Australian Government

Department of Education, Employment and Workplace Relations

PSPRAD202 Work safely with radioactive ores and minerals

Release 1

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Modification History

Release	TP Version	Comments
1	PSP12V1	Primary release. Supersedes and is equivalent to PSPRAD702A. AQF indicator updated to reflect usage.

Unit Descriptor

This unit covers the ability to recognise the hazards and risks of working with uranium/thorium ores, mineral sands and any other naturally occurring material and to use appropriate radiation protection and safety measures. This involves recognising the hazards and risks associated with assigned work activities, using the required radiation protection and safety measures, responding appropriately to actual or potential emergencies, and contributing to improved radiation safety.
No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.

Application of the Unit

This unit of competency applies to personnel who directly handle, or come in direct contact with, radioactive materials in the mining and mineral processing industry sector and who may receive occupational exposures of greater than 1 millisievert per annum.
These personnel include drillers, miners, loader operators, plant operators, and samplers/testers who may:

- undertake exploration surveys of radioactive ore bodies
- extract, mill, process or pack radioactive ores, concentrates or mineral products
- manage radioactive by-products, contaminants and/or waste
- rehabilitate mine sites
- undertake laboratory testing.

All assigned work tasks would be performed under the authorisation and supervision, or delegated supervision, of a responsible person and in accordance with radiation protection safety standards, codes and guidelines.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Identify hazards and associated risks with the site and assigned tasks	1.1 Interpret and apply information about ***hazards due to radioactive materials and work activities*** at the site prior to undertaking assigned tasks, where necessary requesting further information on ***radiation protection safety standards***, ***codes and guidelines***. 1.2 Implement instructions about ***site radiation control measures***, ***monitoring***, ***safe working rules*** and ***personal protective equipment*** (PPE) specified for the location and work activities prior to undertaking assigned tasks. 1.3 Recognise hazards and risks in work area prior to starting work, at regular intervals during work, and in response to changes in working conditions and seek advice if necessary. 1.4 Recognise and report non-routine hazards and seek advice to deal with any situation beyond own technical competence.
2. Apply required radiation protection and safety measures	2.1 Use recommended hazard and risk control measures and follow safe working rules during assigned work tasks. 2.2 Comply with all site safety signs. 2.3 Follow required tag-out and lock-out procedures. 2.4 ***Use plant and equipment*** supplied for radiation protection or for the monitoring and assessment of radiation exposure. 2.5 Maintain required standards of personal hygiene.
3. Respond to potential or actual radiation incidents	3.1 Recognise any unsafe situation, hazard or ***incident*** associated with assigned tasks. 3.2 Inform relevant personnel about the situation, hazard or incident and seek their advice. 3.3 Provide appropriate workplace first response in accordance with instructions and organisation's workplace emergency ***response procedures***.
4. Contribute to radiation safety	4.1 Recognise and report defects in plant, equipment or procedures that may compromise radiation protection and safety or the management of radioactive waste. 4.2 Participate in required radiation safety training and participative/consultative activities within the scope of own responsibilities. 4.3 Advise of previous employment involving occupational exposure to radiation and cooperate in obtaining records of previous exposure. 4.4 Complete ***required records*** and reporting.

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

- following the organisation's information about radiation protection and safety
- following safety signs
- regularly assessing and reassessing risks and hazards and applying appropriate control measures
- applying standard operating procedures and specified safe working rules for assigned tasks
- seeking advice and further directions when faced with unexpected situations that may require decisions or response actions beyond own technical competence
- using and caring for PPE and personal monitoring equipment required in job role
- using communication equipment

Required knowledge

- responsibilities of employers, subcontractors and employees under:
  - commonwealth guidelines, such as RPS No.9 Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)
  - state or territory legislation and local regulations and by-laws
  - duty of care obligations
- meaning of words such as radioactivity, radioactive material, naturally occurring radioactive material (NORM), ionising radiation, contamination, contamination controls, shielding, half-life, and safe distance
- types and properties of ionising radiation (e.g. alpha, beta, gamma), particularly radiation associated with uranium, thorium and decay products (e.g. radon)
- relevant dose limits
- sources of hazardous radiation around the site (e.g. underground, tunnel, stockpiles, processing plant and storage locations) and changes in risk of exposure/contamination due to weather, time of day, etc.
- location of controlled or supervised areas within site and working rules for each
- internal and external exposure pathways and protective measures
- signs and symptoms of radiation exposure, radiation health effects
- techniques for assessing radiation hazards likely to be encountered in job role, such as:
  - spot the hazard, assess the risk, make the changes (SAM)
  - stop, think, go
- application of the hierarchy of control measures, including:
  - avoiding exposure, where practicable
  - isolating sources of radiation where practicable through shielding, containment and remote handling techniques
  - engineering controls, such as local exhaust ventilation to remove contaminants

from work area
    - adopting safe work practices, including work methods which make appropriate use of time, distance and shielding to minimise exposure
    - using approved PPE where other means of controlling exposure are not practicable
- personal hygiene, and effects and implications of risky behaviours
- health, safety and workplace emergency response procedures
- safe working rules and safe operating procedures for equipment
- safety signs relevant to job role
- use and care of PPE and monitoring equipment for job role and assigned tasks
- potential adverse health and performance effects of wearing PPE while working in potentially hazardous environments
- principles and techniques for decontamination of personnel and equipment
- procedures for the disposal of contaminated waste

Evidence Guide

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment must confirm the ability to:

- recognise radiation hazards associated with uranium/thorium ores, mineral sands or any other naturally occurring material and regularly assess and reassess risks associated with assigned tasks
- apply the radiation control measures and safe working rules specified for assigned tasks
- use and care of required PPE and monitoring equipment
- provide workplace first emergency response consistent with incident, technical competence and job role

Consistency in performance
Competency should be demonstrated by safely undertaking a variety of assigned tasks that involve working with radioactive ores and minerals.

