



Australian Government

Department of Education, Employment and Workplace Relations

UEPOPS435B Operate and monitor flue gas (NO_x) mitigation systems

Release: 1

UEPOPS435B Operate and monitor flue gas (NOx) mitigation systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit deals with the skills and knowledge required for the operation, inspection and monitoring of flue gas NOx mitigation systems.

Flue gas (NOx) mitigation systems are those associated with coal, gas, oil and biomass fired thermal power stations, and oil and/or gas fired gas turbine power stations and combined cycle power stations

Application of the Unit

Application of the Unit 2)

This unit is intended to augment formally acquired competencies.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

There are no pre-requisite units.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following levels. A description of what each level entails is provided in Section 2.3.1 Language, Literacy and Numeracy.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare work	1.1 Safety issues are identified to comply with enterprise/site and legislative requirements
	1.2 Work requirements are identified from relevant personnel and documentation
	1.3 Localised plant inspection, pre-operational checks and field preparations for service are carried out in accordance with manufacturer's and enterprise/site procedures
	1.4 Plant operational pre-requisites are established in accordance with manufacturer's and enterprise/site procedures
	1.5 Sequence for recommissioning of plant is determined to suit existing circumstances in accordance with enterprise/site requirements
	1.6 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training
2 Operate plant	2.1 Plant is operated in accordance with enterprise and manufacturer's operating procedures
	2.2 Plant is monitored and observed to detect deviations from normal operating conditions
	2.3 Corrective actions taken or reported, to rectify abnormalities, are in accordance with industry standards and site requirements
3 Test plant operation	3.1 Tests are performed in accordance with defined procedures applicable to the operational test
	3.2 Plant is observed for correct operational response
	3.3 Corrective action is taken when response is not in accordance with documentation, plant integrity or personnel safety requirements
	3.4 Plant is returned to required operational status

ELEMENT	PERFORMANCE CRITERIA	
		upon completion of test
4 Analyse plant faults	4.1	Causes of abnormal plant operating conditions are identified by analysing the technical and operational information in a logical and sequential manner
	4.2	Corrective action taken is in accordance with enterprise/site procedures
	4.3	Plant integrity and personnel safety is maintained through consultation with appropriate personnel, and with reference to plant, technical and operational documentation
5 Monitor and inspect plant	5.1	Plant to be monitored/inspected is physically identified
	5.2	Plant is monitored/inspected for normal operation or to detect deviations
	5.3	Corrective action taken is in accordance with enterprise/site procedures
	5.4	Appropriate personnel are notified when defects are detected
6 Complete documentation	6.1	Documentation is updated and plant problems, movements and abnormalities and status are reported and logged in accordance with enterprise/site procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired operating and monitoring flue gas (NOx) mitigation systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

The extent of the Essential Knowledge and Associated Skills required follows:

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T1 Evidence shall show that knowledge has been acquired for safe working practices of:

- Relevant environmental, occupational health and safety legislation and regulations
- Enterprise procedures
- Plant drawings and manufacturers manuals
- Introduction to and typical arrangements of power production plant
- Relevant plant and equipment, its location and operating parameters
- Relevant state and territory regulations
- Electric motor types and characteristics
- Pump and compressor types and characteristics
- Valve, damper and actuator types and characteristics
- Switchgear types and characteristics
- Electrical protection types and characteristics
- Electrical principles
- Transformers types and characteristics
- Water treatment plants types and characteristics
- Types of air pollution
- Gaseous emission removal equipment, types and characteristics
- NOx control equipment, types and characteristics
- Combustion principles
- Fuels, types and properties
- Enterprise recording procedures
- Control and data acquisition systems
- Alarm, protection and control equipment
- NOx emission control system components and their interaction with other plant and equipment external to that covered by this competency
- a.c. and d.c. electrical distribution systems
- Station water distribution systems
- Fire protection control systems
- Compressed air systems
- Auxiliary supply systems.

