



Australian Government

MSL974015 Operate an automated mineral analysis system

Release: 1

MSL974015 Operate an automated mineral analysis system

Modification History

Release 1. New unit

Application

This unit of competency covers the ability to operate a computer-controlled robotic system for the specialised analysis of minerals, such as iron ore. Automated mineral analysis systems are operated in conjunction with robotic sample preparation systems to handle high volumes of relatively homogeneous material or when there is a need to minimise the operator's contact with potentially hazardous materials.

This unit of competency is applicable to instrument operators in the mining industry sector. Personnel are required to adjust the system's operating parameters to suit individual sample batches and to achieve production targets without sacrificing quality or safety standards. They are required to interpret routine system error codes and apply specified corrective actions and seek advice when non-routine problems arise. Operators are not required to interpret analytical methods or results.

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.	
1	Prepare automated analysis system for operation	1.1	Confirm equipment status, shift priorities, work flow issues and/or specific client requirements with supervisor and other operators
		1.2	Plan or adjust work flow to suit maintenance or servicing as required

- 1.3 Review job requests to identify samples/batches, required operating parameters and any special instructions/analyses for each
 - 1.4 Identify hazards, safety equipment and safe work procedures associated with samples, reagents, analytical methods and operating robotic arms
 - 1.5 Perform routine system checks at start of shift
- 2 Conduct or monitor loading of samples into system
 - 2.1 For systems with a manual in-feed station, prepare vials with the specified sample volume and load them in the correct sequence
 - 2.2 For fully automated systems, monitor sample in-feed station to ensure vials contain specified minimum volumes
- 3 Monitor and adjust system operation
 - 3.1 Adjust system operating parameters, such as furnace temperature, to suit specific batch requirements
 - 3.2 Monitor control screens continuously and respond promptly to error codes
 - 3.3 Conduct regular visual checks to ensure that system elements are operating correctly
 - 3.4 Interpret routine error codes to identify faulty system elements
 - 3.5 Take control of system and activate interlocks to isolate relevant system elements before investigating faults
 - 3.6 Clean and reposition robots, vials, crucibles or other system elements as necessary
 - 3.7 Use appropriate system checks and commands to reset system elements, re-enter sample data and resume operations
 - 3.8 Seek advice about dealing with any situation beyond scope of responsibility or knowledge
 - 3.9 Liaise with and assist relevant service personnel to ensure major breakdowns are rectified promptly

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| 4 | Maintain a safe work environment | 4.1 Use safe work practices, safety equipment and personal protective equipment (PPE) to ensure personal safety and that of others

4.2 Clean and maintain system elements, maintain consumable stocks, and care for and store equipment as required

4.3 Minimise the generation of waste and environmental impacts

4.4 Segregate and dispose of wastes in accordance with workplace requirements |
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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; industrial robot systems; sampling and analysis of specific mineral ores; 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

- requirements for specific samples, batches and clients (such as labelling, preparation, analysis, storage, transport and disposal)
- methods and procedures, which may be written, to meet workplace, client and/or regulatory/certifying body requirements

Mineral samples

Mineral samples include one or more of:

- pulverised solids, such as rocks, minerals, soils, sands and stream sediments
- pulverised core and other drill samples

Automated analytical methods in

Automated analytical methods include, but are not limited to, one or more of:

- thermal gravimetric analysis (TGA)
- x-ray fluorescence (XRF)

Automated system elements

Automated system elements include:

- sample in-feed station
- weigh stations
- mould table
- furnaces
- robotic arms
- conveyor belts
- acid/ultrasound baths for cleaning crucibles
- compressed air system

Routine system checks

Routine system checks include:

- safety
- operating system, including calibration checks
- stocks of reagents, such as fluxes, acids and cleaning agents

Visual checks

Visual checks include:

- presence of surface dust on system elements, particularly sensors

- sample contamination during sample extraction from vials
- cleanliness of crucibles before re-use

