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1.0 GENERAL

1.1 SCOPE

These rules apply to all high voltage mains and apparatus operated by the Company. It includes, but is not limited to the high voltage (HV) mains and apparatus owned by the Company. These rules set down precautions to be taken by persons entering High Voltage areas (including switchyards) and the procedures to ensure HV mains and apparatus are safe to operate and work on or near.

1.2 DUTIES

It is the duty of all persons who may be concerned with operating and working on the Company's high voltage distribution network to make themselves thoroughly conversant with these safety rules and those sections of the Regulations under the Electricity Act (1996) that relate to high voltage operations and work. Ignorance of these Rules and Regulations will not be accepted as an excuse for neglect of duty.

1.3 SUPPLY AND KNOWLEDGE OF THESE RULES

Any employee who may be called upon to work on the Company's High Voltage distribution network must be supplied with or have access to a current copy of these rules. Such employees SHALL keep themselves thoroughly conversant with the rules. These employees SHALL be authorised to perform a certain level of operations or work on the Company's High Voltage distribution network and SHALL be adequately trained to carry out the duties required for their level of authority under these rules. All high voltage authorised persons SHALL have access to a current copy of the Regulations (2012) under the South Australian Electricity Act, (1996).

1.4 DEFINITIONS

Throughout the rules, the following terms SHALL have the defined meaning given.

Alive (or Live)
is the term applied to a conductor or circuit when a difference of electrical potential exists between it and earth. This includes any hazardous induced or capacitive voltage.

Approved
Sanctioned in writing by an authorised person.

Authorised Person
means a person who has been assessed as having the required competencies or experience to avoid danger and has been appointed in writing by the High Voltage Systems Co-ordinator or deputy, to carry out specified duties associated with the commissioning, operation and maintenance of the High Voltage distribution network.
1.4 DEFINITIONS (Cont)

**Basic Switching**
is switching that involves the operation of a maximum of two High Voltage switches.
Note: Ganged fuses or links SHALL be considered as a single “switch”.

**Checker (Switching)**
See Switching Checker

**Company (The)**
means the owner/operator of SIMEC Mining / Liberty Primary Steel operations and all other operations and sites under its direct management.

**Danger**
means risk to life, bodily injury or damage to health from shock, burn or other causes arising from the generation, distribution or use of electrical energy.

**Dead (also De-energised )**
means at zero voltage difference to the general mass of the earth, or, not Live.

**Earthed**
means electrically connected to the general mass of earth.

**ElectraNet**
Refers to ElectrNet Pty Ltd (or any legal body derived from this company – an electricity transmission company operating in South Australia.

**Electrical Area**
means any electrical installation, generating station or substation, whether of indoors, outdoors, underground or pole mounted type.

**Emergency Switching**
is unplanned switching required due to plant failures or power outages or life threatening circumstances. (see also Clause 2.4.3).

**Exposed High Voltage Conductors**
means a High Voltage conductor which is bare or not effectively guarded by either fixed insulation barrier or earthed metal shield complying to the relevant Australian Standards.

**High Voltage (HV)**
means a voltage normally exceeding 1,000 volts alternating - or 1,500 volts direct current.

**High Voltage Access Permit (HVAP)**
means a form of declaration to be used when an Isolation Permit is not used for work carried out on or near exposed High Voltage conductors (See Section 2.8).
1.4 DEFINITIONS (Cont)

High Voltage Cage
means a fully fenced or walled area, room or compartment containing Exposed High Voltage Conductors which do not maintain standard safety clearances.

High Voltage Distribution Network
means the Mains and Equipment supplying High Voltage electrical energy to the Company’s operations and other consumers.

High Voltage Mains and Apparatus
means that part of a conductor, cable, machine, transformer, switch or other apparatus forming part of the High Voltage Distribution Network.

High Voltage Switchyard
is an electrical area surrounded by man-proof fences or walls (inside which there are Exposed High Voltage Conductors) which maintain standard safety clearances (except for conductors in any cage within the switchyard).

High Voltage Systems Co-ordinator
is responsible for the implementation of the systems, training, Quality Procedures, Work Instructions, Rules and Policies, etc. required to ensure the safety of operations and work on the Company’s High Voltage Distribution Network.

High Voltage Tester-in-Charge
see Tester-in-Charge

Isolated (Check against AS3000 and Electrical Safety Manual)
means disconnected from all possible sources of electrical energy by the opening of switches, withdrawal of circuit breakers, removal of fuses, links, connections and the like, verified to be isolated and dead, then rendered incapable of being made live unintentionally by lock-out.

Local
means within three (3) metres of the high voltage mains or apparatus, with no barriers in between. Opposite to Remote.

Minimum Approach Distances (MAD)
are the minimum distances a person may allow any part of their body, or conducting tool or object held or carried by that person to get close to any live, exposed, High Voltage conductor.

Minimum Working Clearances
are the minimum distances allowable from the nearest live, exposed, high voltage conductor to a position within a defined safe work area. (Refer to 2.3.2 Table 1)
1.4 DEFINITIONS (Cont)

Observer
See Safety Observer

Operating Instructions
means those instructions that detail how to operate a piece of High Voltage apparatus, eg. Open, Close, Rack In, Rack Out; Charge Spring, Apply and Remove Earths and VTs, etc.

Operational Switching
Operational HV Switching is the operation of a fully enclosed circuit breaker with integral earthing system using a safe operating procedure documented that is specific for that breaker and approved by the High Voltage Group and plant owner. Operational switching also applies to fully enclosed re-closers on High Voltage Aerials.

This does not include the following:
- proving dead High Voltage mains and apparatus outside of an approved safe operating procedure;
- earthing High Voltage mains and apparatus outside of an approved safe operating procedure;
- issuing and cancelling of Permits for High Voltage Access
- any switching outside of an approved safe operating procedure;

Operational Switching Officer
means the Operational Switching Operator and Operational Switching Checker who are the Authorised Personnel who are responsible for operational switching.

An Operational Switching Officer is someone who has been trained and authorised. No minimum switching operations are required to maintain this competency.

Radial Feeder
is any single source of High Voltage supply to a load e.g. motor; power transformer or switchboard.

Remote
means OPENING or CLOSING a circuit breaker from a remote hard wired control panel located outside of the switchroom. Remote switching must be conducted with the switchroom door closed. Remote switching does not include:
- Use of an umbilical cord. Connecting an umbilical cord may operate the breaker with the Switching Officer in front of it.
- Any manual racking operation

SAPN
Refers to SA Power Networks (or any legal body derived from this parent company), operator of the distribution network in South Australia
1.4 DEFINITIONS (Cont)

Safe Work Area
is that area, the boundary of which is defined by yellow, insulated rope or barriers, that provides safe access, egress and work space. The ropes or barriers are placed to ensure that minimum working clearances are maintained between the live, exposed conductors and any position a person may stand within the safe work area.

Safety Observer
is the person who SHALL be present and observing when personnel are working in an area where the safe work clearances from live, exposed conductors cannot be maintained.
The Safety Observer SHALL not carry out any of the work for which they are acting as safety observer. The sole responsibility of the Safety Observer is to observe and warn personnel against unsafe approach to high voltage mains and apparatus, thereby ensuring minimum approach distances are maintained between the live, exposed conductors and any tools being used by members of the work-group.
The Safety Observer SHALL be trained, authorised and experienced in working near high voltage apparatus and understand the limits of approach to minimum working distances and be aware of the hazards involved for the voltages concerned.

Spout
Is the fixed hollow part for receiving the circuit breaker bushing..

Substation
means any premises or place (including a switchyard) in which a high voltage supply is converted, controlled or transformed.

Switching (or Switching Operations)
means the operation of fuses, links, circuit breakers, isolators and other methods of making or breaking an electrical circuit. It ALSO includes the proving dead and testing of High Voltage mains and apparatus, the application and removal of earths, as well as the racking in and out of voltage transformers but not in the case of Operational Switching)

Switching, Basic
see Basic Switching
1.4 DEFINITIONS (Cont)

Switching Checker
is the most experienced person of a high voltage switching team and SHALL be high voltage trained and authorised.

The switching checker must not perform switching operations while acting as a checker except for tasks which specifically require two (2) people.

A switching checker must be a Switching Operator and is required to independently check carefully the sequence and correctness of each switching operation about to be carried out by the Switching Operator.

The Switching Checker is required to be present during the switching and check the Switching Operator for correct PPE.

The Switching Checker must carry, complete and sign off their own copy of the switching programme, if used. They must check only in the category for which they are authorised.

The Switching Checker shall check the equipment identification and confirm each operation with the Switching Operator before it is carried out.

The Switching Checker should be the most experienced operator of the team for the particular switching apparatus being undertaken except where the switching checker and switching operator duties have been previously assigned by an authorised officer. Where this cannot be determined, the most senior switching operator will be the switching checker.

The Switching Checker MUST give permission to the Switching Operator to proceed with any item on the Switching Program.

It is the checker’s responsibility to stop the operator should the operator be about to perform an incorrect switching operation.

Switching, Emergency
see Emergency Switching

Switching Officers
means the Switching Operator and Switching Checker who are the Authorised Personnel that are responsible for switching operations, proving dead and earthing, and the issuing and cancellation of High Voltage Access Permits in a specific area of the High Voltage Distribution System.
A Switching Officer is someone who has been trained and authorised and has maintained 2 operations every 3 months.
1.4 DEFINITIONS (Cont)

**Switching Operator**
is the least experienced member of a high voltage switching team or nominated by the supervisor. The "operator" SHALL:
- check the Switching Checker for correct PPE;
- be high voltage trained and authorised
- perform all the switching operations detailed in a switching programme;
- confirm each switching operation with the switching checker before performing the operation;
- MUST receiver permission from the Switching Checker before proceeding with any item on the Switching Program
- SHALL complete their copy of the switching programme, if used.

**Switching Programme**
means the set of written switching instructions which detail the sequence of steps required to complete a switching task on the High Voltage distribution network.
It SHALL conform to the guidelines provided in these rules. (Refer Appendix A)
It does not include the operating instructions for the switches concerned in the switching operations (see Operating Instructions).

**Systems Co-ordinator High Voltage**
see High Voltage Systems Co-ordinator

**Tester-in Charge**
that person in charge of carrying out high voltage tests on high voltage mains and apparatus.

**Work-Group Leader**
means the person who is in charge of a work group that is required to work on or near exposed High Voltage conductors forming part of the Company's High Voltage distribution network. The work group leader SHALL be issued and accept all Permits and Safe Systems of Work documentation issued for High Voltage Access and the work to be carried out.

**Work Group**
means those personnel under the supervision of a work group leader, who are required to work on or near exposed High Voltage conductors forming part of the Company's High Voltage distribution network.
1.5 HIGH VOLTAGE AUTHOURISED PERSONS

Safety is paramount with high voltages. Accidents involving high voltage may occur without direct contact are extremely serious and often fatal. Workers in the vicinity of a high voltage incident can receive severe injuries from the resultant flash, blast, or arc that results.

High Voltage Authorised Persons

Appropriately authorised personnel are needed to implement safe High Voltage work practices. These personnel require a hierarchy of authority so that the checking and authorisation stages necessary in the procedures are possible. To receive or grant such authorisations the personnel must have appropriate competencies. See Appendix B.

Table 1. The Hierarchy of High Voltage Authorised Persons

<table>
<thead>
<tr>
<th>LEVEL OF AUTHORITY</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ELECTRICAL SAFETY NETWORK – HIGH VOLTAGE COMMITTEE (WI37.INF.040)</td>
</tr>
<tr>
<td>2</td>
<td>HIGH VOLTAGE SYSTEMS CO-ORDINATOR</td>
</tr>
<tr>
<td>3</td>
<td>PLANT ELECTRICAL SUPERVISOR</td>
</tr>
<tr>
<td>4</td>
<td>HIGH VOLTAGE SWITCHING OFFICERS</td>
</tr>
<tr>
<td>5</td>
<td>HIGH VOLTAGE –OPERATIONAL SWITCHING OFFICER</td>
</tr>
<tr>
<td>6</td>
<td>WORK GROUP LEADER</td>
</tr>
<tr>
<td>7</td>
<td>AUTHORISED TO ENTER ELECTRICAL AREAS WITH LIVE, EXPOSED HIGH VOLTAGE</td>
</tr>
<tr>
<td></td>
<td>CONDUCTORS</td>
</tr>
<tr>
<td>8</td>
<td>AUTHORISED TO ENTER ELECTRICAL AREAS WITH NO LIVE, EXPOSED, HIGH VOLTAGE</td>
</tr>
<tr>
<td></td>
<td>CONDUCTORS</td>
</tr>
</tbody>
</table>
1.6 GENERAL WARNINGS CONCERNING THE DANGERS ASSOCIATED WITH HIGH VOLTAGE MAINS AND APPARATUS

1.6.1 MATERIALS

All materials including liquids and gases SHALL be regarded as conducting materials unless there is definite knowledge to the contrary. In particular it should be noted that:
1. Earth, concrete and wet or damp timber are conducting materials.
2. Flame conducts electricity and care must be exercised when using flame producing equipment.
3. Metal objects such as jewellery, portable radio or telephone units, rules, ladders, tapes, torches and the like must not be used when working near Exposed Live High Voltage Mains and Equipment.
4. The liquids of certain fire extinguishers are conductive. (see Clause 1.6.6).
5. High Voltage conductors that are disconnected from the source of supply may still have a dangerous capacitive charge or induced voltage if they are not properly discharged to earth (see Clause 1.6.4).

1.6.2 FLEXIBLE INSULATION IS NOT ADEQUATE PROTECTION

Tape, rubber or similar material directly applied to High Voltage Mains and Equipment must not be regarded as adequate insulation and such High Voltage Mains And Equipment SHALL be treated as Exposed.

1.6.3 DANGER OF NEAR APPROACH

Exposed, high voltage conductors are designed and arranged to be surrounded by sufficient air to prevent formation of an electric arc. If some material e.g. ladder, tool or part of the body is moved closer to the conductor than the designed clearance an arc may form, and serious injury could result. (See Clause 2.3)

1.6.4 CAPACITANCE AND INDUCTION

Dangerous capacitive and inductive voltages may be present on any High Voltage conductor that is isolated but not earthed. These voltages may originate from High Voltage testing - megger and hi-pot - or induction from nearby circuits. Care must be taken to ensure any exposed, High Voltage conductor that is isolated but not earthed is fully discharged to earth, immediately prior to touching.

Note: Some High Voltage mains and apparatus may require a significant amount of time to completely discharge to earth (minutes). The capacitive charge may reappear within minutes after removing an earth connection that has been applied for too short a time.
1.6 GENERAL WARNINGS CONCERNING THE DANGERS ASSOCIATED WITH HIGH VOLTAGE MAINS AND APPARATUS (cont)

1.6.5 FEEDBACK

Both power transformers and voltage transformers are a possible source of high voltage supply via feedback through their low voltage windings. Care must be taken to ensure they are correctly isolated before accessing associated High Voltage mains and apparatus.

Voltage transformers may be connected to the high voltage network via the busbar or cable side of the switchboard. They may be found at both ends of a high voltage interconnector. Safe access will generally require both the local and remote voltage transformers to be isolated.

1.6.6 Fires Involving HIGH VOLTAGE Mains and Apparatus

Fires around High Voltage Apparatus can involve hazards associated with gas under pressure, oil and exploding insulators, and should be dealt with by personnel trained for this task.

**DO NOT ATTEMPT TO FIGHT A FIRE INVOLVING ENERGISED, HIGH VOLTAGE ELECTRICAL EQUIPMENT**

**NO FIRE EXTINGUISHER IS SUITABLE TO FIGHT ANY HV FIRE**

Call the Company's Emergency Services immediately and then attempt to de-energise the High Voltage electrical equipment.

