



AUSTRALIAN RAIL TRACK CORPORATION LTD

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Discipline

Engineering Standard - NSW

Category

Electrical

Title

Electrical Network Management Plan

Reference Number

POP 04 - (RIC Standard: EP 95 00 30 06 SP)

Document Control

Status	Date	Prepared	Reviewed	Endorsed	Approved
Issue 1 Revision 2	Mar 05	Standards and Systems	Signalling Standards Engineer	GM Infrastructure Strategy & Performance	Safety Committee
		Refer to Reference Number	T Moore	M Owens	Refer to minutes of meeting 24/01/05

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Document Approval

The technical content of this document has been approved by the relevant ARTC engineering authority and has also been endorsed by the ARTC Safety Committee.

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About This Standard

This publication has been prepared in accordance with the Electricity Supply (Safety and Network Management) Regulation 2002.

This Electrical Network Management Plan is applicable to the Australian Rail Track Corporation (ARTC) to ensure the safe management and operation of the ARTC electricity distribution network.

Document History

Primary Source – RIC Standard EP 95 00 30 06 SP Version 1.0

List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	05/01/2005		Reformatted to ARTC Standard
1.2	11/03/2005	Disclaimer	Minor editorial change

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1 Introduction

1.1 Background

The Australian Rail Track Corporation (ARTC) owns and maintains the infrastructure comprising the NSW rail network. The network includes track, bridges, signalling systems, communications systems, an electricity distribution system, and other infrastructure.

This publication sets out ARTC's approach to the management and operation of its electricity network in order to achieve the required levels of safety and reliability. It is the primary instrument by which the requirements of the Electricity Supply (Safety and Network Management) Regulation 2002 (the Regulation) are implemented.

This introductory section contains explanatory material necessary to clarify the unique nature of ARTC and the ARTC distribution system in the context of the licensed electricity distributors around which the legislation has been based.

The Australian Rail Track Corporation was formed in January 2001 when the previous Rail Access Corporation (RAC) and the Rail Services Australia Corporation (RSA) were merged. RAC previously was the owner of the rail infrastructure, and RSA was the prime provider of infrastructure services (the maintainer).

Under previous Government policy, the rail system was geographically divided into 13 areas, and the provision of infrastructure services was to be made contestable. Four areas were tendered, and contracts awarded. A 14th area was also created in May 2000 with the opening of the New Southern Railway (the Airport Rail Line) which is based upon a BOOT contract.

The Government has now suspended indefinitely contestability within the rail maintenance industry and external contracts that have expired have not been renewed. This has resulted in ARTC being the prime provider of infrastructure services in 12 of the areas, with Fluor Global Services and Transfield Maintenance in 1 area each.

1.2 Responsibility within ARTC

ARTC's principal objective as stated in the Transport Administration Act 2000 (NSW) is to ensure that the New South Wales rail network enables safe and reliable passenger and freight services to be provided in an efficient, effective and financially responsible manner.

To achieve this objective ARTC has produced a Safety Management System which is summarised in Publication A00-00-G001 "Introduction to the Safety Management System". Management of the ARTC Electrical Distribution Network falls under this Safety Management System.

The following is a summary of the responsibilities within ARTC as applicable to the Electrical Distribution Network.

Prime responsibility for legislative compliance associated with the Electrical Network is with the General Manager, Safety. This involves the production of the Electrical Network Management Plan as required by the Regulation.

Safety Division is responsible for providing the safety systems for work (both OH&S and electrical), for ensuring compliance throughout the Corporation with the systems and standards via an audit process, and for investigation of incidents and accidents.

The General Manager Metropolitan is responsible for the production and implementation of plans compliant with the relevant safety plans and standards. Within the Metropolitan Division a Regional structure has been created with field offices providing the inspection, routine maintenance, certification and emergency response functions. The existing contracts with Fluor and Transfield come under this regional structure. Due to the nature of these contracts, the personnel working on these contracts are classed as employees for the purpose of the Electrical Network Management Plan.

