



**NSW
Resources
Regulator**

COMPETENCY FRAMEWORK

MECHANICAL ENGINEER

of coal mines other than underground mines

Work Health and Safety (Mines and Petroleum
Sites Regulation) 2014

Document control

Published by NSW Resources Regulator

Title: Mechanical engineer of coal mines other than underground mines

First published: August 2019

Authorised by: Director Regulatory Programs

CM9 reference: DOC19/224930

AMENDMENT SCHEDULE

Date	Version	Amendment
August 2019	1	Published
June 2020	1	Corrected errors in title of document

© State of New South Wales through Department of Planning, Industry and Environment 2019. You may copy, distribute, display, download and otherwise freely deal with this publication for any purpose, provided that you attribute the Department of Planning, Industry and Environment as the owner. However, you must obtain permission if you wish to charge others for access to the publication (other than at cost); include the publication in advertising or a product for sale; modify the publication; or republish the publication on a website. You may freely link to the publication on a departmental website.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (August 2019) and may not be accurate, current or complete. The State of New South Wales (including the NSW Department of Planning, Industry and Environment), the author and the publisher take no responsibility, and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice when making decisions related to material contained in this publication.

1. Introduction

This document should be read in conjunction with the framework for competencies of statutory functions requiring practising certificates.

2. Legislation

The statutory function of mechanical engineer is to:

- (a) to develop and review the standards, mechanical engineering practice and procedures for the life cycle of mechanical plant and installations at the mine, and
- (b) to supervise the installation, commissioning, maintenance and repair of mechanical plant at the mine.

The requirement for nomination to exercise the statutory functions is that the individual nominated must:

- (a) hold a mechanical engineering certificate of competence (surface coal) or a mechanical engineering manager certificate of competence (coal) that is in force, or
- (b) have evidence of compliance with Australian Engineering Competency Standards Stage 2 in respect of mining operations at a mine and be:
 - i. a professional mechanical engineer who is registered on the National Professional Engineers Register, or
 - ii. a mechanical engineering technologist who is registered on the National Engineering Technologists Register, or
 - iii. a mechanical engineering associate who is registered on the National Engineering Associates Register.

3. Competencies for mechanical engineer of coal mines other than underground mines

The competencies of statutory functions in the framework are generally described below and specific details for this function are found in the following sections.

Situational Awareness and Risk Assessment

This competency covers the practitioners' actions to identify and assess risks, hazards or other issues that may affect the safe functioning of the mine. It involves gathering information, analysing emerging issues and seeking objective evidence to draw conclusions, so as to eliminate or minimise undesirable consequences.

The mechanical engineer of coal mines other than underground mines is to apply a broad theoretical and specialised technical knowledge and skills, in the assessment of hazards and potential risks, in a range of contexts, to demonstrate autonomy, judgement and defined responsibility when:

- developing mechanical engineering standards and mechanical engineering practice and procedures through investigation and analysis to identify and manage risks with mechanical controls in the mine
- monitoring by obtaining data, information, and evaluating audit outcomes to verify compliance with mechanical standards and legislation for mechanical plant lifecycle
- participating in and reviewing risk assessments for mechanical plant and structures
- verifying to the specified requirements including risk controls
- reviewing by measuring the effectiveness of the mechanical engineering standards and procedures, in particular the mechanical engineering control plan.

Behavioural tendencies and skills to support the demonstration of Situational Awareness and Risk Assessment:

- Investigate and analyse data and information to support the development of the mechanical engineering standards and procedures.
- Identify how to access various sources of information and evaluate its merit.
- Analyse and interpret reports and information available under the SMS to identify how and why a hazard can be present in the coal mine, the likelihood and potential consequences of the risk.
- Plan how an event or process may occur after its parts or steps are moved or rearranged.
- Assist in the development and maintenance of mechanical control plans, principal hazard management plans and principal control plans.
- Monitor mechanical operations and verify compliance with legislation.
- Review and evaluate audit outcomes on the effectiveness of the SMS against its mechanical performance standards and procedures.
- Participate in management of risk, including risk assessment processes and particularly those involving principle hazards.

A blue circular icon with a white border containing the text 'Effective communication'.

Effective communication

This competency refers to the practitioners' responsibility in using appropriate, clear and effective communication to ensure instructions, hazards, risks, safety plans and other technical and non-technical issues are effectively communicated at all levels, taking into account the knowledge, expectations, requirements, interests and terminology of the intended audience. Methods of communication and ensuring the communication has been delivered and understood forms part of this competency.

The mechanical engineer of coal mines other than underground mines is expected to transfer complex information and communicate technical advice on mechanical plant and installations at any time for WHS, to a variety of audiences within the specific type of mine. This includes:

- supporting the communication and documentation of the mechanical standards and procedures
- explaining processes to others, including the results of their analysis of data, information and review outcomes
- engaging in consultation processes when required including when developing the mechanical engineering standards and procedures.

