Performance Monitoring Protocol for Microspectrophotometers

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1 INTRODUCTION

This document addresses the quality assurance/quality control (QA/QC) performance monitoring of the microspectrophotometer (MSP) systems. Color measurement of fibers is conducted using one of the MSP systems identified below or an equivalent or better system. The performance of the system must be monitored in order to verify that the instrument is producing reliable and reproducible results.

2 SCOPE

This procedure applies to the microspectrophotometer (MSP) systems utilized by personnel in the Trace Evidence Unit (TEU) and Scientific and Biometrics Analysis Unit - Trace (SBAU-Trace) .

3 EQUIPMENT

- Microspectrophotometer: CRAIC QDI 2010, CRAIC Microspectra 121™ (MSP 121)[1], J&M TIDAS S 800, or equivalent or better system
- Calibration filters with certification of traceability to National Institute of Standards and Technology (NIST) standards:
    - Holmium oxide standard
    - Didymium standard (if needed per manufacturer specifications)
    - Three neutral density standards: OD 0.1, OD 0.5, and OD 1.0
- Quartz slide marked with reference point
- Lens paper

4 STANDARDS AND CONTROLS

The calibration filters are analyzed as the performance standard to assess operating performance, wavelength assignment, absorbance assignment, and continued integrity of the system. The filters may only be used within the listed time frame on the certificate associated with the filter.

5 PROCEDURE – DAILY PERFORMANCE CHECK

Calibration verification must be conducted each day the instrument is to be used before beginning casework analysis.

A. The calibration verification spectra should be saved in the proper calibration folder in the MSP system.
B. Ignite the appropriate source and allow approximately 30 minutes of stabilization time before beginning analysis.
C. Place the quartz slide on the sample stage and obtain Köhler illumination. The slide will remain on the stage for the remainder of the analysis.

[1] The CRAIC Microspectra 121™ (MSP 121) is the designation that CRAIC gives to microspectrophotometers sold through GSA. Based on when the instrument was purchased it may designate differing models.

D. Initialize the calibration software feature in the system.
E. Begin the wavelength verification:
    1. Collect a spectrum of the holmium oxide standard.
    2. Collect a spectrum of the didymium standard if required per manufacturer specifications.
    3. The software will compare the obtained values to the target values programmed for the holmium oxide and didymium filters (if needed) (example: 440.90nm ± 3.00nm).
    4. Verify that the software reports passing results and/or verify that the obtained values are within the target range as tabulated on the NIST traceability certificate.
    5. If the obtained values are within the certified range, save the wavelength test results and document the results in the instrument log.
F. Begin the photometric verification:
    1. Collect a spectrum for each of the three (3) neutral density standards.
    2. The software will compare the obtained values to the target values programmed for the assigned neutral density filters (example: 0.128 ± 0.026AU).
    3. Verify that the software reports passing results and/or verify that the obtained values are within the target range as tabulated on the NIST traceability certificate.
    4. If the obtained values are within the certified range, save the photometric test results and document the results in the instrument log.
G. If passing results are obtained for both the wavelength and the photometric calibration verification tests, the MSP system is ready for use.
H. If at any point in the calibration verification process the obtained values are not within the certified range, verify Köhler illumination, gently clean the filters with lens paper, verify proper filter placement, and conduct a subsequent analysis.
    1. If the obtained values are still not within the certified range, place an out-of-service sign on the instrument, record the instrument status in the appropriate logbook, and contact the Technical Leader (TL) or SBAU-Trace supervisor, for assistance in troubleshooting.
    2. The TL or SBAU-Trace supervisor is responsible for bringing the instrument back into service.
    3. Any adjustments made will be recorded in the appropriate log.

6 LIMITATIONS

Only properly trained personnel shall perform the duties involved in the operation, maintenance, and troubleshooting of this instrument.

7 SAFETY

Universal precautions will be followed. No specific hazards are associated with the microscopy techniques performed.

8 REVISION HISTORY

Revision	Issue Date	Changes
04	2/3/2020	Removed Trace Evidence from the title. Updated SBAU-Trace name throughout. Updated instrument list in Section 2. Updated language in Sections 3 and 4.
05	1/28/2022	Reformatted entire document and removed duplicate information.