Strategic Plan

for

Electrical Engineering Safety

in NSW Mining Operations (Coal, Metals & Extractive) & Onshore Petroleum Operations (Exploration & Extraction)

2009 – 2014

Planning for Electrical Engineering Safety

Strategies and Plans for Electrical Engineering staff of Mine Safety Operations to achieve target objectives for Electrical Engineering Safety in the NSW Mining (Coal, Metals and Extractive) & Petroleum exploration & extraction industries

NO LIVE LINE WORK

TEST BEFORE YOU TOUCH

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Foreword

The legislation for Mines (Coal, Metals and Extractives) and Onshore Petroleum allows operations to develop occupational health and safety management systems that will:

- be appropriate for that organisation;
- be integrated with other systems and core functions of the organisation;
- improve the organisations overall safety performance;
- assist the organisation to meet its legal responsibilities; and
- improve the performance of a site or the industry by a range of actions.

The industry is committed to authoritative good practice OHS systems (refer Appendix A)

The role of Mine Safety Operations and associated Technical Services is to:

- Reinforce workplace responsibility for OHS management;
- Provide advice, direction and guidance material emphasising outcomes to be achieved, supported by technical guidance on how to achieve outcomes that provide for a tolerable and ALARP level of risk. ALARP = As Low As Reasonably Practicable
- Apply a consistent approach and format to technical guidance material that reflects its role in the legislative framework and the concepts of risk tolerability and ALARP;
- Develop guidance material on legal framework and responsibilities and OHS management processes
- Communicate the required standard of performance
- Apply the relevant control from the hierarchy of regulatory responses outlined in the Government's Enforcement Strategy.

Specific Mine Safety Operations targets for electrical engineering safety within the mining and petroleum industry are:

- Zero electrocutions.
- Zero deaths as a result of electric shock (eg falls because of receiving an electric shock).
- Zero permanent disabling injuries as a result of electric shock.
- Zero incurable burns from electricity.
- Zero gas/dust explosions with electricity as an ignition source.
- Zero fires that result in injury, death or evacuation of an operation or part of an operation, caused by the malfunction of electrical equipment.
- Zero injury or death from unintended operation of electrically powered or controlled equipment.
- Zero injury or death from failure to stop of electrically powered or controlled equipment.
- Zero injury or death from failure to operate of electrically powered or controlled equipment.

The Mine Safety Operations Strategic Plan for Electrical Engineering Safety identifies the need for an established framework for Mine Safety Operations electrical engineering staff to operate within whilst providing a great deal of autonomy for individual electrical engineering staff. It also identifies key programs to be implemented, these are:

- Industry Standards Program
- Industry Support Infrastructure Program (Certification, Licensing & Registration)
- Special Projects Program (High Risk Plant)
- Communications Program

Each of these programs is interlinked, for example the Special Projects Program has elements from each of the other programs, that is, standards are developed, registration is utilised and the communication program has special projects as a subject topic.

John Francis Waudby
Senior Inspector of Electrical Engineering

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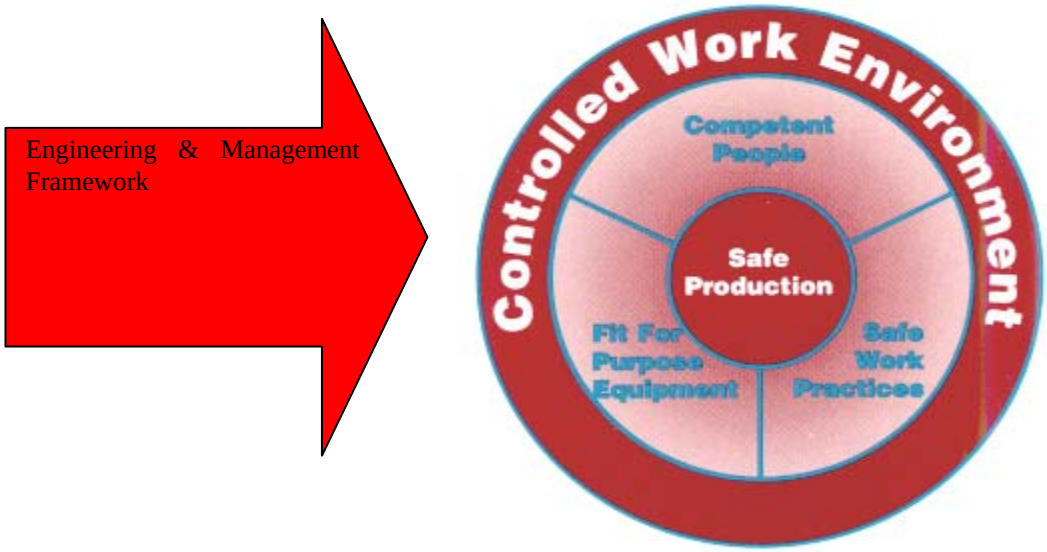
Strategic and Operational Planning

Background Information about the planning framework and operating philosophy of the Electrical Engineering staff of Mine Safety Operations

Overview of the mining industry and Electrical Engineering Safety

Electrical Engineering decisions are critical to attaining safe production at mining & petroleum operations. To achieve safety, these decisions must be of the highest quality. A model for making these quality decisions is the Minerals Industry Risk Management Model (MIRM Model). The MIRM Model has two main elements; these are the management system and the work process factors. The management system incorporates the management and engineering framework for the design and operation of the site. As such, it supplies the inputs to the daily work processes to achieve safe production within a controlled work environment, by, competent people, fit for purpose equipment and safe work practices. This is expressed in the diagram below. (Refer: www.mishc.uq.edu.au)



The quality of the decision depends on the quality of the engineering and management process that designs, purchases, installs, commissions, operates, maintains (including repair and overhaul), modifies, trains, standardises and otherwise defines the nature of the day-to-day work process. To do this the management system has to be defined and formally documented so that the quality of key decisions is not left to chance. (Refer to Australian/New Zealand Standard AS/NZS 4801:2001 *Occupational health and safety management systems—specification with guidance for use)*

All of the above must be present and effective at every stage of the equipment and mining (or petroleum exploration and extraction) operation's life cycle, and must be effectively supported by the organisational culture. If any element is deficient, or, there is ineffective support from the organisational culture – safe production is left to chance.

A Strategic Plan for Electrical Engineering Safety focus's the Mine Safety Operation's Electrical Engineering Team on the critical areas so that a maximum return for our activities is achieved.

Background to Developing this Document

For a number of years the Electrical Engineering staff of Mine Safety Operations has been actively engaged in an improvement project designed to deliver a model for operating that is efficient and effective. The result was a Strategic Plan for Electrical Engineering Safety in NSW Mining Operations; this has now been extended to include the Onshore Petroleum exploration and extraction industry.