1.6.7 EARTHING SYSTEM

If part of any earthing system is broken, dangerous Voltage may appear. When it is necessary to break a part of any earthing system, jumpers of equivalent current carrying capacity SHALL be connected across the affected part of the earthing system before it is broken. Earthing connections between apparatus and the earthing system SHALL not be removed while the apparatus is in service unless it is specifically known that this can be done safely.

1.6.8 NEUTRAL SYSTEMS

All parts of insulated neutral systems as well as neutral earthing systems SHALL be regarded as live and these Rules SHALL apply to work on this equipment.
1.6 GENERAL WARNINGS CONCERNING THE DANGERS ASSOCIATED WITH HIGH VOLTAGE MAINS AND APPARATUS (cont)

1.6.9 ELECTRONIC PERSONAL HEALTH DEVICES

Personnel wearing implanted electrically activated or ferromagnetic devices - such as cardiac pacemakers - may be at risk by fields above a few milli-Tesla. Therefore, personnel likely to be affected by magnetic or electric fields should be advised of the risks and avoid exposure if necessary.

1.7 SAFETY EQUIPMENT AND OPERATING TOOLS

Only operating tools and equipment rated for use on power frequency systems and authorised by the Company's Electrical Services Manager SHALL be used for work on the Company's live, High Voltage mains and apparatus. These tools and equipment include insulated gloves and mats, operating sticks, Live-line indicating devices, discharge and earthing sticks. All tools and equipment SHALL be tested every 12 months. (see Appendix C)

1.8 CURRENT TRANSFORMER CIRCUITS

The secondary circuits of a current transformer (CT) SHALL not be open-circuited whilst the primary circuit has current flowing. The secondary winding of a live current transformer must be short-circuited before disturbing any of the wiring in the secondary circuit. Failure to do this may induce dangerous high voltages (10s of kV) at the secondary terminals that form a potentially lethal hazard to personnel as well as a severe arcing and fire hazard to the apparatus.

1.8 CURRENT TRANSFORMER CIRCUITS (cont.)

Loose CT secondary connections will produce intermittent open-circuits, thereby creating high voltages across the terminals of the secondary windings resulting in a similar arcing and fire hazard as described above.

Note: The unused taps of a multi-tapped secondary CT circuit do not need to be short circuited if any one of the taps is in use or short circuited.
1.9 DANGEROUS OPERATING AND MAINTENANCE PRACTICES

The following are some practices that are dangerous to personnel and/or plant (see also Appendix H):

- Slow closing a circuit breaker onto a live circuit;
- Racking a CLOSED circuit breaker IN or OUT of a LIVE switchboard;
- Multiple, quick re-closing of any type of circuit breaker onto a live system;
- Maintaining a circuit breaker mechanism whilst the closing spring is charged;
- Closing unsynchronised supplies together;
- Opening the secondary circuit of a CT whilst current is flowing in the primary circuit;
- Pulling or inserting aerial fuses under high loads;
- Opening or closing aerial links under load;
- Single phasing by opening an aerial link or fuse under load;
- Re-closing after a trip without investigating the cause of the trip.
2.0  RULES FOR SAFE OPERATIONS AND WORK, ON OR NEAR THE COMPANY’S HIGH VOLTAGE MAINS AND APPARATUS

2.1  EXCEPTIONS

2.1.1  Switching Operations

The following activities are NOT covered by these rules:

- Switching operations controlled from the Power House mimic panel performed by employees as part of their normal duties;
- Controlling plant process by the switching of motor loads by employees as a part of their normal duties, so long as these loads are controlled at locations remote from the High Voltage switchgear;

2.1.2  Equipment That Does Not Form Part of The High Voltage Network

NOTE: Any apparatus with an isolation point that is part of the Company’s high voltage power distribution network is covered by these rules.

However, the Company has equipment that is powered by low voltage and, while capable of generating high voltage, is not part of the Company’s High Voltage power distribution network and is not covered by these rules. Examples of such equipment are Precipitators, Igniters and Cathode Ray Tube devices.

Equipment that generates high voltage is exempt from these rules as long as the equipment satisfies ALL of the following criteria:

1. The isolation point is at low voltage and can be isolated and locked; and
2. The equipment has only a low voltage source of supply; and
3. A written isolation procedure, as supplied by the manufacturer or Liberty primary Steel, is used;

If there is any doubt with any of the above points, Electrical Services Manager SHALL be consulted for clarification.
2.2 BASIC SAFETY PRINCIPLES

i) No employee SHALL operate high voltage equipment, nor work on or near exposed High Voltage conductors unless authorised to do so.

ii) Apart from the exceptions described in these rules, all High Voltage Mains and Apparatus must be treated as LIVE until they have been:
   - Isolated, and
   - Proven Dead (if possible*), and
   - Earthed.

iii) No employee SHALL:
   - Bring any portion of their body within the minimum safe approach distances of any live, exposed, High Voltage conductor.
   - Bring any material (other than equipment approved for testing or operating live high voltage mains and apparatus) within the minimum approach distance of any live, exposed conductor.

iv) If any employee is in doubt as to the safe performance of any work assigned to them near exposed, live, high voltage mains and apparatus, they SHALL request further instructions from the authorised person supervising the working group.

v) An employee may refuse to work with another employee whom they consider works in an unsafe manner. The employee SHALL notify a relevant supervisor of these concerns immediately.

* Some equipment has integral earthing facilities fitted that do not allow the circuit to be tested dead. It is a requirement of these switches that they are capable of closing onto a live circuit and withstanding the rated fault current without damaging the equipment or injuring the operator.

2.3 CLEARANCES

2.3.1 MINIMUM APPROACH DISTANCES (MAD)

An employee must not allow any part of their body, including a conductive object held or carried by the employee, to come within the relevant distance to any live exposed conductor as specified in Table1 below.

When it is likely that an employee’s body or any object which they might be carrying would come within the distances specified above, the exposed, live, high voltage mains and apparatus must be de-energised and isolated, and earthed.

If isolation of the high voltage conductors is not practical, For example accessing an area near busbars – not being able to maintain appropriate clearances, a safe work procedure SHALL be prepared and written authorisation obtained from the Company's Electrical Services Manager before any work can proceed.
2.3 CLEARANCES (cont.)

2.3.2 MINIMUM WORKING CLEARANCES

The plastic barriers that define the work area borders SHALL be placed in such a manner so as to ensure that minimum working clearances are maintained (see Clause 2.17).

A Safety Observer

Working clearances for high voltage conductors are determined by the following:

\[
\text{MINIMUM WORKING DISTANCE} = \text{HEIGHT OF WORKER with OUTSTRETCHED ARM + TOOL LENGTH + MINIMUM APPROACH DISTANCE from any point where the person may put their feet.}
\]

Any live, exposed conductor falling within an arc of this radius lies within the minimum working clearance requirements of these rules and SHALL be de-energised and earthed before work may commence (except as provided for in Clauses 2.12, 2.15 and 2.16).

Table 1 LIBERTY PRIMARY STEEL
Minimum Approach and Working Distances

<table>
<thead>
<tr>
<th>Nominal Voltage (Volts RMS)</th>
<th>Liberty Primary Steel Minimum Approach Distances (Millimetres)</th>
<th>Minimum Working Distances (Electricity Act 2012) (Millimetres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>above 1,000 but not exceeding 11,000</td>
<td>700</td>
<td>That distance as calculated in Clause 2.3.2</td>
</tr>
<tr>
<td>above 11,000 but not exceeding 33,000</td>
<td>1000</td>
<td>That distance as calculated in Clause 2.3.2</td>
</tr>
</tbody>
</table>
During switching operations, it may be necessary to breach the Minimum Approach Distance as per Table 1 above, for purposes of operating circuit breaker shutters, i.e. opening and closing for testing, proving dead using approved earthing equipment inside circuit breaker spouts and locking shutters. When the Minimum Approach Distance as per Table 1 cannot be maintained, the South Australian Standard Minimum Approach Distance SHALL be used as stipulated in Table 2.

### Table 2 SOUTH AUSTRALIAN Minimum Approach Distances

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>South Australian Minimum Approach Distances</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Regulations (2012) of the South Australian Electricity Act (1996))</td>
</tr>
<tr>
<td>(Volts RMS)</td>
<td>(Millimetres)</td>
</tr>
<tr>
<td>above 1,000 but not exceeding 11,000</td>
<td>300</td>
</tr>
<tr>
<td>above 11,000 but not exceeding 33,000</td>
<td>450</td>
</tr>
</tbody>
</table>

AT ALL TIMES THE LIBERTY PRIMARY STEEL MINIMUM APPROACH DISTANCES SHOULD ALWAYS BE ATTEMPTED TO BE MAINTAINED (Table 1)

UNDER NO CIRCUMSTANCES ARE THE DISTANCES DEFINED IN TABLE 2 TO BE BREACHED
2.4 RESTRICTIONS ON HIGH VOLTAGE SWITCHING

2.4.1 Basic Rules For Switching Operations

1. Apart from the exceptions of Clause 2.1, devices that are part of the Company’s high voltage distribution system SHALL only be operated by high voltage authorised personnel i.e. High Voltage Switching Officers.

2. The proving de-energised and earthing of High Voltage mains and apparatus SHALL be carried out only by High Voltage Switching Officers or contractors who are not only appropriately trained and authorised but who also comply with the requirements of Clause 2.4.4.1.

3. The preparation, issue and cancellation of permits that allow access to high voltage mains and apparatus SHALL be carried out by high voltage switching officers only.

4. Apart from the exceptions of Clause 2.4.2(A), High Voltage switching operations SHALL be carried out by a switching team comprising two authorised High Voltage Switching Officers- the “operator” and the “checker”.

5. Apart from the exceptions of Clause 2.4.2(B), all switching operations SHALL follow a set of written instructions called a High Voltage Switching Programme.

6. When carrying out high voltage switching operations, the operator and checker SHALL both wear appropriate PPE, as supplied and authorised by the Company as per the GFG Alliance Electrical Safety Manual (refer clause 1.6.3.).

Correct PPE consists of the following:

- Safety helmet;
- Safety glasses with side shields;
- Face-shield (operator only, not required when operating air-break switches);
- Safety boots;
- High Voltage Switching Balaclava
- Gloves:
  - Operator:
    - 4kV working / 20kV tested rubber insulating gloves, or
    - Leather gloves and stand on a personal, tested, insulating mat.
  - Checker: Leather gloves.
- Long sleeved shirt, long pants, and coat made from heavy-duty fire-retardant material (cotton, wool). The clothing SHALL have no direct metal contact with the skin, no openings in the front or wrists and be fastened to the neck.
2.4 Restrictions on High Voltage Switching (cont.)

7. Personnel who are unsure of how to operate any high voltage apparatus, or who are concerned as to the safe operation of this apparatus, SHALL seek assistance from an experienced person or consult the relevant operating and maintenance manuals before operating the switchgear.

2.4.2 Exceptions

(A) Single Authorised Person Switching

Note: This switching must not be for the application or removal of earthing on High Voltage circuits or for the issue of Permits for High Voltage Access.

Switching may be performed with a single authorised person only in the following circumstances:

- Switching any feeder circuit ON or OFF REMOTELY, at any time (Note: the racking in/out of any circuit breaker / isolator must be carried out by two persons).
- Operating air-break-switches on a DE-ENERGISED aerial line;

(B) Switching Without a High Voltage Switching Programme

High Voltage switching operations may be performed without a High Voltage Switching Programme only in the following circumstances:

- Emergency switching (refer section 2.5.1);
- Basic switching.

2.4.3 Emergency Assistance

These Rules do not prevent any person who can do so safely, from taking such action as may be necessary and appropriate in an emergency involving danger to human life or damage to vital plant.

This switching must not involve the removal of earths, nor be for the issue or cancellation of Permits for High Voltage Access.

2.4.4 Boundaries of Authority

1. Switching Officers are authorised to perform switching operations only within the boundaries of their own Department. However, Switching Officers may carry out switching in another department under any of the following circumstances:

   - During an emergency;
   - If accompanied and supervised by an authorised switching officer for that department;
   - If authorised by the manager or Electrical Supervisor for the department that is visited eg. Flying squad operating drives and switching feeders on various plants (Plants they are visiting).
2.4 RESTRICIONS ON HIGH VOLTAGE SWITCHING (cont.)

- If historical precedent has been set, and it is a routine requirement for the control of their own department’s High Voltage supply, and the switching has no affect to any other Department’s power supply, e.g. BOS personnel switching BOS feeders in the TOP High Voltage switchroom;

2. Power House controlled circuit breakers should not be operated (open/close; rack in/out) without first notifying the Power and Services Energy Controller. The Energy Controller should always attempt to open and close these circuit breakers remotely from the Power House mimic panel.

Before an OPEN / CLOSE operation, a “PRE-SELECT” permissive signal is required to ensure the mimic panel functions correctly.

Before a racking operation, a “RACK IN/OUT FRONT/REAR BUS” permissive signal is required to ensure correct mimic panel logic is maintained.

3. Where a High Voltage Switching Programme calls for switching operations in more than one department and boundaries of authority are crossed, the switching operations SHALL be conducted as arranged by prior agreement between authorised personnel from the departments involved in the switching.

2.4.4.1 Contractors

Contractors SHALL not perform switching operations on the Company’s High Voltage distribution network unless all of the following are complied with:

- They have had appropriate High Voltage training that is accepted by the High Voltage Systems Co-ordinator. The names and training details of these Contractors SHALL be managed in the Company’s Training records system (TRS) by the HV Systems Coordinator or deputy and
- They obey the Company’s High Voltage Rules as set out in this document, and
- They are authorised to do so by a plant manager, or they are accompanied and supervised by an authorised person.

Contractors, who are suitably trained and authorised to the requirements specified above, may perform switching, or be part of a switching team.
2.4  RESTRICTIONS ON HIGH VOLTAGE SWITCHING (cont)

2.4.4.2 Interfacing with The Public Supply Authority

The Company has a large and important interface with the power supply authority. It is important that switching and access to this plant is controlled, taking account of load considerations, plant operating requirements, network configuration and the safety of switching and maintenance personnel. One example is the interlocking and key locking required for operation of Supply Authority earthing switches on the Company’s main incomers. This is noted in the Company’s single-line-diagram (refer to Company sketch S16666).

Responsible people in the Power and Services and the Central Engineering Departments have access to the Supply Authority’s local maintenance crews and System Control personnel, as well as the keys for access to certain parts of the Supply Authority’s earthing switches. These responsible people will determine who in the Company and Supply Authority are to be notified before any switching or access may proceed on the equipment forming the Company/Supply Authority interface.

Other Company plants with a Supply Authority interface SHALL notify a responsible person from the Central Engineering or Power and Services departments to co-ordinate access with the Supply Authority. The Access and Safe Systems of Work requirements for both the Company and the Supply Authority will need to be adhered to when accessing Company equipment located on the Supply Authority’s site.

2.4.5 Switching and Work On or Near High Voltage Overhead Lines

The operational and maintenance requirements of overhead lines differ significantly to those for cables and metal-clad switchgear that the Company’s authorised persons are most familiar.

The operation, isolation, proving dead, earthing, setting up of safe work areas and other aspects of work on or near overhead lines is restricted to those persons trained and authorised in 33kV aerial switching and switchyards (Switching Operator – Aerials). See Appendix E for details.

NOTE: Limited operations of air-break switches may be carried out by Switching Officers who are trained in the operation of these switches during their training and refresher courses.
2.5 SWITCHING PROGRAMMES

Apart from the exceptions given below, a High Voltage Switching Programme is required for all switching operations covered by these rules, including switching that does not provide access to high voltage apparatus.