Behavioural tendencies and skills to support the demonstration of Effective Communication:

- Use appropriate verbal and non-verbal communication and communication channels to explain technical information in an articulate and clear manner, and listen actively to others (i.e. when communicating information to technical and non-technical professionals within the mine).
- Supervise implementation of risk assessments and mechanical engineering control plan including consideration of selection of controls based on the hierarchy of controls.
- Present as a credible source of information.
- Control barriers of communication, supporting others to understand and implement mechanical standards and procedures in the mine.
- Report information effectively, maintaining written and verbal reporting requirements.
- Seek to clarify information or reports by asking questions and actively listening to others' input.
- Support others to follow guidance when implementing or applying mechanical standards and processes.
- Leverage own and others' knowledge, experience, and credibility to confidently influence others in managing incidents.



Collaboration

This competency covers the practitioners' competency to collaborate, provide support and leadership, facilitate the gathering and dissemination of information and knowledge for mine compliance. It includes behaviours and mechanisms that support the supervision, training and support of workers.

The mechanical engineer of coal mines other than underground mines is expected to support the collaboration and supervision of others, supporting the safe and compliant operation of the mine. This includes:

- providing supervision on the implementation of mechanical standards, processes and systems as well as specific tasks related to the mechanical installation, commissioning, maintenance and repair, as well as the decommissioning
- providing advice and instructions on implementation of mechanical standards, processes and systems, and on how risks should be managed as per mechanical standards and relevant legislation
- identifying key internal and external stakeholders, and collaborating through participation in consultation
- supporting information, training and instruction when required
- providing advice and instructions on how risks are managed as per the mechanical engineering control plan, mechanical standards and relevant legislation.

Behavioural tendencies and skills to support the demonstration of Collaboration and Leadership:

- Cooperate with others to support the implementation of the mechanical engineering standards and procedures for mechanical plant are compatible and effective.
- Review procedures for contractors and their management plans, as required.
- Cooperate with external stakeholders, such as original equipment manufacturers and their suppliers.
- Participate in consultation and training, to support others to have appropriate and timely access to specialised technical advice and guidance on implementation of mechanical standards, processes and systems.
- Supervise the installation, commissioning, maintenance and repair of mechanical plant at the mine.
- Verify and provide technical advice on implementation of mechanical engineering standards and procedures when required.
- Provide general supervision and to a lesser extent direct supervision, as required.
- Assist in the application and monitoring of the mechanical components of the SMS.
- Support others to remain focused during stressful situations.

Operational decision making and initiative

This competency covers the practitioners' operational decision-making ability to initiate, plan, lead or manage the resolution of hazards and risks that have been identified to support safe mining operations. It includes the ability to respond to issues in a decisive manner, applying their knowledge and using their experience from previous situations.

The mechanical engineer of coal mines other than underground mines is to apply a broad theoretical and technical knowledge and skills to make decisions and respond to hazards and potential risks in the mechanical plant, understanding its impact in a variety of contexts, and demonstrating autonomy, judgement and defined responsibility in the decision-making process. This includes:

- referring to evidence and objective information when establishing mechanical standards and procedures
- considering available evidence and objective information when reviewing the effectiveness of the mechanical engineering standards and procedures, as well as audit results and remedial actions
- supporting the implementation of mechanical engineering controls and management of risks
- supporting the management of complex issues for mechanical plant within changing parameters.

Behavioural tendencies and skills to support the demonstration of Operational Decision Making and Initiative:

- Demonstrate autonomy, judgement and responsibility when making decisions and defining courses of action regarding the mechanical engineering standards and procedures.
- Incorporate required changes in mechanical standards, processes and plans as per risk assessment results and auditing outcomes and recommendations.
- Use an objective evidence-based approach to decision-making around safety matters.
- Take the initiative to incorporate improvements in the mechanical engineering standards.
- Integrate and combine different set of information, from different sources, to form general conclusions.
- Sign off on agreed decisions (e.g. route of a long wall move).

Organised and disciplined

This competency covers the practitioners' abilities in planning and organising their work and the work of others, to support processes being followed, tasks prioritised, and inspections and checks are completed in a systematic manner as per legislation. It includes supporting systems, plans and procedures that are implemented, maintained and updated as required.

The mechanical engineer of coal mines other than underground mines is to apply a broad theoretical and technical knowledge and skills to manage WHS issues in an organised and systematic manner. This includes:

- planning and organising activities, as prescribed by relevant regulation and the SMS, when developing and amending mechanical standards and procedures
- reviewing compliance in a systematic, organised and timely manner
- supporting others to implement activities in a systematic and consistent manner as per mechanical standards and processes
- reviewing the mechanical engineering control plan or supervise a person who is doing so periodically, per timing specified in the SMS (e.g. in response to events).