The most important element in developing this plan is the result obtained from the Electrical Engineering Safety Risk Identification Management System EES RIMS). It is the EES RIMS that provides for the implementation of the NSW Workplace Safety Summit of 2005, especially:

"…Effectively targeting the most vulnerable workers and high-risk activities…;
A comprehensive and systematic approach to OH&S Risk Management should be a normal part of business operations;
Actions to eliminate or control safety risk should focus on the source of those risks…;
Evidence on and solutions for workplace safety risks should be shared;
Workplace health and safety interventions should target hazards, injuries, industries or occupations where the risk, incidence or severity of injury is significantly high (and consequently the most significant improvements may be realised…"[1]

The EES RIMS was supplemented by requirements identified in the Gretley Inquiry, Mine Safety Review 1997, National OHS Improvement Framework, National Mine Safety Framework, Wran Mine Safety Review 2004, Digging Deeper Action Plan, NSW Mining Industry Health and Safety Action Plan to 2008, Mining and Extractives Industry CEO OHS Culture Change Summit, Nov 2008, DPI Corporate Plan, Mine Safety Operations Business Plans, Mine Safety Operations Risk Identification Management System (RIMS).

The Strategic Plan for Electrical Engineering Safety is a construct that gives a solid foundation for the development and implementation of a number of programs; through to development of documented assessment criteria, and work plans that are designed to deliver our objectives in accordance with identified priorities.

The Strategic Plan for Electrical Engineering Safety incorporates actions relating to a number of project plans developed to support the NSW Mining Industry Health and Safety Action Plan.

Leadership & Continuous Improvement

The IEE will lead and continually improve in all aspects of electrical engineering safety so that the electrical engineering safety aspirations of Mine Safety Operations are achieved by the Mining & Petroleum Industries.

This document provides the vision, direction and the means to consolidate improvements, prevent loss of previous gains, and aligns the team in terms of where we are, and helps us to see where we are going to go next.

The Mine Safety Advisory Council terms of reference includes the statement "To provide leadership to the mining industry to develop safe and healthy workplaces within a framework which:
Encourages innovative and safe technology processes".
Sets the strategic direction for the industry in developing competent people … To encourage a move towards cross-industry and national standards"
Everything we do is consistent with these terms of reference, however it needs to be recognised that from an engineering and technology perspective, it is our actions that will influence the outcomes in these areas by providing advice to the peak safety council and committees on strategic requirements for engineering and technology application.

Purpose of this Plan

The Strategic Plan will be used by Electrical Engineering staff of Mine Safety Operations to:

- Prepare work plans for a 1 year and 3 year outlook.

[1] NSW MINING INDUSTRY HEALTH AND SAFETY ACTION PLAN TO 2008, p7.

- Show other officers in Mine Safety Operations what we are trying to do and why we are trying to do it.
- Solicit constructive comment on our activities to help us improve.
- Provide justification for funding regulatory activities.
- Provide information to peak safety council and committee activities in relation to engineering and technology application

Other industry stakeholders will benefit from the document by being able to align their expectations with a documented plan. They will be able to participate in many of the strategies outlined in this plan, review their Electrical Engineering Safety priorities against this plan knowing what are the important activities and priority risk areas.

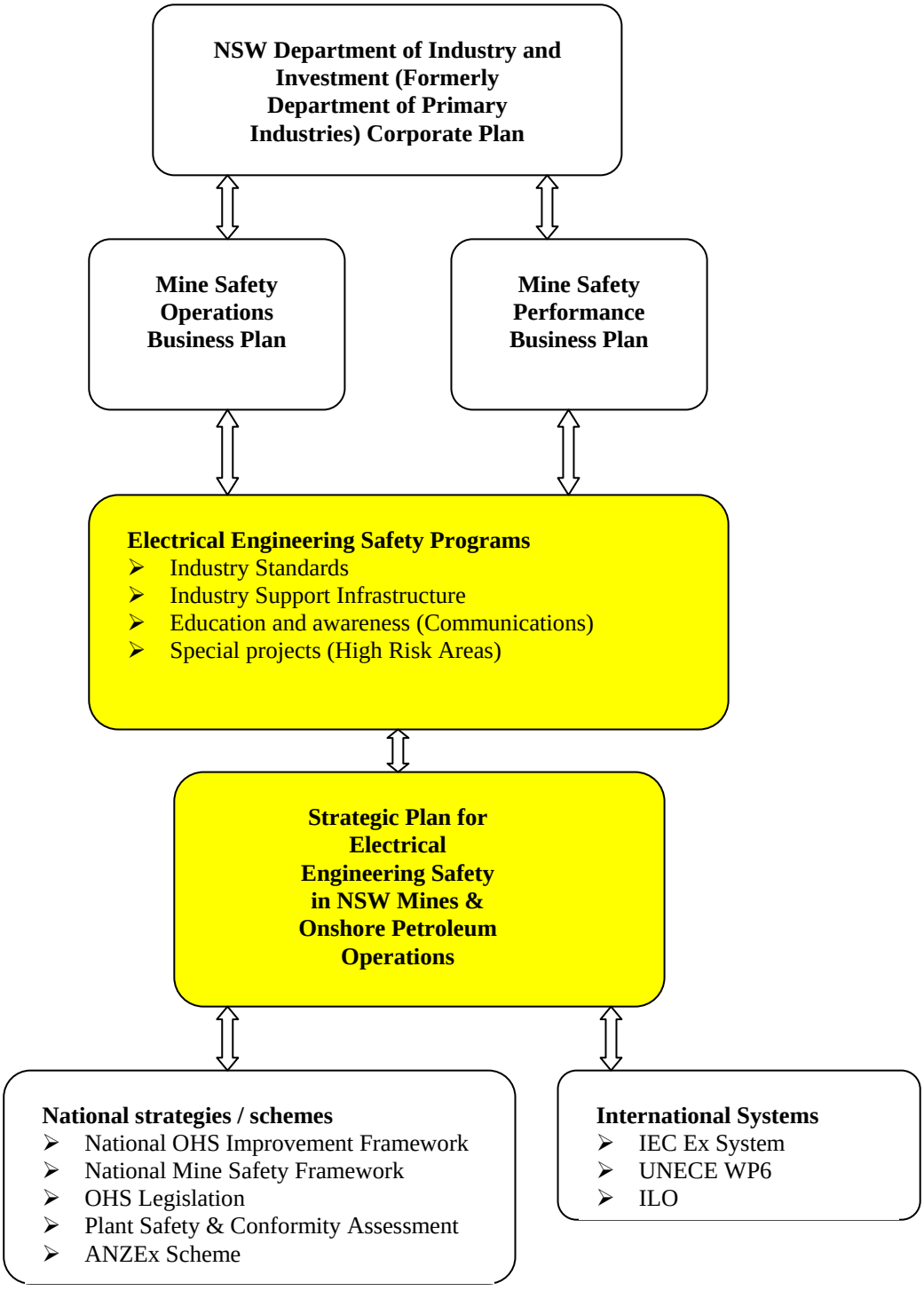
In particular:

- Mining & Petroleum Operations will be able to integrate elements of this plan or all of it in their Electrical Engineering Management Plan.
- Manufacturers will be able to integrate elements or all of this plan in their design processes for plant.
- Service providers will be able to integrate elements or this entire plan in their OH&S Management Systems for mining operation site activities.
- Industry safety advisory committees can use this document as a basis for the review of Electrical Engineering Safety.

