ACCREDITATION SERVICES

SCC Requirements and Guidance for the Accreditation of Mineral Analysis Testing Laboratories

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Table of Contents

Introduction

The general requirements for the competence of testing and calibration laboratories are described in ISO/IEC 17025:2017. These requirements are designed to apply to all types of calibration and objective testing and therefore need to be interpreted with respect to the type of calibration and testing concerned and the techniques involved. The SCC Requirements and Guidance documents also apply.

This Program Speciality Area – Mineral Analysis (PSA-MA) document provides an elaboration, interpretation and additional requirements to those requirements in ISO/IEC 17025:2017 that are required for laboratories involved in performing mineral analysis testing. It is expected that where no elaborations, interpretations or additional requirements are stipulated in this document for the elements of the standard, best scientific practices in the area of mineral analysis testing will guide the assessment process.

The program is designed to ensure mineral analysis testing laboratories meet minimum quality and reliability standards and to ensure a demonstrated uniform level of proficiency among mineral analysis testing laboratories. This document identifies the minimum requirements for accreditation of laboratories supplying mineral analysis testing services.

This document does not re-state all the provisions of ISO/IEC 17025:2017 and laboratories are reminded of the need to comply with all the relevant criteria detailed in ISO/IEC 17025:2017 and the current edition of the Accreditation Services Program Overview. The main clause numbers in this document generally follow those of ISO/IEC 17025:2017, but since not all clauses require interpretation, the numbering of clauses may not be contiguous. Section 9 is unique to this document.

To obtain initial accreditation by SCC under the PSA-MA program, a laboratory shall successfully complete both a proficiency testing regimen and an on-site assessment by technical specialists. The assessments will be conducted using standard SCC assessment protocols as outlined in the Accreditation Program Overview.

Laboratories are also reminded of the need to comply with any and all relevant statutory or legislative requirements applicable to the jurisdiction in which they operate. With respect to health and safety legislation, this normally requires the establishment of a health and safety committee, or if the laboratory is small, an employee with responsibility for overall safety, as per Section 5.5 of ISO/IEC 17025:2017.

1. Scope

The PSA-MA program for mineral analysis testing laboratories applies to tests associated with the measurement of all media used in mining exploration and processing. This includes, but is not limited to, sediments, rocks, ores, metal products, tailings, other mineral samples, water and

vegetation. However, it cannot cover all aspects of mineral analysis testing and shall be regarded as being representative of this area of activity. The specific scope described below was selected because of the market demand. This scope may be modified, depending on market and regulatory requirements.

2. Normative References

The following referenced documents are essential for the application of this document. The latest edition of the referenced document (including any amendments) applies.

- ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories
- SCC Accreditation Services Program Overview
- SCC Requirements and Guidance for Accreditation of Laboratories Engaged in Test Method Development and Non-Routine Testing
- SCC Requirements & Guidance – Proficiency Testing for Testing and Medical Laboratories
- SCC Requirements and Guidance for Calibration and Measurement Traceability in Testing Laboratories
- SCC Requirements and Guidance for Method Validation in Testing Laboratories
- SCC Requirements and Guidance for the Accreditation of Testing Laboratories
- ILAC P9:06/2014 ILAC Policy for Participation in Proficiency Testing Activities
- BIPM JCGM 200:2012, International vocabulary of metrology – Basic and general concepts and associated terms (VIM). (2012). (JCGM 200:2008 with minor corrections) V J Barwick and E Prichard (Eds), Eurachem Guide: Terminology in Analytical Measurement – Introduction to VIM 3 (2011). ISBN 978-0-948926-29-7.

3. Definitions

All definitions in ISO/IEC 17025:2017 and VIM 3rd ed. and those applicable from ISO/IEC 17043 and ISO 9000 apply.

Scientists from different sectors often use different words for the same concept; however, consistent definitions are essential if analysts and assessors are to understand each other. Also, words can have several meanings and be used in different ways. An example of this is the word “replicate” which has a generic meaning and is used in general conversation; while, “replicate” has a specific meaning in mining laboratories. For these terms, laboratories should clearly define and use these terms consistently. The Eurachem Guide “Terminology in Analytical Measurement - Introduction to VIM 3”, First Edition 2011 and the Analytical Methods Committee Technical Briefs on terminology are good sources for these definitions.

