



Australian Government

MSL973011 Perform fire pouring techniques

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MSL973011A Perform fire pouring techniques

Application

This unit of competency covers the ability to follow standard procedures for extracting precious metals from their host matrices in readiness for analysis. Fire pourers are expected to handle routine samples, recognise common sample preparation and cupellation problems and make standard adjustments to fluxes and firings. They are expected to seek advice from their supervisor when non-routine problems arise.

This unit of competency is applicable to laboratory personnel working in the mineral assay industry sector.

While no specific licensing or certification requirements apply to this unit at the time of publication, laboratory operations are governed by relevant legislation, regulations and/or external accreditation requirements. Local requirements should be checked.

Pre-requisite Unit

Nil

Competency Field

Testing

Unit Sector

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 Plan work for shift | <div style="display: flex; flex-direction: column; gap: 10px;"><div>1.1 Review job requests to identify the samples, preparation methods required for each, and shift priorities</div><div>1.2 Identify hazards, safety equipment/procedures associated with samples, preparation methods, reagents and equipment</div><div>1.3 Plan parallel work sequences to optimise the throughput</div></div> |
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- of multiple sets of samples during shift
- 1.4 Assemble all required equipment, materials, reagents and check they are fit for purpose
 - 1.5 Check pots and cupels and discard those with faults and/or a record of high gold values
 - 1.6 Check that fusion and muffle furnaces are operating at the specified temperatures
- 2 **Prepare sample racks for fusion**
- 2.1 Check samples against accompanying documentation and record/report any discrepancies
 - 2.2 Conduct simple visual/chemical tests for each sample to assess the adequacy of prior sample preparation and possible presence of sulphides or other mineralogy
 - 2.3 Weigh out the recommended amount of sample and add specified identifier to maintain orientation, as necessary
 - 2.4 Weigh out flux components, mix thoroughly with the sample charge and transfer to recommended type and size of pot without loss of material
 - 2.5 Place pots in racks
 - 2.6 Record all required details of sample preparation to ensure traceability of samples
 - 2.7 Seek advice to deal with any situation beyond scope of responsibility or knowledge
- 3 **Obtain acceptable buttons and prills**
- 3.1 Maintain sequencing in order to track samples, buttons and prills throughout the recovery process
 - 3.2 Monitor furnace temperature/time to ensure complete sample fusion
 - 3.3 Remove fused samples from furnace and pour into moulds with minimal loss of material
 - 3.4 Recognise the need for repeat firings due to lead shotting and/or poor fusions
 - 3.5 Separate slag and button with minimal loss of collector

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| | | 3.6 | Inspect buttons for matte, brittleness, size and malformed shape |
| | | 3.7 | Place acceptable buttons in muffle furnace using cupels that have been previously loaded and preheated |
| | | 3.8 | Regularly monitor furnace temperature/time/air flow to ensure efficient cupellation |
| | | 3.9 | Recover prills, check identifiers and inspect for contamination, losses and evidence of other precious metals (e.g. high gold, Platinum and Palladium) |
| | | 3.10 | Complete and collate sample records before presenting prills for analysis |
| 4 | Troubleshoot and correct common recovery failures | 4.1 | Monitor all stages of recovery for indicators of potential loss |
| | | 4.2 | Recognise undesirable recovery conditions and decide whether the process requires correction |
| | | 4.3 | Apply an established corrective action and restart the process |
| | | 4.4 | Document any adjustments made to standard methods and re-sequencing of samples |
| | | 4.5 | Seek advice when problems are beyond scope of responsibility or knowledge |
| 5 | Perform daily maintenance of assay equipment | 5.1 | Grade and inspect pots using established criteria prior to storage for re-use |
| | | 5.2 | Report defective equipment and consumable requirements to appropriate personnel |
| 6 | Maintain a safe work environment | 6.1 | Use safe work procedures and personal protective equipment (PPE) to ensure personal safety and that of others |
| | | 6.2 | Minimise the release of collectors to the work environment |

6.3 Segregate and dispose of waste in accordance with workplace requirements

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.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Standards, codes, procedures and/or workplace requirements

Standards, codes, procedures and/or workplace requirements include the latest version of one or more of:

- Australian and international standards covering the requirements for the competence of testing and calibration laboratories; laboratory safety; quality management and environmental management; analysis of specific ores and determination of gold; and labelling, storage, handling and transport of hazardous materials
- national work health and safety (WHS) standards and codes of practice, national environmental protection measures, and national measurement regulations and guidelines
- specific codes, guidelines and procedures, such as National Association of Testing Authorities (NATA) accreditation requirements and principles of good laboratory practice (GLP)
- workplace documents, such as standard operating procedures (SOPs); quality and equipment manuals; maintenance schedules; material safety data sheets (MSDS) and safety procedures; material, production and product specifications; production and laboratory schedules; workplace recording and reporting procedures; and waste minimisation and safe disposal procedures
- recovery methods and procedures for specific samples, sites and clients (labelling, preparation, storage, transport and disposal), and published preparation methods

Samples

Samples include, but are not limited to, one or more of:

- solids, such as rocks, minerals, soils, sands and stream sediments
- core and other drill samples (e.g. rotary air blast (RAB), reverse circulation (RC) and aircore)
- slurries, powder concentrates and metallurgical solutions
- dump samples and grab samples

Sequencing of pots in a rack

Sequencing of pots in a rack includes, but is not limited to, or more of:

- addition of silver wire or silver nitrate (AgNO_3) mix
- addition of coloured salts (e.g. copper sulphate CuSO_4)

Separation of collectors

Separation of collectors includes, but is not limited to, one or more of:

- cupellation; digestion; and/or parting, annealing and weighing for a gravimetric finish

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Hazards

Hazards include, but are not limited to, one or more of:

- dust, silica, slag, glass shards and molten flux
- chemicals, such as hydrofluoric acid, bromine, perchloric acid, aqua regia, cyanide, lead-based compounds, free-mercury and nickel compounds
- noise and vibration
- crushing, entanglement and cuts associated with moving machinery
- manual handling of heavy loads, such as pots, racks and trolleys
- heat exhaustion/stress and fatigue

Workplace safety procedures

Workplace safety procedures include, but are not limited to, one or more of:

- ensuring access to service shut-off points, fire-extinguishers/fire hoses, safety shower/eye wash stations and first aid stations
- recognising and observing hazard warnings and safety signs
- labelling samples, reagents and hazardous materials
- using direct extraction and fume hoods
- providing guards for moving machinery parts
- providing noise insulation
- using PPE, such as dust masks, heat-resistant mittens, safety face shields with tinted visor, coats, ear muffs, safety boots, heat-reflective clothing and latex gloves for flux handling
- following established manual handling procedures
- regularly cleaning equipment and work areas
- reporting abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/wastewater, gasses, smoke, vapour, fumes, odour and particulates, to appropriate personnel

WHS and environmental management requirements

WHS and environmental management requirements include:

- complying with WHS and environmental management requirements at all times, which may be imposed through state/territory or federal legislation. These requirements must not be compromised at any time

- applying standard precautions relating to the potentially hazardous nature of samples

Unit Mapping Information

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Links

MSA Training Package Implementation Guides - <http://mskills.org.au/training-packages/info/>