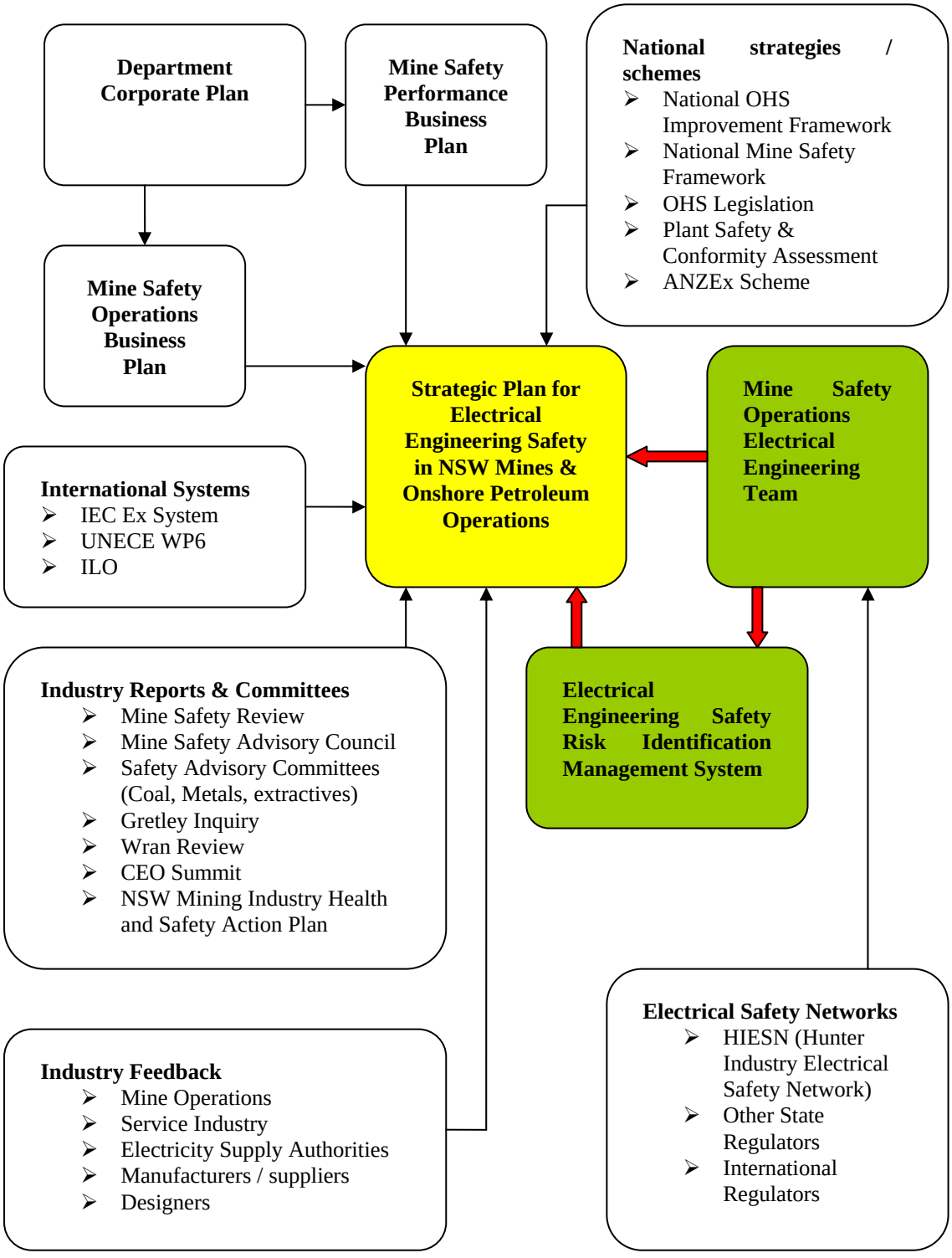
VISION

A Mining & Petroleum Industry Free of Death and Injury from Electrically Powered Plant and Electrically Controlled Plant

Planning Framework



Planning Inputs



Plan Overview

VISION
A mining industry free of death and injury from electrically powered plant and electrically controlled plant

Operational philosophy of the Mine Safety Electrical Team

Strategic Plan for Electrical Engineering Safety

Electrical Engineering Safety Programs
- **Industry Standards**
- **Industry Support Infrastructure**
- **Education and awareness (Communications)**
- **Special projects (High Risk Areas)**

Electrical Engineering Safety Objectives
- Zero electrocutions.
- Zero deaths as a result of electric shock (eg falls because of receiving an electric shock).
- Zero permanent disabling injuries as a result of electric shock.
- Zero incurable burns from electricity.
- Zero gas/dust explosions with electricity as an ignition source.
- Zero fires that result in injury, death or evacuation of a mine or part of a mine, caused by the malfunction of electrical equipment.
- Zero injury or death from unintended operation of electrically powered or controlled equipment.
- Zero injury or death from failure to stop of electrically powered or controlled equipment.
- Zero injury or death from failure to operate of electrically powered or controlled equipment.

The Case for Strategic and Operational Planning

PURPOSE

The purpose of the Strategic Plan is to:

- Provide a long term strategic focus,
- Develop a consistent approach by Mine Safety Operations officers across the state,
- Provide a framework from which electrical staff can operate with a large degree of autonomy, and
- Plan actions to achieve targeted safety performance.

OBJECTIVES

- Implement a risk-based approach to the management of electrical engineering safety, without compromising good electrical engineering practice,
- Facilitate the use of authoritative good electrical engineering practice at mining & petroleum operations,
- Facilitate the adoption of international and national schemes for mining electrical engineering safety and petroleum operations with potentially explosive atmospheres,
- Establish an extensive electrical engineering safety network, and
- Implement efficient and effective public sector processes

INDUSTRY OUTCOME TARGETS

- Zero electrocutions,
- Zero deaths as a result of electric shock (eg falls because of receiving an electric shock),
- Zero permanent disabling injuries as a result of electric shock,
- Zero incurable burns from electricity,
- Zero gas/dust explosions with electricity as an ignition source,
- Zero fires that result in injury, death or evacuation of a mining operation or part of a mining operation, caused by the malfunction of electrical equipment,
- Zero injury or death from unintended operation of electrically powered or controlled equipment,
- Zero injury or death from failure to stop of electrically powered or controlled equipment,
- Zero injury or death from failure to operate of electrically powered or controlled equipment.

OUTCOMES

A professional electrical engineering safety regulatory authority, supporting:

- Authoritative good practice in electrical engineering safety, and
- Authoritative good practice in the management of electrical technology in mining and petroleum operations.

A mining and petroleum industry culture which accepts:

- The importance of electrical engineering safety, and
- The use of authoritative electrical engineering practices.

The safety of mining & petroleum operation employees is based on genuinely managing risks associated with the use of electricity in mining & petroleum operations. The risks presented by electrically powered plant and electrically controlled plant are tolerable and ALARP (As Low As Reasonably Practicable).

Continuous improvement of the mining & petroleum industry in:

- electrical engineering safety performance,
- electrical engineering practices,
- management of electrical technology,
- the use of electrical equipment,
- electrical work practices, and
- competency of electrical workers.