State-wide operation of the rail system, including operation of the electricity distribution system, is contracted to SRA Network Control. Within Network Control is the Electrical System Control area, which controls the day to day operation of the electrical network, as well as providing Protection and SCADA functions.

Electrical Design, Engineering Division via internal contract provides centralised engineering expertise and support. This includes production of the relevant engineering standards and electrical design schemes.

Electrical Engineering Assurance, Engineering Division reports primarily to the Chief Executive and the ARTC Board on the integrity of the electrical network and on the adequacy of systems implemented to manage and operate the electrical network. Engineering Assurance is responsible for the delegation of Engineering Authority throughout the organisation.

Projects and Support Division provide project management and construction services.

1.3 ARTC as an Electricity Distributor and a Rail Operator

The prime purpose of the ARTC electricity distribution network is to supply electricity to the NSW rail network. In this context ARTC operates as an exempt Network Operator and an exempt Network Retailer.

For the purpose of ARTC's Electrical Network Management Plan the 1500V Overhead Wiring is in effect excluded.

The management of safety associated with the 1500V Overhead Wiring system is captured by the Rail Safety Act 2002, and is included in publication A00-00-G001 "Introduction to the Safety Management System", which is submitted to the Department of Transport as part of ARTC's rail safety accreditation. The format of that publication is similar to that required for the Electrical Network Management Plan. It should be noted that the Department of Transport also regulates some aspects of the safety and operation of the ARTC electricity distribution system.

1.4 Relationship of 1500V OHW to the Electrical Network Management Plan

ARTC's 1500V OHW is a unique type of distribution system.

The key issue of its uniqueness is its intimate and exclusive association with a railway which is regulated by the Rail Safety Act 2002.

The Code of Practice for Electricity Transmission and Distribution Asset Management specifically excludes 1500V OHW.

The Code of Practice for Contestable Works is not applicable because 1500V OHW does not fall within the definition of contestable works as defined in the Electricity Supply (General) Regulation 1996.

The Code of Practice for Service and Installation Rules does not apply because neither 1500V OHW nor electric rolling stock falls within the definition of an installation.

With regard to clause 5(1) of Schedule 1 of the Regulation, ARTC will report, to the Ministry of Energy and Utilities, any safety incidents associated with the 1500V OHW which are considered to be appropriate and relevant to the electricity distribution industry.

It is also relevant to note that if a person is to be at risk from the 1500V OHW system, the person will also be at risk from train operations, which then becomes a Rail Safety management issue.

1.5 Audit of Electrical Network Management Plan

1.5.1 Nomination of Auditor

ARTC nominates SAI Global Assurance Services to audit its Electrical Network Management Plan.

1.5.2 Periodical Audits

The nominated auditor will be engaged to carry out periodical audits in accordance with Clause 12 of the Regulation. The results of the audits and a copy of the Electrical Network Management Plan, if it has been updated since the last audit, will be submitted to the Ministry of Energy and Utilities.

1.6 Measurement of Safety Performance

Safety performance is measured and reported in accordance with the guidelines provided by the Ministry of Energy and Utilities. This comprises the Serious Electrical Network Incident (SENI) guidelines and the Ministry of Energy and Utilities 2002/2003 New South Wales Electricity Network Performance Report Outline.

1.7 Compliance with the Electrical Network Management Plan

1.7.1 Work On or Near the ARTC Distribution System

All work on or near the ARTC distribution system is carried out in accordance with the Safety Management System and in particular the System Safe Operation suite of Electrical Standards.

1.7.2 Compliance Audits

ARTC audits each Region for compliance with the Electrical Network Management Plan in accordance with publication A12-00-Y012 - "Safety Audit".

2 Description of ARTC Distribution System

2.1 Maps of the Distribution System

Maps showing the location of the ARTC distribution system electricity works are held on Level 2, 477 Pitt St, Sydney. Maps are also held locally at each Regional office.

Access to those maps may be gained on application to the Configuration Manager at that location, or can be arranged through the respective Regional office.