Behavioural tendencies to support the demonstration of Organised and Discipline:

- Work in a systematic manner when developing and reviewing mechanical standards, and procedures.
- Plan and schedule actions to be implemented in compliance with legislation, mechanical standards and procedures.
- Support the implementation and application of mechanical standards by defining step by step actions, monitoring fit for purpose, and expected performance outcomes.
- Ensure systems and mechanical standards are implemented appropriately for control of risk.
- Arrange activities or resources in a certain order per a specific rule or set of rules when developing mechanical standards and procedures.
- Prioritise their activities and the activities of others per risk level and legislation.
- Apply the legislative requirements for gathering, recording, evaluating, reviewing data and information.
- Use planning tools and systems as appropriate.
- Ensure that mechanical engineering standards and procedures used in any plans are relevant and timely, such as trigger action response plans (TARPs).

Driven by
safety and
integrity

This competency refers to the practitioners' capability to act so as to comply with legislation, as well as supporting others to adhere to legislation. It includes their ability to persist with challenging tasks through sustained commitment and effort whilst maintaining standards, and their ability to model high standards of behaviours for others through own behaviour.

The mechanical engineer of coal mines other than underground mines is to apply a broad theoretical and technical knowledge and skills to act consistently in accordance to legislation, mechanical standards and procedures, and support others to adhere to those principles consistent with existing legislation. This includes:

- acting in a way that does not contravene existing legislation, mechanical standards and procedures even in situations of considerable internal or external pressure
- identifying situations where legislation and safety mechanical standards are contravened

- providing instruction and guidance to others on how to comply to existing legislation, mechanical standards and procedures in coal mines other than underground mines
- setting, upholding and monitoring the health and safety expectations in line with the mechanical standards.

Behavioural tendencies to support the demonstration of Driven by Safety and Integrity:

- Act in accordance with legislation, processes and mechanical standards at all times.
- Identify and act on non-compliance, by challenging situations to ensure safety and compliance.
- Verify compliance requirements and remain objective in its execution.
- Verify mechanical engineering standards and procedures in principal hazard management plans and principal control plans.
- Fulfil responsibilities to the highest professional and ethical mechanical standards.
- Evaluate the effectiveness of the SMS against mechanical standards and procedures.
- Review risk assessments and mechanical controls to ensure they refer to the appropriate mechanical standards, where applicable, and control the risks from hazards.
- Consider relevant external information sources, such as original equipment manufacturer, regulator and other safety and health type alerts.
- Challenge on areas of concern and communicate these internally and to appropriate agency if required.
- Put the safety and health of people at the forefront of decisions making to make a 'correct safety' decision, in the face of other challenges and priorities.

Responsiveness
to change

This competency refers to the practitioners' capability to use and apply their relevant knowledge of legislation and standards, previous experience and skills to respond to changing circumstances in the mine they operate in.

The mechanical engineer of coal mines other than underground mines is to apply a broad theoretical and technical knowledge and skills and specific experience to consider and incorporate contingencies plans to accommodate change. This includes:

- reviewing (or supervise a person to do so) mechanical standards, processes, including mechanical engineering control plan, to institute change where necessary, as per changes in conditions
- updating and realigning mechanical standards to changing or emerging circumstances, without compromising compliance
- supporting others to respond effectively during stressful situations and to implement changes as required.

Behavioural tendencies to support the demonstration of Responsiveness to Change:

- Support change management in the mechanical engineering standards, to accommodate changing conditions.
- Navigate uncertain, novel situations or ill-defined problems to identify when changes are required.
- Accommodate changing conditions in the mechanical engineering standards and control plans.
- Use available evidence, information, and expertise to reassess decisions based on new information.
- Amend mechanical standards and processes while ensuring safety is not compromised.
- Consult, advise and support the implementation of the most optimal course of action.

Technical
knowledge
and skills

This refers to the practitioners' capability to demonstrate technical skills and specific knowledge to be able to act or apply the requirements of legislation, standards, systems, procedures and processes.

The mechanical engineer of coal mines other than underground mines is expected to demonstrate a broad theoretical and technical knowledge and skills, in a range of contexts, to demonstrate autonomy, judgement and defined responsibility within the coal mine within the scope of their statutory function. The technical skills and knowledge include:

- mining and WHS systems
- legislation
- emergency management
- general WHS topics
- general knowledge to support the demonstration of technical skills incorporating associated non-technical skills.

Technical knowledge and skills required

Mining and WHS systems

Safety management system (SMS)

- Understand their obligations in reviewing and reviewing performance of the standards and procedures for mechanical plant and installation against the specified standards of the SMS.
- Develop mechanical standards and evaluate the mechanical components of the SMS for the mine.

