



Industry &
Investment

Special Projects Program
(High Risk Plant & Sector Issues)
For
Electrical Engineering Safety
2009 - 2014

A basis for regulatory management of high risk areas and identified industry wide issues

Program for establishing regulatory management arrangements for key electrical engineering safety high risk areas and identified industry issues.

TEST BEFORE YOU TOUCH

NO LIVE LINE WORK

PREPARED BY: THE ELECTRICAL TEAM

APPROVED BY: J F WAUDBY SENIOR INSPECTOR OF ELECTRICAL ENGINEERING

Ph: 02 4931 6641

Fax: 02 4931 6790

Email: john.waudby@dpi.nsw.gov.au

INDUSTRY SPECIAL PROJECTS (HIGH RISK PLANT) PROGRAM 2009-14 V4A.DOC

Foreword

This document should be read in conjunction with the Strategic Plan for Electrical Engineering Safety in NSW Mining Operations. It deals with a program of activities that deal with significant risk areas where electrical engineering provides key risk controls or in industry sectors with particular needs. These activities are an essential tool in achieving specific DPI Mine Safety targets for electrical engineering safety within the mining industry. The activities encompass:

- Life-cycle management of electrical equipment used in underground coal operation hazardous zones. Assessing the life-cycle management of hazardous area equipment at underground coal operations.
- Remote controlled mining machines. Remote controlled mining machines will be subject to focussed DPI scrutiny.
- Verification of the design of powered winding systems against set standards and registration of powered winding system designs.
- The use of functional safety for electrically powered and controlled machines and electrical safeguards for all types of hazards.
- Industry issues
- Underground coal mine earthing arrangements
- Underground coal mine communications and data acquisition
- Electrical installations at quarries
- Electrical installations at opal mines
- Electrical engineering safety arrangements at Broken Hill and Cobar mines

A structured Infrastructure program will:

- Facilitate the life-cycle management of electrical equipment in a hazardous zone.
- Provide industry with contemporary advice on the design and use of remote controlled mining equipment.
- Facilitate the life-cycle management of mine winders
- Provide industry with contemporary advice on the design of machine control systems so that the risk of unplanned movements is minimised.
- Provide industry with contemporary advice on the design of electrical safeguards for all types of hazards (interlocks, trip systems) that have a high reliability of working.
- Provide advice on basic requirements for electrical installations at quarries and opal mines
- Embody the minimum expectations of the community.
- Embody the minimum expectations of the regulator.

John Francis Waudby
Senior Inspector of Electrical Engineering



Contents

FOREWORD	2
CONTENTS	3
PURPOSE.....	4
LIFE-CYCLE MANAGEMENT OF HAZARDOUS AREA EQUIPMENT (UNDERGROUND COAL OPERATIONS).....	5
REMOTE CONTROL MINING EQUIPMENT (UNDERGROUND MINES – COAL & METALS)	7
POWERED WINDING SYSTEMS (UNDERGROUND MINES – COAL & METALS)	9
FUNCTIONAL SAFETY (ALL MINES & EXTRACTIVES OPERATIONS).....	11
ELECTRICAL INSTALLATIONS AT QUARRIES.....	ERROR! BOOKMARK NOT DEFINED.
USE OF ELECTRICITY AT OPAL MINES.....	ERROR! BOOKMARK NOT DEFINED.
ELECTRICAL INFRASTRUCTURE AT UNDERGROUND COAL MINES	15
ELECTRICAL INSTALLATIONS AT COBAR & BROKEN HILL LARGE METALLIFEROUS MINES	16



Purpose of this Document

Within the Strategic Plan for Electrical Engineering Safety in NSW Mines includes a strategy for Legislation and industry standards development and it states:

- Identify the highest risk areas and implement projects to evaluate industry management of these highest risk areas.
- Identify particular risk areas that need regulatory intervention and implement special programs to improve industry performance.