Context of and specific resources for assessment

Competency should be assessed in the workplace or a simulated workplace environment.
Assessment must comply with:

- organisation's radiation management plan and health and safety procedures
- commonwealth guidelines, such as RPS No.9 Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)
- local, state and territory regulations

Access is required to:

- registered operator's site
- supervision by a radiation safety professional
- appropriate PPE and personal monitoring equipment
- organisation's radiation management plan and standard operating procedures

Method of assessment

The following assessment methods are suggested:

- oral questioning about the meaning of radiation terms, principles of radiation protection and safety, employee responsibilities, safe working rules, and the use and care of PPE and personal monitors
- feedback from peers and supervisor that the candidate consistently applies relevant radiation protection and safety requirements
- response to scenarios, case studies and reports of radiation incidents and exercises

- observation of the candidate safely undertaking a variety of assigned tasks involving radioactive ores in a simulated or actual workplace environment

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency that are difficult to assess directly.

Guidance information for assessment

Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
Hazards due to radioactive materials and work activities may include:	• internal exposure following inhalation and/or ingestion of radioactive dust • internal exposure to alpha radiation from inhaling radioactive gas (e.g. radon) • external exposure to radiation from radioactive materials (e.g. raw, intermediate or final products and waste)
Radiation-related ***work activities*** may include:	• collecting, preparing or consigning radioactive ore samples • drilling ore bodies above or below ground • extracting radioactive ore above or below ground • milling and processing radioactive ore • packing and storing final product or concentrates containing radioactive material • decontaminating and servicing equipment that has been in contact with radioactive material • managing waste • undertaking mine rehabilitation activities

Radiation protection safety standards, ***codes and guidelines*** may include:	• Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) radiation protection series publications, such as:
	  • RPS No.1 Recommendations for Limiting Exposure to Ionizing Radiation (1995) and National Standard for Limiting Occupational Exposure to Ionizing Radiation (republished 2002)
	  • RPS No.2 Code of Practice for the Safe Transport of Radioactive Material (2008)
	  • RPS No.9 Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)
	  • RPS No.15 Safety Guide for the Management of Naturally Occurring Radioactive Material (NORM) (2008)
	• requirements of commonwealth, state and territory legislation, such as radiation protection legislation
	• definition of a responsible person

Site radiation control measures may	• hierarchy of control measures, including:

include:	• avoiding exposure, where practicable • isolating sources of radiation where practicable through shielding, containment and remote handling techniques • engineering controls, such as local exhaust ventilation to remove contaminants from work area, and dust suppression • adopting safe work practices, including work methods which make appropriate use of time, distance and shielding to minimise exposure • using approved PPE where other means of controlling exposure are not practicable • designation of controlled or supervised areas within workplaces with appropriate working rules for each, such as: • controlled exposure times • logging of personnel on entry and exit

Monitoring may include:	• observation of personnel conducting work activities in controlled radiation areas • personal radiation monitors • personal dust monitors
Safe working rules will vary according to the organisation and assigned task and may include:	• details of expected hazards and radiation levels in work area • radiation management plan • procedures and equipment for preventing or minimising occupational, environmental and public radiation exposure during assigned work tasks • standard operating procedures covering work tasks, equipment and decontamination • requirements for personal monitoring • steps to be taken in the event of an emergency
Personal protective equipment may include:	• safety helmets, safety goggles/face shields, gloves, overalls, safety boots and hearing protection • respirators or HEPA filter masks, and dust masks • self-contained breathing apparatus (SCBA) • totally encapsulated and certified (TEC) suit

Using plant and equipment involves:	• avoiding careless or reckless actions that may:
	  • result in unnecessary personal radiation exposure or exposure of others
	  • compromise management of radioactive waste

Radiation ***incidents*** may include:	• unauthorised personnel entering a controlled area
	• failure to follow required safe working rules and/or personal hygiene requirements
	• malfunction of ventilation or dust suppression equipment
	• malfunction of PPE
	• leakage or dispersion of contaminants following processing plant breakdown or damage to storage containers
	• contamination of vehicles, clothing, equipment, food or water
	• exposure to radiation, including:
	  • dust and air
	  • external

Response procedures will include:	• instructions for keeping exposures to a minimum, consistent with essential operations through evacuation or otherwise:
	  • bringing the situation under control
	  • providing access to necessary medical or counselling services
	  • obtaining information for assessing cause of accident or

	emergency • obtaining information for assessing any doses received as a consequence of accident
Required records may include:	• work rosters and schedules • log in and log out of controlled areas • personal health records • previous work records involving radiation exposure • details of defects in plant, equipment or procedures that may compromise radiation protection and safety, or waste management • details of radiation incidents and accidents • personal monitoring results

Unit Sector(s)

Not applicable.

Competency field

Radiation Safety.