



Australian Government

Assessment Requirements for MSL975010 Perform fire assay techniques

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MSL975010A Perform fire assay techniques

Performance Evidence

Evidence of competence in this unit must satisfy all of the requirements of the elements and performance criteria, and include demonstration of:

- safely performing fire assay techniques to extract a range of precious metals from their host matrices in readiness for analysis on at least three (3) occasions
- interpreting and closely following standard recovery methods
- selecting and modifying laboratory methods to suit particular ores and to ensure total recovery
- accurately weighing samples and flux components
- maintaining close attention to technical and safety requirements in a physically demanding hazardous environment
- maintaining sequential control of samples through all recovery stages
- optimising work flow to ensure efficiency of recovery for multiple client samples
- recognising and identifying the cause of non-acceptable received and fused samples, buttons and prills
- identifying indicators of poor recovery and contamination
- applying knowledge of mineral chemistry and fire assay techniques to solve recovery and contamination problems
- keeping accurate and complete records, including:
 - pour sheets (date, time, client, pour number and preparation method)
 - number of pots, positions of sample, blank and check in rack
 - adjustments made to standard preparation methods for specific samples
 - analytical method
 - assay data
- minimising rework, waste and environmental impacts
- safely collecting and disposing of all waste responsibly
- recognising hazards, using workplace safety procedures and safety equipment to work safely at all times.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- chemical and physical principles relating to:
 - fusion of mineral ores
 - cupellation
 - parting and digestion processes
- expected physical and chemical properties of materials at each recovery stage
- standard methods for the fire assay of a range of precious metal ores relevant to job role
- criteria for an 'acceptable' button, including:
 - one piece, mass >20g and <50g
 - malleable
 - separates cleanly from slag
 - free of undecomposed ore, matte and speiss
- causes of contamination, including:
 - poorly made cupels
 - base metals (copper (Cu), nickel (Ni), zinc (Zn) and bismuth (Bi))
 - arsenic (As), sulphur (S), antimony (Sb), selenium (Se), tellurium (Te) and chromium (Cr)
 - scoria
 - sprouting
- indicators of potential loss and the corrective actions, including:
 - viscous slag (check furnace temperature, adjust flux and lower charge weight)
 - lead shotting (adjust flux and lower charge weight to compensate for high oxides, silicates and chromites)
 - sulphides (adjust fusion time and adjust sample weight and/or flux)
 - matte, speiss (adjust sample weight and flux)
 - incomplete fusion (adjust sample weight and/or flux)
 - unacceptable button (adjust sample weight and/or flux)
 - inquartation (add 3 parts silver (Ag) to prill, wrap in lead foil and re-cupel)
- workplace safety procedures and operation of safety equipment
- function and operation of assay/equipment used as part of job role
- workplace and/or legal traceability requirements
- relevant hazards, work health and safety (WHS) and environment requirements.

Assessment Conditions

- Judgment of competence must be based on holistic assessment of the evidence. Assessment methods must confirm consistency of performance over time, rather than a single assessment event.
- This unit of competency is to be assessed in the workplace or a simulated workplace environment. A simulated workplace environment must reflect realistic operational workplace conditions that cover all aspects of workplace performance, including the environment, task skills, task management skills, contingency management skills and job role environment skills.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept in each case).
- This unit of competency may be assessed with:
 - MSL975020 Apply routine spectrometric techniques
- Holistic assessment methods include:
 - observation of the candidate
 - review of quality control performance and analytical results traceable to assay samples prepared by the candidate
 - review of sample records prepared by the candidate
 - feedback from supervisors, peers and/or clients about the candidate's ability to safely and efficiently extract a range of precious metals from their host matrices in readiness for analysis, provide acceptable buttons and prills, and troubleshoot and correct common recovery failures
 - written/oral questioning about relevant mineral chemistry principles, precious metal recovery steps, typical problems and corrective actions.
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit, including, but not limited to:
 - client requests/documentation, including client profile, sample identification, sample receipt, storage and analyses, and required preparation method/and service charges
 - a variety of precious metal ore samples
 - fire assay methods, examples of assay records, equipment, materials and reagents
 - assay equipment, including:
 - mixing equipment and balances
 - fusion and muffle furnaces and associated spares
 - temperature sensors and hotplates
 - compressed air service, extraction systems and fuel supply lines
 - pots, cupels, pouring equipment, pot loader, trolleys, moulds, tongs and hammers
 - safety equipment and workplace safety procedures.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competence and currency.
- Technical competence can be demonstrated through:

- relevant VET or other qualification/Statement of Attainment AND/OR
- relevant workplace experience.
- Currency can be demonstrated through:
 - performing the competency being assessed as part of current employment OR
 - having consulted with a laboratory about performing the competency being assessed within the last twelve months.

Links

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