Cable search information for high voltage underground cables is generally obtained, on a fee for service basis, from the relevant Regional office for the area concerned. ARTC is also registered with the "Dial Before You Dig" service.

A description of the ARTC distribution system is contained in publication PGS 01 – "ARTC Electrical System General Description".

2.2 Design and Construction Standards

Design and construction standards are developed and implemented in accordance with publication A15-00-Y015 "Infrastructure Standards". Standards covering ARTC's Distribution Network are covered under the subsection Electrical Engineering Standards.

The relevant Standards are contained within the following categories published on the ARTC website.

2.2.1 Transmission Lines and Cables

Transmission Lines

HV Cables

2.2.2 Substations

Earthing, Bonding and Electrolysis Protection

System Substations

2.2.3 Low Voltage Distribution Assets

Earthing, Bonding and Electrolysis Low Voltage

2.3 Maintenance Standards

Maintenance standards are developed and implemented in accordance with publication A15-00-Y015 "Infrastructure Standards". Standards covering ARTC's Distribution Network are covered under the subsection Electrical Engineering Standards.

The relevant Standards are contained within the following categories published on the ARTC website.

2.3.1 Standards

Transmission Lines Substations

Technical Maintenance Plans

2.3.2 Exceptions

Standards for maintenance of the following assets are presently being developed.
Low Voltage Distribution Assets.

Because of the low quantity, low voltage distribution assets are generally inspected in conjunction with maintenance on the associated high voltage substation equipment. Maintenance of low voltage assets is typically limited to corrective maintenance.

2.4 Operation and Work Procedures

Operation standards and work procedures are developed and implemented in accordance with publication A16-00-Y016 "Operational Standards". Standards covering ARTC's Distribution Network are covered under the subsection EP 95 – Electrical System Safe Operation Standards.

2.4.1 Procedures

The relevant Standards are contained within the following category published on the ARTC website.

System Safe Operation.

Additional information is contained in the following hard copy document held at the Electrical Operating Centre and ARTC Electrical Standards

SRA, Network Control Division, Electrical Operating Centre - Trouble Instructions.

"Work Procedures" in this context means those mandatory procedures that are necessary for establishing an electrical safety system, including procedures for work on or near both deenergised and live electricity works.

2.4.2 Reporting Incidents and Unsafe Conditions

Incidents and unsafe condition reporting is implemented in accordance with publication A19-00-Y019 "Reporting and Notification". The particular publications are the "Network Rules" under the section "Work on Track" to capture non-electrical personnel and the "System Safe Operation" suit of standards to capture the electrical staff.

Incident reports to the Ministry of Energy and Utility is in accordance with the SENI system.

2.5 Safety, Test & Measuring Equipment

Design, use and maintenance standards and procedures for safety, test and measuring equipment for the ARTC distribution system are contained in publication A16-00-Y016 "Operational Standards" under the subsection EP 95 – Electrical System Safe Operation Standards.

The relevant Standards are contained within the following category published on the ARTC website.

System Safe Operation

ARTC carries out audits in accordance with publication A12-00-Y012 – "Safety Audit" to ensure that the Region's verification mechanisms, as required by the "General Requirements" publication, are in place.

2.6 Engineering Records, Drawings and Maps

2.6.1 Electricity Works

Drawings and maps associated with the ARTC distribution system electricity works are managed by the Configuration Manager, Engineering Services Division and include:

- Layouts,
- Cross sections,
- Design arrangements, and
- Cable Routes.

ARTC's Regional Offices maintain records relating to asset condition and reliability.

ARTC audits those records in accordance with the publication A12-00-Y012 – "Safety Audit".

The Safety Audit Division of ARTC maintains records on registered files associated with audits carried out by ARTC.

Records are maintained on registered files associated with external audits of ARTC in the Engineering and Safety Divisions.

2.6.2 Operating Diagrams

Diagrams associated with the operation of the ARTC distribution system are maintained by Electrical Engineering Services, Engineering Design and include:

- High Voltage operating diagrams,
- High Voltage system diagrams, and
- Substation operating diagrams.

