



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **PSPRAD201 Work safely in a radiation environment**

**Release: 1**

## PSPRAD201 Work safely in a radiation environment

### Modification History

| Release | TP Version | Comments                                                                                             |
|---------|------------|------------------------------------------------------------------------------------------------------|
| 1       | PSP12V1    | Primary release. Supersedes and is equivalent to PSPRAD701A. AQF indicator updated to reflect usage. |

### Unit Descriptor

This unit covers the competencies required to apply radiation protection and work safety measures when working in an environment where sources of ionising radiation are present. This involves recognising the hazards and risks associated with working near sources of ionising radiation, interpreting and following site safety information, using specified radiation protection and safety measures, applying required operational safety measures, and responding appropriately to actual or potential emergencies.

All assigned work tasks would be performed under the authorisation of a responsible person and with the advice of a radiation safety professional, such as a radiation safety officer, and in accordance with organisational procedures based on relevant radiation protection safety standards, codes and guidelines.

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 require radiation protection and site safety training prior to undertaking operational, technical, and/or maintenance tasks in a radiation environment. It is relevant to all workers who may receive occupational exposures of greater than 1 millisievert per annum.

The unit applies to those who need to be competent and take action to avoid unacceptable exposure to radiation hazards, or to ensure that others are not unacceptably exposed to radiation hazards due to their work.

- Such personnel may work in mines, construction sites, hospitals and laboratories and may include:
- utility and site service personnel, such as electricians, plumbers, fitters and equipment service technicians
- site cleaners and maintenance workers
- operators of equipment that emits ionising radiation
- those who handle and/or transport radioactive material
- those who use radionuclides.

## 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. Complete site safety induction                       | <p>1.1 Participate in required radiation protection and site safety training.</p> <p>1.2 Confirm contact details for personnel who can provide emergency and radiation protection and safety information.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2. Recognise site radiation hazards and degree of risk. | <p>2.1 Apply information about the nature and magnitude of <b>radiation hazards</b> and <b>degree of risk</b> associated with work activities at the site.</p> <p>2.2 Apply information about exposure pathways and <b>health effects</b> of radiation exposure.</p> <p>2.3 Apply information about <b>occupational dose limits</b>.</p> <p>2.4 Recognise possible sources of personal contamination and implement recommended decontamination procedures.</p> <p>2.5 Identify hazards and risks in work area prior to starting work, at regular intervals during work, and in response to changes in working conditions.</p> <p>2.6 Recognise and report non-routine hazards, unusual situations, and potential or actual emergency incidents.</p>                                                                                                                                                                                                          |
| 3. Follow procedures for controlling radiation hazards  | <p>3.1 Implement instructions based on <b>radiation protection principles</b> during assigned work.</p> <p>3.2 Apply <b>specified safe working rules</b>, and use required <b>personal protective equipment</b> (PPE) and <b>personal monitoring</b> during assigned work tasks.</p> <p>3.3 Comply with all site safety signs.</p> <p>3.4 Observe <b>required standards of personal hygiene and behaviour</b> while on site.</p> <p>3.5 Seek advice or instructions to deal with any situation beyond own technical competence.</p> <p>3.6 Apply specified procedures to decontaminate work surfaces and/or personnel as necessary.</p> <p>3.7 Implement instructions for managing contaminated waste produced during assigned tasks.</p> <p>3.8 Advise employer of previous employment involving occupational exposure to radiation and cooperate in obtaining records of previous exposure.</p> <p>3.9 Complete <b>required records</b> and reporting.</p> |
| 4. Follow workplace emergency response procedures       | <p>4.1 Review information about workplace <b>emergency response procedures</b> and personal responsibilities in the event of a <b>radiation incident</b>.</p> <p>4.2 Recognise emergency alarms, move to the designated muster point, and follow instructions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5. Report problems                                      | <p>5.1 Recognise and report defects in plant equipment and</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**ELEMENT****PERFORMANCE CRITERIA**

procedures that may compromise radiation protection and safety or ***radiation protection safety standards, codes and guidelines.***

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

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

#### Required skills

- following required radiation protection and safety procedures
- following radiation safety signs
- regularly assessing and reassessing risks and hazards and applying required control measures
- literacy skills to read signs and follow procedures
- numeracy skills to recognise dose limits
- seeking advice and further directions when faced with unexpected situations
- using and caring for PPE and personal monitoring equipment that has been issued for assigned work tasks
- responding correctly when encountering contaminated work surfaces and personnel