Operational Philosophy

Corporate Values

Integrity

We will behave ethically and act with honesty, fairness, courage and loyalty

Professionalism

We will conduct ourselves in a business-like manner to deliver efficient and expert services and we will be accountable for our decisions.

Innovation

We will strive for excellence, creativity, leading edge science and quality.

Respect

We will respect each other, our families, our clients, those with different ideas and from diverse backgrounds, and other cultures.

Beliefs

- All fatalities and injuries are preventable
- No task is so important that it can not be done safely
- Multiple barriers are preferable to individual barriers
- Electricity is a major hazard
- The uncontrolled risk from electricity is of the highest order
- Remove engineering from electrical engineering safety and death and injury will follow

The Way we Operate

- The way we do things must contribute to changing the safety culture of the industry so that industry accepts ownership of safety.
- Anything we do must provide for a level of risk less than or equal to the current risk.
- Information is provided in advisory terms, not as a “must do it this way”.
- Effective consultation and communication in the workplace contributes to a safer mining industry.
- Be prepared to take appropriate actions against stakeholders not complying with safety legislation.

Prevention of Incidents

- Avoiding risks
- Evaluating risks that can not be avoided
- Combating risks at source
- Replacing the dangerous with less dangerous
- Giving collective risk controls precedence over individual risk controls

Industry Culture that is Positive

- Ownership of safety rests with the mine owners/operators and equipment manufacturers/suppliers.
- The focus is one of continuing culture change from a prescriptive style to a mainly performance or outcome based safety system that is underpinned by good engineering and correct application of technology in the workplace.

Digging Deeper Principles – 10 Platinum Rules

1. Remember you are working with people;
2. Listen to and talk with your people;

3. Fix things promptly;
4. Make sure your paperwork is worth having;
5. Improve competence in OHS;
6. Encourage people to give you bad news;
7. Fix your workplace first;
8. Measure and monitor risks that people are exposed to;
9. Keep checking that what you are doing is working effectively; and
10. Apply adequate resources in time and money.

Electrical Engineering Safety

Electrical engineering safety encompasses:

- Prevention of electric shock and burns, (electrocution, death or injury as a result of a shock, radiation burns, flash burns, burning particles and plasma)
- Prevention of electrical arcing and surface temperatures that have sufficient energy to ignite gas and/or dust,
- Prevention of fires caused by the malfunction of electrical equipment,
- Prevention of injury and death from unintended operation, failure to stop or failure to operate, of electrically powered and electrically controlled equipment, and
- Use of electrical technology to provide safe-guards and monitoring with a safety integrity level appropriate for the risk for non-electrical hazards and electrical hazards.

Acceptable Risk

- Risk must be TOLERABLE and ALARP
- No increase in risk to ANY worker at a mining or petroleum operation
- An order of magnitude risk reduction at the first opportunity

Credible Risk controls

Credible Risk controls require:

- A credible risk assessment
- Uncertainty to be dealt with
- Authoritative good practice risk controls in place
- Reliability of risk controls to be established
- Synergy between risk controls to be considered
- Risk control supervision – where risk controls are procedures, competent supervision and monitoring is essential.
- Risk control verification – the presence of risk controls has to be verified at the design and commission stage at the very least. Risk control verification – the higher the risk the more credible the verification. Controls for high risk require highly credible and independent verification. (Type 5 certification schemes, NATA test reports).

Risk Management

- All hazards can be identified and their risks managed to a tolerable and ALARP level
- If you don't understand the hazards – you can't manage the risks
- If you don't understand the risk controls you can't manage the risk
- The higher the energy the higher the risks
- Remove a risk control and you increase the risk
- Known risk with known risk controls – the risk controls must be applied
- The higher the level of uncertainty, the more robust the risk controls need to be.

A System Safety Approach

Based on RISK MANAGEMENT, requiring FIT FOR PURPOSE EQUIPMENT, COMPETENT PEOPLE AND PROCESSES / PROCEDURES, WITHIN A MANAGED WORK ENVIRONMENT all supported by MANAGEMENT SYSTEMS through:

- Identifying the hazards in the system
- Determining the underlying causes of the hazards
- Developing engineering and management controls to eliminate the hazards or mitigate their consequences such that the risk is tolerable and ALARP.
  - For plant - a functional safety approach and utilise safety files
  - For safety instrumented systems, such as gas detection and ventilation interlocks - a functional safety approach.
- Verifying the risk controls are adequate and in place
- Monitoring the system

Use of the Life Cycle Concept

- Project Concept
- Project Feasibility /Sanction
- Project Design
- Construction / Acquisition
- Installation and commissioning
- Operation
- Maintenance (including breakdown, repair and overhaul)
- Modification
- Disposal / Closure

Apply The Hierarchy Of Risk Controls:

- Eliminate the hazard (Prevent the accumulation of energy in the first place)
- Substitute the hazard for one that gives a lesser risk (Reduce the accumulation of energy)
- Prevent the release of the energy
- Modify the rate of spatial distribution of release of the energy
- Separate, in time or space, the energy and the person
- Isolate the hazard from the person (Separate the energy and the person by the interposition of a material barrier
- Engineering controls
- Modify contact surfaces
- Procedures
- PPE (Make the person to be protected more resistant to damage from the energy)

Apply Risk Reduction Precedence

- Design out the hazard
- Safety devices that fail to safety
- Warning devices
- Special procedures and training

Principles of Safe Design

- Safe design is the integration of hazard identification and risk assessment methods early in the design process to eliminate or minimise the risks of injury throughout the life of the product being designed. It encompasses all design including whole mining or petroleum operations, parts of mining operations, associated facilities, hardware, systems, plant, materials, energy controls, layout and configuration[2]
- Persons with control (mine operators) make decisions affecting the design of mining machines, mine layout, production methods, facilities, energy transmission infrastructure, they are the ones that must promote safety at the source. They must demonstrate safe design knowledge and capability and ensure information transfer between people at every phase of the life-cycle[3]

[2] Modified from "Guidance on the Principles of Safe Design for Work", Australian Safety and Compensation Council, p5

[3] Modified from "From the State Mining Engineer", MineSafe Vol 16, No3 Dec 2007

- Electrical infrastructure at a mining operation must be considered at the concept phase
- Electrical Engineering Safety is often compromised by ill informed decisions on mining operation electrical infrastructure.
- Electrical Engineering Safety is often compromised by ill informed decisions on mining operation electrical infrastructure incorporated in mine layouts and production methods

Technical principles

These principles are detailed in Technical Reference Electrical Engineering Safety EES011 Technical Principles for the Design of Electrical Systems at NSW Mines (Coal and Metals) and Extractives Operations
These guiding principles are for use by electrical staff as a starting point for any discussions with stakeholders. These principles can be applied in the vast majority of situations, where they can not be applied the electrical staff must be satisfied that alternative arrangements have the same or lesser risk.

The detail about these principles can be found in legislation, standards, guidelines and codes of practice.

Strategies & Programs

RISK MANAGEMENT

Identify core mining electrical engineering safety risks and associated risk controls

Specify safety outcomes related to those risks - Risk controls to provide for tolerable and ALARP risk

Focus resources on the application of the risk controls.