3 Analysis Of Hazardous Events

3.1 Background

Australian Rail Track Corporation has a very detailed system for managing hazardous events. ARTC publications for this are:

A00-00-Y001 - "Introduction to the Safety Management System"

A08-00-Y008 – "Incident Management"

A12-00-Y012 – "Safety Audit"

A19-00-S009 - "Safety Incident Database Coding Manual"

Publication A00-00-Y001 - "Introduction to the Safety Management System" details the safety policies, procedures and instructions to be incorporated into management systems and operating and service agreements with the aim of controlling risk across the ARTC Network.

Hazardous events that might be expected to occur on the ARTC rail network, including electrical hazards, are identified in the publication A19-00-S009 - "Safety Incident Database Coding Manual". Hazardous events or incidents have been classified and coded according to the modes, causes and reasons for the incident. Each incident is ranked and assigned a Hazard Rating Factor using an algorithm which considers the Consequence, Exposure, Likelihood, Potential, Opportunity and Trend.

The Hazard Rating Factors (HRF's) are periodically reviewed and revised as necessary. Those incidents whose HRF's are higher than a predetermined threshold become those targeted in the current Rail Safety Plan.

Publication A12-00-Y012 – "Safety Audit" describes the audit role and protocols adopted by ARTC and is used to verify the effectiveness of the safety systems.

Publication A08-00-Y008 – "Incident Management" details the policy and responsibilities for the management of all incidents (including electrical incidents).

A mapping of the hazards and their corresponding controls is to be provided in Annex A of ARTC publication A11-00-M014 – "Safety Risk Management Manual". Until Annex A is published the events and controls listed in sections 2.2 to 2.4 of this Electrical Network Management Plan may be used.

3.2 Events

The events or incidents pertaining to the ARTC electricity distribution system, which are targeted in the current Rail Safety Plan, are listed in Table 1.

The methodology used to identify hazards is contained in manual A19-00-S009 - "Safety Incident Database Coding Manual".

Code	Incident	Cause	Consequence	Examples
D-38-121	Strike: By Electricity	Vandalism	Fatality Electric Shock Damage to Equipment	Contact with live electrical conductors due to vandalism of protective barriers. Unauthorised entry to a substation.
D-38-220	Strike: By Electricity	Equipment Fault	Fatality Electric Shock Damage to Equipment	Fallen overhead conductors resulting from incorrect operation of substation protective equipment.
D-38-248	Strike: By Electricity	Overhead line equipment failure	Fatality Electric Shock Damage to Equipment	Broken or fallen overhead conductors due to failure of components, including conductors, crossarms and poles. Equipment failure due to storm damage or other natural causes.
D-38-262	Strike: By Electricity	Strike wire or cable	Fatality Electric Shock Damage to Equipment	Contact with live cables or overhead lines. Working within prescribed safe working distances. Unauthorised excavation work in the vicinity of a buried cable.
D-38-422	Strike: By Electricity	Violation of procedure	Fatality Electric Shock Damage to Equipment	Liven an isolated line due to incorrect switch operation.
E-39-121	Fire or Explosion: Electrical	Vandalism	Fatality Electric Shock Damage to Equipment	Fire caused by the vandalism of electrical equipment.
E-39-219	Fire or Explosion: Electrical	Overload	Fatality Electric Shock Damage to Equipment	Fire caused by overheating of overloaded electrical equipment.

Table 1 - Hazardous Events or Incidents

3.3 Safeguards

The safeguards or control specifications, which have been developed to prevent the hazardous events listed in Table 1 from occurring, are listed in Table 2. Table 3 shows the Hazard Control Matrix, which details the control codes applicable to each hazardous event.

ARTC supplies to each Region a list of hazard control specifications, which was developed by the former SRA Rail Safety Audit Group. The Region is not obliged to follow those hazard controls, however each Region produces a safety management system which demonstrates how they propose to manage the identified hazards. This includes the development of hazard control outlines, control specifications and audit programs.