The Special Projects (High Risk Plant) Program will be integrated with the Industry Support Infrastructure Program and the Industry Standards Program and used by Inspectors of Electrical Engineering to:

- Implement an assessment program for the life-cycle management of hazardous zone equipment.
- Provide industry with contemporary advice on the design and life-cycle management of powered winders
- Register powered winding systems
- Provide industry with contemporary advice on the design and use of remote controlled mining equipment.
- Provide industry with contemporary advice on the design of machine control systems so that the risk of unplanned movements is minimised.
- Provide industry with contemporary advice on the design of electrical safeguards for all types of hazards (interlocks, trip systems) that have a high reliability of working.
- Provide advice to the quarrying sector on basic requirements for safe electrical installations
- Provide advice to the opal mining sector on basic requirements for safe electrical installations
- Analyse underground coal mine electrical infrastructure to provide strategic advice to the industry
- Analyse underground coal mine communication and data acquisition infrastructure to provide strategic advice to the industry
- Implement an assessment program of electrical engineering safety arrangements at Broken Hill and Cobar mines
- Prepare work plans for a 1 year and 3 year outlook.
- Solicit constructive comment on our transition from approvals to utilisation of national and international certification schemes.
- Show other officers in the DPI what we are trying to do and why we are trying to do it.

Other industry stakeholders will benefit from the document by being able to align their expectations with a documented plan, and participate in industry forums and advisory groups, knowing why all of this is required. In particular mines will be able to integrate the requirements of the special projects into the electrical engineering management plan for a coal operation.

Internal and external organisations will be able to adjust their own processes to integrate with the processes documented here for greater efficiency and effect.



Life-cycle Management of Hazardous Area Equipment (Underground Coal Operations) Overview

OBJECTIVES

Mines have comprehensive management systems to provide for explosion-protected electrical equipment throughout the life-cycle of the mine and equipment.

Equipment is explosion protected when purchased (appropriately certified).

Mines use only certified equipment by 2015.

Information is provided with equipment so that life-cycle activities maintain explosion protected properties.

Information is maintained by the mine so that life-cycle activities maintain explosion protected properties

People working on the equipment are competent to work on hazardous area equipment

The repair of electrical explosion-protected equipment is only done at nationally or internationally accredited workshops.

The repair of flexible cables is only done at licensed workshops.

OUTCOMES

Equipment is in an explosion protected condition whilst in use at the mine.

Equipment is returned to a certified condition and “as new” condition when it is repaired.

Well maintained and operated equipment is not a source of ignition of flammable gas.

Electrical equipment for use in coal mines is certified in accordance with community expectations.

The mining industry is aligned with general industry.

STRATEGIES

Technical reference for the life-cycle management of hazardous area equipment.

Assess all underground coal operations against the technical reference. Target 10 mines per year

Contribute to the development of life-cycle standards for hazardous area equipment Target refer Industry Standards program

Communicate with industry on how the program will be conducted and the results of the program.

Integrate with the Industry Support Infrastructure Program.

Integrate with the Standards and Guideline Program.

Consistency with and application of OH&S Regulation 2001, Chapter 5 – Plant safety

Review reportable incident data relating to failure of Ex equipment and utilise the information in appropriate forums. Target - Publish annual statistics once per year



Industry Special Projects (High Risk Plant) for Electrical Engineering Safety

Recognition of current Ex competent persons in accordance with prior learning principles, in the area of hazardous area electrical competencies.

Review reportable incident data relating to cable arcing in a hazardous zone and utilise the information in appropriate forums. Target - Publish annual statistics once per year

Collect cable damage data from licensed cable repair workshops and utilise the information in appropriate forums. Target - Publish annual statistics once per year

RESOURCES:

SIEE, Electrical Engineering staff of Mine Safety Operations,

MSO Electrical Engineering to assess how underground mines manage Ex equipment. All underground mines visited at least once per year. Note the use of IEC Ex certified equipment that has NOT been certified by an Australian Certification Body to be monitored.

Electrical Engineering staff of Mine Safety Operations assesses mine Ex management routinely

Electrical Engineering staff of Mine Safety Operations investigates incidents of Ex failures and cable arcing.



Remote Control Mining Equipment (Underground Mines – Coal & Metals) Overview

OBJECTIVES

Remote controlled machines are life-cycle managed using a functional safety approach
Remote Control Mining machines are designed to an appropriate standard.
Remote control equipment is used in accordance with appropriate standards
Provide industry with contemporary advice on the design and use of remote controlled mining equipment.
Remote controlled equipment fitted with people detection systems when they are available

OUTCOMES

Remote controlled machines are not the cause of injury or death
If a remote controlled machine moves unexpectedly, the movement is detected and the machine is brought to rest before injury to persons.
Remote control machines comply with AS/NZS4240, AS62061 and other appropriate standards.
If a remote controlled machine moves unexpectedly, there are no persons in the vicinity to be injured by the movement.
The use of remote control machines is in accordance with MDG5002 and AS/NZS4240