Identify new/emerging issues associated with the mining & petroleum industry.

Managing the risk of introducing new technologies.

STRATEGIC PLANNING

Evaluate the efficiency and effectiveness of the electrical program against the objectives and targets.

Use of the Risk Identification Management System (RIMS) to plan Mine Safety Operations activities.

Have a strategic focus.

Consistent with MSAC and associated Mining Industry Health and Safety Action Plan

Strategic decisions on specific topics will be initially documented in Electrical Engineering Safety Decision Sheets

LEGISLATION, CODES, STANDARDS

Communicate with mining & petroleum operations, manufacturers, unions and other key stakeholders during the development of legislation.

Legislation Objectives

Legislation reflects the Strategic Plan for Electrical Engineering Safety in NSW Mining & Petroleum Operations

Legislation to be outcome based and encompasses:

- The definition of electrical engineering safety.
- The key risk controls for electrical engineering safety.

Legislation to be applicable to coal, metals and extractives mining operations & petroleum operations

Legislation to require electrical work to be done by electrically qualified people.

Legislation to provide for the safe use of electricity at a level as good or better than that for the non-mining industry.

Legislation Outcomes

Mining and Petroleum Operations have total responsibility for ensuring electrical technology is used in a safe manner.

Legislation for electrical engineering safety includes the use of plant safety legislation.

Legislation for electrical engineering safety is consistent with the Electricity (Consumer Safety) Act and Regulation

Mining and Petroleum operations are not unnecessarily restricted by legislation in implementing new technology and novel ways of using technology. (That is, where mine's wish to implement new methods or new technology

then the legislation will not be an impediment to good engineering where the risk to the safety of mine workers is reduced)

There are no unnecessary legislative barriers (differences between states).

Standards and Guidelines

Support the application of good engineering by having standards that provide for a tolerable and ALARP risk. That is in applying the technical and prescriptive requirements of standards is one way of achieving conformance to the outcomes based legislation. This is facilitated by participating in the development and/or adoption of International Standards, Australian Standards, and Australian Standards Handbooks. Where there are gaps in standards providing for a holistic approach to mining electrical engineering safety, these will be "filled by Electrical Engineering Safety Technical References, Electrical Engineering Information Sheets and providing Electrical Engineering Safety input into other guidance material (Mine Safety Operations Guidelines, Mine Safety Operations Codes of Practice and Workcover Codes of Practice). The primary focus is on the development of Australian and International Standards. Do this through the "Industry Standards Program."

The scope of Industry standards work must support this plan and cover the essential risk controls.

Refer to Industry Standards Program

ASSESSMENT, INVESTIGATION & ENFORCEMENT

Implement the Department's assessment, investigation and enforcement policies.

Implement the Wran Review requirements to assess the implementation of the new legislation. For coal mines there will be an emphasis on EEMP's. For metalliferous and extractives operations, Electrical Engineering Safety matters will be incorporated in the Wran review Audit document

Develop and implement assessment guides focussing on electrical engineering safety key risk controls.

Operate a mine inspection / audit program focused on electrical engineering safety and essential risk controls.

Investigate incidents and accidents in electrical engineering safety in accordance with the Incident Decision Form. Typical incidents are:

- Electric Shock,
- Electrical burns
- Failure of electrical Ex equipment in a hazardous zone,
- Cable arcing in a hazardous zone,
- Unplanned movement of plant where the "electrical control" system has malfunctioned,
- Winder system failures,
- Electrically caused fires,
- Contact (by machinery, tools etc) with energised HV equipment,
- Catastrophic failure of electrical equipment

Planned Mining Operation Site Activities

General

Electrical Engineering staff of Mine Safety Operations use this as the framework for developing their work plans. It is also a framework for area managers to use to have confidence that "electrical engineering safety" issues are being addressed within their area.
These activities are not done in isolation, other activities and programs, namely Industry Standards program and participation on Australian Standards committees, Industry Infrastructure Program, Special Projects Program, and Accident and Incident Investigations support the mining operation site assessments activities.
Priority activity for 2009 is the audit of Electrical Engineering Management Plans at Coal Operations

Mining Operation Site Activities at Underground Mines (Coal and Metalliferous)

When visiting U/G mines some or all of the electrical risk controls will be addressed, depending on the perceived risk at the mine. Please note there are no known hazardous areas defined in any NSW underground metalliferous mine, therefore it is not expected that assessments carried out will encompass hazardous area equipment.

Targets will be set on an annual basis, via the individual workplans agreed to with the Area Manager.

Actions taken as a result of Electrical Engineering Safety Alerts and Safety Bulletins will be reviewed on an annual basis.

Any follow up as a result of previous assessments will be conducted.

One electrical engineering safety key risk control or key risk area will be assessed at every underground operation (coal and metalliferous) each year. In 2009 the implementation of EEMP's at coal mines will be assessed. For underground metalliferous mines the focus will be on implementation of the new legislation, especially in 2010.

The management of Ex equipment at coal operations will be assessed on a continuous basis – Resource is Inspector Grade 2 – Electrical Engineering, Maitland

Mining Operation Site Activities at Open Cut Mines, Quarries, and Processing Plants (Coal, Metalliferous and Extractives)

When visiting O/C mines and processing plants some or all of the electrical risk controls will be addressed, depending on the perceived risk at the mine. It should be noted that there are no defined hazardous zones in NSW O/C coal mines. It is known that there are very few hazardous areas in quarries, open cut mines and underground metals mines. For this reason the risks associated with hazardous areas are not considered other than to require a risk control of identifying hazardous areas.

Targets will be set on an annual basis, via the individual workplans agreed to with the Area Manager.

Actions taken as a result of Electrical Engineering Safety Alerts and Safety Bulletins will be reviewed on an annual basis.

Any follow up as a result of previous assessments will be conducted.

One electrical engineering safety key risk control or key risk area will be assessed at every operation (coal and metalliferous) each year. In 2009 the implementation of EEMP's at coal mines will be assessed. For open cut metalliferous mines the focus will be on implementation of the new legislation, especially in 2010

A general electrical engineering safety assessment will be made at selected quarries, with a long term goal of visiting every quarry in NSW.

Onshore Petroleum Exploration and Extraction Operation Site Activities at Open Cut Mines

Petroleum sites will be visited on a "as needs basis". When visiting these operations classification of hazardous areas, use of electrical plant in hazardous areas and compliance with AS/NZS3000 will be the focus.

No targets will be set at this point in time, other than 100% response to requests from Petroleum Inspectors. Any follow up as a result of previous assessments will be conducted.

COMPETENCIES

Minimum competency for doing & verifying electrical work at a mining operation is the same as that for the non-mining industry (qualified supervisors certificate)

Identifying and increasing mining industry electrical personnel competencies.

Implement Cable Repairer Competency requirements and oversee the competency assessment process.

Continue participation in the development of National Competency Standards for electrical equipment used in potentially explosive atmospheres.

Participate in the IEC Ex Certified Ex Persons Scheme and associated competency requirements and assessment.