For the purposes of this document the following definitions will be used:

3.1 Laboratory sample

The customer submitted material received by the testing laboratory or an off-site physical sample preparation facility

3.2 Test sample

Sample, prepared from the laboratory sample, from which the test portions are removed for testing or for analysis.

NOTE: The test sample is the result of physical preparation operations, including all comminution, splitting, blending, and handling operations. The analyst withdraws a test portion from the test sample.

4. General Requirements

No additional requirements

5. Structural Requirements

No additional requirements

6. Resource Requirements

ISO/IEC 17025:2017	SCC Requirements
6.3 Facilities and environmental conditions	
6.3.1	The laboratory shall have procedures for monitoring, controlling and recording environmental conditions such as acceptable dust control, especially in the sample comminution area and activities.

7. Process Requirements

ISO/IEC 17025:2017	SCC Requirements
7.1 Review of Requests, Tenders and Contracts	
7.1.1	Laboratories that, as part of their accredited test(s), report test results with respect to the parent sample from “representative” prepared samples or sub-samples received from an off-site physical sample preparation facility shall, in contracts with their customers, specify the crushed top particle size and pulverized pass criteria as required by section 9.
7.3 Sampling	
	The laboratory shall monitor the reliability of its sampling and sub sampling to ensure any sub-sample taken (e.g. from a crushed rock split) is reliably and demonstrably representative of the original sample submitted. The records referenced on test sample containers must be retained for the life of the test sample and must be readily available. Record requirements for physical sample preparation are described in section 9.
7.5 Technical records	
7.5.1	The record of calculations and data transfers shall include when such checks were carried out and by whom.
7.7 Ensuring the validity of results	
7.7.2	The Laboratory shall participate in a proficiency testing program based on the availability of such program and according to the hierarchy below. All accredited tests listed on the laboratory scope of accreditation must be covered semi-annually at minimum. • A recognized PT provider (ISO/IEC 17043 accreditation) • An approved provider of a round-robin study qualifying a reference material certification process • Interlaboratory comparison study that involves, at minimum, one external lab using the same method • Intralaboratory comparison study involving method comparison/techniques (e.g. AAS vs ICP) or different analysts performing the method on the same sample • Internal method study that demonstrates that the method is fit for use (e.g. spike recovery, long term CRM performance).

8. Management System Requirements

No additional requirements

9. Physical Sample Preparation at Mineral Analysis Laboratories

9.1 General sample reduction assessment criteria

Physical sample preparation refers to the process in which bulk or other samples have undergone any size reduction processes to provide an appropriate, representative sub-sample. The reduction process may take place on-site or off-site.

If the laboratory is analyzing sub-samples received from an off-site sample reduction facility, then clause 7.8.5 of ISO/IEC 17025:2017 applies - where relevant, a statement to the effect that the results relate only to the items tested or calibrated.

9.1.1 The record of the laboratory sample mass on receipt and the test sample mass after physical preparation must be maintained.

9.1.2 The assessment of the size reduction processes shall include the laboratory demonstrating to the Assessor the following:

a. The sample is crushed to the appropriate top particle size as specified in the contract (e.g. 90% <10 mesh).
b. The pulp material is pulverized to pass the criteria specified in the contract (e.g. 90% <150 mesh).
c. Items a) and b) must be documented by keeping a record of regular screen tests of the crushed and pulverized material at an established frequency and with action taken if and when these tests fail on a regular basis.

9.1.3 There is a clear demonstration that all routinely used sieves employed have been certified, are properly maintained, checked and cleaned at appropriate intervals.

9.1.4 Sieves are critical pieces of equipment and must meet the general requirements of SCC Requirements and Guidance for Calibration and Measurement Traceability in Testing Laboratories. The laboratory shall periodically confirm the sieves are suitable for use. This may be done a few ways:

a. By use of particle size certified reference materials (CRM) or
b. By comparison to a “reference sieve” that is kept for the purpose of checking against the sieves in use.