A hard copy of all switching programmes used for high voltage access SHALL be kept by the area Electrical Supervisor for a period of not less than seven (7) years.

For switching that requires the participation of the Power and Services Energy Controller, a hard copy of the switching programme should be provided with a minimum of 24 hours notice. Verbal notification only is required for switching that does not require a written switching programme.

At the completion of any task, the Company’s High Voltage distribution network SHALL be returned its original configuration as shown in the Company’s single-line-diagrams. Where any discrepancy exists, the configuration as shown in sketch S16666 SHALL take precedence. Any long-term change to the Company’s high voltage network configuration must be authorised in writing by the high voltage system co-ordinator.

For details on the preparation, modification, use and examples of high voltage switching programmes, see Appendices A and J.

2.5.1 Exceptions

A high voltage switching programme is not required for the following:

- Basic switching;
- Emergency Switching (see note below)
- Activities not covered by these rules - see Clauses 2.1.1 and 2.1.2

**Note:**

**Emergency Switching**

_In the event of an emergency, an Emergency Switching Programme should be used. (Refer section 2.4.3 & appendix N)_
2.6 EARTHING OF HIGH VOLTAGE CONDUCTORS AND APPARATUS

2.6.1 Other than Overhead Lines

Except as provided below, conductors and apparatus to be worked on SHALL be earthed and short-circuited as close as possible to the site of work, at a point between the site of work and all points of possible supply.

There SHALL be no appreciable time delay between proving conductor’s dead and applying the earthing and short-circuiting devices.

Only approved earthing and short-circuiting equipment SHALL be used.

Earthing and short-circuiting equipment SHALL be adequate to carry the short circuit currents which may flow and SHALL remain in position for the duration of the work.

When applying a portable earth, it SHALL be connected to earth before it is applied to the conductors, and it SHALL be removed from the conductors before it is disconnected from earth.

A portable earth SHALL be regarded as liable to become alive until the circuit earthing is complete. This necessitates the use of PPE and insulated tools to attach the earths.

Wherever provision has been made for earthing conductors through a circuit breaker or earthing switch, earthing SHALL be carried out in this manner unless otherwise authorised by the Company’s Electrical Services Manager.

In cases of High Voltage rotating equipment where their exists a primary and secondary component (eg slip ring motor, synchronous motor) before any work is to be conducted on the secondary side, the primary supply shall be isolated, verified and locked out.

The Secondary side shall be appropriately discharged using approved discharging equipment prior to being worked on.

Exceptions

High Voltage mains and apparatus on which work is to be carried out need not be short circuited and earthed provided that:

i) The work is on withdrawable type equipment which has been withdrawn clear of live conductors and discharge stick used on HV bushing of the HV withdrawable unit eg. withdrawable portions of metal clad switchgear;

In the cases of (ii), (iii) and (iv) below, the exception SHALL only be applied after the high voltage mains and apparatus have been isolated and locked, proven dead and short-circuited to earth to fully discharge any dangerous, capacitive and inductive voltages immediately prior to the commencement of work. The earths SHALL remain in place for the length of time recommended by the manufacturer to ensure re-charging of the apparatus does not occur.

ii) The work is on dismantled high voltage equipment on which it is impracticable to fix earths; or

iii) The work involves the application of test voltages, or

iv) The work is on high voltage equipment that is not part of the high voltage network, dependent on manufacturer’s recommendations (see Clause 2.1.2).
2.6  EARTHING OF HIGH VOLTAGE CONDUCTORS AND APPARATUS (cont.)

2.6.2  “Witness System”

A variation to the lock-out rules exists which allows the “witness system”, as described in Appendix E.5 and E.6, to be used for the remote isolation, earthing and lock-out of long, high voltage mains and apparatus other than overhead lines. This system may only be used when minor repairs or testing is required.

2.6.3  Overhead High Voltage Lines

The earthing requirements of high voltage aerials differ significantly from those of cables and metal-clad switchgear. See Appendix E for details.
2.7 LOCK-OUT OF EARTHS ATTACHED TO HIGH VOLTAGE MAINS AND APPARATUS

2.7.1 General

The earthing of high voltage conductors is a safe work practice carried out after the conductors have been isolated. As such, the earthing and short-circuiting connections are not subject to QP29.20 “Isolation for Personal Protection” lock-out requirements and need not be included on isolation permits, nor locked out under QP29.20 rules.

High voltage mains and apparatus can generally be isolated separately from the earthing of the conductors, e.g. live bus shutters may be locked to provide isolation, the circuit can then be earthed through a circuit breaker.

However, it is a requirement under these rules that all earth connections, with the exception of portable earth jumpers used on overhead lines, be locked out and included in all permits used to access high voltage apparatus.

2.7.2 Other than Overhead Lines

Earthing and short-circuiting equipment attached to high voltage mains and apparatus other than overhead lines, while not subject to the lock-out requirements of QP29.20 SHALL, under the requirements of these Rules, be locked-out and included on any Isolation Permit or High Voltage Access Permit used for high voltage access.

The removal and application of earths for testing and other purposes SHALL require a NEW Isolation Permit or High Voltage Access Permit.

2.7.3 “Witness System”

A variation to the lock-out rules exists which allows the “witness system”, as described in Appendix E.5 and E.6, to be used for the remote isolation, earthing and lock-out of long, high voltage mains and apparatus other than overhead lines.

This system may only be used when minor repairs or testing is required.

2.7.4 Overhead High Voltage Lines

The earthing lock-out requirements of high voltage aerials differ significantly from those of cables and metal-clad switchgear. See Appendix E for details.
2.8 PROCEDURES FOR ACCESS TO EXPOSED HIGH VOLTAGE MAINS AND APPARATUS

2.8.1 General

Before any work is carried out on or encroaching upon the minimum approach and working distances of bare, High Voltage conductors, the supply SHALL be isolated and the work carried out under the authority of a High Voltage Access Permit or Isolation Permit.

A hard copy of all permits used for access to high voltage mains and apparatus SHALL be kept by the area Electrical Supervisor for a period of time not less than seven (7) years.

Dependent on the requirements of QP29.20 which stipulates that an Isolation Permit must be used for all complex isolations, either an Isolation Permit or a High Voltage Access Permit SHALL be used to authorise access to high voltage conductors. When an Isolation Permit is used, a High Voltage Access Permit is not required.

For non-complex isolations, i.e. isolations using a maximum of three equipment locks, an Isolation Permit is not mandatory under QP29.20 requirements. In this case, either an Isolation Permit or a High Voltage Access Permit SHALL be used.

2.8.1.1 Multiple Work-Groups

If more than one work-group requires access to the same high voltage mains and apparatus at the same time, a separate, written authority SHALL be prepared and issued to each work-group.

When a single Isolation Permit is used for high voltage access, each work-group SHALL be listed in the appropriate section of the Isolation Permit.

If an Isolation Permit is not used, each work-group SHALL be issued with their own High Voltage Access Permit.

Separate Safe Systems of Work documentation SHALL be prepared and issued to each work-group as required.

2.8.1.2 Company Officers

A Company officer may enter a high voltage area, at any time for the purposes of visual only inspection and audit, if the officer:

- Is authorised for entry into that electrical area (or accompanied by an authorised person); and
- Does not encroach upon the minimum approach distances of any high voltage exposed conductors, and
- Notifies members of the work-group/s in the area.

No lock-out is required in this case.
2.8.1.2 Company Officers (cont)

- If the Company officer intends to perform work of a non-visual nature or encroach within the minimum approach distances of any conductors, the Company officer SHALL be regarded as a separate workgroup as per clause 2.8.1.1

2.8.2 Guidelines for the Issue and Cancellation of Permits for High Voltage Access

(a) The Issue and Cancellation of a permit allowing access to High Voltage mains and apparatus SHALL only be carried out by an authorised switching officer.

Access to high voltage mains and apparatus locked out as part of a larger isolation by an isolation leader who is not an authorised switching officer is not allowed under these Rules. The central isolation board and Isolation Permit set up by someone other than an authorised switching officer can only be used for high voltage access after an authorised switching officer has issued a written authority (eg ATW) specifying use of the Isolation Permit and central isolation board. The work-group must then be added to the appropriate sections of the Isolation Permit as per QP29.20 requirements.

Otherwise, a separate permit for high voltage access SHALL be prepared and issued by an authorised switching officer.

(b) Permits that allow access to High Voltage mains and apparatus SHALL not authorise work to begin until the high voltage conductors are safe to work on.

(c) No work SHALL begin until the relevant permits and paper-work have been issued, i.e. Isolation Permit or High Voltage Access Permit, plus Safe Systems of Work (SSoW) documentation (Task Hazard Check-list, Authority to Work, Job Safety Analysis, etc.)

(d) The authorised switching officer SHALL ensure the work-group leader, or project controller in charge of the job, is made aware of the following:

- the extent of the electrical apparatus on which work is to be carried out;
- isolation, earthing and lock-out points;
- the existence of any nearby electrical hazards;
- other conditions to which access is subject, eg use of barriers, safe work areas, safety observer, etc.;
- the work-group leaders’ responsibility to pass on this information to each and every member of the work-group.

(e) No work SHALL begin until ALL members of the work-group apply personal locks to the lock-out points.

(f) Every member of the work-group has the right and responsibility to question the safety of any task and refuse to do it unless satisfied the task is safe to carry out. These concerns SHALL be passed onto the work-group leader immediately.
2.8.2 Guidelines for the Issue and Cancellation of Permits for High Voltage Access (cont)

(g) Every member of the work-group has the right and responsibility to question the safe working habits of any member of the work group and refuse to work with that person. These concerns SHALL be passed onto the work-group leader immediately.

(h) That, unless it is cancelled sooner, all paperwork allowing access to the high voltage mains and apparatus must be cancelled as soon as practicable after the work to which it relates has been completed.

2.8.3 Testing of High Voltage Mains and Apparatus

See Appendix I

2.9 ENERGISING HIGH VOLTAGE APPARATUS

Before High Voltage Apparatus is energised by the application of test voltages or otherwise, adequate precautions (ie completed High voltage access permit or a completed isolation permit) SHALL be taken by the authorised switching officer or tester-in-charge to ensure that all persons who have been engaged on the work are clear of the High Voltage Apparatus and will henceforth regard the High Voltage Apparatus as being Alive.

When energising high voltage apparatus, whether for the first time or after maintenance or repairs, care SHALL be taken to evacuate the immediate vicinity and ensure only those people necessary remain near the apparatus. These people SHALL wear appropriate PPE.

Precautions SHALL be taken to ensure adequate warning and protection of the public from access to any exposed mains and apparatus subjected to dangerous test voltages including those sites remote from where the test voltages are applied.

2.10 WORK ON HIGH VOLTAGE CABLES

2.10.1 Work Which May be Carried Out with a Cable in Service

Before any work on High Voltage Cables, a safe work procedure SHALL be designed and approval obtained from the company’s Electrical Services Manager.

Certain work such as minor repairs to cable serving (but not wire armour, which often forms part of the earth return circuit) or slight movement of the cable may be carried out with the cable in service. This work SHALL be carried out as per WI37.07.001 “Working On Or In The Vicinity Of Electrical Cable Trays And Ladders”, which stipulates a hazard assessment be completed prior to the start of work, as well as the use of appropriate PPE such as high voltage insulated gloves or mats.
2.10.2 Identification and Isolation of High Voltage Cables

Usually it is not possible to prove dead, earth and short circuit high voltage cables close to the location where work is to be carried out on them.

In these circumstances the cable must be proved Dead and Earthed at each point of isolation, and then identified at the point where the work is to be carried out, either by approved test equipment or by physically tracing it.

Labels on cables or drawings SHALL not be relied upon as a positive means of identification.

After identification, spiking of the cable SHALL be carried out by a suitably certified person using approved equipment. If spiking of the cable is undesirable or impossible, the cable may be cut only if it can be physically followed, or, if a safe work method has been designed and then authorised by the Company's Electrical Services Manager.

2.11 WORKING ON THE WITHDRAWABLE PORTIONS OF METAL CLAD SWITCHGEAR

Before working on the circuit breakers or voltage transformers of metal clad switchgear, the circuit breaker or voltage transformer SHALL be withdrawn completely from the fixed position, and the live spout shutters - or access to the live spout shutters - SHALL be closed and if possible LOCKED See Clause 2.12 “Working on or near Open, Live Spouts”.

The circuit breaker or voltage transformer SHALL be discharged then be considered dead and not a part of the High Voltage network.

2.12 WORKING ON OR NEAR OPEN LIVE SPOUTS

Work SHALL not be carried out within the minimum approach distance of live busbars that are exposed when the spout shutters are opened. This work may be carried out ONLY when the spout shutters are CLOSED and LOCKED. If locking is not possible a safe work procedure which includes the installation and removal of barriers SHALL be authorised by the Area Electrical Supervisor before work may start.

When visual inspection or testing of live busbars is required, the spout shutters SHALL be opened, or fixed open, by two authorised, high voltage switching officers wearing appropriate PPE.

No live spout shutters SHALL be left open and unattended, unless adequate protection against accidental entry is provided and authorised by the Company's Electrical Services Manager.

If the removal or installation of live spout shutters is required, a safe system of work SHALL be prepared by a switching officer and approved by the area Electrical Supervisor and the Company’s Electrical Services Manager.
2.13 WORKING ON HIGH VOLTAGE ROTATING MACHINES

All work on, or near, the exposed high voltage conductors of high voltage rotating machines, such as motors or alternators, SHALL be performed under the procedures for High Voltage access defined in these rules.

Note: High Voltage access procedures do not apply for work on machinery driven by a high voltage motor such as a fan, pump or coupling, nor on the low voltage components of a high voltage machine.

A high voltage motor or alternator may be turning on its barring gear, but considered safe for High Voltage access when:

- The high voltage circuit breaker or busbar spout shutters are locked-out to prevent access to any live busbar circuits; and
- The High Voltage circuit conductors have earths attached and locked in position; and
- Other positive energy supplies or ancillary equipment is isolated eg heaters, steam, etc.

2.14 ENTRY AND WORK IN HIGH VOLTAGE ELECTRICAL AREAS

2.14.1 Gates and Doors

The gates and doors giving access to high voltage electrical areas SHALL be kept locked shut except:

1. When in immediate use; or
2. When providing unimpeded entry or exit for personnel working inside; or
3. For the environmental benefit of personnel working inside.

For doors to be kept open for an appreciable time prior approval from the area Electrical Supervisor SHALL be obtained and appropriate steps SHALL be taken to ensure security is maintained eg post a sentry or install warning barriers at the doorways.

The doors must be locked shut whenever the personnel inside vacate the area.

Keys SHALL be issued to Authorised Persons only. A register of keys and to whom they have been issued SHALL be kept by the area Electrical Supervisor.

2.14.2 Access to Areas with Normally Exposed Live High Voltage Conductors

No person SHALL enter an area where there are normally Live, Exposed High Voltage Mains and Apparatus unless the person is:

a) Authorised (See Appendix B1.7 and the appropriate document referenced in Section2.19 the requirements of being authorised); or
b) Accompanied by an Authorised Person, or
c) A member of a Workgroup covered by a permit for High Voltage Access.
2.14.3 Entry and Work in Transformer Yards

Hazards
All persons required to enter an enclosure housing an energised transformer should be aware of the following hazards:

- The covers and bolts of the high and low voltage cable termination boxes may become dangerous missiles in the event of an electrical fault within the boxes;
- The oil tank explosion vent may eject hot oil and gases if a fault develops in the transformer tank (for oil filled transformers);
- The hazards associated with high voltage mains and apparatus and the minimum approach and work distances required for any exposed live conductors;
- The transformer may have hazardous voltages if the main Earth is not attached to the transformer structure;

Time spent in a transformer yard should be kept to the minimum required to complete the job. When inside a transformer yard, the time spent in front of cable termination boxes and explosion vents should be minimised.

