Quality Manual

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1 SCOPE

This document applies to individuals within the Trace Evidence Unit (TEU).

2 EQUIPMENT

2.1 Instruments Requiring Internal Calibration/Alignment Verification (Complete list of instruments maintained within the appropriate unit)

The following instruments used in the TEU require internal calibration/alignment verification. Further information on calibration/alignment verification can be found in the appropriate technical procedure.

A. Microspectrophotometers
B. Fourier Transform Infrared Spectrometers (FT-IR)
C. Malvern Panalytical Empyrean X-ray Diffractometer

2.2 Instruments Requiring Internal Calibration (Complete list of instruments maintained by the unit)

The following instruments used in the TEU require internal calibration. Further information on calibration can be found in the appropriate technical procedure.

A. Glass Refractive Index Measuring System (GRIM3)
B. ThermoFisher iCAP 6500 Duo Inductively Coupled Plasma – Optical Emission Spectrometer (ICP-OES)
C. ThermoFisher iCAP RQ Inductively Coupled Plasma – Mass Spectrometry (ICP-MS) with NWR UP213 Nd:YAG Laser Ablation System

2.3 Instruments Requiring External Calibration/Alignment (Complete list of instruments maintained by the unit)

A. Balances
    1. Balances are calibrated on an annual basis by an ISO 17025 accredited laboratory to manufacturer's specifications.
    2. A record of calibration will be maintained by the unit.
B. Micrometers/Calipers/Gauges
    1. These are calibrated on an annual basis by an ISO 17025 accredited laboratory to manufacturer's specifications, if used for critical measurements.
    2. Certificates of calibration dates will be maintained in Resource Manager.
C. Balance Weights
    1. These weights are recertified on a biennial basis by an ISO 17025 accredited laboratory to manufacturer's specifications.
    2. Certificates of conformance will be maintained on the UNET.
D. Malvern Panalytical Empyrean X-ray Diffractometer

1. The alignment of the XRD is verified on an annual basis by an outside vendor, and if necessary, they will re-align the system.
2. Refer to the alignment and maintenance logs maintained adjacent to the instrument and vendor service summaries maintained on the system computer for the documentation of service visits.

2.4 Microscope Maintenance

A. Microscopes are cleaned and serviced on an annual basis by an outside vendor. A list of microscopes by unit requiring yearly maintenance will be maintained within the appropriate unit. A microscope will not be considered out of service unless it has not been serviced within a year and a half of its last service.
B. Microscopes used for trace evidence examinations at a non-FBI Laboratory controlled space will be assessed prior to use. This assessment will include performing modified Kohler illumination and color balancing, if appropriate. This assessment will be recorded in the examination notes. Any irregularities observed during this assessment will also be recorded in the examination notes.

2.5 Microscope Transport

If items will be examined outside the Laboratory there may be a need to bring a stereobinocular microscope to the external location to facilitate the examinations.

A. The microscope will be disassembled into its component parts and carefully packed in a container (*e.g.*, Pelican case) to ensure they will not be damaged during transport.
    1. The component parts will be inspected for possible damage and the microscope will be reassembled at the external location. If any damage has occurred, or if any irregularities are observed during use, the microscope will not be used.

2.6 Quality of Products

Products that can affect the quality of analysis must be verified prior to use. If the quality of the new supply, reagent or consumable has not been shown to meet the requirements of the analysis, it will not be used. Materials requiring quality checks prior to use and the method for checking their quality are identified in the individual technical procedures dictating their use. Quality checks will be recorded, and the documentation will be maintained with the appropriate equipment.

3 REFERENCE MATERIALS

3.1 Reference Materials

A reference material is material, sufficiently homogeneous and stable with reference to specified properties, which has been established to be fit for its intended use in measurement or in examination of nominal properties.

3.1.1 TEU Reference Materials

- Trace Elements in Glass Reference Material (National Institute for Standards and Testing [NIST] standard reference material [SRM] 1831)
- Float Glass Reference Material (Bundeskriminalamt [BKA] FGS 1 from SCHOTT Glass, Germany)
- Trace Elements in Glass (National Institute for Standards and Testing [NIST] standard reference material [SRM] 612)
- Float Glass Reference Material (BKA FGS 2 from SCHOTT Glass, Germany)
- Float Glass Reference Material (BKA DGG from SCHOTT Glass, Germany)
- Container Glass Reference Material (NIST SRM 621)
- 1000 µg/ml Scandium Spectrometric Standard Solution (NIST-traceable)
- Glass Refractive Index Reference Material, (NBS melt 9012, or equivalent)
- Glass Refractive Index Reference Material, (BKA K5, from SCHOTT Glass, Germany)
- Locke Scientific standard reference glasses (Locke B1 through B12, Locke A1 through A5, Locke C1 and Locke C1, or equivalent)
- Holmium oxide Suprasil7 standard
- Didymium Suprasil7 standard
- Neutral density 0.1 Suprasil7 standard
- Neutral density 0.5 Suprasil7 standard,
- Neutral density 1.0 Suprasil7 standard
- XRD (X-ray diffractometry) Flat Plate Intensity Standard (NIST SRM 1976)
- XRD (X-ray Diffractometry) Fat Plate Intensity Standard (NIST SRM 1976c)
- Pressed Silicon Powder XRD Line Position and Line Profile Standard
- Polystyrene Standard: 1.5mil (38 micron) matte-finish film mounted on a card (Traceable and/or non-traceable)
- Standards Wheel in Nicolet 6700 or is50 Spectrometer Bench: 1.5mil (38 micron) matte-finish NIST traceable polystyrene standard and 1.0mil Schott NG11, National Physical Laboratory (NPL) traceable optical glass reference installed within the bench
- Pinhole Slide: Slide containing a metal disk with a 100 micron pinhole, an open hole, and a gold mirror
- XRF (X-ray Fluorescence) Calcium Hydroxyapatite Standard (NIST SRM 2910-a)