- Demonstrate specialised theoretical and technical knowledge and skills in mechanical engineering, including:
 - design principles for the management of human factors
 - engineering design mechanical standards
 - fire protection
 - maintenance mechanical standards
 - conveyor operations
 - mobile plant
 - lifting and crange
 - hydraulics
 - fire and explosion
 - chemical energies.
- Mechanical engineering standards, including life cycle of mechanical plant:
 - commissioning
 - decommissioning
 - procedures and instructions for the safe operation of plant
 - mechanical integrity of plant
 - control of abnormal operations and emergency shut down or decommissioning.
- Operational planning:
 - Operational planning, including the scope, boundaries and performance objectives of mechanical standards, as well as monitoring and review of SMS effectiveness.
 - Critical mechanical systems and devices relevant to the coal mines other than underground mines.
 - Mechanical maintenance requirements relevant to the coal mine.
- Ability to identify gaps in the SMS for the mine.
- Identify non-compliance to processes and high risks activities within their assigned area of mechanical operations as prescribed by the WHS (M&PS) Regs 2014.
- Maintenance requirements within the scope of statutory function.
- Review work practices, regarding their compliance to mechanical standards and processes.

- Review the performance of the SMS against mechanical standards and procedures.

Principal hazards (catastrophic fatal hazards) as listed in schedule 1 - Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*

- Support the implementation of the principal hazard management plans for all applicable prescribed principal hazards in WHS (M&P) Regs 2014, clause 5 and any other relating to mechanical plant.
- High level of understanding of the nature of harm that could be caused by a hazard, how serious the harm could be and the likelihood of it happening.

Principal control plans as listed in schedule 2 - Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*

- Fully understand the mechanical engineering control plan.
- Set the standards in the development and review of the mechanical engineering control plan.
- Support others to implement mechanical control plans as instructed.
- Reviewing the mechanical engineering control plan and standards have been met.
- Support the development and review of other control plans (e.g. electrical and emergency) relating to mechanical engineering standards.

Specific control measures in Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*

- Each mechanical control measure is adequately supported by relevant systems within the SMS and mechanical standards, within the specific area of the mine.
- Support the implementation of specific control measures.
- Develop contingency plans.
- System for monitoring the performance of control measures.
- Performance indicators to identify effectiveness and failure of control measures.

	<ul style="list-style-type: none"> • Corrective actions in the event of failure of controls and in the event of the indicators not meeting performance targets. • Follow-up action items to close any gaps. • Relevant equipment as per activities to be undertaken in the mine, such as firefighting.
<p>Legislation</p>	<p>Apply a broad theoretical and technical knowledge of acts, regulations, approved codes of practice, standards, and guidelines relevant to the execution of their function, such as:</p> <ul style="list-style-type: none"> • <i>Work Health and Safety Act 2011</i> and Work Health and Safety Regulations 2017. • <i>Work Health and Safety (Mines and Petroleum Sites) Act 2013</i> and Work Health and Safety (Mines and Petroleum Sites) Regulations 2014. • <i>Explosives Act 2003</i> and Explosives Regulation 2013. • approved codes of practice under the <i>Work Health and Safety Act 2011</i>: <ul style="list-style-type: none"> ○ international and Australian/New Zealand mechanical related standards.
<p>Emergency management</p>	<ul style="list-style-type: none"> • Support the implementation of emergency preparedness and response systems, evacuation, withdrawal, notification and response. • Health and safety issues. • Procedures and conditions under which persons at the mine or a part of the mine are to be withdrawn to a place of safety. • Think quickly and flexibly when required in the face of new events • Causes and prevention of mine incidents. • Support the investigation of incidents and manage system, including reporting and investigation procedures, and tracking remedial actions.
<p>General WHS topics</p>	<ul style="list-style-type: none"> • Demonstrate an ability to apply knowledge of relevant topics included in the guide of maintenance of competence scheme for statutory functions requiring practicing certificate.
<p>General knowledge to support the demonstration of technical skills</p>	<ul style="list-style-type: none"> • Advanced risk management processes and tools. • Advanced analytical processes and tools, auditing processes and techniques.

incorporating associated non-technical skills

- Types of adverse environmental conditions that may exist across the mechanical operation.
- Incident investigation processes.
- Communication channels, systems, conventions and requirements for written or verbal communications, including means of communication between different teams.
- Document control and procedures for documenting relevant communications within the mechanical engineering standards.
- Resources, tools and processes required to achieve mechanical standards.
- Conflict resolution processes in a high-risk situation.
- Planning tools and resources.
- Processes, techniques and examples of continuous improvement for WHS activity at a mine.
- Contingency planning.
- Conditions and interactions that may impact safety.
- Change management strategies to implement new or revised mechanical standards or procedures.