of survival

The Chain of Survival describes the sequence of critical intervention stages in the initial care of a cardiac arrest patient. A cardiac arrest patient’s chance of survival increases dramatically with each stage.

The critical stages are:

1. **Early recognition and call for help**
   - Recognise the symptoms of cardiac arrest, attend to the casualty and call for help as soon as possible.

2. **Early access**
   - Access emergency care by calling 000 and asking for an ambulance immediately.

3. **Early cardiopulmonary resuscitation (CPR)**
   - Provide CPR (the emphasis should be on chest compressions). This will increase the casualty's chance of survival by encouraging oxygenated blood to flow to the brain and other vital organs.

4. **Early defibrillation**
   - An electronic device known as a defibrillator should be used to deliver a shock to the heart. The restoration of an adequate heart rhythm is necessary a casualty to survive a cardiac arrest.

5. **Post-resuscitation care**
   - Ensure that the casualty is transported to hospital by an ambulance as soon as possible so that the patient can receive further treatment and their condition can be monitored by healthcare professionals.
DRSABCD action plan

In an emergency call triple zero (000) for an ambulance

D

DANGER
Ensure the area is safe for yourself, others and the patient.

R

RESPONSE
Check for response—ask name—squeeze shoulders
No response
• Send for help.

S

SEND for help
Call Triple Zero (000) for an ambulance or ask another person to make the call.

A

AIRWAY
Open mouth—if foreign material is present:
• place in the recovery position
• clear airway with fingers.
Open airway by tilting head with chin lift.

B

BREATHING
Check for breathing—look, listen and feel.
Not normal breathing
• Start CPR.

N

Normal breathing
• place in recovery position
• monitor breathing
• manage injuries
• treat for shock.

C

CPR
Start CPR—30 chest compressions : 2 breaths
Continue CPR until help arrives or patient recovers.

D

DEFIBRILLATION
Apply defibrillator if available and follow voice prompts.

Learn First Aid | 1300 360 455 | www.stjohn.org.au
Appendix 7 – Blank

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Appendix 8 – Kwinana industrial strip emergency response procedure

Instructions

Staff check-in to area

Staff attending uncontrolled access sites or in near vicinity

- On arrival (preferably prior to alighting from vehicle) personnel must check-in via the Check In – Check out system. For more on this, see work practice 5.2 (Substation entry requirements).
- Confirm that it is safe to enter the site (i.e. there is no danger to personnel if they enter the site or are in the vicinity) by using the Check In – Check out system. If checking in by:
  - Smart phone app – a warning message (in the web browser) will be displayed if danger is present
  - Phone (via the Western Power Contact Centre) – ask if it is safe to enter the site

Important

If there is danger present:

- remain in, or return to, the vehicle
- wind up the windows
- place vehicle air controls in recirculation mode
- depart to either Medina or Rockingham substations
- make contact on arrival and await further instruction

- On departure, check-out using the Check In – Check out system.
Advising field staff of an incident

Alerting field staff of an incident
Alerting Network Operations Control (NOC) of an incident will usually be done by the Tiwest Cogen Operator (TCO) but could be via a third party.

NOC alerting field staff of an incident
- NOC is to confirm which staff, if any, are checked in.
- NOC is to advise all staff of the incident.
- The Network Coordinator will declare a Western Power Internal Level One Emergency stating that an emergency or incident (briefly describing the emergency/incident) exists in the Kwinana Industrial Strip.
- All staff that are logged in must be advised of the incident and instructed with the appropriate response.

Alerting field staff that all is clear
- When the emergency/incident no longer exists the TCO will contact NOC to advise that all is clear.
- NOC will advise all staff in the affected locations that the emergency/incident no longer exists.
- Confirm with field staff that previous contact arrangements are still correct.
- The Network Coordinator will relinquish the Western Power Internal Level One Emergency when advised by NOC that the emergency or incident no longer exists.
Uncontrolled Access Sites

1. British Petroleum Substation (BP)
2. Broken Hill Substation (BHK)
3. Hismelt Substation (HIS)
4. Kwinana 132/66 kV Substation (kW 8/7) substation only
5. Mason Road Substation (MSR)
6. Western Mining Substation (WM)

Controlled access sites required through site security

7. Alcoa Kwinana Substation (AKW)
8. Australia Fused Metals Substation (AFM)
9. BP Refinery Substation (BPR)
10. CSBP Kwinana Substation (CBP)
11. Kwinana Power Partners Substation (KPP) – including Cogen Power Station site
12. Kwinana Power Station Site
13. Kwinana Power Station Site – microwave site
14. Kwinana 330 kV Substation (KW9)
15. Kerr McGee Kwinana Substation (KMK), including Cogen Power Site
16. Tiwest Pigment Plant (TPP)
References

- Transmission Substation Work Practice Manual, work practice 5.2 (Substation entry requirements)
- Network Operations Control Room Instruction 00-11 – Kwinana industrial strip emergency response procedure (DM# 1190718)