Develop (in conjunction with Engineers Australia) a National Register for Mine Electrical Engineers at Professional, Technologist and Engineering Officer level so that CPD is maintained..

High level of competency in mining electrical engineering and management systems, of departmental officers.

Refer to Industry Standards Program
Refer to Industry Support Infrastructure Program

COMMUNICATION

Our communication strategy and actions will:

Position the Mine Safety Operations within the world wide network of electrical engineering and OH&S application of electrical engineering communications (interstate and overseas regulators (mining and electrical), non-mining electrical industry, mining industry etc.).

Facilitate intelligent and informed decision making in maters of electrical engineering safety

Facilitate the acquisition of relevant Electrical engineering Safety & OH&S data,

Provide the frame work for value adding to information

Reinforce workplace responsibility for OHS management,

Provide advice, direction and guidance material emphasising outcomes to be achieved, in the area of risk management

Provide advice, direction and guidance on integrating good electrical engineering practice into OHS management and risk management

Identify and inform of, emerging issues (eg high voltage distribution underground, safety critical systems, high energy explosion protection, and communication technology),

Ensure that the full range of industry participants are provided with quality information in a timely manner, and

Communicate widely to the mining industry, mining support industries and the community using the “Communication Program”.

The Electrical Engineering Safety section of the DPI, Mine Safety website will be the key portal for delivering documented information.

Integrate with Mine Safety Operations communication policies

Integrate with Mine Safety communications policies, protocols and programs (website, safety alerts, safety bulletins, guidance notes, bulletin boards)

Develop Electrical Engineering Safety Decision Sheets for specific matters addressed by officers

Develop Electrical Engineering Safety Information sheets to assist smaller operators (smaller quarries and opal miners)

Refer to Industry Communication Program

MINING INDUSTRY SUPPORT INFRASTRUCTURE

Continue to administer off-mine site support programs in electrical engineering key risk areas (registration of equipment, licensing workshops, competent persons), whilst devolving these activities into established national or international based systems. Do this through the “Industry Support Infrastructure Program.”

Complete the transition to certification of Ex equipment – cull approvals where possible, whilst maintaining a list of approved equipment that is in use. Target ALL electrical equipment used in an underground coal mine hazardous zone to be certified by 2015.

Transition from licensing Ex workshops to acceptance of the Australian New Zealand Recognised Service Facilities Program (MP87-2)

Monitor the IEC Ex Scheme for Certification of Ex Service Facilities, with a view to acceptance in lieu of licensing

Monitor the IECEx Scheme for Certification of personnel, with a view to accepting certification as an alternative to the attainment of a national equivalent competence

Refer to Industry Support Infrastructure Program

SPECIAL PROJECTS

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.

Small quarries assessment program – continue assessing small quarries (completion date 30 June 2010)

Lightning Ridge Electrical safety – develop a long term program to assist opal miners where multi-phase installations are used.

Refer to Special Projects Program (High Risk Plant)

- Life-cycle Management of Hazardous Area Equipment
- Remote Control Mining Equipment
- Powered Winding Systems
- Functional Safety
- Mine earthing
- Communications and data acquisition systems

Electrical Engineering Safety – Key Risk Areas and Key Risk Controls

Description of the key risks associated with electrically powered and controlled plant and the risk controls necessary to attain a tolerable risk level.

Key Risk Areas for Electrical Engineering Safety

Ranking the key risk areas is based on the uncontrolled risk and the number of people exposed to the risk and the industry performance with regard to related incidents. It is also recognised that many of the key risk areas require non-EES risk control and EES risk controls to adequately manage the risk.

Electrical Key Risk Areas in risk ranking order

1. Electrocution, electric shock and electric burns, incorporating failure of distribution systems (reasonable consequence is 1 fatality per event, although multiple fatalities have occurred).
2. Asphyxiation/poisoning caused by insulation combustion (Fire caused by failure of electrical plant). (reasonable consequence is 10 or more fatalities in one event)
3. Explosion or fire caused by electrical plant in a gas or dust hazardous area, incorporating failure of ventilation systems (reasonable consequence is 10 or more fatalities in one event.)
4. Failure of transport systems for people safety – Mine winders. (reasonable consequence is 10 or more fatalities in one event – much larger numbers could occur at some mines with shaft winders)
5. Failure of Machine Control electric's. (reasonable consequence is 1 fatality per event)
6. Radiation, harmful energy sources. (consequence is generally long term)
7. Carcinogenic substances & asbestos (consequence is generally long term)
8. Chemical sources (General OHS risk area)
9. Electrical Shot firing. (reasonable consequence is 1 fatality per event)
10. Mine emergency system infrastructure (Mining risk area)

Key Risk Controls for Electrical Engineering Safety

The elements required as a minimum to safely manage the use of electricity (These elements were identified via a risk assessment conducted and regularly reviewed by Mine Safety operations electrical engineering staff.)

Note: Where mines do not have hazardous zones or hazardous areas then it can be considered that the risk of explosions from hazardous areas is adequately managed.

- Electrical technology management systems incorporating emergency management and incident investigation
- Competency (of people engaged in electrical plant and systems throughout the life cycle).
- Fit for purpose (FFP) electrical plant.
    - Electrical protection
    - Earthing and lightning protection
    - Electrical plant (cables and apparatus) in non hazardous areas (HV, LV, ELV)
    - Machine (M/C) Control circuits - Functional safety, Field devices = ELV
    - Electrical plant (cables & apparatus) in a hazardous zone (includes gas monitoring) (HV, LV, ELV)
    - Signage
- Safe Procedures
    - Hazardous zone classification and identification
    - Removal/restoration of power procedures
    - Isolation procedures
    - Electrical testing procedures
    - Electric welding procedures
    - Electric shock and burn protocols
    - Use of portable apparatus U/G (underground)
    - Use of remote controlled plant
    - High Voltage procedures
    - Work near overhead lines

Relationship between Key risk areas & Key Risk Controls for Electrical Engineering Safety

TABLE 1

Electrical Engineering Safety Risk controls	Electrical Engineering Safety Key Risk Area
Electrical technology management systems incorporating incident investigation	1,2,3,4,5,6,7,8,9,10
Competency	1,2,3,4,5,6,7,8,9,10
Fit for purpose (FFP) electrical plant.	1,2,3,4,5,6,7,8,9,10
➢ Electrical protection	1,2,3,4,5
➢ Earthing and lightning protection	1,2,3,4,5,9
➢ Electrical plant (cables and apparatus) in non hazardous areas ➢ HV ➢ LV ➢ ELV	1,2,6,7,8,9,10
➢ Control circuits & safeguards (Machine (M/C) Control circuits) ➢ Functional safety ➢ Field devices = ELV	1,2,3,4,5,9,10
➢ Electrical plant (cables and apparatus) in a hazardous zone (includes gas monitoring)	1,2,3,5,9,10
➢ Signage	1,2,3,5,9,10
Safe Procedures	
➢ Hazardous zone classification and identification	3,9,10
➢ Removal/restoration of power procedures	1,2,3,6,10
➢ Isolation procedures	1,2,3,4,5,6,7,8,9,10
➢ Electrical testing procedures	1,3,4,5,6,9
➢ Electric welding procedures	1,2,3,6,9
➢ Electric shock and burn protocols	1,10
➢ Use of portable apparatus U/G	1,3,9,10
➢ Use of remote controlled plant	5,10
➢ High Voltage procedures	1,2,3,10
➢ Work near overhead lines	1,10

Key Risk Controls for Electrical Engineering Safety & Supporting Information

General information is available in: AS/NZS 3000, AS 3007 & Minerals Industry safety Handbook (section 4.8).
Note: EES documents reference other standards.