Entry
No person SHALL enter an enclosure housing with an energised transformer unless there is unimpeded access from the work area to the enclosure exit. If required, permission may be granted by the area Electrical Supervisor for all exits to be unlocked and opened for the duration of the work. Upon completion of the work, the enclosure SHALL be locked shut.

Entry into transformer yards is restricted to authorised persons only. The requirements of authorisation will depend on whether the transformer yard has exposed conductors or not, and whether minimum approach and work distances can be maintained. See Appendix B, Clauses B1.7 and B1.8 for details.

No work SHALL commence without the appropriate authorisation having been issued by the plant owner and accepted by the work-group representative.
2.14 ENTRY AND WORK IN HIGH VOLTAGE ELECTRICAL AREAS (cont.)

Work Allowed to be Performed on an Energised Transformer
No work SHALL be carried out on an energised transformer that could jeopardise its structural or functional integrity. This includes work that could cause a leak (of the tank medium eg oil, nitrogen) serious enough to jeopardise the safe operation of the transformer.

The following tasks may be carried out on or near energised transformers:

- Taking oil and gas samples;
- Inspections of transformer condition;
- Topping up the oil conservator (or header) tank **
- Inspection and replacement of breather cartridges;
- Repair and testing of auxiliary equipment fitted to the transformer, including On-Load-Tap-Changer controls;
- Inspection and maintenance of the area and enclosure;
- Inspection of the earthing system.
- Minor cleaning of the transformer tank **

** Any task considered capable of compromising the integrity of the transformer tank SHALL be approved by the area Electrical Supervisor before being carried out.

2.14.4 Entry and Work in High Voltage Cages
(See also Appendix B 1.7(B))

Procedures for high voltage access SHALL be followed to cover all persons required to work in a High Voltage Cage.

An authorised switching officer SHALL enter a High Voltage Cage only:

- If the conductors within the cage have been isolated and earthed and entry is via a permit for high voltage access; or
- If the switching officer enters to carry out switching using appropriate PPE and equipment in order to make the cage safe for entry, or
- If the switching officers ensure they do NOT come within the minimum approach distance for the voltages concerned; or
- If a second switching officer acts as a safety watcher to ensure controlled movement.

2.14.5 Work on or Near Exposed High Voltage Conductors

Work on or near exposed high voltage conductors SHALL be carried out under the high voltage access procedures described in Clause 2.8 of these rules.
2.15 INSULATING SCREENS

Insulating screens SHALL NOT be used to provide barriers for live exposed high voltage conductors except:

- If the work is carried out by contractors using contractor supplied and installed insulated screens and procedures;

and

- The use of the screens has been authorised by the Company’s Electrical Services Manager.

or

- When tested insulating mats are used to cover open live spouts as part of an authorised safe work procedure as per Clause 2.12.

2.16 LIVE HIGH VOLTAGE LINE WORK

Work on or near live, exposed, high voltage conductors that form part of the Company’s high voltage distribution network SHALL NOT be performed except:

- If the work is carried out by experienced personnel, trained and authorised for live work at the voltages concerned;

and

- The work, along with the safe work method, is authorised by the Company’s Electrical Services Manager.

2.17 WARNING BARRIERS

Colour Code to be used are as follows

- YELLOW ............ SAFE WORK AREA;
  (or YELLOW/BLACK)
- RED ............... HAZARDOUS AREA / TEST VOLTAGES
  (or RED/WHITE)

2.17.1 Safe Work Area

Colour Code - YELLOW ............ SAFE WORK AREA;
  (or YELLOW/BLACK)

When working in an area with live, exposed, high voltage conductors non-conductive YELLOW (or yellow/black striped) warning barriers SHALL be installed to clearly indicate the safe work areas and access ways.

These warning barriers SHALL clearly indicate the dividing line between live High Voltage Mains and Apparatus and the equipment to be worked on.

No part of the warning barrier SHALL be supported by any structures carrying High Voltage mains and apparatus. This is to ensure no access to live apparatus can be obtained by resting a ladder on that particular structure.

A clearly defined path of safe access for employees and equipment to the work site SHALL be installed. No work SHALL take place in this defined access way. Work SHALL be restricted to the area within the immediate boundaries of the safe work area.

No employee, material, tools or other objects SHALL pass over, under or interfere with any safety barriers.

If it becomes necessary to relocate the safety barrier, the work-group SHALL contact an authorised Switching Officer who will modify the barrier as required.
2.17 WARNING BARRIERS (cont.)

2.17.2 Hazardous / Test Area

Colour Code - RED ........ HAZARDOUS AREA / TEST VOLTAGES
(or RED/WHITE)

When hazardous voltages are applied, non-conductive RED (or red/white striped) barriers with appropriate signage SHALL be erected to warn personnel of the hazard. The barriers SHALL ensure minimum approach distance from all hazardous voltages.

The hazardous area warning barrier SHALL be a total barrier with NO defined entrance/exit opening.

A hazardous area warning barrier may be set up within an existing safe work area eg when applying test voltages in a safe work area after maintenance or construction.

Also, a hazardous voltage warning barrier may be set up within another hazardous voltage barrier to restrict access not only to the test area, but also to the point of application of the test voltages.

2.18 REFERENCE DOCUMENTS RELATING TO HIGH VOLTAGE SYSTEMS

1. QP30.17 Access To Switchrooms / Switchyards
2. WI37.INF.040 HV Distribution Committee Management
3. Regulations Under The Electricity Act 1996

2.19 APPLICATIONS FOR EXEMPTIONS OR VARIATIONS TO THESE RULES check validity

Applications for variations or exemptions to these rules SHALL be made in writing and addressed to the Chairperson, Electrical Safety Network - High Voltage Distribution Committee.

(Note: the form in QM37.01, Appendix A1 may be used for this purpose).

A formal reply to the application will be prepared by the Electrical Safety Network - High Voltage Distribution Committee, and delivered to the relevant person.
A.0 GENERAL

As per Clause 2.5 of these rules, a High Voltage Switching Programme is required for all switching operations except:

- Basic switching;
- Emergency Switching (refer section 2.5.1)
- Those switching activities not covered by these rules i.e. starting and stopping process equipment; Energy Controller mimic panel operations; etc. (see Clauses 2.1.1 and 2.1.2).

When switching operations require both a High Voltage Switching Programme and the participation of the Power and Services Energy Controller, the Energy Controller should be given a copy of the switching programme with a minimum of 24 hours prior notice. Verbal notification only is required for switching operations that do not require a written switching programme.

All switching programmes SHALL be authorised by the signature of a responsible person for the areas in which the switching will occur. This responsible person may be a switching officer or plant management, depending on the impact and risk to the plant and process caused by the switching operations.

A.1 PREPARATION and MODIFICATION

PREPARATION:

The Switching Programme SHALL be prepared by an authorised Switching Officer and Checked by another Switching Officer. The Switching Officers who write and check the switching programme need not be those involved in the actual switching operations. The switching officers who carry out the switching SHALL carefully read and understand the switching programme and agree with its contents before starting any switching.

A Switching Program SHALL contain all of the following details:

- Identity of the switching team;
- Identity of the equipment;
- Identity of the authorising person;
- A list of the single-line-diagrams used in developing the switching actions;
- The reason for carrying out the switching and a description of the work to be done;
- The limits of the isolation;
- A unique number that identifies the switching programme;
- Proposed date and time of the switching;
- The actions required and the order they are to be performed, may include:
  - Open/Close, Racking In/Out, Busbar details,
  - Isolations;
  - Proving Dead and Earthing;
  - Erection of Warning Signs and Barriers;
  - Testing;
  - Attachment and Removal of earths;
  - Return-to-service procedures;
  - Notification procedures;
  - Reminders eg re-charging springs, changing control switches, signals from Energy Controller.

Except for emergency switching, Switching Programmes should be prepared and issued on the Company’s standard High Voltage Switching Programme Form (refer Appendix J).
MODIFICATION:

A switching programme may be modified during a switching exercise if the following conditions are met:

- Both switching officers and any other person involved in the switching exercise – eg Energy Controller, other switching teams, etc, - agree on the changes and that the changes are safe to carry out;
- All people involved in the switching exercise modify their switching programmes to show the relevant changes;
- These people SHALL initial and date these changes.
- The members of a switching team SHALL check and initial the changes made on the other switching team member’s copy. Note: The Energy Controller will generally change, initial and date their own copy.
- For Modification Control purposes, any hard or electronic copies of the original switching programme must be either destroyed or modified to show the changes made during the switching exercise.

A.2 Definitions

The Title headings are to be completed by providing the relevant information in the spaces provided:

Written by: Name of the Switching Officer who writes the programme. Print, Sign name and date.

Checked by: Name of the Switching Officer who checks the programme and declares it is accurate and suitable for the task. Print, Sign name and date.

Authorised by: Name of the person who gives permission for the switching to be carried out. The interruption to plant or process may require the authority of operations personnel or plant management; while switching on another plant will require authorisation by that Plant’s Electrical Supervisor or nominee. More than one person may be required to sign here. Note: The signatory does not check the procedure for correctness, only that the switching and any associated risks and power outages are understood and accepted. This person may place restrictions on when the switching may proceed eg personnel, times, dates, process conditions. Print, Sign name and date.
HVSWP:

ADD the High Voltage Switching Programme Identifier: This identifier SHALL be unique for each high voltage switching programme.

A plant may develop their own identifier to suit their particular isolation and lock-out systems.

The following is the preferred Identifier used by Central Engineering HV group. The identifier consists of:

**Plant Area- HVSWP-Apparatus-Date-(and version if required):**

*(Each identifier SHALL be separated by a “-“)*

i) **Plant Area Concerned:** A two (2) or three (3) letter identifier i.e.

<table>
<thead>
<tr>
<th>Plant Area</th>
<th>Identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP – Pellet Plant</td>
<td>BF – Blast Furnace</td>
</tr>
<tr>
<td>Co – Coke Ovens</td>
<td>PS – Power and Services</td>
</tr>
<tr>
<td>BS – Basic Oxygen Steelmaking</td>
<td>CC – Continuous Caster</td>
</tr>
<tr>
<td>BC – Billet Caster</td>
<td>LP – Lime Burning Plant</td>
</tr>
<tr>
<td>RM – Steel Products</td>
<td>R1 – Finishing End No.1 Side</td>
</tr>
<tr>
<td>R2 – Finishing End No.2 Side</td>
<td>R3 – Finishing End Rail</td>
</tr>
<tr>
<td>ML – Mill Service Shop</td>
<td>ES – Electrical Services</td>
</tr>
<tr>
<td>MS – Mechanical Service Shops</td>
<td>WF – Wharf</td>
</tr>
<tr>
<td>TS – Tech Engineering Services</td>
<td>AD – Admin &amp; Service Depts</td>
</tr>
<tr>
<td>LB – Laboratories</td>
<td>TP – Heavy Vehicle Maint Area</td>
</tr>
<tr>
<td>ARD – Ardrossan</td>
<td>SMR – South Middle Back Ranges</td>
</tr>
<tr>
<td>EXP – Export Facility</td>
<td></td>
</tr>
</tbody>
</table>

ii) **ID Of Plant Switched / Isolated.**

eg circuit breaker Number including OCB, VCB, ACB, or GCB prefix; or TF 40, Cafeteria TF etc for equipment with no circuit breaker identifier;

iii) **6 Digit Date Of Proposed Isolation / Switching.** (dd/mm/yy)

(iv) **Version (If Required).**

If further switching is required on the same day and the same HVSWP identifier parts i, ii and iii are used, an “-A”, “-B”, etc SHALL be added to differentiate between the different switching programmes.

Example 1.
Isolating the Forge Plant to Blending Plant 6.6 kV Interconnector on March 9th, 2010, the HVSWP number would be

**ES-HVSWP-OCB293-090310 or ES-HVSWP-OCB293-090310-A (switching on the same day)**

Example 2.
Isolating the cafeteria transformer on September 12th, 2011, the HVSWP identifier would be

**ES-HVSWP-CafeteriaTF-120911.**

**System Diagram Reference:**

WD or Sketch numbers of the Company’s Single Line Diagrams used to prepare the switching programme.

The drawing revision is to be included in brackets after the drawing number eg. S16666 Sheet 8(AP) or S16666/8(AP)
<table>
<thead>
<tr>
<th>Proposed Date and Time:</th>
<th>Proposed date and time that switching is to start. This may be changed at the time of switching.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching Operator:</td>
<td>Name of Switching Operator. To be completed at the time of switching. A new switching operator may add their name and carry on switching.</td>
</tr>
<tr>
<td>Switching Checker:</td>
<td>Name of Switching Checker. To be completed at the time of switching. A new switching checker may add their name and carry on switching.</td>
</tr>
<tr>
<td>Work to be carried out:</td>
<td>A description of the mains and apparatus to be worked on and the tasks to be carried out by the work group.</td>
</tr>
<tr>
<td>Limits of Isolation:</td>
<td>The apparatus that must be operated to provide the isolations for the proposed work. The limits of isolation are normally switching and isolation devices such as fuses, links, circuit breakers, air break switches, etc. They are NOT usually plant to be worked on eg links could be pulled to provide isolation but will still be Live and cannot be worked on. Example. To isolate the Forge Plant to Blending Plant 6.6 kV Interconnector circuit (cable), the limits of isolation would be: OCB 141, OCB 293 and OCB141 VT (Voltage Transformer)</td>
</tr>
<tr>
<td>Item No.:</td>
<td>The switching instruction number, starting at “1” and increasing in sequential order, or “NOTE” if adding a reminder or non-core switching action to the programme. Each instruction must leave the High Voltage network in a safe condition. For example, <strong>Earthing must be carried out immediately after proving mains and apparatus dead</strong>, thus “PROVE DEAD and EARTH” becomes a single instruction as opposed to two separate instructions.</td>
</tr>
<tr>
<td>Time of Operation:</td>
<td>Time of completion of the switching instruction; Written in 24:00 hrs format; The Switching Operator and Switching Checker <strong>SHALL</strong> Initial their own copies of the switching programme. The time and initials <strong>SHALL</strong> be completed after each switching step is completed.</td>
</tr>
</tbody>
</table>
Switching Instructions:

Describe the switching action to take place. The following guidelines should be followed:

i) Begin each line of an instruction with an ACTION. The action SHALL be in BLOCK letters eg. NOTIFY, OPEN, CLOSE, RACK IN, RACK OUT, LOCK, UNLOCK, ATTACH, CHECK, PROVE DEAD and EARTH, etc,

ii) Each action SHALL begin a new line. Several actions, on separate lines, may be written for one instruction.

iii) Apparatus identifiers SHALL be in BLOCK letters eg, OCB141, LFAB3;

iv) The apparatus identifier MAY be followed by its description and location enclosed in inverted commas, and written in Title Case, eg. “Forge Plant Interconnector” “Blending Plant Substation”.

v) The instruction MAY include who performs the action eg. Energy Controller - useful when several switching teams are in action or Power House Controlled circuit breakers are to be operated.

vi) Notes should be inserted as required to remind the switching teams of important, non-action details that are required.

vii) A Switching Programme will generally have a RESTORE to NORMAL /NEW CONDITION section attached, however, this may be written as a separate switching programme.
### A.3 Example Of A High Voltage Switching Programme

**HIGH VOLTAGE SWITCHING PROGRAM**

<table>
<thead>
<tr>
<th>Written by: Joe Blow</th>
<th>Checked by: Fred Smith</th>
<th>Authorised by: Jane Citizen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SYSTEM DIAGRAM REFERENCE:** S16666/14(E); WD34505(AA)