Routine system faults and corrective actions

Routine system faults and corrective actions include one or more of:

- balancing errors in weigh station (activate interlocks, clean sensors, recheck and reset weigh station, and reset system to re-weigh sample)
- positioning errors by robot (activate interlocks, manually reposition vials or crucibles, recheck and reset system)
- cracked bead or incomplete fusion (activate interlocks, check rejected sample, reset system to extract fresh sample from correct vial and repeat fluxing and fusion)
- contamination of sample by robotic arm during sample extraction from vial (reset system to reject contaminated sample and extract fresh sample for analysis)
- leaks in pneumatic elements (arrange for servicing)

Hazards

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

- dust
- noise and vibration
- fixed source x-ray radiation, RF radiation from induction furnaces
- crushing, entanglement and cuts associated with moving machinery
- impact injuries from contact with robot arms
- failure of pneumatic hoses

Safe work procedures

Safe work procedures include, but are not limited to, one or more of:

- ensuring access to service shut-off points
- recognising and observing hazard warnings and safety signs
- labelling of samples and hazardous materials
- extracting dust
- using guards for moving machinery parts
- providing noise insulation
- following established manual handling procedures
- regularly cleaning equipment and work areas
- using PPE, such as masks, heat resistant mittens, boots, goggles, coats, ear muffs, safety boots and heat-reflective clothing
- monitoring exposure to workplace radiation by wearing personal thermoluminescent dosimeters

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

Release 1. No equivalent unit

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for MSL974015 Operate an automated mineral analysis system

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Performance Evidence

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

- operating an automated mineral analysis system safely, reliably and efficiently for at least three (3) different sets of operating conditions or three (3) different types of samples
- interpreting and applying workplace procedures for operating an automated mineral analysis system
- recognising potential problems caused by prior sample handling and/or preparation
- applying specified start-up/shutdown procedures and system checks
- recognising and promptly responding to common system error codes
- taking control of the system and safely investigating and rectifying faults using specified procedures
- cleaning and repositioning automated system elements
- using appropriate commands to reset system, update system information and resume operations after stoppages
- maintaining sequential control of samples through all stages of analysis
- recognising hazards and using specified safety equipment, personal protective equipment (PPE) and safe work practices
- communicating problems clearly and promptly to supervisors and/or service personnel
- minimising rework, waste and environmental impacts
- working safely.

Knowledge Evidence

- Must provide evidence that demonstrates knowledge of:
- importance of good customer relations, achieving production targets and minimising costs and rework
- purpose of analytical tests conducted in job role
- function and operation of automated system elements and flow chart for automated analysis process
- computer operating procedures, including use of specific control screens, menus and control commands
- common faults, routine system error codes and specified corrective actions for each
- procedures for cleaning/maintaining equipment and instruments used in job role
- procedures for preventing contamination of samples and equipment

- procedures for ensuring traceability of samples
- relevant hazards, work health and safety (WHS) and environment requirements.

Assessment Conditions

- Judgement 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).
- Holistic assessment methods include:
 - review of production data in operator/system logs showing the range of operating conditions and samples handled by the candidate
 - review of quality control performance and analytical results traceable to samples handled by the candidate
 - feedback from supervisors, other operators and/or service personnel about the candidate's ability to safely operate an automated mineral analysis system, achieve quality and production targets, communicate effectively with other personnel and seek advice when necessary
 - observation of the candidate using an automated mineral analysis system and handling stoppages or breakdowns
 - oral or written questions to assess candidate's knowledge of automated system procedures, prioritising work flows, recognising and rectifying common faults, and safe work procedures.
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit, including, but not limited to:
 - an automated mineral analysis system, operating procedures, reagents, sample containers and labels
 - mineral ore samples, such as iron ore
 - client requests/documentation, such as client profile, sample identification and sample receipts, required analyses, storage and/or disposal, and service charges
 - safe work procedures, safety equipment and PPE.
- 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

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