TABLE 2

Electrical risk controls	Key Supporting Information
Electrical technology management systems incorporating incident investigation	EES001, AS/NZS4801,EES013, National Handbook for Safe Mining (section 4.8)
Competency	EES001, EES002, AS/NZS 4761
Fit for purpose (FFP) electrical plant.	EES001, EES011, AS4871 (U/G Mines), MDG15 (Mobile and Transportable Plant for Use in Mines – Surface applications), AS 4242 (Automotive wiring), National Handbook for Safe Mining (section 4.8)
➢ Electrical protection	EES001, EES005, EES011, EES013, EES014, National Handbook for Safe Mining (section 4.8)
➢ Earthing and lightning protection	EES001, EES005, EES011, EES013, National Handbook for Safe Mining (section 4.8)
➢ Electrical plant (cables and apparatus) in non hazardous areas ➢ HV ➢ LV ➢ ELV	EES001, HB242, EES011, EES013, EES014
➢ Control circuits & safeguards (Machine (M/C) Control circuits) ➢ Functional safety ➢ Field devices = ELV	MDG2005 (Winders), EES008 (Winders - in draft), EES009 (Winders - in draft), AS4024, AS/NZS4240, AS60204, AS61508, AS62061, EES001, EES011, EES013, AS61511, MDG5001
➢ Electrical plant (cables and apparatus) in a hazardous zone (includes gas monitoring)	EES001, EES003, EES007, EES010 (in draft), AS/NZS 60079, AS/NZS2290.1 & 3, AS/NZS2381, AS/NZS3800, AS/NZS 1020, , AS/NZS1747, AS/NZS1802, AS/NZS1972
➢ Signage	EES001, EES013
Safe Procedures	
➢ Hazardous zone classification and identification	EES003, EES001, EES013
➢ Removal/restoration of power procedures	EE006, EES001, EES013
➢ Isolation procedures	MDG40, EES001, EES013
➢ Electrical testing procedures	EES004, HB187, EES001, EES013
➢ Electric welding procedures	AS/NZS1674.2, WTIA TN 7-98, MDG25, EES001, EES013
➢ Electric shock and burn protocols	EES001, EES013
➢ Use of portable apparatus U/G	EES-001, EES004
➢ Use of remote controlled plant	EES001, EES013, AS/NZS4240, MDG5002
➢ High Voltage procedures	EES001, HB242, EES013
➢ Work near overhead lines	EES001, Workcover CoP, EES013

Appendix A – Extracts from Other Plans

NATIONAL MINE SAFETY FRAMEWORK IMPLEMENTATION PLAN

WORLD CLASS HEALTH AND SAFETY IN THE NSW MINING INDUSTRY PROJECT OUTLINE FOR THE NSW MINE SAFETY ADVISORY COUNCIL May 2007

MINING AND EXTRACTIVES INDUSTRY CEO OHS CULTURE CHANGE SUMMIT – Nov 2008

MINE SAFETY BUSINESS PLAN

National Mine Safety Framework Implementation Plan

Safety in mining operations and the health of mine workers is of the utmost priority for industry and for governments.

Nationwide consistency in approach to safety and health in mining offers many benefits, not least enhanced confidence within the industry in addressing statutory requirements and cost-effectiveness in implementing them.

It is Governments' role to encourage this consistency across the full spectrum of issues impacting on safety and health, from the legislative framework, competency support, compliance and enforcement issues through to data collection and research. This was the basis for the Ministerial Council on Mineral and Petroleum Resources' agreement in March 2002 to a National Mine Safety Framework — *Realising a Safe and Healthy Mining Industry : the Contribution of Government.*

It is the basis, also, of the Ministerial Council's endorsement of this Implementation Plan to give the Framework full effect. The Plan is based on extensive analysis by Chief Inspectors of Mines, drawing also on the information provided by parties interested in mining safety and health in consultations during the Plan's development.

UNDERLYING PRINCIPLES

The primary responsibility for mine safety and health rests with the industry parties.

It is the basis, also, of the Ministerial Council's endorsement of this Implementation Plan to give the Framework full effect. The Plan is based on extensive analysis by Chief Inspectors of Mines, drawing also on the information provided by parties interested in mining safety and health in consultations during the Plan's development.

Sound workplace structures and operational arrangements for mine safety are essential, so that employers and employees at all levels within the industry are empowered and encouraged to identify mine safety and health issues and options for dealing with them.

Governments have a responsibility to set the standards of safety management they expect to be observed, and a responsibility on behalf of both mine site workers and the broader community to require performance to these standards.

Governments also have a crucial role in complementing and supporting industry initiatives to ensure the delivery of authoritative good practice in safety and health.

The National Mine Safety Framework identified seven priority goals, and proposed broad strategies to address them. The Implementation Plan specifies the steps to be taken to give practical effect to the Framework, and the timeframes for achieving them.

The primary goal of the Implementation Plan is to establish nationwide consistency of approach. At the same time, it is designed to allow for flexibility within individual jurisdictions in dealing with specific mine safety and health issues and solutions.

The Implementation Plan is intended to provide not only the opportunity but also encouragement for individual enterprises to go beyond basic measures to find better, more innovative and effective mine safety practices.

Mine safety and health, while critical in its own right, needs to be considered in the context of broader national efforts to improve occupational health and safety. Initiatives undertaken as part of this Plan will be implemented in close collaboration with these broader efforts under the aegis of the National OHS Strategy 2002-2012.

STRATEGY 1 : A NATIONALLY CONSISTENT LEGISLATIVE FRAMEWORK

Goal

To provide, within five years, a nationally consistent legislative framework that protects the safety and health of mine employees and persons who may be affected by mining operations. The legislative framework shall incorporate the principles adopted in the International Labour Organisation's *Convention 176 : Safety and Health in Mines.* (ILO C176).

Key Tasks and Timeframes

A consistent legislative framework is essential for an efficient, effective and equitable regulatory system nationwide. Legislation in individual jurisdictions need not be identical, but should embody the key principles and outcomes agreed by the Ministerial Council on Mineral and Petroleum Resources (the Council). As a first step in implementing this strategy, all legislation will be reviewed against the provisions of ILO C176 to ensure that the key principles and intent of the Convention are addressed.

STRATEGY 2 : COMPETENCY SUPPORT

To encourage and promote continuous skills development and competency nationwide, in support of the progressive move to industry-based assessments of competency.