**Day & date & time (estimate if unsure):** TUESDAY, MAY 16, 2000, APPROX. 0600HRS

**Switching Operator:** Frank Citizen  
**Switching Checker:** Emily George

**Work to be carried out:** CUT, BELL-OUT, JOINT and TEST OCB235 HV CABLE

**Limits of Isolation:** OCB235; ACB2017 (A.C.B.12); ACB2035

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Time of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NOTIFY Power and Services electrical and ENSURE they do not plan any outages of Blast Furnace House supply during the period of this work.</td>
</tr>
</tbody>
</table>
| 2        | NOTIFY Elect. Flying squad that the HV CB Earthing Gear for AEI QF10 Type 422 switchgear is required and ENSURE it is at the Blast Furnace MG Room on the Tuesday morning.  
At the Scrubber Substation continue: |
| 3        | ENSURE ACB 2017, the incomer from TF 5 is OPEN. If not, OPEN ACB 2017. |
| 4        | RACK OUT ACB2017 |
| 5        | LOCK ACB2017 in the Isolated position as per Isolation Permit.  
At the Compressor Sub. |
| 6        | OPEN ACB2035 (new ACB) |
| 7        | RACK OUT ACB2035 into the Isolated position. |
| 8        | LOCK ACB2035 in the Isolated position as per the Isolation Permit |
| 9        | Go to the MG Room 6.6kV Switchroom |
| 10       | OPEN OCB235 |
| 11       | RACK OUT OCB235 from the Front busbar position. |
| 12       | ATTACH the Earthing gear to OCB235 |
| 13       | PROVE DEAD OCB235 Circuit and  
RACK IN OCB235 into Circuit Earth position and  
LOCK OCB235 into Circuit Earth position as per Isolation Permit |

**NOTE:** ACB2017 is also numbered as A.C.B.12

**NOTE:** There will be no hv/lv interlocking on the new transformer. It is a temporary installation that will be changed in September, 2000.
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Time of Operation</th>
</tr>
</thead>
</table>
| 14      | COMPLETE and ISSUE High Voltage Access Permit for cutting the cable to the Work Group Leader. 
NOTE: The cable will be identified and then cut as per the work instruction. After the cable is cut, CONTINUE: |
| 15      | CANCEL the Access Permit for cutting the cable. |
| 16      | UNLOCK OCB235 |
| 17      | OPEN OCB 235 |
| 18      | RACK OUT OCB235 from Circuit Earth position |
| 19      | BELL OUT OCB235 cable cores and mark them RED, WHITE and BLUE with permanent markers. |
| 20      | RACK IN OCB235 into Circuit Earth position. |
| 21      | CLOSE OCB235 and LOCK OCB235 in Circuit Earth as per Isolation Permit. |
| 22      | COMPLETE and ISSUE High Voltage Access Permit for jointing the cable to the Work Group Leader. 
The work group SHALL now joint the old and new cables. When the joint is completed, CONTINUE: |
| 23      | COMPLETE and CANCEL HV Access Permit for the jointing. |
| 24      | UNLOCK, OPEN and RACK OUT OCB235 from Circuit Earth position. |
| 25      | ERECT Warning Signs and Barriers around OCB235 (shutters cannot be locked) for Electrical Testing. |
| 26      | COMPLETE and ISSUE HV Access Permit for testing to the Tester-in-Charge. 
NOTE: The cable will be tested as per the WI provided for the task. When testing is completed and if successful, CONTINUE: |
| 27      | CANCEL the HV Access Permit for testing. |
| 28      | PROVE DEAD, RACK IN and CLOSE OCB235 in Circuit Earth position. |
| 29      | COMPLETE and ISSUE HV Access Permit to the work group completing the Transformer disconnect box. 
When the Transformer is ready to be energised, CONTINUE: |
| 30      | CANCEL HV Access Permit for completing the disconnect box. |
| 31      | CHECK ALL PERSONEL CLEAR AND PERSONAL LOCKS REMOVED 
REMOVE all Barriers and Signs, etc that were erected for electrical testing |
| 32      | RACK IN OCB235 into the Front bus position. |
| 33      | CLOSE OCB235 (Ensure redundant LT interlock from ACB2017 is removed) |
| 34      | PHASE OUT at the Compressor Sub LTAC swbd as per WI provided for the task. If phase-out is successful, CONTINUE: |
| 35      | UNLOCK ACB2035 |
| 36      | NOTIFY BLAST FURNACE ELECTRICAL THAT WORK IS COMPLETED. |

Note: There is no separate Return-To-Service section in this Switching Programme.
B.1 DEFINITIONS

B1.1 LEVEL 1 – Electrical Safety Network (HIGH VOLTAGE DISTRIBUTION sub COMMITTEE)
(see WI37.INF.040 “Electrical Safety Network – High Voltage Distribution Committee”)

Responsibilities:

- Operate under Electrical Safety Network – High Voltage Distribution Committee”, and chaired by the High Voltage Systems Coordinator.
- Ensure compliance with the South Australian Electricity Act, the Regulations under the Act, and the relevant South Australian Regulatory Bodies.
- Review of all Rules, Policies, Procedures, etc involved with the safe operations of the Company’s High Voltage Distribution Network.
- Make presentations and recommendations to the Company’s Central Safety Committee on subjects concerned with the Company’s high voltage distribution network.
- Provide leadership, technical and plant-wide input into the Company’s High Voltage Rules, Policies, Procedures, etc.
- Set up sub-committees to investigate and report on specific issues.

Comprised of:

<table>
<thead>
<tr>
<th>Role</th>
<th>Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Voltage Systems Coordinator (Chairperson)</td>
<td>Permanent</td>
</tr>
<tr>
<td>Electrical Services Manager</td>
<td>Permanent</td>
</tr>
<tr>
<td>Operations Manager - Power &amp; Services</td>
<td>Permanent</td>
</tr>
<tr>
<td>High Voltage Systems Engineer</td>
<td>Permanent</td>
</tr>
<tr>
<td>High Voltage Maintenance Project Controller</td>
<td>Permanent</td>
</tr>
<tr>
<td>Three (3) off Plant Electrical Supervisors</td>
<td>3 Years</td>
</tr>
</tbody>
</table>
B1.2 LEVEL 2 - HIGH VOLTAGE SYSTEMS CO-ORDINATOR

Responsibilities:

- Introduce and maintain policies and rules to ensure compliance with the South Australian Electricity Act, the Regulations under the Act, and the relevant South Australian Regulatory Bodies.
- Ensure systems are in place to meet the requirements of these rules and polices.
- Ensure the Company and its employees have access to the latest versions of these Rules and the Regulations under the Electricity Act (1996).
- Provide guidance and direction on the implementation and requirements of these rules and policies.
- Monitor compliance with the requirements of these rules and polices.
- Manage (Documented) the authorisation of the Company’s High Voltage Switching Officers and High Voltage Isolators-Restricted, and ensure that each person is conversant with their duties and responsibilities.
- Approve appropriate High Voltage operating equipment e.g. sticks, operating gloves, Live Line testers, earthing devices, etc. for use on the Company’s High Voltage distribution network.
- Delegate own responsibility to an appropriate person for a defined period of time as required.
- Chairperson of Electrical Safety Network – High Voltage Distribution sub Committee
- High Voltage Switching Officer and High Voltage Isolator - Restricted in the Central Engineering responsible areas; Authorised to enter and work in Central Engineering switchyards with or without live, exposed, High Voltage conductors.
- Wear appropriate PPE.
- Audit the systems for updating the single-line-diagrams of the Company’s high voltage distribution network. Ensure sketch S16666 is kept up-to-date.
- Maintain the test records of the high voltage apparatus that requires periodic testing.

Requirements for Authorisation:

- Completion of an authorised High Voltage Switching Officers Course which includes 33kV, aerial switching, or refresher course, within the last 36 months;
- Authorised to enter and work in Central Engineering switchyards and switchrooms including those with live, exposed, High Voltage conductors. (Comply with QP30.17).
- Knowledge of the Company's High Voltage Safety Rules and Policies.
- Knowledge of the Regulations under the South Australian Electricity Act - 1996.
- Level 2 lock-out authority for Central Engineering area.
- Received appropriate training in CPR within the previous 24 months.
- Received appropriate training in the release of persons from live equipment within the previous 24 months.
B1.3 LEVEL 3 - AREA ELECTRICAL SUPERVISOR

Responsibilities:

- Ensure safe operation of the High Voltage distribution within their plant area. (In case of Central Engineering, the HV responsibilities of the Area Electrical Supervisor is High Voltage Project Controller)
- Implement the Company’s High Voltage Safety Rules and Policies.
- Nominate and authorise personnel for the respective High Voltage training courses and switchroom entry levels for their plant.
- Monitor compliance with the requirements of these Rules and any High Voltage Policies on their plant.
- Control access to all electrical areas on their plant.
- Ensure the training requirements for High Voltage authorised personnel on their plant is up to date and relevant to the plant requirements.
- Ensure all high voltage authorised personnel in their area are made aware of these Rules and the relevant sections of the Regulations under the Electricity Act (1996), as well as having access to up-to-date copies of both.
- Audit the systems for updating the single-line-diagrams of the high voltage and main low voltage interconnection distribution network in their area and ensure these are kept up-to-date.
- Ensure copies of high voltage plant operating instructions are available in each substation for each type of high voltage switchable apparatus within that substation.
- Ensure single-line-diagrams of their area’s high and low voltage power distribution, with any associated area’s distribution, are available in each substation or switchroom in their area.
- Ensure correct PPE, operating and test equipment is available for the area’s switching personnel.

Requirements for Authorisation.

- Plant Manager’s discretion.
- Knowledge of the Company’s High Voltage Safety Rules and Policies.
- Knowledge of the Regulations under the South Australian Electricity Act - 1996.
- Complete the appropriate training (QP30.17) and Authorised to enter all electrical areas on their plant.
B1.4 LEVEL 4 - SWITCHING OFFICER

Responsibilities:

- Perform High Voltage Switching Operations on their plant.
- Issue and cancel permits for High Voltage access on their plant.
- Isolation, proving dead and earthing of High Voltage mains and equipment on their plant. Set up safe work areas as required.
- Develop and issue High Voltage Switching Programmes.
- Explain and show to work-group leaders (or project controllers) the limits of isolation, position of earths, hazards and restrictions associated with any High Voltage access and work on their plant.
- Perform switching officer duties on other plants when requested to do so.
- Wear appropriate PPE.
- Obey the Company’s High Voltage Rules and Policies.
- Work safely on the Company’s High Voltage network and obtain assistance when it is required.

Requirements of Authorisation

- Nominated by Plant Electrical Supervisor.
- Authorised to enter all electrical areas on their plant as defined in QP30.17.
- Level 2 lock-out authority on their plant.
- Completion of an approved High Voltage Switching Officer Course or refresher course within the previous 36 months.
- Candidate has previously completed the online course HV Rules module and proven competent through required assessment.
- Candidate’s Electrical Safety and Low Voltage Rescue and Resuscitation unit of accreditation is current.
- Candidate has a current electrical workers licence.

Note: Those persons authorised to switch on the Company’s 33kV aerial network require 33kV aerial switching as a component of their course.

- Knowledge of the High Voltage distribution network and equipment on their plant.
- Knowledge of the Company’s High Voltage Safety Rules and Polices.
- Received appropriate training in CPR and the release of persons from live equipment within the previous 24 months.
- Agrees to perform the tasks required of a person in this position and agrees to be competent and capable of performing these tasks.
B1.5 LEVEL 5 - HIGH VOLTAGE –OPERATIONAL SWITCHING OFFICER

Responsibilities:

- Perform *Operational Switching* and isolations of High Voltage apparatus on approved equipment with an approved safe operating procedure.
- Wear appropriate PPE.
- Obey the Company’s High Voltage Rules and Policies.
- Work safely on the Company’s High Voltage network and obtain assistance when it is required.

Requirements of Authorisation

- Nominated by the Plant Electrical Supervisor.
- Authorised to enter all relevant electrical areas on their plant as defined in QP30.17.
- Level 2 lock-out authority for own plant area.
- Completion of an authorised High Voltage Switching Officer Course or refresher course within the previous 36 months.
- Knowledge of the Company’s High Voltage Safety Rules and Regulations.
- Knowledge of the isolation procedures for the specific items of plant.
- Has a current accreditation for Electrical Safety and Low Voltage Rescue and Resuscitation.
- Agrees to perform the tasks required of a person in this position and agrees to be competent and capable of performing these tasks.

B1.6 LEVEL 6 - WORK-GROUP LEADER

Responsibilities:

- In charge of a working party carrying out work on or near High Voltage installations and equipment.
- Accept and complete the necessary permits to obtain High Voltage access.
- Follow all instructions issued by the relevant switching officers.
- To be informed and then instruct the work-group on the limits of isolation, position of earths and all hazards and restrictions of the tasks being undertaken.
- Wear appropriate PPE.
- Provide a written statement to the project controller or switching officer that the work is completed and the plant can be tested and / or re-energised. This statement may be in the form of a completed ATW or High Voltage Access Permit.

Requirements of Authorisation:

- Knowledge of the Company’s Isolation and Lock-out procedures.
- Knowledge of the Company’s Safe Systems of Work procedures.
- Authorised to enter the electrical area where the work is to be carried out.
B1.7 LEVEL 7 - ENTRY INTO AN ELECTRICAL AREA WITH LIVE EXPOSED HIGH VOLTAGE CONDUCTORS (See QP30.17 "Access to Switchrooms / Switchyards").

(A) SWITCHYARDS

Responsibilities:

- Follow all instructions given to them by any authorised switching officer;
- Follow all requirements specified in the Company’s High Voltage access, Safe Systems of Work and personal isolation permits.
- Stay within any defined work areas.
- Maintain all necessary approach and work clearances for the voltages concerned.

Requirements of Authorisation

A person is authorised for entry into an electrical area with normally live, exposed, high voltage conductors when they satisfy the following requirements:

1. Current ASCO training and plant induction; and
2. Current CPR and release of victim from live apparatus training (24 months); and
3. Completed the Company’s requirements for Switchroom and Switchyard entry as specified in QP30.17, and
4. Completed an approved high voltage switching officer course that includes minimum approach and work distances,
5. Has ETSA level 2 accreditation for substation entry, or higher.

or

- Completed Items 1. and 2. above; and
- Completed the necessary ATW and JSEA requirements including a Switchroom / switchyard site induction;

or

- Completed Items 1. and 2. above; and
- Completed the necessary ATW and JSEA requirements including a Switchroom / switchyard site induction; and
- Enters under a Permit for High Voltage Access;

or

- Accompanied by an Authorised person;
B1.7 LEVEL 7 - ENTRY INTO AN ELECTRICAL AREA WITH LIVE EXPOSED HIGH VOLTAGE CONDUCTORS (cont.)

(B) HIGH VOLTAGE CAGES (see Section 2.14.4)

Responsibilities:

- Follow all instructions issued by an authorised switching officer;
- Follow all requirements of the Company’s High Voltage access, ATW and JSEA and Personal Isolation rules and regulations;
- Stay within defined work areas.

