



Australian Government

MSL954005 Prepare mineral samples for analysis

Release: 1

MSL954005 Prepare mineral samples for analysis

Modification History

Release	Comments
Release 1	This version was released in <i>MSL Laboratory Operations Training Package Release 2.0</i>. Supersedes and equivalent to MSL954002 Prepare mineral samples for analysis. Range of conditions removed. Assessment requirements amended.

Application

The unit of competency describes the skills and knowledge to reduce given mineral samples to representative client samples and analytical portions that meet client requirements for analysis. Personnel are also required to recognise problems and invalid preparation steps and take appropriate corrective actions.

This unit applies to technical assistants working in the mineral assay and construction materials testing sectors.

No licensing or certification requirements exist at the time of publication. However, regulations and/or external accreditation requirements for laboratory operations exist, so local requirements should be checked. Relevant legislation, industry standards and codes of practice within Australia must also be applied.

Pre-requisite Unit

Nil

Competency Field

Sampling

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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|---|---|-----|--|
| 1 | Interpret and schedule client requirements | 1.1 | Review client request to identify sample/analysis requirements, preparation methods and equipment involved |
|---|---|-----|--|

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
	1.2 Inspect samples, compare with specifications, record and report any discrepancies 1.3 Liaise with client when samples and/or request forms do not comply with workplace procedures 1.4 Identify hazards, safety equipment and safe work procedures specified for the sample, preparation methods, reagents and equipment 1.5 Plan parallel work sequences to optimise throughput of multiple sets of samples 1.6 Assemble all required equipment materials, reagents and check they are fit for purpose
2 Prepare client samples for analysis	2.1 Estimate safe times for the preparation of required sample portions 2.2 Split samples to obtain representative sub-samples as required 2.3 Safely operate preparation equipment 2.4 Monitor texture of the samples as an indicator of particle size and adjust milling times accordingly 2.5 Monitor sample compaction and build-up of residues on equipment and rectify as necessary 2.6 Record preparation difficulties that may impact on quality or cause additional client costs 2.7 Report any departure from preparation methods or client specifications 2.8 Label client samples and record chain of custody information 2.9 Store all client samples in accordance with workplace procedures
3 Use	3.1 Examine the recommended preparation method to

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Performance criteria describe the performance needed to demonstrate achievement of the element.

	non-destructive methods to prepare laboratory portions for analysis		identify critical steps that will affect the quality of analytical results
		3.2	Closely follow each preparation step with particular attention to safety, precision and minimisation of cross-contamination of samples
		3.3	Monitor parameters that indicate completion or failure of each preparation step
		3.4	Analyse and record invalid preparation steps and take corrective action before repeating the procedure
		3.5	Present laboratory portions for analysis in appropriate containers with all required chain of custody documentation
4	Maintain a safe work environment	4.1	Apply established safe work practices and use personal protective equipment (PPE) to ensure personal safety and that of other laboratory personnel
		4.2	Minimise the generation of waste and environmental impacts
		4.3	Ensure the safe disposal of all hazardous waste and spent or surplus samples
		4.4	Clean, care for and store equipment and reagents as required

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Equivalent to MSL954002 Prepare mineral samples for analysis, Release 1.

Links

MSL Laboratory Operations Companion Volume Implementation Guide is available from VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5c63a03b-4a6b-4ae5-9560-1e3c5f462baa>

Assessment Requirements for MSL954005 Prepare mineral samples for analysis

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Performance Evidence

There must be evidence the candidate has completed the tasks outlined in the elements and performance criteria of this unit, and:

- safely reduced at least 3 types of mineral samples to representative samples and prepared analytical portions of each that meet client requirements. Portions must be:
 - representative
 - free of contamination
 - of specified quantity and particle size
 - ready for analysis.

Knowledge Evidence

There must be evidence the candidate has knowledge of:

- geological properties of samples used in job role, including sulphides, oxides and silicates
- typical materials sampled include:
 - solids, such as rocks, minerals, soils, sands and stream sediments
 - pulverised core and other drill samples, such as rotary air blast (RAB), reverse circulation (RC) and aircore samples
 - powder concentrates
 - dump samples and grab samples
- sample preparation methods:
 - sorting, boxing and drying
 - sieving
 - primary crushing (e.g. 10 mm, 2 mm)
 - fine pulverising (e.g. 100 micron, 75 micron)

- partial digestion requiring separation (e.g. aqua regia)
- complete digestion (e.g. multi-acid digest)
- non-destructive (e.g. LIF, Li2B4O7 disks)
- critical preparation steps that determine analytical accuracy and precision, including:
 - monitoring drying (incipient and total)
 - mixing to ensure homogeneity before sub-sampling
 - suitability of reagents for purpose (e.g. dryness)
 - accurate operation of dispensers and balances
 - critical/non-critical volumes and critical reagent quantities
 - temperature control during digests
 - loss of solution prior to/after mixing
 - type and acid strength in final solutions
 - mechanical loss of digest (sputtering, residues on glassware/plastic ware and filtering)
- terminology, including homogeneous, heterogeneous, integrity and segregation
- distribution of common analytes in a matrix
- chemical reactions associated with common preparation methods used in job role
- effects of reagents on the element of interest
- reaction and recovery rates, solubility and equilibria
- tracking analytes of interest during changes of state
- function of key components and operating procedures for sample preparation equipment
- calculation steps in preparation methods (e.g. serial dilution)
- use of non-international system of units (SI) units (ppm, ppb) and SI units, and conversions
- relevant hazards, work health and safety (WHS) and environmental requirements, including use of safety data sheets (SDS) and antidotes for specific hazards, including hydrofluoric acid and cyanide
- workplace and/or legal traceability requirements
- awareness of environmental sustainability issues as they relate to the work task
- legal and ethical requirements specific to the work task.

Assessment Conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies. The following conditions must be met for this unit:

- use of suitable facilities, equipment and resources, including:
 - a variety of mineral samples, sample preparation methods, reagents, sample containers and labels
 - client requests/documentation
 - sample preparation equipment including splitters, mills, bowls and tumblers, crushers, grinders and disc pulverisers, sieves, ovens and muffle furnaces

- laboratory equipment: ultrasonic baths, centrifuges and vacuum and pressure filtration, volumetric glassware/plastic ware and dispensers, analytical balances and auto-samplers
- safety equipment and safe work procedures.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

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