In addition, ARTC will carry out audits of each Region's safety management system in accordance with publication A12-00-Y012 – "Safety Audit".

Control Code	Control	Control Measures
C502	Electrical Infrastructure Design	Refer Section 2.2.
C503	Electrical Equipment Maintenance	Refer Section 2.3.
C504	AC Circuit Breaker Testing	Refer Sections 2.3 and 2.4.
C505	Electrical Equipment Defect Monitoring	Refer Section 2.6.
C506	Overhead Line Patrols	Refer Section 2.3.
C508	Pole Top Overhaul	Refer Section 2.3.
C510	Protective Relay Testing	Refer Section 2.3.
C511	Electrical Practices & Procedures	Refer Sections 2.2, 2.3, 2.4, 2.5, 2.6 and 4.
C513	Wooden Pole Inspection & Testing	Refer Section 2.3.
C515	Procedures For Working Near Underground Cables	Refer Section 2.4.
C520	Inspection of High Voltage Installations Security Fencing	Refer Section 2.3.
C001	Training and Authorisation	Refer Section 8.1 and 8.2.

Table 2 - Hazard Controls

3.4 Hazard Control Matrix

Control Code	Hazard Code						
	D-38-121	D-38-220	D-38-248	D-38-262	D-38-422	E-39-121	E-39-219
C502	X	X	X	X		X	X
C503	X	X	X	X		X	X
C504		X				X	X
C505	X	X	X	X		X	X
C506	X		X			X	
C508			X				
C510		X				X	X
C511	X	X	X	X	X	X	X
C513			X				
C515				X			
C520	X					X	
C001	X	X	X	X	X	X	X

Table 3 - Hazard Control Matrix

4 Emergency Procedures

The procedures for the management of emergencies, including verification of effectiveness, are outlined in the publication A08-00-Y006 - "Incident Management" and in particular publication A08-00-M006 "Incident Management Manual". This publication standardises the approach adopted by ARTC for all types of emergencies, including those associated with the electrical network.

The manual requires each Region to have detailed procedures for electrical incidents tailored for their area.

5 Asset Management Strategies

All ARTC assets, including those associated with the Electrical Distribution Network, are managed in accordance with publication A03-00-Y003 "Asset Management".

This publication sets out the requirements for the specification and management of Australian Rail Track Corporation assets that could impact safety of, or safety upon, the ARTC Network. The Corporation complies with the Government's Total Asset Management requirements and applies systems engineering and life cycle science to decisions relating to ARTC assets.

6 Reports to the Director General

ARTC reports to the Director General of the Ministry of Energy and Utilities in relation to maintenance, reliability and safety aspects of the ARTC distribution system in accordance with the accepted protocols and formats as produced by the Ministry. These reports currently comprise:

- SENI
- Ministry of Energy and Utilities 2002/2003 New South Wales Electricity Network Performance Report Outline.

7 Standards and Codes

7.1 ARTC Electrical Publications

The standards which ARTC conforms to for the design, installation, operation and maintenance of its distribution system, are listed in Appendix A.

7.2 Other ARTC Publications

The publications, which ARTC uses for the review, auditing and management of the Regions, are as detailed in publication A00-00-G001 "Introduction to the Safety Management System".

7.3 Codes of Practice

ARTC has incorporated the following Codes of Practice in the design, installation, operation and maintenance of its distribution system, except as indicated in section [7.4](#).

- NENS 01 – 2001 National Electricity Network Safety Code
- NENS 04 – National Guidelines for Safe Approach Distances to Electrical Apparatus
- EA of NSW publication Electricity Transmission and Distribution Asset Management.
- EA of NSW publication Service and Installation Rules.
- EA of NSW publication Contestable Works.
- EA of NSW publication Service Standards

7.4 Departures from Codes of Practice

7.4.1 National Guidelines for Safe Approach Distances to Electrical Apparatus

Current ARTC standards continue to utilise the safe approach distances that have been used within ARTC for many years. The adoption of the distances as specified in the National Guidelines is currently under technical review within ARTC and is expected to be finalised by the end of 2003.