The transition from current practice to a competency-based system will be a complex process. It will require close consultation with industry, educators, registered training organisations and training advisory bodies, within individual jurisdictions and nationally. The maintenance of nationwide consistency, especially in the light of mutual recognition principles, and quality control over the development and administration of competency training modules, particularly in the transition phase, will be particularly important, and will require a detailed strategic approach in which all key interested parties are involved.
The Chief Inspectors of Mines will: develop a structured national approach (audit/verification tool) for use when requiring enterprises to demonstrate they have systems in place to ensure the ongoing competence of employees.
Implementation of this strategy will be managed on behalf of the Ministerial Council by the Standing Committee of Officials representative from New South Wales. A working party (Queensland/New South Wales) has been established to address transition issues and, augmented by other jurisdictions as appropriate, will take overall responsibility for carrying out these tasks.

STRATEGY 3 : COMPLIANCE SUPPORT

Goal

To develop a national approach to providing advisory information for duty holders to assist them in achieving compliance, recognising the varying needs of individual operations.
The principle of duty of care underpins the mining industry's operation and the legislation that deals with it. Information is needed to support the industry in ensuring compliance. There is a substantial array of guidance material at various levels currently available. Efficient and effective mining industry safety and health systems demand that this information be apposite, properly codified, national in character but well suited to local needs, up-to-date and well maintained, properly distributed and easily accessed.
Implementation of this strategy will be managed on behalf of the Ministerial Council by the Standing Committee of Officials representative from New South Wales. It will require extensive input from key stakeholders able to advise on industry needs and priorities and accessibility of materials.
Where appropriate, measures undertaken in support of this initiative shall be subjected to Regulatory Impact Assessments or associated requirements in accordance with the *Principles and Guidelines for National Standard Setting and Regulatory Action* endorsed by the Council of Australian Governments in November 1997.
establish and maintain the national Minerals Industry Safety Handbook;

Establish a working party to coordinate the development of a standardised range of guidance information, and means of enhancing timely and cost-effective distribution of and access to information;

Examine, and advise the Council on, the development or adoption of a range of additional tools, ranging from site self-assessment and self-auditing/evaluation tools to computer-based expert systems.

STRATEGY 4 : A NATIONALLY CO-ORDINATED PROTOCOL ON ENFORCEMENT

STRATEGY 5 : CONSISTENT AND RELIABLE DATA AND ANALYSIS

STRATEGY 6 : EFFECTIVE CONSULTATION MECHANISMS

STRATEGY 7 : A COLLABORATIVE APPROACH TO RESEARCH

Goal

To establish appropriate mechanisms for governments to foster effective research into occupational safety and health in the mining industry.

Governments have an important part to play in ensuring that mine safety and health benefit from research. This role does not necessarily encompass direct sponsorship of specific research and development projects. It is a matter for companies and organisations to determine how best to avail themselves of broader Government support mechanisms.

Governments' role is to encourage basic or strategic research into occupational safety and health, and assist in identifying ongoing research priorities. The effective dissemination of research outcomes — including, if appropriate, its uptake in compliance support and associated advisory material — is also an important role of government.

World class health and safety in the NSW mining industry project outline for the NSW Mine Safety Advisory Council May 2007

A strategic vision that will result in the NSW mining industry being seen by its peers as having world class occupational health and safety.

World class health and safety may include the following criteria;

- "0" Fatalities & "0" Serious Bodily Injuries.
- Lost Time Injury Frequency Rate < 1.
- Everyone working within the industry has the same expectations on health and safety.
- All fatal risks have been identified, assessed, eliminated or controlled.
- Managers, supervisors and workers are competent.
- Managers, supervisors and workers are committed.
- Managers, supervisors, workers and contractors know the risks & risk elimination and control strategies.
- Safety risks are integrated with business risks.
- Ongoing consultation progresses meaningful engagement.
- There is a fit & healthy workforce.
- All individuals intuitively recognise & correct risks / hazards within their control.
- Equipment is designed & fit for purpose.
- People are confident that they will be supported when they act.
- Comprehensive training and education.
- Health and Safety is integrated into business processes.
- Proactive approach to all aspects of health and safety.
- People feel safe in their workplace.[4]

Improving the safety and health performance of the NSW mining industry is a priority for the NSW Government.

[4] **WORLD CLASS HEALTH AND SAFETY IN THE NSW MINING INDUSTRY PROJECT OUTLINE** FOR THE NSW MINE SAFETY ADVISORY COUNCIL May 2007

The role of NSW Department of Primary Industries' Mine Safety program is to provide the framework and direction to industry to manage risks through consultation and safe systems. Mine Safety works closely with employers, employees, other government agencies and the community to promote authoritative good practice in the area of mine safety. Through the verification of appropriate safety systems, processes and standards Mine Safety strives to be an efficient and effective regulator, encouraging those who exceed minimum standards and holding accountable those who do not. Mine Safety also aims to significantly improve the safety performance and culture of the industry though communication strategies and measures of performance.
Mine Safety has a strategic approach to achieve the Government's aim of zero fatalities in the mining industry. This is seen as an objective that can be achieved… Mine Safety also ensures that people have adequate competencies to work in the industry through examinations and competency assessment.
Mine Safety has the objective to work with industry to develop a strong systematic approach based on risk management principles and performance outcomes supported by a sound safety culture prevailing in the industry.[5]

Mining and extractives industry CEO OHS culture change summit – Nov 2008

SUMMIT VISION

1. Zero harm.
2. Demonstrated commitment at all levels that OHS is authentic and innate. Everyone has a leadership role.
3. All people are competent and have the authority and resources to complete the job safely.
4. Authoritative good practice consultation that is meaningful and effective.
5. No tension between productivity and OHS.
6. OHS implementation at regulatory, industry, site and individual levels is achievable, fair and just.
7. An effective enforcement policy that is applied in a consistent, fair and proportionate manner.
8. Accountabilities and responsibilities of all persons in the workplace are clear and within their control.
9. Stakeholders understand that a perceived problem for one stakeholder is a problem for the whole industry and needs resolution.
10. Industry stakeholders collaborate to achieve common goals. Collaboration provides a mechanism to appreciate the perceptions of other stakeholders.
11. The industry has 'effective' consultation. There is no disconnect between systems and practice.

INDUSTRY STAKEHOLDER COMMITMENT

- Our personal commitment to health and safety values and to world-leading performance and outcomes is evident at all levels, and health and safety is at the forefront of all decisions.
  - We support the promotion of:
  - A world leading health and safety culture, and
  - A regulatory policy framework that encourages and fosters a relationship of transparent, open and honest communication among all stakeholders
  - Adequate resources across the industry – including human resources – for both establishing and maintaining world-leading performance and outcomes
- All stakeholders work together in a cooperative environment to make the workplace safe and healthy.
- Accountabilities and responsibilities of all persons in the workplace are clear and within their control.
- Having systems and processes that build continuous improvement in OHS performance and regulation, with reliable information, data, auditing and benchmarking.

Mine Safety Operations Business Plan

Outcome: 3.3: Mining industry operates to best practice health and safety standards

Corporate Strategy 3.3(a):

[5] DPI website May 2007

Develop the regulatory model and industry standards, and enforce those standards and analyse information to improve on the safe extraction of a resource
Corporate Strategy 3.3(b): Evaluate industry performance through site assessments and conduct responsive and effective investigations.