REQUIRED SKILLS AND KNOWLEDGE

T2 Specific skills needed to achieve the Performance Criteria:

- Interpret plant drawings and manufacturers manuals
- Apply relevant state and territory regulations
- Apply enterprise recording procedures
- Communicate effectively
- Plan and prioritise work
- Organise resources
- Identify plant status
- Prepare plant/equipment for operation
- Use relevant hand tools
- Operate NOx emission control plant and equipment
- Apply diagnostic and testing techniques
- Identify and respond to abnormal plant operating conditions
- Apply data analysis techniques and tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this competency standard unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitude competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment. Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all pre-requisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UEP12". Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in 6) Essential

Knowledge and Associated Skills of this unit

- Demonstrate an appropriate level of employability skills
- Conduct work observing the relevant Anti-Discrimination legislation, regulations, policies and workplace procedure
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - The knowledge and application of relevant sections of occupational, health and safety legislation; statutory legislation; enterprise/site safety procedures; enterprise/site standard operating procedures and safe operating principles; enterprise/site emergency procedures
 - The knowledge of the principles of NOx generation during the combustion process within fossil fuelled boilers and gas turbines
 - The knowledge of principles and techniques of operation of NOx emission control plant and equipment
 - The knowledge of system components and the manner in which these components interact with other plant and equipment
 - The knowledge of operational testing of plant
 - The ability to prepare and plan work
 - The ability to prepare plant/equipment for operation
 - The ability to operate and monitor plant/equipment in accordance with enterprise/site standard operating procedures and safe operating principles
 - The ability to analyse plant faults
 - Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Competency Standards should be assessed in the workplace or

simulated workplace and under the normal range of workplace conditions.

Assessment of this unit will be supported with documentary evidence, by means of endorsement stating type and application of work.

In addition to the resources listed above in Context of assessment', evidence should show competency working in limited spaces with different types of plant and equipment as well as different structural/construction types and methods and in a variety of environments.

Method of assessment

9.4)

This unit shall be assessed by methods given in Section 1.3.00 Assessment Guidelines..

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed with allied competency standard units where listed.

UEPOPS407B Start and Run up a Gas Turbine

UEPOPS409B Start Up a Boiler Unit

UEPOPS336B Operate and Monitor a Gas Turbine

UEPOPS339B Operate and Monitor a Gas Turbine

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole, providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Plant and equipment may include: flue gas emission control systems associated with coal, gas, oil and biomass fired thermal power stations and oil and gas fired gas turbine and combined cycle power stations; a.c. and d.c. electrical distribution systems; electrical switchgear; electric motors; electric motor driven pumps and fans; valves, dampers and actuators (manual, electric, hydraulic and pneumatic); flue and/or exhaust gas temperature control equipment; storage hoppers and material conveying equipment; lubrication systems; station water distribution systems; hydraulic power oil systems; compressed air systems; distributed control systems; supervisory, protection, alarm and control equipment.

Safety standards may include relevant sections of Occupational Health and Safety legislation, enterprise safety rules, relevant State and federal legislation, national standards for plant and Australian standards.

Information and documentation sources may include verbal or written communications; enterprise safety rules documentation; enterprise operating instructions; computer-based and computer accessed documentation; enterprise/site standing and operating instructions; enterprise log books; manufacturer's operation and maintenance manuals; and equipment and alarm manuals.

Technical and operational indicators may include stimuli (auditory, olfactory, tactile, visual), local indicators and recorders, computers and alarms (visible and/or audible).

Communications may be by direct personal interaction or by means of telephone, verbal or text-based telephone messaging, two way radio, pager, computer (electronic mail) and/or operating logs (written or verbal).

Appropriate personnel for consultation, giving or receiving direction may include: supervisor/team leader or equivalent, power plant operations personnel or equivalent, technical and engineering officers or equivalent, maintenance staff, other operating staff or equivalent, system controller/network controller, field operator, restricted H.V. operators, independent generators and customers and contractor staff.

Operating environment may be remote from the plant and equipment being operated, (in cases where operation is assisted by remote indication of operating parameters and plant status), during inclement or otherwise harsh weather conditions, in hot, wet, noisy, dusty, elevated, confined or enclosed areas or during night periods.

Plant operations (systems requirements) may include:

Returns to service with the heat recovery steam generator in a cold, warm or hot condition; heat recovery steam generator internal chemical clean; raising pressure to allow steam main blow-out; raising pressure to allow safety valve setting, operational testing.

Operational tests may include:

System calibration tests, stand-by plant "cut-in" tests; dampers/valves operating checks and pre and post start tests; performance tests and alarm initiation tests

Faults and abnormal operating conditions may include:

Loss of electrical supply to switchboards, drive motors or valve actuators; controlled

RANGE STATEMENT

emissions limits exceeded; automatic control loop(s) malfunctions; high flue gas or exhaust gas temperatures; high temperatures on/in: motor and/or pump bearings, lubricating oil or motor windings; high differential pressures on oil/air filters and strainers; failed field devices; failed/malfunctioning actuators/dampers/valves; emission control system protection operation.

Generic terms are used throughout this Training Package for vocational standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms are given in Section 2.1 Preliminary Information and Glossaries.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Operations