STRATEGIES

Develop Australian Standards for the design of Remote Controlled Plant and for the use and maintenance of Remote Controlled Plant. Refer Industry Standards program
Facilitate an industry advisory group RCEAG – Remote Control Equipment Advisory Group). 2 meeting/year
Consistency with and application of OH&S Regulation 2001, Chapter 5 – Plant safety
Investigate unplanned movements of remote controlled plant.
Review reportable incident data relating to unplanned movements of machinery and utilise the information in appropriate forums. Target - Publish annual statistics once per year
Monitor industry use of remote controlled plant.
Integrate with Functional Safety.
Liaise with interstate and overseas agencies.
Consistency with the Mining Industry Health and Safety Action Plan – Unplanned movement of plant
Implement an assessment program for underground coal mines (**RESOURCES:**
SIEE)

Gather information on remote control equipment used at each mine



Industry Special Projects (High Risk Plant) for Electrical Engineering Safety

Gather information on what mine's have done to implement safety alert recommendations

Improvement opportunities identified

Inform safety advisory committees

RESOURCES:

SIEE, Electrical Engineering staff of Mine Safety Operations



Powered Winding Systems (Underground Mines – Coal & Metals) Overview

OBJECTIVES

Provide industry with contemporary advice on the design and life-cycle management of powered winding systems.

Powered winding systems are designed to an appropriate standard.

Powered winding systems are managed over their life-cycle to ensure electrical safeguards are functional.

OUTCOMES

Powered winding systems are not the cause of injury or death.

Powered winding systems are verified as safe to operate by competent engineers.

If powered winding systems become “out of control”, the situation is detected and the winder is brought safely to rest.

Powered winding systems comply with EES008 (Parts 1,2,3 & 4 as appropriate) (equivalent to MDG2005)

Powered winding systems are life-cycle managed in accordance with EES008.5 (MDG2005 a key source)

STRATEGIES

Develop a Technical Reference on the design requirements for powered winding systems – using a prescriptive approach. Target July 2010

Develop a Technical Reference on the design requirements for powered winding systems – using a functional safety approach. Target July 2010

Develop a Technical Reference on the life-cycle management of powered winding systems Target May 2010

Develop criteria for design and item registration of powered winding systems.

Withdraw MDG2005 when the other technical references are developed and published. Target July 2010

Communicate with and seek input from mines and other key stakeholders how the mine winder program will be implemented. In particular hold industry mini-seminars.

Mines to employ competent persons to assess mine winders against the published design criteria.

MSO Electrical Engineering to assess registration applications against the specified design criteria – Target All mine winders registered by 30 June 2010

The electrical portion of registration to only consider the actual mine winder equipment design.

Assess all mine winders against the published design criteria. Target All winders assessed by June 30 2010

Consistency with and application of OH&S Regulation 2001, Chapter 5 – Plant safety

Investigate failures of safety related parts of powered winding systems

Investigate unplanned movements of powered winding systems.

Consistency with the Mining Industry Health and Safety Action Plan – Unplanned movement of plant



Industry Special Projects (High Risk Plant) for Electrical Engineering Safety

RESOURCES:

SIEE, Electrical Engineering staff of Mine Safety Operations

Support from Inspectors of Electrical Engineering as required. Inspectors of Electrical Engineering to assess the mine winder registration applications and make recommendations as to registration.

MSO Electrical Engineering to assess all mine winders against MDG2005



Functional Safety (All Mines & Extractives Operations) Overview

OBJECTIVES

Electrically controlled plant is designed in accordance with functional safety standards (or equivalent where the control circuits are simple, AS4024).

Electrical safeguards for electrical and non-electrical hazards are designed in accordance with functional safety standards.

Electrically controlled plant is life-cycle managed using a functional safety approach.

Electrical safeguards are life-cycle managed using a functional safety approach.

Provide industry with contemporary advice on functional safety.

OUTCOMES

Electrically controlled plant (in particular mobile mining machines) is not the cause of injury or death

If electrically controlled plant moves unexpectedly, or fails to stop, the movement is detected and the machine is brought to rest before injury to persons.

Electrically controlled plant conforms to AS62061 and other appropriate standards (AS4024 for simple circuits with clearly identified failure modes).

Electrical safeguards conform to AS61508, AS61511 or AS62061 (or equivalent where the control circuits are simple, AS4024).

STRATEGIES

Integrate functional safety into key equipment standards.