Until this has been finalised ARTC will continue to use the safe approach distances as currently specified within its standards.

7.4.2 Service and Installation Rules

ARTC departs from this code in the manner specified in Section 7 of PYP 02 – "Customer Installation Safety Plan".

7.4.3 Contestable Works

The primary function of the ARTC distribution system is the supply of electricity for electric traction and for signalling. For this reason, the following provisions of the Regulation are not considered relevant to the ARTC distribution system.

With regard to clause 6(4) of the Regulation, the Electrical Network Management Plan does not comply with the Code of Practice for Contestable Works in that ARTC does not have an accreditation system for providers of contestable works on its distribution system.

The risks associated with the connection of installation work in ARTC's dc traction area are considered to be best managed at this time by limiting the works to the Regions. This is primarily due to installations supplied from the ARTC distribution system using an MEN System with the MEN link remote from the Installation Main Switchboard (See AS3000:2000 Fig 5.1). To mitigate the risk from dc leakage current and dc fault current there is a single MEN link within each segment of ARTCs distribution system. It also assists management of the physical isolation requirements for supplies and of personnel entering the rail corridor.

Accreditation may be considered in individual cases, for instance a large project, for which accreditation requirements will be covered by a contract specification.

The small volume of connection work, and the aforementioned risks, renders the development of an accreditation system that encourages numerous service providers technically and commercially inappropriate at this time.

7.4.4 Service Standards

ARTC is supplied as a high voltage customer from the networks of Energy Australia and Integral Energy, both of whom are licensed network service providers. In addition, ARTC currently has a retail contract in place for the purchase of energy and will continue to purchase its bulk energy from a licensed retailer.

Proportion of electricity end usage for the ARTC network is generally as follows:

- 1500Vdc Traction Supply to Trains - 82% (State Rail Authority & Freight Corp)
- Signals & other rail critical Loads - 3% (RAC loads)
- Railway Stations - 10% (mainly SRA with some private tenant shops)
- Railway Workshops - 5% (mainly Rail Services Australia)
- Others - 1 %

The majority of the above supplies (traction, railway stations, signals, offices, and workshops) are not individually metered.

On some railway stations there are tenant customers (kiosks, small newsagencies etc) that derive their electricity from the railway station supply. ARTC separately meters and bills these customers. These customers are generally connected to the ARTC electricity network as a matter of historical convenience and ease of connection. All these customers are covered by a standard ARTC customer connection contract.

ARTC will not be implementing this code for these customers. The small number of customers (at present 319) and the unique nature of our network render implementing this code impracticable.

8 Other Provisions

8.1 Training

ARTC ensures that personnel carrying out work on the ARTC distribution system have been trained in accordance with the requirements of publication A18-00-Y018 "Human Resource Management". This includes work which requires specific authorisations as defined in publication PGP 01 – "Authorisation and Training of Personnel". ARTC conducts audits on the Regions training records in accordance publication A12-00-Y012 – "Safety Audit".

As a guide a training/competencies matrix has been developed to support the Electricity Association of NSW publication EA 18 – "Guide to the Training of Personnel Working on or near Electricity Works" and is attached as Appendix B.

8.2 Authorisation

The types of work on the ARTC distribution system for which authorisation is required are specified in PGP 01 – "Authorisation and Training of Personnel".

The responsibility for granting of authorisation, dependent on the nature of the authorisation, rests with the Regions and/or the System Control Engineer, SRA Network Control.

8.3 Performance Indicators

In line with ARTC's objectives of owning a safe and reliable electrical distribution system, ARTC reports on Key Performance Indicators. The performance indicators are reported in accordance with the formats as produced in the Ministry of Energy and Utilities annual report.

Appendix A - ARTC Electrical Publications

Publications marked (*) had not been published at the time of issue of this Safety and Operating Plan.

