



Australian Government

Department of Education, Employment and Workplace Relations

NWP328A Inspect and report on embankment dam safety

Revision Number: 2

NWP328A Inspect and report on embankment dam safety

Modification History

NWP328A Release 2: Layout adjusted. Minor editorial changes to Application.
NWP328A Release 1: Primary release.

Unit Descriptor

This unit of competency describes the outcomes required to plan, implement and report on embankment dam safety inspection. This requires the operator to conduct routine visual inspection, capture and report dam condition and faults in dams constructed primarily from earth and rock materials. Dam safety operators should be aware of the damage potential of the dam and be able to recognise and report deficiencies, or adverse trends that could lead to failure.

Application of the Unit

This unit is required for staff with responsibility for the inspection of embankment dams and reporting of faults or trends.

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 <i>bold italicised</i> 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 Plan and prepare embankment dam inspection.	1.1 Identify and apply <i>organisational requirements</i> relating to embankment dam safety inspection. 1.2 Identify <i>features of embankment dam types</i> and their applications to the dams to be inspected. 1.3 Identify <i>embankment dam behaviour</i> under a range of conditions. 1.4 Gather and validate checklists and previous inspection reports. 1.5 Schedule activities for embankment dam inspection according to workplace requirements.
2 Inspect and assess the condition of components of embankment dams.	2.1 Implement embankment dam inspection procedures and practices according to <i>organisational requirements</i>, including for <i>unusual events</i>. 2.2 Inspect and assess the condition and performance of identified areas and features of embankment dams. 2.3 Recognise, record and assess any faults and changes in the condition of the embankment dam and its appurtenant structures.
3 Report the condition of the components of embankment dams.	3.1 Identify the purpose and audience of dam safety reports. 3.2 Collect and record <i>measurements and evidence</i> to establish the extent of changes in conditions 3.3 Prepare and submit reports to meet organisational requirements.

Required Skills and Knowledge

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

Required skills:

- follow instructions, standard operating procedures, policies and standards for embankment dam safety
- plan and organise work schedules and responses to contingencies
- communicate with engineering professionals, team members and the public on dam safety using clear and direct communication
- record and report dam safety data using organisation information systems
- make mathematical calculations to collect and process data from dam inspections
- identify embankment dam faults and failure indicators
- assess the importance and urgency of deficiencies
- collect and process embankment dam inspection observations
- read and interpret plans, drawings and charts
- produce embankment dam inspection reports
- apply safety hazards protocols
- use digital photography and locational equipment

Required knowledge:

- embankment dam types (including concrete faced rock fill dams), elements, zones, risks and failure modes
- historic information and lessons from previous embankment dam incidents
- potential earthquake effects and damage
- properties of stored water
- embankment dam design and construction principles, including basic understanding of:
 - materials science (in particular soil and rock properties)
 - hydraulics and erosion by water
 - principles of filters, piping and embankment stability
 - treatment of foundations, grouting and drainage system
 - pore pressures
 - causes of cracks and settlement
 - dam performance history
 - principles of embankment dam inspection
- occupational health and safety and personal work site safety relevant to worksite and working with dams including working in confined spaces
- organisational policies, procedures, guidelines and requirements relevant to the work site and dam safety monitoring

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

The candidate should demonstrate the ability to conduct and report on embankment dam safety inspection including:

- interpreting and applying relevant organisational and regulatory information and requirements to the planning of inspection activities
- identifying inspection features and scheduling activities according to the required frequency
- conducting embankment dam inspection activities
- gathering and recording data
- identifying faults, changes and failure indicators
- reporting on inspection and monitoring outcomes, with recommendations for action

Context of and specific resources for assessment

Access to the workplace and resources including:

- documentation that should normally be available in a water industry organisation

relevant codes, standards, and government regulations. Where applicable, physical resources should include equipment modified for people with disabilities.

Access must be provided to appropriate learning and/or assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the language and literacy capacity of the candidate and the work being performed.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice
- a decision of competence should only be made when the assessor has complete confidence in the person's competence over time and in various contexts

- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence
- where assessment is for the purpose of recognition (RCC/RPL), the evidence provided will need to be authenticated and show that it represents competency demonstrated over a period of time
- assessment can be through simulated project-based activity and must include evidence relating to each of the elements in this unit

In all cases where practical assessment is used it will be combined with targeted questioning or examination to assess the underpinning knowledge. Questioning will be undertaken in a manner appropriate to the skill levels of the operator, any cultural issues that may affect responses to the questions, and reflecting the requirements of the competency and the work being performed.

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.

Organisational

requirements will include:

- Australian National Committee on Large Dams (ANCOLD) guidelines
- past embankment dam inspection reports, surveillance reports and risk assessments
- survey information
- relevant regulator's technical bulletins
- occupational health and safety information, regulations and procedures
- operation and maintenance information
- dam performance history
- dam safety performance indicators
- environmental laws and policies
- incident management plans
- public safety and disaster plans
- state and local government requirements
- standard operating procedures
- asset management plan
- dam safety inspection manuals
- and may include:
 - design and modification plans and reports
 - construction records and reports

Features of embankment dam types will include:

- soil mechanics and its application in dam embankments design
- foundations, grout curtains and filter systems
- spillway and water regulation options for a range of embankment dams
- dam structure
- embankment walls and structures
- hydraulic structures
- spillways/ diversions systems
- outlet works/ intake structures
- pipes/ conduits
- abutments and foundations
- access to areas
- reservoir perimeter and downstream areas

Embankment dam behaviours will include:

- weirs and monitoring installations
- tunnels, galleries and drainage systems
- and may include:
 - mechanical and electrical components including valves, winches, hydraulic and electrical systems
 - civil infrastructure including ladders, pipe work, and security
 - post tensioning anchors
- design of the embankment downstream, upstream and settlement movement of the embankment
- leakage and seepage through drainage systems under a range of weather and storage content situations
- structural vibration and water flow patterns of regulated and flood waters
- structural movements expected during and post earthquakes

Unusual events may include:

- seismic events
- floods
- extreme inflows
- rapid draw down
- landslides and slips
- dam incidents
- sabotage / terrorist attack
- fires
- long term low storage levels

Identified areas and features will include:

- visual observation and note taking
- use of manual, electronic and/or computer equipment and digital camera
- dam condition assessments
- site security
- site access
- embankment dam safety fault indicator reporting
- landslides and environmental conditions
- details of sites to be inspected and monitored, including:
 - embankment crest, slopes and groins
 - downstream toe area
 - walls retaining earth/rock fill
 - spillways/ diversions systems
 - outlet works/ intake structures
 - pipes/ conduits
 - abutments and foundations
 - reservoir perimeter and downstream areas

Faults and changes will include:

- weirs and monitoring installations
- galleries
- cracks
- slips
- seepage
- embankment and foundation piping
- sinkholes
- erosion and rutting
- settlement and movement
- deterioration
- animal and human activity:
 - burrowing
 - vandalism
- maintenance concerns:
 - dense overgrowth
 - blocked drainage
 - leaking or inoperative valves and gates
 - damaged monitoring instrumentation

Measurements and evidence will include:

- flood, rainfall and relevant weather information
- visual observation and note taking
- manual, electronic and/or computer equipment and digital camera
- dam condition assessments
- site security
- site access
- embankment dam safety fault indicator reporting
- seismic and other incident details
- inspection findings
- location and extent of faults and changes
- photographs
- monitoring data

Unit Sector(s)

Not applicable.

Competency field

Dam safety.