Communicate with and seek input from mines and other key stakeholders on the use of functional safety. In particular a topic of seminars and engineering forums.

Legislation to require a functional safety approach.

Consistency with and application of OH&S Regulation 2001, Chapter 5 – Plant safety

Develop expertise on functional safety within Mine Safety Operations. Target – all Electrical staff to attend a functional safety course by June 2010

Investigate unplanned movements of electrically controlled plant.

Consistency with the Mining Industry Health and Safety Action Plan – Unplanned movement of plant

Implement an assessment program for underground coal mines (**RESOURCES:**

SIEE)

Gather information on how functional safety is addressed at underground coal mines

Improvement opportunities identified

Inform safety advisory committees



Industry Special Projects (High Risk Plant) for Electrical Engineering Safety

RESOURCES:

SIEE, Electrical Engineering staff of Mine Safety Operations



Electrical Installations at Quarries (Quarries with an established electrical infrastructure)

OBJECTIVES

All quarries with an established electrical infrastructure are audited and given advice on improvements required.
Develop basic information for quarries to manage electrical installations
Develop a training module for quarry supervisors on basic electrical requirements.

OUTCOMES

Electrically installations are brought into compliance with AS/NZS3000
Quarry electrical installations are not a source of death or injury from electric shock and fire.
Quarries have basic information for the ongoing management of electrical installations
Quarry supervisors have a basic knowledge of how to manage the ongoing safety of electrical installations through the use of qualified engineers and tradespersons

STRATEGIES

Assess all quarries with electrical infrastructure in the North of NSW – Target June 2009
Assess all quarries in the Hunter/ Central Coast region of NSW- Target May 2010
Develop a training module on electrical safety awareness for quarry supervisors
Develop a network of electrical people dealing with quarries
Establish a partnership with the Institute of Quarries.
Report to industry on the outcomes of the assessments – Target Report published 30 June 2010

RESOURCES:

SIEE, IEE employed for the project



Use of electricity at Opal Mines

OBJECTIVES

Develop basic information for opal mines to manage 240 V electrical “plug and play” equipment

Opal mines implement a regular test and tag regime for 240 V plug and play equipment and associated generators

Develop basic information for opal mines to manage multi phase (415 V) electrical “plug and play” equipment

Opal mines implement a regular test and tag regime for 415 V plug and play equipment and associated generators

Opal mines implement a regular inspection and testing program for permanent electrical installations

Opal mines comply with legislation for 415V bidders (install earth continuity protection)

OUTCOMES

240V plug and play equipment is not a source of electric shock or fire

415V plug and play equipment is not a source of electric shock or fire

Permanent electrical installations comply with AS/NZS3000

415 V bidders and the like have improved protection installed

Opal miners have a basic knowledge of how to manage the ongoing safety of electrical equipment and installations and when to use a qualified electrical tradesperson

STRATEGIES

Develop the electrical section of the Opal Miners Handbook – focus on 240V plug and play. Target April 2009

Partnership with local electrical tradespeople to develop test, tag and maintenance programs for plug and play equipment and associated transportable generators. Target Oct 2010

Identify those opal mines with 415V fixed installations and those that use 415V bidders and the like and the associated issue (ability to install earth continuity systems, AS/NZS3000 compliance). Target April 2010

Develop a strategic plan for opal miners and the use of electricity Target June 2010

RESOURCES:

SIEE, IEE Kennedy



Electrical Infrastructure at Underground Coal Mines

OBJECTIVES

Gather information on electrical engineering infrastructure at the mine

Supply to the mine

Mine supply arrangements

Mine safety critical infrastructure supply arrangements

Communications

Miners cap lamps

OUTCOMES

Characteristics of mine infrastructure identified

Improvement opportunities identified

STRATEGIES

Develop an Electrical Engineering Infrastructure information tool

Gather information through site visits

Identify the most significant infrastructure deficiencies

Inform safety advisory committees

RESOURCES:

SIEE



Electrical Installations at Cobar & Broken Hill Large Metalliferous Mines

OBJECTIVES

Assess electrical engineering safety management practices against MHSReg 2007 requirements.

OUTCOMES

Deficiencies in electrical infrastructure identified

Improvement programs developed and implemented

STRATEGIES

Develop an Electrical Engineering Safety assessment tool

Audit the mines

Identify the most significant infrastructure deficiencies

Implement the enforcement policy

RESOURCES:

SIEE, IEE Kennedy