Requirements of Authorisation

A person is authorised for entry into a high voltage cage when they satisfy the following requirements:

1. Current ASCO training and plant induction; and
2. Current CPR and release of victim from live apparatus training (24 months); and
3. Completed the Company’s requirements for Switchroom and Switchyard access as specified in QP30.17, and
4. Completed an approved high voltage switching officer course that includes minimum approach and work distances, or
5. Has ETSA level 2 accreditation for substation entry, or higher; and
6. Able to maintain minimum approach and work distances.

or

- Completed Items 1, 2, 3, and 4 above; and
- The work is to perform switching, isolation and earthing to enable High Voltage access to the area, and all PPE, operating tool and test equipment requirements of these Rules are followed.

or

- Completed items 1 and 2 above; and
- Completed the necessary ATW and JSEA requirements including a site induction; and
- Entry is under permit for high voltage access ONLY;
B1.8 LEVEL 8 - ENTRY INTO AN ELECTRICAL AREA WITH NO EXPOSED LIVE HIGH VOLTAGE CONDUCTORS

Responsibilities

- Follow all instructions given to them by any electrical personnel for the area;
- Follow all requirements of the High Voltage access, Safe Systems of Work and personal isolation procedures.
- Stay within defined work areas.

Requirements of Authorisation

- Authorised by the Area Electrical Supervisor or nominee as per the requirements of QP30.17 “Access to Switchrooms/Switchyards”
B.2 HIGH VOLTAGE SWITCHING ACCREDITATION

There are three classes of authorised persons who perform manual switching on the Company’s high voltage distribution network. These classes of switching persons are:

1. High Voltage Operational Switching Operator;
2. High Voltage Switching Operator;
3. High Voltage Switching Operator – Aerials;

Process of Accreditation:

To become accredited, a person will fulfil some, or all of the following requirements:

- **SHALL** have an electrical background (trade or technical) or complete an approved course in Electrical Technology;
- **SHALL** be chosen by the area Electrical Supervisor to carry out the responsibilities of a certain class of switching person;
- **SHALL** achieve “Competency” in the accredited Company high voltage switching course;
- **SHALL** achieve “Competency” in a refresher every 36 months or less; OR in a refresher course every 12 months if the switching Officer has not performed 8 operations for 12 months;
- **SHALL** achieve “Competency” in CPR training every 24 months or less;
- **SHALL** have access to the relevant electrical areas in which they are required to perform switching as defined in QP30.17.
Once a person’s accreditation has lapsed, it may be regained by achieving competency in the relevant refresher course and CPR training, and gaining access to the electrical areas where switching is to be performed.

<table>
<thead>
<tr>
<th>REQUIREMENTS</th>
<th>Operational Switching Officer</th>
<th>Switching Operator</th>
<th>Switching Operator - Aerials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Background (trades or technical)</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>CPR Training Within 24 months</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Access to Electrical Area</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Relevant HV Switching Training Course (course length – on site)</td>
<td>√(3 Days)</td>
<td>√(3 Days)</td>
<td>√(4 Days)</td>
</tr>
<tr>
<td>Refresher Course Within 36 Months or less than 8 operations in the past 12 months (course length – on site)</td>
<td>√(1 Day)</td>
<td>√(1 Day)</td>
<td>√(1-2 Days)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RESPONSIBILITIES / RESTRICTIONS</th>
<th>Operational Switching Officer</th>
<th>Switching Operator</th>
<th>Switching Operator - Aerials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic switching on metal-clad switchgear</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Isolations for work that is not for HV access.</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Complex switching on metal-clad switchgear</td>
<td>X</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Prove dead and earthing on metal-clad switchgear</td>
<td>X</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Preparation of switching programmes</td>
<td>X</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Preparation of permits for high voltage access</td>
<td>X</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Operation of air-brake switches on overhead lines up to 6.6kV</td>
<td>X</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Operation of air-brake switches on 33kV lines</td>
<td>X</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Operation of fuses, links, proving dead and earthing on overhead lines up to and including 33kV</td>
<td>X</td>
<td>X</td>
<td>√</td>
</tr>
<tr>
<td>Application of flexible earths</td>
<td>X</td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>
ONLY THOSE DEVICES APPROVED BY THE COMPANY’S HIGH VOLTAGE SYSTEMS CO-ORDINATOR SHALL BE USED ON SITE.

C.1 Operating Sticks

All operating sticks used for any purpose involving contact with live conductors SHALL:

i) Be adequately stored and kept dry and clean. Care must be taken when handling the sticks so as not to damage their surface. They must not be laid directly on the ground and care must be taken when inserting or removing the sticks from any storage tubes. The storage tubes SHALL be constructed and sealed so as to prevent internal condensation, which results in the accelerated decay of the sticks’ insulating properties.

ii) Be examined before use and, when necessary, wiped thoroughly with a clean dry cloth. Wiping the stick with a cloth impregnated with a silicone water repellent spray is recommended and helps maintain the stick’s electrical properties. If the stick is obviously damaged or outside its 12 month test period, it must not be used and SHALL be withdrawn from service, tagged as defective and arrangements made with the High Voltage maintenance group for its replacement / testing. Vertical (or longitudinal) scratches - as opposed to horizontal scratches - can seriously decrease the insulation properties of the operating stick.

iii) Be marked with the voltage/s for which they are suitable and SHALL not be used for higher voltages (See Appendix E0.2 for colour coding of voltages on sticks used for overhead line work).

iv) Hands must remain behind that mark denoting the safe distance for the voltage concerned. Care SHALL be taken to identify the correct mark when using a double-ended stick as there will generally be two similar marks for 11kV and 33kV on the one stick.

v) When using an insulating stick, whether for operations, live-line testing or earthing, the operator SHALL ensure another level of tested insulated protection is used. This extra level of tested, insulation may be rubber gloves, a personal mat or an insulated working platform (such as the EWP used by ETSA).

vi) Be examined and electrically tested every 12 months. Each stick will have a sticker attached with the last test date. The record of test results SHALL be kept by the high voltage system co-ordinator.

C.2 Rubber Gloves / Personal Insulating Mats

Either approved, High Voltage rated rubber gloves SHALL be worn, or personal insulating mats used under foot in conjunction with wearing leather gloves, when performing switching operations on the Company’s High Voltage distribution network.

They provide protection against the hazard of step and touch potentials during flash-over faults to earth.

The High Voltage rubber gloves SHALL be rated 20 kV Tested / 4 kV Working (4/20kV).

The personal insulating mats SHALL have a minimum insulation rating similar to that of the insulating gloves.
C.2 Rubber Gloves / Personal Insulating Mats  (cont)

All high voltage gloves / personal insulating mats:

i) Must be adequately stored and kept dry and clean. Gloves must be kept unfolded and dusted with talc or chalk powder.

ii) If gloves and mats become wet they must be dried before returning them to their containers. To clean gloves and mats, wash them in warm, soapy water (less than 65°C). They should then be thoroughly dried and the gloves dusted with talc or chalk.

iii) Must be visually inspected for damage and last test date before each use - look for nicks and cuts and excessive wear, especially on the palm of the hand of gloves. Any article showing defects SHALL be rendered unusable. When one glove of a pair is rejected, the other may be mated with a similar glove of the same size and type, and after retesting the resultant pair can be put into service. Gloves found outside their 12 month test period SHALL not be used, and sent to Electrical Services for testing.

iv) Gloves must not be worn wrong side out or left in that condition.

v) Must be tested electrically every 12 months. They will be stamped in ink with the test date. The record of test results SHALL be kept by the high voltage system co-ordinator. Note: These articles are sent to Adelaide for testing. Spare, tested gloves and mats must be available to cover for this situation.

C.3 Live Line Indicating Devices

All live line indicating devices must be adequately stored and kept clean and dry. They must be examined and electrically tested every 12 months. They will have a sticker attached with the last test date. The record of test results SHALL be kept by the high voltage system co-ordinator.

Live line indicating devices include modiewarks and phase-out sticks and like equipment used for testing dead or measuring purposes on high voltage mains and equipment.

There are two types currently authorised for use on site, the ABB ‘TAPLIN’ High Voltage tester and the MODIEWARK.

A) ABB ‘TAPLIN’ High Voltage TESTER.
C.3 Live Line Indicating Devices (cont)

Advantages:

- Has an analogue meter readout.
- Can be tested in a test box.
- Is approved and used by the local Power Authority.
- Can be used for phase-out as well as live / dead line indication.
- Can be used on voltages up to 12 kV.

Disadvantages:

- A little difficult for a single person to handle at times.
- Requires contact with conductors and should only be used if the modiewark is unsuitable.
- Range is only up to 12 kV, therefore NOT suitable for 33 kV work.

B) MODIEWARK.

Advantages:

- Wide range of voltage selection including 33 kV.
- Can be tested in its test box or may be self testing.
- Is approved and used by the local Power Authority.
- Can be used with an operating stick.

Disadvantages:

- Batteries can go flat.
- Fails to an unsafe condition. It is most important to test the instrument before and after using it.
D.1 Electric Shock Involving Low Voltage Equipment

Death may not be instantaneous. Electric shock can render a victim unconscious and stop the breathing, therefore prompt rescue action is vital. However the rescuer must be aware of the danger(s) present and take suitable precautions.

To release from electric contact.

a) Quickly assess the accident site
   - What voltage is involved?
   - Are other hazards present such as adjacent live exposed conductors?
   - Are special precautions necessary?

b) Take precautions against becoming a victim yourself
   - Remember that the victim is electrified (at the voltage of the electrical equipment until released).
   - Avoid direct contact with the victim or any conducting material touching the victim.

c) Where possible switch off the power
   - If the switch is nearby it should be immediately opened and the victim pushed or pulled clear of electric contact.
   - If in doubt as to which switch to open, open all switches, however assume the circuit is still alive until proved otherwise.
   - If the accident involves portable electrical equipment, remove the plug from the socket.

d) Take care that the victim does not fall and sustain injury.

e) If electric power cannot be switched off immediately, disconnect the victim from contact using dry non-conducting material such as
   - An insulated rescue crook. Where practicable the rescuer should also wear electrical insulated gloves.
   - A dry stick or timber.
   - Clean rope.
   - Dry clothing eg. A coat held by the sleeves.
   - Rubber or plastic sheeting.
   - High voltage operating stick.

DO NOT USE METAL OR ANYTHING DAMP
D.1 Electric Shock Involving Low Voltage Equipment (cont)

After release from contact.

Assess the condition of the patient. If breathing is absent commence expired air resuscitation (EAR) immediately - give 5 breaths and reassess the patient. If a heart beat is absent, commence cardio-pulmonary resuscitation (CPR) immediately.

Send for medical assistance, however do not leave the patient unattended or cease artificial resuscitation.

D.2 Electric Shock Involving High Voltage Equipment

Rescue is extremely dangerous if a person makes contact with high voltage and is not thrown clear.

No attempt should be made to rescue a person remaining in contact with high voltage equipment until the equipment has been isolated, proved de-energised and earthed.

Dry sticks, timber or other materials must not be used.

Note that insulating gloves ALONE may not be suitable for protection against direct contact with the voltages existing on the Company's High Voltage Distribution System, but should be used in conjunction with an approved and tested high voltage operating stick to knock the victim clear of any conductors.

At all times any rescuer must maintain the minimum approach distance from any live, exposed, high voltage conductor. In addition, the minimum approach distance must exist between the victim or any conductive material touching the victim and the live high voltage equipment otherwise no rescue should be attempted until the circuit has been made safe.
E.0 General

The Company’s high voltage, overhead line network has characteristics that make it unique when it comes to isolation, earthing and lock-out requirements. Exemptions to QP29.20 have been obtained from the Isolation Committee to enable work on these lines to be carried out. Some of these characteristics are:

- **Height:** Access to mains and apparatus requires the use of an elevated work platform;
- **Exposed Conductors:** The bare, high voltage conductors place strict minimum approach and work distance requirements for all work carried out on or near these aerials; Insulated operating sticks are required to perform most operations on aerial lines;
- **Distance:** Overhead (aerial) lines may be many kilometres in length; Isolation points may be 10’s of kilometres from the actual work site;
- **Business and Private Consumers:** The Company supplies power to internal customers as well as external customers, some of which are private businesses and emergency services groups;
- **Specialized Isolation and Switching Apparatus:** Generally, aerial apparatus used in isolations require the use of an elevated work platform and/or insulated operating sticks. The installation of ground operated air-break switches is increasing in order to provide more ground accessible isolation points; These Air-Break switches and Reclosers are locked by Central Engineering for plant security reasons.
- **Portable Earthing:** Most aerial earthing is achieved with portable jumper leads that are attached using an insulated operating stick whilst working from an elevated work platform. The nature of the work often requires these earths to be moved to different sites while under the same isolation.
- **Proximity of Isolation Points to Live Exposed Conductors:** Most isolation points lie within the Regulatory safe work distances and require the use of appropriate PPE and insulated operating sticks to operate.
- **Work-force:** Most work on the Company’s high voltage aerial distribution network is performed by contract labour using contractor supplied equipment. The number of persons authorised to operate, isolate, earth and lock-out on the Company’s high voltage overhead lines is limited.

E 0.1 The Iron Baron and Iron Knob Lines - General

Before commencing work on either of these lines, it SHALL be isolated and earthed using the links provided in the 2-Mile Substation. Individuals in the work-groups SHALL then apply one or more personal (or working) earths at the work-site before commencing work.

The Iron Baron and Iron Knob lines share the first 172 poles (or 21km) of their run from the 2-Mile substation before they diverge and continue on their own poles. **All work on the first section of shared poles requires BOTH mine feeders to be isolated and earthed.**

Contractors are responsible for the supply, maintenance and regular testing of their own high voltage earthing and operating equipment and ensuring it is suitable for the task.
E 0.2 Insulated Operating Sticks - General

- 4/20kV insulated rubber gloves are required when using an insulated operating stick;
- Hands must stay behind the coloured marker (orange = 11kV; green = 33kV; black = 66kV);
- Care SHALL be taken to NOT scratch the sticks, especially lengthways;
- Silicon spray SHALL be applied via a clean, dry rag to maximise the stick’s life and insulation;
- Operation Sticks SHALL be checked that they have been tested in the last 12 months;
- Operating Sticks SHALL be checked prior to use for any defects or damage.

E.1 Authority To Switch on the Company's High Voltage Aerial Network

Maintenance of the Company's high voltage aerial network is the responsibility of the Central Engineering High Voltage Group. Authority to isolate, earth and lock-out the Company’s High Voltage aerial lines is restricted to the following:

1. Authorised Central Engineering employees whose high voltage training includes the operation of 33kV air-break switches, fuses and links (Switching Operator - Aerials).

2. Contractors with the appropriate high voltage switching training may assist in switching and carry out isolations and earthing under instruction from a Central Engineering Aerial Switching Operator. Only those contractors with Yellow Lock authority in the Central Engineering Department may lock-out for personal isolations. These contractors’ Yellow Lock authority will be restricted to certain areas of the Company's aerial network.

E2 Earthing Requirements

High Voltage aerial lines SHALL be earthed to the following requirements:

a) Main earths SHALL be attached at each isolation point, as close as practicable to the isolation points;

b) Working earths SHALL be attached as close as practicable to the work-site, between the work-site and every isolation point and possible point of supply;

c) Earthing facilities at circuit breakers or isolators SHALL be used as the main earths when available;

d) All possibilities of feed-back, including low voltage and emergency supplies, SHALL be isolated;

e) Only approved equipment SHALL be used to prove dead and earth aerial lines;

Where the operation of apparatus for the isolation, proving dead and earthing of the Company’s High Voltage aerials is carried out by contractors, the contractor employees SHALL follow the procedures as set out in this Clause as a minimum requirement. Contractor requirements above those defined in these rules may then be applied to the
E.3 Lock-out Of Earthing Connections

Portable earth jumpers, used for both main and personal (working) earths on high voltage aerial lines, are exempt from the lock-out requirements of QP29.20.

The earthing links in 2-Mile substation that earth the Iron Baron and Iron Knob lines SHALL be locked “indirectly” by placing a multi-lock device and yellow lock through the hole provided on the sign situated below the earthing links concerned.