Sieves with openings smaller than 0.15 mm are more easily damaged. These should be checked more often than those with larger openings. Sieves with openings greater than 2

mm require less frequent checking. These are more robust, and defects are generally obvious by visual inspection.

9.2 Required documentation includes:

9.2.1 The manufacture's certificate of compliance (e.g. stating their conformity to ISO 9001, and the manufacturing requirements of ASTM E11 and ISO 565 3310-1).

9.2.2 The laboratory records "date the sieve was put into use". (This information could be recorded directly on the certificate.)

9.2.3 The laboratory records "date the sieve was removed from use". (This information could be recorded directly on the certificate.)

9.2.4 The laboratory has developed and implemented a procedure(s) for use and maintenance of sieves in the physical sample preparation area that meets the following requirement:

9.2.5 Sieves are cleaned, usually via air hose, in between each sample and further cleaning by other means if air cleaning fails to remove sample.

9.2.6 The sieves are regularly inspected for damage, for example, tears.

9.2.7 Proper maintenance can be demonstrated by recording cleanings in the log book and recording observations that the sieve is not damaged.

9.3 Specific off-site sampling assessment criteria

For samples reduced off-site, the accredited test method must contain a clear statement that the "physical preparation of samples" encompasses all processes including those sample reduction processes from off-site physical sample preparation facilities.

The assessment of the off-site preparation of samples for these specific accredited test methods shall include the laboratory demonstrating to the Assessor the following requirements in addition to those mentioned above:

Provides evidence that the offsite sample preparation location is under the operational control of the laboratory;

Provides evidence demonstrating that the samples prepared at a different location meet contractual or advertised specifications;

Provides evidence demonstrating that the offsite sample preparation location is under the scope of the laboratory quality management system, including evidence that the offsite sample preparation location is part of the internal audit processes;

Provides any further documentation or records as requested, to demonstrate conformance of the off-site preparation activities to ISO/IEC 17025, SCC requirements, and laboratory procedures; and,

*Note: The facility doing the physical sample preparation cannot be accredited for the physical preparation alone because stand-alone sample preparation methods cannot be accredited by SCC.

9.3.1 Records and when necessary, actions taken of regular screen tests of the crushed and pulverized material shall be accessible to the accredited laboratory, either electronically or by hard copy. Records shall also include acceptance criteria, where required. Also, see 9.1.2.

9.3.2 The off-site physical sample preparation facility has developed and implemented a procedure for use and maintenance of sieves in the sample reduction area and this procedure shall be accessible to the accredited lab.

9.4 Failure to meet specific off-site sampling assessment criteria

If the laboratory is unable to demonstrate during the assessment that all the requirements for off-site facilities are met, the Laboratory will be required to provide this evidence in response to the assessment findings. SCC may decide, based on the information collected during the on-site assessment of the laboratory or during any other type of assessment that an on-site assessment of the offsite sample preparation location is required. The laboratory may elect to have SCC conduct an assessment at all or representative off-site physical sample preparation facilities at the full cost to the laboratory.

9.5 Scope listings and test reports

For mineral analysis laboratories that choose to include the off-site physical sample preparation in their accreditation, the off-site sample preparation locations shall be clearly identified and listed on their Scope of Accreditation. In the "Notes" section of the Scope there shall be a statement similar to the following:

"The physical sample preparation involving accredited test methods as listed on the scope of accreditation may be performed at .... (name) ..... laboratory or at off-site physical sample preparation locations that are monitored regularly for quality control and quality assurance practices."