GENERAL

PGS 01	ARTC Electrical System General Description
PMP 01	Electrical Technical Maintenance Coding System
EP 00 00 00 04 SI*	Approvals Required to Change the Configuration of the RIC Electric Power System
PMP 02	Requirements for Handling & Disposal of Material Containing PCB

TRANSMISSION LINE

PDS 20	Transmission Line Standard for Design & Construction
PMP 17	Transmission Line Maintenance Standards
POS 01	Transmission Line Base Safety & Operating Standards
PYS 01	Transmission Line Easement Conditions
PDS 19	Transmission Line Current Ratings & Standard Conductors
PMP 16	Wood Pole Condemning Policy
PYS 02	Requirements for Electric Aerials Crossing ARTC Infrastructure

EARTHING, BONDING & ELECTROLYSIS

PDS 02	High Voltage & 1500 V System Earthing References & Definitions
PDS 04	System Substation Earthing
PDS 05	Distribution Substation Earthing
PDS 06	Transmission Line & Cable Earthing
EP 12 10 00 22 SP	Buildings and Structures Under Overhead Lines (RailCorp publication)
PDS 03	Low Voltage Distribution & Installations Earthing References & Definitions
PDS 07	Low Voltage Distribution Earthing
PDS 08	Low Voltage Installations Earthing

PROTECTION

PDS 09	Protection System Requirements for High Voltage Network
PCP 01	Commissioning of Translay Pilot Wire Protection Scheme

HIGH VOLTAGE CABLES

PDS 14	High Voltage Cable Selection Guide
PDS 13	Above Ground Cable Installation Systems – Selection Guide
PCS 01	Requirements for Cable Polymeric Terminations and Joints
PCP 03	Cable Route Selection Guide
PCS 02	Underground Installation Configurations for High Voltage and 1500 Vdc Cables
PCP 04	Ground Entry Arrangements
PCS 03	Cable Pits
PCP 05	Underground Cable – Location Recording
PCP 02	Testing of High Voltage Cables

ELECTRICAL SYSTEM REQUIREMENTS

PCS 04	Electrical Phase Relationships
PCS 05	Standard Voltage Tolerances

ELECTRIC POWER SYSTEM SAFE OPERATION

PSP 01	Electric Power System Safety Aspects
PMP 04	Requirements for Work Using Cranes and Plant
PGP 01	Authorisation and Training of Personnel
PGP 02	Hazard Assessment and Work Process Controls
PMP 05	Tools and Safety Equipment
POP 02	Suitable Operating Equipment
PMP 06	Permit System
PYP 01	Operating Agreement
PGS 02	Definitions

PMP 07	Requirements for Work Using Scaffolding and Metal Ladders
PCP 06	Advertising of New Work
PMP 09	Work Near High Voltage Equipment – Permit Requirements and Safe Working Distances
PMP 10	Work on Live High Voltage Equipment
PMP 11	Isolation of High Voltage Overhead Lines and Cables for Work Outside Substations
PMP 12	Isolation of High Voltage Equipment for Work Inside Substations
POP 05	Operating Work – High Voltage System
PMS 01	Requirements for Portable Earthing Equipment for the High Voltage System
PMP 14	Work on or Near Low Voltage Distribution Equipment – Permit Requirements and Safe Working Distances
PMP 15	Isolation of Low Voltage Distribution Equipment for Work
POP 06	Operating Work - Low Voltage Distribution System
PYP 02	Customer Installation Safety Plan
PSP 02	Public Electrical Safety Awareness Plan
PMP 08	Bushfire Risk Management Plan for the Electrical Distribution Network
POP 04	Electrical Network Management Plan

SUBSTATIONS

PDS 16	Transformer Loss Evaluation
PDS 17	Insulation Co ordination & Surge Arrester Selection
PCS 07	Substations Minimum Construction Standards
PCP 07	System Substation Commissioning Tests
POP 07	Substations - Base Safety & Operating Standards
PDS 18	System Substation Battery