E.4 Indirect Lock-out Of High Voltage Aerial Isolation Points - Procedure

The act of locking high voltage aerial links and fuses is illegal, dangerous and impractical (Safe Clearances).

With the exception of the Iron Knob and Iron Baron isolation and earth links in the 2-Mile substation, (where identification signs have been placed in the ground below the apparatus concerned for the attachment of locks) the following “Indirect” method of locking-out aerial fuses and links that provide isolation points on the Company’s high voltage overhead lines is approved.

The Indirect procedure for the “lock-out” of aerial fuses and links is as follows:

1. Open/Remove the high voltage aerial links/fuses;
2. Using yellow, plastic chain, attach a plastic “DANGER - HIGH VOLTAGE ISOLATION - DO NOT OPERATE” sign at chest/head height around the pole carrying the fuses/links. Ensure the sign is on the main approach side of the pole;
3. Fix the chain so it cannot slip down or be removed from the pole by attaching a multi-lock device through the chain. Attach a yellow, equipment lock through the multi-lock device.
E.5 "Witness System" - for Remote Isolation, Lock-out and Testing

An exemption to the lock-out requirements of QP29.20 has been granted by the Isolation Committee for the use of the "witness system" on those feeders specified at the end of Appendix E6:

The basic principles of the "witness system" are as follows:

1. The work site is a great distance from the isolation and main earthing points;
2. A switching team performs the isolations, main earthing and locking for a remote work-group;
3. The switching team and work groups maintain radio or telephone contact at all times;
4. The two persons in the switching team "witness" and acknowledge all communications to and from the work-group regarding isolations, earthing and lock-out.
5. Two people from each work-group "witness" all communications to and from the switching team regarding the isolations, earthing and lock-out.

Before the commencement of work:

6. The two persons in the switching team perform and witness all isolations, earthing and lock-out for the work-group;
7. Both persons in the switching team communicate to the individual members of the work-group to confirm the isolations and earthing have been completed and locked-out in the name of that individual. Each isolator, switching officer and individual work-group member SHALL be named.
8. Each work-group member will acknowledge the isolations and earthing have been completed and locked out in their name;

   **NOTE:** No member of the work group SHALL approach any conductor without proving the conductor dead and, if necessary locally earth. (eg. Overhead lines).

At the completion of work:

9. Each individual of the work-group SHALL identify themselves and acknowledge they have completed their work, removed their working earths, are a safe distance away from the lines and SHALL not approach the lines again. They will then request that their personal locks be removed and that they will now treat the lines as Live.
10. The two persons in the switching team acknowledge the request from each individual of the work group to remove their locks. Each individual SHALL be named.
11. The two persons in the switching team carry out and witness the removal of locks and earths. The lines may be put into service once all locks are removed and the work-group leader acknowledges the work is completed and the lines may be re-energised.
NO MEMBER OF A WORK-GROUP SHALL APPROACH ANY CONDUCTOR AT THE WORK SITE AFTER REQUESTING REMOVAL OF THEIR PERSONAL LOCK.

TO RE-START WORK, AN INDIVIDUAL MUST REQUEST THE ISOLATION, EARTHING AND LOCK-OUT IS COMPLETED IN THEIR NAME, THEN RECEIVE CONFIRMATION FROM THE SWITCHING TEAM.

E.6  “Witness System” - Example at 2-Mile Substation

VARIATION TO QP29.20

The radio or telephone controlled witness system as detailed will be carried out by employees engaged in repairs to high voltage transmission lines to Iron Knob and Iron Baron, when isolation at the 2 Mile Sub-station is required.

Procedure

Switching procedures at the 2- Mile sub-station will be carried out at all times by at least two authorised persons of the Central Engineering Electrical Services department.

Details

1. The Working Group will contact the 2 Mile Sub-station and establish radio or telephone communications.
2. The Working Group will request that the appropriate switching and locking be carried out.
3. The authorised person at the 2 Mile Sub-station will reply and repeat the request. The witness at the 2 Mile Sub-station will monitor the conversation and repeat the request, also.
4. The authorised person at the 2 Mile Sub-station will have the necessary switching carried out by the Power House Energy Controller who will also place a “Danger” cover over the OCB push-button on the mimic panel. The witness will monitor the conversation.
5. When the appropriate switch has been operated, the authorised person will visually check that the mechanical indicators of that switch are in the off / open position.
6. The following operations SHALL then be carried out:
   (a) The H.T. links on the outgoing side of the appropriate switch are to be opened using the Insulated Operating Stick.
   (b) Check that the interconnection links between the Iron Knob and Iron Baron distribution systems are in the appropriate position. These must be open when systems are independently fed through their own switch.
       Note: When the appropriate links are open, isolation of the line has been achieved and there is no need to lock out the OCB or its controls.
   (c) The earth links appropriate to the isolated section will then be closed.
   (d) The insulated operating sticks are to be placed back into their storage tubes.
       “Lock-out” the isolated apparatus. This is achieved by attaching “Danger - High Voltage Isolation - Do Not Operate” signs, multi-lock-devices and equipment locks onto the signs installed below the isolators, then locking the operating sticks’ cover closed. Personal locks bearing the Working Group members’ particulars will be attached to the multi-lock-devices or Central isolation Board as required.
E.6  “Witness System” - Example at 2-Mile Substation  (cont)

7. The authorised person at the 2 Mile Sub-station will then contact the Working Group, and after his call is acknowledged, state his name and the following:
   (a) The switch number that has been opened and the transmission line that has been de-energised.
   (b) The outgoing links of the switch have been opened and locked out in the name of the working group member.
   (c) The interconnection links have been observed as open and locked in the name of the working group member (if applicable).
   (d) The earth links to the isolated section of the transmission line have been closed and locked in the name of the working group member.
   (e) The operating sticks have been locked in the name of the working group member.

8. The witness SHALL state their name, repeat all the above details and that they have in fact witnessed the operations being carried out.

9. Each working group member SHALL confirm the transmission line has been isolated and earthed and acknowledge their understanding of the switching that has taken place and that the equipment is locked-out in their name.

10. The working group SHALL then test the line dead and attach their own local, working earths as required.

On Completion of Work

1. The work-group leader SHALL contact the 2 Mile Sub-station and verify that the work is completed, all members of the work-group are clear and accounted for and all working earths are removed.

2. Each individual member of the work-group (as applicable) SHALL then state their name that their working earth has been removed and they are clear of the lines. They SHALL then request that their personal locks be removed and the line re-energised.

3. Both authorised persons at the 2 Mile Sub-station will state their names and acknowledge each request.

4. When ALL personal locks have been removed and the line is ready to be re-energised, the authorised person will proceed to:
   (a) Remove all equipment locks and multi-lock-devices.
   (b) Ensure the appropriate switch (OCB) is open.
   (c) Open the earth links.
   (d) Close the line out going links.
   (e) Ensure the interconnector links are in the correct position.
E.6  "Witness System" - Example at 2-Mile Substation  (cont)

5. The authorised persons will then contact the Power House Controller and request the closure of the appropriate OCB.

6. The authorised persons will then contact the work-group and inform them that power has been restored.

**Note:** All switching and locking carried out under this variation SHALL be recorded in the substation log book, giving date and time, all job particulars and reasons for switching, and SHALL be signed by both operator and witness.

If the two authorised persons in the 2-Mile substation leave for any length of time, plastic bunding SHALL be erected across the switchyard from the south fence to the north fence on the live side of OCB119 and OCB120 to provide a warning to people entering the substation. Warning tags SHALL be attached to the bunding and detail the isolations carried out.

The Central Isolation Board, if used, SHALL be set up inside the substation building directly in front of the access door to the switchyard.

### Feeders for the Use of the "Witness System"

All High Voltage Overhead Lines:

- 2-Mile Sub to Iron Knob and all branches off the line;
- 2-Mile Sub to Iron Baron and all branches off the line;
- 2-Mile Sub to Pellet Plant 33 kV;
- 2-Mile Sub to ETSA Terminal Substation;
- Oil Tanks Substation to Saltworks Road Aerials.

All ETSA Terminal Substation Feeders, including but not limited to the following:

- ETSA Incomer No. 1 to Power House;
- ETSA Incomer No. 2 to Power House;
- ETSA Incomer No. 3a to TOP Transformer 471.
- ETSA Incomer No. 4 to the SMF.
There are a number of tasks that require the mandatory notification and authorisation of one or more of the following: The Area Electrical Supervisor; the Company’s Electrical Inspector; the High Voltage Group.

F.1 Underground High Voltage and Low Voltage Services

To prevent damage, deterioration or access problems to underground power cables, permission from the area Electrical Supervisor, the Company’s Electrical Inspector, or the High Voltage maintenance group is required before carrying out any of the following activities:

- excavations;
- dumping or stock-piling of hot or large amounts of material;
- construction of new roads or traffic-ways;
- laying of concrete slabs or the erection of buildings;
- upgrading existing roads, especially for increased traffic;
- planting of trees and gardens;

F.1.1 Excavation Permit

An Excavation Permit is required before any excavation. The electrical section of the Excavation Permit can only be completed by those persons in the Electrical Services Department experienced in the use of the underground services drawings and cable detection equipment.

All instructions written on the Excavation Permit by the responsible person SHALL be complied with.

Warnings:

a) Never assume a cable is at a certain depth. Non-standard installation practices or later earthworks may result in cables laying at various depths, including just below the surface of the ground.

b) Never assume a cable is installed to the modern standard. Previous installation methods have resulted in cables with no impact protection eg concrete tiles or hard plastic sheeting, warning tape, bedding or covering sand, not to mention different distances between the cables and tiles, etc.

c) Beware of slow, accidental excavations. The use of front-end loaders at a material dump/reclaim site will eventually scrape away enough soil to expose underground services.
F.1.2 Road / Rail Crossings

High Voltage cables SHALL be protected against the heavy mechanical loads of road and rail traffic by the use of appropriate mechanical protection such as concrete culverts, pipes or suitably designed concrete slabs. The concrete SHALL be sulphur resistant. Any queries regarding the protection requirements of underground electrical services SHALL be directed to the High Voltage maintenance group or the Company’s Electrical Inspector.

F.1.3 Access to High Voltage Cable Reserves

The Company’s high voltage cable reserves are identified by their white, water-pipe fencing with associated signs warning of the presence of buried and high voltage cables. They hold many of the Company’s 6.6kV and 33kV cables. Access to these cable reserves is strictly forbidden without permission from the High Voltage maintenance group or the Company’s Electrical Inspector. The high voltage cables are not installed with any form of protection against constant vehicular traffic or heavy loads. A safe work procedure dependent on the magnitude and frequency of the traffic load will be required before permission is granted. Access will generally require steel plates to be laid under the loads to distribute the point forces across the widest possible area.

F.2 Transport of High Loads

Authorisation to carry high loads under any of the Company’s High Voltage Aerial lines SHALL be obtained in writing from the High Voltage maintenance group. Access under the Company’s lines may not be available for some time (days, weeks), so as much notice as possible should be provided*, along with the following information:

- Date and Time of crossing.
- Delivery Route.
- Height above ground of the highest point on the load. This height must be accurate.

All written instructions on the Authorisation are to be strictly followed.

* Heights of aerials may need to be measured, aerials de-energised, or de-energised and raised. Power outages and line maintenance crews may need to be organised. Also, some aerial installations carry the Company’s telephone and LAN communications which require special consideration and isolation requirements.

F.3 Dumping and Storage of Materials

It is not allowed for any person to place or maintain, or cause to be placed or maintained, any corrosive, heavy, hot or bulk materials above any underground line without the permission of the High Voltage maintenance group or the Company’s Electrical Inspector. These materials may be quite deleterious to the life of the cables.
F.4  Modification of Protection Settings or Purchase of Test and Operating Equipment

A person must not -

1. Modify any protection settings on any protection relay on the Company's High or Low Voltage distribution network without first receiving the written authority of the Central Engineering Electrical Engineers (HV).

2. Modify or purchase, or cause to be modified or purchased any operating tools, PPE or test equipment to be used by employees for personal protection or to operate and test on the Company's High Voltage distribution network without the written authority of the Company's Electrical Services Manager.

F.5  Reporting of Faults, Incidents and Dangerous Conditions and Practices

The following SHALL be reported to the Area Electrical Supervisor who SHALL then notify the necessary Company officers:

- Faults, failures, mal-functions - catastrophic, or otherwise - on High and Low Voltage power distribution plant, PPE, Test gear; Operating sticks; Protection and control relays; Interlocks; switching;
- Incidents and accidents involving both High and Low Voltage plant and equipment, both operational and during switching;
- Dangerous or unusual conditions eg poor earthing, serious leaks on switchgear and transformers; extended periods of high or low volts; Alarms - Buchholz gas; temperature, gas pressure, etc.;
- Dangerous and unsafe work practices.

F.6  Modifications to the High or Low Voltage Distribution Network.

The design and materials list for major additions and modifications to the high voltage power distribution networks SHALL be approved by the Company's Electrical Services Manager in conjunction with the QP02.05 – Modification Control before they can be implemented.

The design and materials list for major additions and modifications to the main low voltage power distribution networks SHALL be approved by the Company's Electrical Services Manager in conjunction with the QP02.05 – Modification Control before the planned work may proceed.
GENERAL

A CIRCUIT BREAKER IS CONSIDERED LOCKED IN THE ISOLATED POSITION WHEN ANY ONE OF THE FOLLOWING IS LOCKED:

- RACKING MECHANISM
- MECHANICAL INTERLOCK
- SPOUT SHUTTERS
- ACCESS TO ANY OF THE ABOVE

A CIRCUIT BREAKER IS CONSIDERED LOCKED IN THE EARTH POSITION WHEN ALL OF THE FOLLOWING ARE LOCKED:

- ELECTRICAL TRIP
- MECHANICAL TRIP
- RACKING MECHANISM
- MECHANICAL INTERLOCK
- EARTH CONNECTION

(A) MECHANICAL ONLY WORK

- CB RACKED-OUT and LOCKED ............

(B) ELECTRICAL ACCESS/WORK

(i) TRANSFORMER (HV / LV)

For work on the LV circuit:

- LV CB RACKED OUT and LOCKED ........
- HV CB RACKED OUT and LOCKED ........
- FEEDBACK via VT or SWITCHBOARD BUSWIRE CIRCUITS, then RACK-OUT VT or REMOVE VT HV or LV FUSES and LOCK-OUT ........

For work on the HV circuit:

- LV CB RACKED OUT and LOCKED ........
- HV CB CLOSED in CIRCUIT EARTH and LOCKED ........
- FEEDBACK via VT or SWITCHBOARD BUSWIRE CIRCUITS, then RACK-OUT VT or REMOVE VT HV or LV FUSES and LOCK-OUT ........

(ii) TRANSFORMER (HV / HV)

For work on primary or secondary circuits:

- BOTH CBs CLOSED in CIRCUIT EARTH and LOCKED ........
- FEEDBACK via VT or SWITCHBOARD BUSWIRE CIRCUITS, at EITHER END of the CABLE, then RACK-OUT VT or REMOVE VT HV or LV FUSES and LOCK-OUT ........

(iii) HIGH VOLTAGE CABLE

- BOTH CBs CLOSED in CIRCUIT EARTH and LOCKED ........
- FEEDBACK via VT or SWITCHBOARD BUSWIRE CIRCUITS at EITHER END of the CABLE, then RACK-OUT VT or REMOVE VT HV or LV FUSES and LOCK OUT ........