3.2 Known Material Reference Collections

A known material[1] is an item from an identified source. Known materials may be acquired for the purpose of comparison with an evidentiary sample or for inclusion in reference collection(s) utilized in training and/or to assist in identification in casework.

3.2.1 TEU Known Material Reference Collections

- Anthropology
    - Histological slides

[1] This is similar to, but distinguished from, using sampling to take a representative portion of an evidentiary sample and labeling it as a Known (*e.g.*, taking a known sample of a piece of evidentiary fabric).

    - Skeletal Casts
    - Skeletons
- Geology
    - Building materials
    - Glass
    - Kitty litter
    - Minerals
    - Rocks
    - Safe Insulation
    - Soil
- Hairs and Fibers
    - Animal Hair
    - Cordage
    - Fabric
    - Fibers
    - Human Hair

3.3 Standards and Controls

A. Reference materials will be traceable to SI units or to certified reference materials, where practicable.
B. Reference materials will be used only during their certification period, if applicable.
C. The holmium oxide, didymium, and neutral density Suprasil7 standards must be returned for re-certification after the end of their certification period.
D. Reference materials will be used as described in the individual technical procedures requiring their use.

3.4 Storage

A. Reference materials and reference collections should be stored in an appropriate container and stored according to manufacturer instructions, if any.
    1. Liquid reference materials will be stored in tightly closed containers.

4 Validation of Technical Procedures

A. Validation studies will include, at a minimum:
    1. Definition of the scope of the analytical procedure
    2. Identification of the characteristic(s) of the technical procedure to validate
    3. Optimization of analytical parameters and select experiments to determine the required characteristic(s)

5 MONITORING

5.1 Performance Monitoring

A. Forensic examiners within the Hairs and Fibers discipline will complete at least one proficiency test annually in the examination and comparison of hairs and in the examination and comparison of textile fibers.
B. Forensic examiners within the Geology discipline will complete at least one proficiency test annually in the examination and comparison of glass and in the examination and comparison of soil.
C. Forensic examiners within the Anthropology discipline will complete at least one proficiency test annually in the examination and/or comparison of skeletal remains.
D. Physical Scientists within the Hairs and Fibers discipline will complete at least one intralaboratory comparison in the area of debris screening for apparent hairs and/or textile fibers.
E. Additional performance monitoring activities may be conducted as necessary to ensure the inclusion of a representative sample of the components/parameters and equipment/technologies within each TEU discipline listed on the scope of accreditation.

5.1.1 Proficiency Testing

Upon review of the proficiency test testing scenario, the TL will provide any relevant information or instruction to the test participants to ensure consistency amongst participants if the design of the test will require departure from standard procedures.

5.1.2 Other Performance Monitoring

A. Intralaboratory tests created in TEU will be created with a witness. The witness will be recorded on the Performance Monitoring – Design/Preparation form (7-290a) along with the Preparer.
B. Intralaboratory comparisons will be technically and administratively reviewed prior to submission.

6 REPORT WRITING

A. The Results of Examinations section will be used to communicate the results of the trace evidence examinations.
B. The report will include a description of the methods used in analysis.
    1. This information may be in the Results of Examination section or under a separate heading.
    2. If no examinations were conducted, then no methods section is required.
C. Interpretations and/or limitations will be included and will be used to communicate any known limitations of the results, and/or limitations of the testing based on the evidence received.
    1. This information will include any interpretations that may aid the reader in understanding the significance of the Results of Examinations.

2. This information may be in the Results of Examination section or under a separate heading.
3. If no examinations were conducted, then no interpretations/limitations section is required.

7 PROCEDURE – REVIEWS

A. A technical review of all Laboratory Reports containing examination results will be conducted by the Technical Leader or an Examiner qualified in the discipline.
B. The Unit Chief, Supervisor, or an Examiner will perform an administrative review of all Laboratory Reports.
C. If the reviewer is qualified in the discipline of the Laboratory Report, they may conduct the technical review, verification, and administrative review.

8 REVISION HISTORY

Revision	Issue Date	Changes
00	1/28/2022	Drafted new manual including requirements from previous Trace Evidence Quality Manual documents.
01	7/15/2022	Added Section 5.1.2.A regarding intralaboratory test creation witnessing. Clarified Section 7.A was applicable to reports containing examination results