TECHNICAL MAINTENANCE PLAN

Electrical Backbone Technical Maintenance Plan

EP 01 HV AC Switchgear

EP 02 Power Transformers and Regulators

EP 05 AC Auxilliary Power Supplies

EP 06 Auxilliary Services

EP 10 Aerial Transmission Lines

EP 12 Protective Earthing, Bonding and Electrolysis Mitigation

EP 16 Distribution Transformers

EP 19 Fault Protection

EP 97 Distribution Substation

EP 99 System Substation

Appendix B – Training Matrix

FUNCTIONS / ACTIVITIES	COMPETENCIES											
	Apply resuscitation techniques	Release a Person from Live Electrical Apparatus	Rescue a person from a pole, structure or EWP	Work aloft	Certified as having passed an approved training course for specified function/activity	Authorised by the System Control Engineer	Authorised by the Employer	Holds a trades certificate	Holds a linesmans certificate	Holds a qualified Supervisor Certificate (Electrician) or Contractor Licence (Electrical-Q)	Holds Pole Examiners Certificate	Accredited in appropriate knowledge of the contractor's Electrical Safety System
HIGH VOLTAGE OVERHEAD LINES												
Work under supervision on high voltage overhead lines	✓	✓	✓	✓								✓
Work without supervision on high voltage overhead lines	✓	✓	✓	✓	✓		✓		✓			✓
Operate high voltage field switches,	✓	✓	✓	✓	✓	✓						✓
Isolate, Test Dead and Earth Transmission Lines	✓	✓	✓	✓	✓	✓						✓
Issue and retrieve Permits and Operating Agreements for work on high voltage overhead lines and associated cable outside substations					✓		✓					✓
Work on live high voltage overhead lines	✓	✓	✓	✓	✓		✓		✓			✓
Manage WHVI					✓		✓					✓
Approve a "WHVI"					✓		✓					✓
Pole inspection					✓						✓	✓
1500 VOLT OVERHEAD WIRING												
Work under supervision on rail-connected 1500 volt overhead wiring	✓	✓	✓	✓								✓
Work without supervision on rail-connected 1500 volt overhead wiring	✓	✓	✓	✓	✓		✓		✓			✓
Operate 1500 volt switches					✓	✓						✓
Isolate, Test Dead and Rail Connect Overhead Wiring	✓	✓	✓	✓	✓		✓		✓			✓
Work on Live 1500V Overhead Wiring	✓	✓	✓	✓	✓		✓		✓			✓
Issue and retrieve Permits and Operating Agreements for work on 1500 volt overhead wiring and associated cables outside substations					✓		✓					✓
Issue a "Notification for the Removal of 1500 Volt Supply for Engineering Work in Electric Vehicle Maintenance Centres"					✓		✓					✓
Manage 1500V Overhead Wiring Authority					✓		✓					✓
Approve a 1500V "Authority"					✓		✓					✓
LOW VOLTAGE EQUIPMENT												
Work under supervision on low voltage overhead lines	✓	✓	✓	✓								✓
Work without supervision on low voltage overhead lines	✓	✓	✓	✓	✓		✓					✓
Work under supervision on low voltage equipment	✓	✓	✓	✓	✓		✓					✓
Work without supervision on low voltage equipment	✓	✓	✓	✓	✓		✓	✓	✓			✓
Issue and retrieve Permits for work on low voltage overhead lines and associated cables outside substations					✓		✓					✓
SUBSTATIONS												
Work under supervision on Substation equipment	✓	✓	✓	✓								✓
Work without supervision on Substation equipment	✓	✓	✓	✓	✓		✓		✓			✓
Operating work inside a substation	✓	✓	✓	✓	✓		✓	✓				✓
Issue and retrieve Permits for work on substation equipment					✓		✓					✓
CABLES												
Undertake specific cable joint work	✓	✓	✓	✓	✓		✓					✓
GENERAL												
Work aloft in the vicinity of electrical apparatus	✓	✓	✓	✓								✓
Receive a permit					✓		✓					✓
Receive Operating Agreement					✓		✓					✓