#### Required knowledge

- responsibilities of employers and employees under:
  - relevant commonwealth guidelines, such as RPS No.1
  - state or territory legislation and local regulations and by-laws
  - duty of care obligations
- meaning of words, such as radioactive decay, radioactive material, ionising radiation, shielding, safe distance, contamination, contamination controls, decontamination
- types and properties of ionising radiation (e.g. alpha, beta, gamma, neutron, x-ray, cosmic)
- relevant occupational dose limits
- sources of hazardous radiation around the site and degree of risk of exposure or contamination
- internal and external exposure pathways and protective measures
- radiation health effects
- location of controlled or supervised areas within the site
- safe working rules for assigned work tasks
- layers of protection:
  - 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

**REQUIRED SKILLS AND KNOWLEDGE**

practicable

- personal hygiene requirements, and effects and implications of risky behaviours
- emergency, health and safety procedures
- safe working rules and safe operating procedures for equipment
- safety signs relevant to assigned tasks
- use and care of PPE and personal monitors for assigned tasks

## 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.

**Overview of assessment** Competency must be demonstrated by applying required radiation protection and work safety measures when working in an environment where sources of ionising radiation are present.

**Critical aspects for assessment and evidence required to demonstrate competency in this unit** Assessment must confirm the ability to:

- recognise radiation hazards and regularly assess risks associated with assigned tasks
- apply the radiation control measures and safe working rules specified for assigned tasks
- use and care of required personal PPE and monitoring equipment
- follow instructions in the event of an emergency

### Consistency in performance

Competency should be demonstrated by safely undertaking a range of relevant work tasks in an area that contains actual or simulated sources of ionising radiation.

**Context of and specific resources for assessment** Assessment must comply with:

- organisation's radiation management plan and health and safety procedures
- commonwealth codes, 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)
- local, state and territory regulations

Access may be required to:

- simulated radiation training environment or registered operator's site
- supervision by a radiation safety professional (depending on radiation sources present)
- appropriate PPE and personal monitoring equipment
- organisation's radiation management plan or 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

- observation of the candidate safely undertaking a variety of assigned tasks in an area that contains actual or simulated sources of ionising radiation
- feedback from peers and/or supervisor that the candidate consistently applies relevant radiation protection and safety requirements
- review of safety/incident records completed by candidate or reports of his or her safety performance

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.

|                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Radiation hazards</i></b> may include:               | <ul style="list-style-type: none"> <li>• internal exposure following inhalation and/or ingestion of radioactive dust or vapour</li> <li>• internal exposure to alpha radiation from inhaling radioactive gas</li> <li>• external exposure to gamma radiation from radioactive materials</li> <li>• exposure to direct or unattenuated x-ray, neutron or gamma radiation beams</li> <li>• exposure following spills of solutions containing radionuclides</li> </ul>                                                             |
| <b><i>Degree of risk</i></b> may involve:                  | <ul style="list-style-type: none"> <li>• type and energy of radiation to be used (i.e. alpha, beta, gamma, x-ray, neutron)</li> <li>• whether work tasks involve routine, well-established or newly developed procedures</li> <li>• duration of work tasks</li> <li>• proximity of radiation sources</li> <li>• potential internal exposure when using unsealed sources</li> <li>• selection of specific isotopes for technical tests or procedures</li> <li>• use of radiation equipment that is not fully enclosed</li> </ul> |
| <b><i>Health effects</i></b> may include:                  | <ul style="list-style-type: none"> <li>• deterministic effects</li> <li>• stochastic effects</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b><i>Occupational dose limits</i></b> may include:        | <ul style="list-style-type: none"> <li>• effective dose</li> <li>• annual equivalent dose for the eye, skin, and hands or feet</li> <li>• pregnant workers</li> <li>• young workers</li> <li>• higher values in exceptional or special circumstances approved by the appropriate authority</li> </ul>                                                                                                                                                                                                                           |
| <b><i>Radiation protection principles</i></b> may include: | <ul style="list-style-type: none"> <li>• hierarchy of control measures, including: <ul style="list-style-type: none"> <li>• avoiding exposure, where practicable</li> <li>• isolating sources of radiation where practicable through shielding, containment and remote handling techniques</li> </ul> </li> </ul>                                                                                                                                                                                                               |