(iv) ON LOAD TAP CHANGER (only found on HV / HV transformers)

- BOTH CBs CLOSED in CIRCUIT EARTH and LOCKED ........
- FEEDBACK via VT or SWITCHBOARD BUSWIRE CIRCUITS at EITHER END of the CABLE, then RACK-OUT VT or REMOVE VT HV or LV FUSES and LOCK OUT ........
- ISOLATE and LOCK-OUT MOTOR SUPPLY ............
<table>
<thead>
<tr>
<th></th>
<th>LOCAL</th>
<th>REMOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low Voltage</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>High Voltage</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Feedback Possible Through Voltmeter Fuses</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Feedback Possible Through Voltage Transformer</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Isolation ONLY Required</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Live Spout Shutters to be Locked</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Mechanical Interlock/Racking Mechanism to be Locked</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Access to 6 and 7 above to be Locked</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Isolation Lock-out via Other method. Specify:</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Earthing via Integral CB position</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Earthing via Earth Connections Through CB</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Earthing via Manual Application</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Earthing via Other Method. Specify:</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Electrical Trip Fuses/Links to be Locked</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Mechanical Trip Push-button to be Locked</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Mechanical Interlock to be Locked</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Earth connection to be Locked</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Access to 14, 15, 16 and 17 to be Locked</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Other Earthing Lock-out Required. Specify:</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Exposed, Live High Voltage Conductors Near to Work Area but Outside Minimum Working Distances</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Safe Work Area to be Defined</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Exposed, Live, High Voltage Conductors Within Safe Work Distances.</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Watcher Required.</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Other Hazard Control Measures Required. Specify:</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>High Voltage Testing Required.</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Warning Signs and Bunding Required</td>
<td></td>
</tr>
</tbody>
</table>
Do NOT slow close a circuit breaker onto a LIVE circuit. - - - - BANG!
Do NOT rack a CLOSED circuit breaker in or out of a LIVE switchboard. - - - - BANG!
Do NOT pull fuses or links under load. - - - - WHOOSH!
Do NOT repeatedly close and open a circuit breaker without allowing time for the insulating and arc quenching medium to recover. - - - - BANG!
Do NOT immediately re-energise any High Voltage apparatus that has just been filled with oil or compound. Some larger apparatus may require 24 hours for the oil to settle. - - - - BANG!
Do NOT work on switchgear that has its spring charged. - - - - WHACK!
Do NOT touch any conductor that has just been taken out of service until it has been proven dead and EARTHED. - - - - ZAAAP!
Do NOT touch a conductor that has been meggerred or hi-pot tested unless it is discharged to earth IMMEDIATELY beforehand OOOOUCH!. Some apparatus require up to 30 minutes of earthing to be completely discharged, or they will recharge within minutes.
Do NOT operate a hand close circuit breaker SLOWLY. - - - - BANG!
Do NOT stop or return in mid stroke when closing a hand close circuit breaker. - - - - BANG!
Do NOT stop or return in mid stroke when opening or closing a fuse or link. - - - - WHOOSH!
Do NOT operate an off-load tap-changer under load. - - - FRIZZLE!
Do NOT open circuit CTs under load. - - - CRACKLE!
Do NOT leave CT connections LOOSE. - - - SIZZLE!
Do NOT close a ring-main without putting any On -Load-Tap-Changer into NON-AUTO. - - - - OOPS!
Do NOT remove the voltage input to an On-Load-Tap-Changer before putting it into NON-AUTO. - - - OOOOPS!
i) When the HV mains and apparatus is ready for testing, the work-group leader SHALL;
    • Instruct the work-group that testing is required, earths will be removed and dangerous voltages applied to the HV mains and apparatus. The work-group must leave the area and not return until notified it is safe to do so.
    • Ensure the HV mains and apparatus is ready for testing.
    • Ensure the work-group has removed all tools and materials from the work area.
    • Ensure the work-group has removed all personal locks.
    • Finally, the work-group leader SHALL notify the appropriate person that apparatus is now ready for testing.

ii) The Tester-in-charge is the person responsible for testing the HV mains and apparatus as well as the safety and welfare of the test group and general public who may access the mains and apparatus under test. The Tester-in-charge SHALL NOT commence testing until all of the following is completed:
    • Plastic warning barriers as per Clause 2.17.2, and “Danger - High Voltage Testing In Progress” warning signs are erected around the test area and all areas that may be hazardous to passers-by due to the test voltages applied - as required.
    • Inspect the work-site to ensure the equipment is ready to be tested and the work-group has removed their tools, materials, personal locks and vacated the area.
    • Notified an authorised switching officer that testing is ready to start. It is the Switching Officers responsibility that, if a Central Isolation Board is in use, ensure the board is de-commissioned and another Isolation Permit for High Voltage Testing is issued.

iii) If the Tester-in-charge and members of the Test Group are not authorised switching officers, Earths and Short Circuits may NOT be removed and replaced by the Tester-in-charge or a member of the Testing Group except if approval is obtained from the Electrical Services Manager.

iv) No earths or short circuits may be removed or attached except under the direct instructions of the Tester-in-charge.

v) The Tester-in-charge SHALL ensure all HV mains and apparatus are completely discharged to earth after each application of test voltage.

vi) The Tester-in-charge SHALL ensure that all bare, HV conductors within the safe working distance of the Test Group are isolated and earthed for the duration of the testing.

vii) The Tester-in-charge SHALL NOT leave the test area unattended unless the test area is appropriately bunted and sign-posted to warn of the hazards and the possible presence of dangerous voltages.

viii) No person is allowed in the Test area unless they have the permission of the Tester-in-charge and attach their personal locks.
ix) When testing is complete the Tester-in-charge SHALL:

- Ensure all HV mains and apparatus have been completely discharged to earth.
- Inform the responsible switching officer that testing is complete.
- Remove all plastic barriers, signs and tags erected for testing purposes.
- Ensure the Test Group have removed their personal locks.
- Communicate to the Switching Officer of the completion of the testing.

x) If the HV mains and apparatus are to be handed back to the work-group, then a switching team will decommission the HV Testing Isolation Permit and re-apply and lock the earths under a new Isolation Permit. The responsible Switching Officer SHALL re-instates the central isolation board (if required), then re-instructs the work-group leader in the job, isolations, earthing and hazards as per Clause 2.8.2(d).

xi) Before starting work again, the work-group leader SHALL:

- Familiarise themselves with the job, isolations, earthing and hazards as detailed on the Isolation Permit provided for the high voltage access.
- Attach personal locks to lock-out points.
- Reinstruct the work-group in the above.
- Ensure the work-group attach their personal locks.
<table>
<thead>
<tr>
<th>Written By:</th>
<th>Signature:</th>
<th>Date:</th>
</tr>
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<tbody>
<tr>
<td>Checked By:</td>
<td>Signature:</td>
<td>Date:</td>
</tr>
<tr>
<td>Authorised By:</td>
<td>Signature:</td>
<td>Date:</td>
</tr>
<tr>
<td>Permit No.:</td>
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</table>

### Distribute Copies to

<table>
<thead>
<tr>
<th>Energy Controller</th>
<th>Energy Controllers</th>
<th>Method</th>
<th>Email</th>
<th>Date:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Area Electrical Leader</th>
<th>Method</th>
<th>Email</th>
<th>Date:</th>
</tr>
</thead>
</table>

| Electronic Copy | G:\Engineering\EngElect\High Voltage\Documents and Standards\Switching Programs\Signed Switching Programs | Date:       |

<table>
<thead>
<tr>
<th>Potential to affect operational Security</th>
<th>☐ Upstream/downstream services</th>
<th>☐ 33kv supply</th>
<th>☐ Increased loads</th>
<th>☐ Supplies more vulnerable</th>
<th>☐ Other</th>
</tr>
</thead>
</table>

**If yes, a High Voltage PPA or risk assessment is to be attached to the switching program and both the Area Maintenance Manager and Electrical Services Manager (or shift manager on backshifts) are to be notified.**

### SYSTEM DIAGRAM REFERENCE:

---

**Details of any power loss:** (to any equipment, including during switching)

---

**Work to be carried out:**

---

**Limits of Isolation:**

---

- **Correct High Voltage Personal Protective Equipment (PPE) to be Worn At All Times when High Voltage Switching**
- **If the task changes during switching ** Stop, Reassess the hazards and document on the switching program before proceeding**
- **Whenever possible, HV Switching should be done remotely**
## ISOLATE TO CARRY OUT WORK

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Time of Operation</th>
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</table>

**INFORM ENERGY CONTROLLER (PH. 4040) that isolation switching will commence as per PERMIT NUMBER** *(See bottom of page)*

**INFORM AREA ELECTRICAL LEADER (PA or PH.____) that isolation switching will commence as per PERMIT NUMBER** *(See bottom of page)*

**SET UP LOCKOUT BOARD and ISSUE ISOLATION PERMIT.**

**INFORM AREA ELECTRICAL LEADER (PA or PH.____) that isolation switching is complete as per PERMIT NUMBER** *(See bottom of page)*

**INFORM ENERGY CONTROLLER (PH. 4040) that isolation switching is complete as per PERMIT NUMBER** *(See bottom of page)*

---

Written by: 
Checked By: 
Authorised By:

Initial: 
Initial: 
Initial: 

Permit No.
<table>
<thead>
<tr>
<th><strong>RESTORE TO NORMAL / ORIGINAL CONDITION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day &amp; date &amp; time</strong>&lt;br&gt;(estimate if unsure)</td>
</tr>
<tr>
<td><strong>Switching Operator</strong></td>
</tr>
<tr>
<td><strong>Switching Checker</strong></td>
</tr>
<tr>
<td>CHECK personnel are clear, tasks have been finished and power can be restored</td>
</tr>
<tr>
<td>INFORM ENERGY CONTROLLER (PH. 4040) that restoration switching will commence as per PERMIT NUMBER (See bottom of page)</td>
</tr>
<tr>
<td>INFORM AREA ELECTRICAL LEADER (PA or PH.____) that restoration switching will commence as per PERMIT NUMBER (See bottom of page)</td>
</tr>
<tr>
<td>CANCEL ISOLATION PERMIT and DECOMMISSION LOCKOUT BOARD</td>
</tr>
<tr>
<td>INFORM AREA ELECTRICAL LEADER (PA or PH.____) that restoration switching is complete as per PERMIT NUMBER (See bottom of page)</td>
</tr>
<tr>
<td>INFORM ENERGY CONTROLLER (PH. 4040) that restoration switching is complete as per PERMIT NUMBER (See bottom of page)</td>
</tr>
</tbody>
</table>

Written by:  
Checked By:  
Authorised By:

Initial:  
Initial:  
Initial:  

Permit No.  
Page 3 of 82
For WORKING on HIGH VOLTAGE MAINS and APPARATUS when an ISOLATION PERMIT is NOT USED

In accordance with the Liberty Primary Steel Whyalla Operations High Voltage Safety Rules and the REGULATIONS UNDER THE ELECTRICITY ACT 1996 No. 161 of 1997

1. WORK AND CIRCUIT DETAILS

PERMIT NO.: 

PROPOSED DATE: 

FOR WORK ON CIRCUIT / PLANT: 

LOCATED AT: 

PURPOSE OF PERMIT:
This permit allows the following work to be carried out:

2

Description of Isolation Points

<table>
<thead>
<tr>
<th>Description of Earthing Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
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</tbody>
</table>

OTHER SAFETY REQUIREMENTS

<table>
<thead>
<tr>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

I have instructed the work-group leader on:
• the hazards of working on or near high voltage mains and equipment;
• the isolations and earthing carried out; and
• all other safety requirements of the job.

I hereby certify that the above precautions have been taken and the work described above is now safe to carry out.

Print:-----------------------------  Sign:-----------------------------  Date:-------------
Switching Officer 1

3. COMPLETION OF WORK

I have instructed the work-group personnel that:
• they SHALL remove their tools, equipment and personal locks and SHALL now consider the mains and apparatus as alive;
• the mains and apparatus may be re-energised at any time.

I hereby certify that the work described above is now complete and the above instructions have been given and carried out. The mains and apparatus described above is ready to be given back to the responsible switching officer.

Print:-----------------------------  Sign:-----------------------------  Date:-------------
Work-group Leader
Note: The Company’s High Voltage Rules, QM37.03, state that only qualified electricians or graduates of an electro-technical tertiary course SHALL be trained and used in high voltage switching on the Company’s high voltage distribution network. However, FINAL year electrical apprentices and engineering cadets can be accepted into high voltage switching courses at the Company’s discretion of Company management, also other exceptions to these rules may be allowed in special circumstances.

High Voltage Switching Applicant Details:

Name: ………………………………………………………………………
Position Description: ……………………………………………………………..
Department: ………………………………………………………………

I, (print) …………………………………………………, as the Electrical Supervisor for the Department named above, request the above-named person be enrolled in the next available high voltage switching course. Successful completion of the course will allow the nominated applicant to perform high voltage switching on the Company’s High voltage distribution network in accordance with the Company’s High Voltage Rules, QM37.03.

Electrical Supervisor (Sign): ……………………… (Print) ………………… Date: ………

Authorised by:

Plant Manager (Sign): ……………………… (Print) ………………………….. Date: ………

Electrical Services Manager (Sign): ……………………… (Print) ………………………… Date: ………

Applicant’s Declaration

I, the undersigned, do hereby agree to be trained in high voltage switching. I understand that high voltage switching will be a normal part of my work.

Applicant (Sign) ………………………………………. (Print) ………………………… Date: ……………
Basic Principle

All high voltage conductors SHALL be treated as live until after they are isolated, proven isolated and earthed.

- No employee SHALL bring any part of their body, including any conductive material they are handling, within the minimum approach distance of a live, bare, HV conductor.

Common Hazards

- Capacitive charge and re-charging of un-earthed conductors - always discharge un-earthed conductors immediately before approach.
- Feedback through local or remote voltage transformers.
- Near approach – high voltage jumps across air-gaps.

If In Doubt

Employees SHALL request assistance from an appropriately experienced switching officer if there is any doubt about the operation or safety of any task assigned to them.

HV PPE, HV Test Equipment, HV Tools

Switching activities (including proving de-energised, earthing and discharge) requires HV PPE and equipment that is in good condition, is appropriately rated and is approved by the Company’s HV Group.

- Before use, inspect your HV PPE, insulated operating tools and live-line testers for damage and a 12 monthly acceptance test date.

Earthing

A HV conductor is to be treated as live and dangerous until after it has been earthed. It SHALL be proven de-energised, (if possible), before it is earthed.

- Only equipment that is supplied by the manufacturer for the purpose, or has been authorised in writing by the Electrical Services Manager, SHALL be used to earth a HV conductor
- The manual application of portable earths is forbidden except for:
  - Aerial switching officers applying portable aerial-type earth jumper leads to any conductor;
  - Switching officers provided with a safe work procedure for the task that is authorised and approved in writing by the Electrical Services Manager.

Authority to Work

All work on or near bare, HV conductors must be carried out under the authority of a permit authorised by a switching officer (except as allowed under section 2.8).

Training

Only personnel who are trained to perform a switching task SHALL perform that task.

Consequences

Failure to comply can result in your injury or death and may result in disciplinary action.

Liberty Primary Steel Whyalla High Voltage Committee
**SYSTEM DIAGRAM REFERENCE: S16666**

---

**Date & time (estimate if unsure)**

**Powerhouse Controller Notified**

**Switching Operator**

**Switching Checker**

**Work to be carried out:**

---

**Limits of Isolation:**

---

**EMERGENCY SWITCHING PROCEDURE**

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Time of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brief the working party</td>
</tr>
<tr>
<td>2</td>
<td>Notify Powerhouse Controller of intent of Emergency Switching - 4040</td>
</tr>
</tbody>
</table>

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Copy of the Emergency Procedure must be forwarded to the HV Group