



Australian Government

Department of Education, Employment and Workplace Relations

PMC557094A Investigate refractory failures

Revision Number: 1

PMC557094A Investigate refractory failures

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers investigating refractory failures and refractory degradation and deterioration and then recommending appropriate action. It is intended for refractory experts who will most likely also have some management responsibility.
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Application of the Unit

Application of the unit	This unit of competency requires the application of knowledge about refractory deterioration, degradation and failure modes together with methods of monitoring or recognising these to determine cause and make recommendations where appropriate to improve refractory service life. This unit is related to <i>PMC554091B Analyse refractory failures</i>, which covers the technician level of refractory failure investigation. This unit applies to individuals who may be designing a refractory installation or component and may also monitor the installation of refractory, or they may be failure investigation specialists. They may be working in liaison with other refractory specialists or they may be the sole refractory specialist for this job/in their organisation. They will typically be liaising with a range of other technical experts as well as management and maybe accounts. This unit may apply to individuals working for an organisation which supplies and installs refractories, is a refractory consulting organisation or a client organisation which buys and uses the refractory.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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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. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Confirm purpose of investigation	1.1.Liaise with relevant stakeholders 1.2.Confirm the purpose of the investigation 1.3.Draft or clarify the investigation brief 1.4.Identify discrepancies or conflicts in requirements 1.5.Negotiate a consistent set of requirements for the investigation
2. Collect appropriate data	2.1.Determine information and data requirements for investigation 2.2.Identify health, safety and environment (HSE) risks from data collection 2.3.Obtain necessary authorisations to collect required data 2.4.Ensure sampling/data collection meets required standard 2.5.Evaluate data for completeness and identify discrepancies and aberrations 2.6.Collate valid data as appropriate
3. Analyse data	3.1.Identify deterioration/failure modes 3.2.Determine causes of deterioration/failure 3.3.Identify refractory issues leading to excessive deterioration or failure 3.4.Identify process issues leading to excessive deterioration or failure 3.5.Identify other issues leading to excessive deterioration or failure
4. Make recommendations	4.1.Draft possible recommendations to improve refractory life 4.2.Discuss causes of failure and recommendations with relevant stakeholders if appropriate 4.3.Ensure information obtained meets the agreed purpose of the investigation and take appropriate action 4.4.Determine required format for reporting of investigation, causes and recommendations 4.5.Report as required to required people/organisations

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Required skills include:

- solving problems
- communicating at all levels
- using organisation knowledge system
- investigating
- analysing
- interpreting data
- negotiating
- technical reporting

Required knowledge

Required knowledge includes:

- properties of all common refractory materials
- typical limitations and applications of all common refractory materials
- installation methods and their impacts on refractory failure
- common refractory repairs and their impacts on refractory failure
- causes of refractory deterioration, degradation and failure
- identification and causes of common failure modes including:
 - spalling
 - corrosion
 - abrasion
 - impact/compression/tension
 - thermal shock

Evidence Guide

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

Assessment of this unit should include demonstrated competence in a workplace based project or a simulated workplace project.

Access should be available to all normally accessed tables, data etc which would be available to and used by a competent refractory specialist performing this assignment.

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

Competence must be demonstrated in the ability to select an appropriate material and write the required specification.

Context of and specific resources for assessment

Assessment may occur on the job or in an appropriately simulated environment. Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.

Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.

Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.

Method of assessment

- Assessment must satisfy the endorsed assessment guidelines of the Manufactured Mineral Products Training Package.
- Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge.
- Assessment methods which include direct observation of tasks should also include questioning on underpinning knowledge to ensure its correct interpretation and application.
- Assessment may be applied under project related conditions (real or simulated) and require evidence of

EVIDENCE GUIDE	
	process. • Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances. • Assessment may be in conjunction with assessment of other units of competency where required.
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy capacity of the candidate and the work being performed.

Range Statement

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. 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.

Stakeholders

Stakeholders may include:

- customer representatives
- technical experts
- regulators
- refractory designer
- refractory installer

Purpose of investigation

The purpose of the investigation may include:

- routine monitoring of the 'wear and tear' deterioration of a refractory
- investigation of suspected degradation of a refractory still in use
- investigation of a catastrophic refractory failure
- investigation to support an insurance or other claim
- investigation requested by a third party (e.g. for a dispute)
- technical investigation aimed at better understanding the refractory in use and so improving the refractory

Data collection

Data collection may include:

- examining samples of failed refractory
- collecting data of a refractory in use
- collecting observations of a refractory in use
- examining an entire refractory installation after it has been shutdown
- one set of data collection or a planned series of data collection at specified intervals over a specified period

HSE risks

HSE risks may include:

- exposure to heat
- exposure to dust

RANGE STATEMENT	
	confined space entry
Discussions with stakeholders	Discussions with stakeholders will vary depending on the purpose of the investigation, for example: - technical investigation - all relevant technical personnel - dispute investigation - discussions may be limited to discussions with client - claim investigation - discussions may be limited to discussions with client

Unit Sector(s)

Unit sector	Operational/technical
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		