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|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"><li>• engineering controls, such as local exhaust ventilation to remove contaminants from work area, and dust suppression</li><li>• adopting safe work practices, including work methods which make appropriate use of time, distance and shielding to minimise exposure</li><li>• where other means of controlling exposure are not practicable, using approved PPE</li><li>• designation of controlled or supervised areas within workplaces with appropriate working rules for each, such as:<ul style="list-style-type: none"><li>• controlled exposure times</li><li>• logging of personnel on entry and exit</li></ul></li></ul> |
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| <b><i>Specified safe working rules</i></b> will vary according to the organisation and assigned task and may include: | <ul style="list-style-type: none"> <li>• details of expected hazards and radiation levels in work area</li> <li>• radiation management plan</li> <li>• procedures and equipment for preventing or minimising occupational, environmental and public radiation exposure during assigned work tasks</li> <li>• standard operating procedures covering work tasks, equipment and decontamination</li> <li>• requirements for personal monitoring</li> <li>• steps to be taken in the event of an emergency</li> </ul> |
| <b><i>Personal protective equipment</i></b> may include:                                                              | <ul style="list-style-type: none"> <li>• safety helmets, safety goggles/face shields, gloves, overalls, safety boots, and hearing protection</li> <li>• respirators or HEPA filter masks, and dust masks</li> </ul>                                                                                                                                                                                                                                                                                                |
| <b><i>Personal monitoring</i></b> may include:                                                                        | <ul style="list-style-type: none"> <li>• observation of personnel conducting work tasks while applying recommended contamination and radiation dose control measures</li> <li>• personal radiation monitor (film, TLD, OSL, and electronic)</li> <li>• personal dust and/or gas monitor</li> <li>• locating contamination on personnel</li> </ul>                                                                                                                                                                  |
| <b><i>Required standards of personal hygiene and behaviour</i></b> may include:                                       | <ul style="list-style-type: none"> <li>• washing or showering on completion of work tasks or prior to eating or drinking</li> <li>• collection and laundry of soiled clothes</li> <li>• collecting and managing non-reusable gloves, masks, outer clothing and waste</li> <li>• avoiding careless or reckless actions that may endanger self or others</li> </ul>                                                                                                                                                  |
| <b><i>Required records</i></b> may include:                                                                           | <ul style="list-style-type: none"> <li>• work rosters and schedules</li> <li>• log in and log out of controlled areas</li> <li>• previous work records involving radiation exposure</li> <li>• details of defects in plant, equipment or procedures that may compromise radiation protection and safety</li> <li>• details of involvement in radiation incidents and accidents</li> </ul>                                                                                                                          |
| <b><i>Emergency response procedures</i></b> may include:                                                              | <ul style="list-style-type: none"> <li>• emergency contact information</li> <li>• instructions for: <ul style="list-style-type: none"> <li>• keeping exposures to a minimum</li> <li>• appropriate first response</li> <li>• moving to muster point/evacuation</li> <li>• obtaining information to assist with assessing the cause of the incident, accident or emergency</li> </ul> </li> </ul>                                                                                                                   |
| <b><i>Radiation incidents</i></b> may                                                                                 | <ul style="list-style-type: none"> <li>• exposure of unauthorised personnel entering a</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                  |

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|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| include:                                                                               | <p>controlled area</p> <ul style="list-style-type: none"> <li>• exposure of authorised personnel due to: <ul style="list-style-type: none"> <li>• failure to follow required safe working rules</li> <li>• malfunction of ventilation or dust suppression equipment</li> <li>• malfunction of PPE</li> <li>• leakage or dispersion of contaminants following processing plant or equipment breakdown or damage to storage containers</li> <li>• spill of liquid radionuclides</li> <li>• discovery of previously unrecognised contamination of vehicles, clothing, equipment, food or water</li> </ul> </li> </ul>                                                                              |
| <b><i>Radiation protection safety standards, codes and guidelines</i></b> may include: | <ul style="list-style-type: none"> <li>• Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) radiation protection series publications, such as: <ul style="list-style-type: none"> <li>• RPS No.1 Recommendations for Limiting Exposure to Ionizing Radiation (1995) and National Standard for Limiting Occupational Exposure to Ionizing Radiation (republished 2002)</li> <li>• RPS No.7 Recommendations for Intervention in Emergency Situations Involving Radiation Exposure (2004)</li> </ul> </li> <li>• requirements of commonwealth, state and territory legislation, such as radiation protection legislation</li> <li>• definition of a responsible person</li> </ul> |

## Unit Sector(s)

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| Unit sector |  |
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## Competency field

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| Competency field | Radiation Safety |
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## Co-requisite units

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| Co-requisite units |  |
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