10. Informative References

The following is an extensive list of recommended references (refer to the most current version):

- Eurachem/CITAC Guide: Traceability in Chemical Measurement. A guide to achieving comparable results in chemical measurement.
- Eurachem Guide: The Fitness for Purpose of Analytical Methods. A Laboratory Guide to Method Validation and Related Topics
- CITAC/Eurachem Guide: Guide to Quality in Analytical Chemistry. An Aid to Accreditation
- Eurachem/CITAC Guide: Quality Assurance for Research and Development and Non-routine Analysis.
- Eurachem/CITAC Guide: Quantifying Uncertainty in Analytical Measurement.
- V J Barwick and E Prichard (Eds), Eurachem Guide: Terminology in Analytical Measurement – Introduction to VIM 3
- ISO 3534-1:2006, Statistics - Vocabulary and Symbols - Part 1: General statistical terms and terms used in probability.
- ISO 5725-1:1994/Cor 1:1998, Accuracy (trueness and precision) of measurement methods and results - Part 1: General principles and definitions.
- ISO 5725-2:1994/Cor 1:2002, Accuracy (trueness and precision) of measurement methods and results - Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method.
- ISO 5725-3:1994/Cor 1:2001, Accuracy (trueness and precision) of measurement methods and results - Part 3: Intermediate measures of the precision of a standard measurement method.
- ISO 5725-4:1994, Accuracy (trueness and precision) of measurement methods and results - Part 4: Basic methods for the determination of the trueness of a standard measurement method.
- ISO 5725-5:1998/Cor 1:2005, Accuracy (trueness and precision) of measurement methods and results - Part 5: Intermediate measures of the precision of a standard measurement method.
- ISO 5725-6:1994/Cor 1:2001, Accuracy (trueness and precision) of measurement methods and results - Part 6: Use in practice of accuracy values.
- ISO 7870-1:2014, Control Charts – Part 1: General guidelines.
- ISO 7870-2:2013, Control Charts – Part 2: Shewhart control charts.
- ISO 7870-3:2012, Control Charts – Part 3: Acceptable control charts.
- ISO 7870-4:2011, Control Charts – Part 4: Cumulative sum charts.
- ISO 9000, Quality management systems - Fundamentals and vocabulary.
- ISO Guide 30:2015, Terms and definitions used in connections with reference materials.
- ISO Guide 33:2015, Uses of certified reference materials.
- ISO 21748, Guidance for the use of repeatability, reproducibility and trueness estimates in measurement uncertainty estimation.
- ISO/IEC Guide 2:2004, Standardization and related activities – General vocabulary.

- ISO/IEC Guide 98-1:2009, Uncertainty of measurement – Part 1: Introduction to the expression of uncertainty in measurement.
- ISO/IEC Guide 98-3:2008, Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995).
- ISO/IEC Guide 99:2007, International vocabulary of metrology - Basic and general concepts and associated terms (VIM).
- ISO 13528, Statistical methods for use in proficiency testing by interlaboratory comparisons.
- ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories.
- ISO/IEC 17043, Conformity assessment – General requirements for proficiency testing.
- Harmonised Guidelines for Internal Quality Control in Analytical Chemistry Laboratories, (Technical Report) 1995 - Pure & Appl. Chem., Vol. 67, No. 4, pp 649-666, 1995.
- Harmonized Guidelines for Single-laboratory Validation of Methods of Analysis, (IUPAC Technical Report) 2002 - Pure Appl. Chem., Vol. 74, No. 5, pp 835-855, 2002.
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- UKAS M3003, The Expression of Uncertainty and Confidence in Measurement, Edition 3, UKAS, Feltham, UK (2012).
- The International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories (IUPAC Technical Report) Prepared for publication by Michael Thompson, Stephen L.R. Ellison, Pure Appl. Chem., Vol. 78, No. 1, pp 145-196, 2006.
- AMC Technical Brief, Terminology – the key to understanding analytical science. Part 2: Sampling and sample preparation, Editor M Thompson, Analytical Methods Committee AMCTB No 19 March 2005.
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- Eurachem/CITAC Guide CG4: Quantifying Uncertainty in Analytical Measurement, (2012).
- Neubauer, Dean V. (Ed), (2010), MNL 7 Manual on Presentation of Data and Control Chart Analysis: 8th Edition.
- ASTM Standard E2587–16, “Standard Practice for Use of Control Charts in Statistical Process Control”.
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