



# **TENNESSEE BUREAU OF INVESTIGATION**

## *Forensic Services Division*

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### Microanalysis Quality Assurance Manual Equipment

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#### **Maintenance of Equipment**

#### **Polarized Light Microscope, Comparison Polarized Light Microscopes and Phase Contrast Microscope**

The microscopes should be covered when not in use and cleaned as necessary.

Kohler illumination shall be established prior to every use of these microscopes and noted in case notes. If Kohler cannot be established or maintained, take the microscope out of service and consult the Unit Supervisor as to next steps.

#### **Kohler Illumination Procedure**

1. Focus the microscope on a sample using transmitted light.
2. Close down the field aperture (field diaphragm). Observe the octagon shaped aperture in the field of view (or if it is really badly out of focus, the entire image will get darker). Close the aperture until it occupies about 2/3 or less of the field of view
3. Focus the condenser with the knobs that raise/lower the entire condenser. The octagon shaped aperture should be made as sharp as possible
4. Center the condenser using the two centering pins.
5. Open the field aperture until it is just out of view.
6. Adjust the condenser aperture so the contrast of the image is appropriate for the analysis.

If a microscope does not reveal an image, verify that the light bulbs are good. If the bulb is blown, replace and check for an image. If there is still no image, verify Kohler illumination. If both of these do not produce an image, take the microscope out of service and consult Unit Supervisor as to next steps.

All problems and repairs shall be reported in the Equipment Maintenance Computer Database.

#### **Stereomicroscopes**

The stereomicroscopes should be covered when not in use and cleaned as necessary.

If a stereomicroscope does not reveal an image, verify that the light bulbs are good. If the bulb is blown, replace and check for an image.



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For stereomicroscopes installed on a boom stand, adjust the position of the stereomicroscope on the stand if an image cannot be brought into good focus.

If an image cannot be established or maintained, take the stereomicroscope out of service and consult Unit Supervisor as to next steps.

Maintain a report of any problems and repairs in the Equipment Maintenance Computer Database.

#### **Ovens**

For ovens used in *Fire Debris Analysis*, temperatures shall be checked and recorded in case notes before samples are placed inside and when the samples are removed. Temperature and date shall be recorded on the worksheet.

For ovens used in *Fire Debris Analysis*, a temperature of 60°C - 80°C shall be maintained. If the oven does not maintain the set temperature, take the oven out of service and consult Unit Supervisor as to next steps.

For ovens used to dry acid digestion samples in *Glass Analysis*, the oven should be set to a temperature that will evaporated the acids without softening the plastic tubes (usually approximately 80°C).

For ovens used in the examination and analysis of other evidence, the oven should be set to a temperature appropriate to the needs of the evidence.

Maintain a report of any problems and repairs in the Equipment Maintenance Computer Database.

#### **Thermometers**

New NIST Certified Oven Thermometers should be purchased annually for all ovens. The NIST Certification papers shall be maintained in the Microanalysis Unit. If only one NIST Certified Oven Thermometer is purchased, that thermometer will be used to check the calibration of the other oven thermometers. Place the new thermometer in the oven with the old thermometer and allow the oven to equilibrate for approximately 15 minutes. Both the new thermometer reading and the old thermometer reading will be recorded. If the thermometers are within  $\pm 2^\circ\text{C}$  of each other, the old thermometer may continue

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to be used. These checks will be done annually and will be recorded in the oven log maintenance book.

#### **Sartorius SC-2 Microbalance**

The microbalance has an internal calibration feature that calibrates the span of the balance. The balance should be internally calibrated with each series of weighings. At a minimum, the balance shall be internally calibrated once each day of use. When the calibration procedure begins, the built-in calibration weights are internally applied by servomotor and removed at the end of the calibration. The date, time and examiner's initials shall be recorded in the Equipment Maintenance Computer Database. In addition, 10 and 20 mg weights shall be weighed each day of use. These weights shall also be documented in the Equipment Maintenance Computer Database. The balance shall maintain an accuracy of +/- .005 mg. If the microbalance does not maintain this accuracy, remove the balance from service and consult the Unit Supervisor as to next steps.

The microbalance should be cleaned at the end of each use. The chamber should be cleaned of any residue from the weighing. Any additional cleaning may be performed as needed.

The microbalance shall be re-linearized whenever the balance is moved. An internal calibration is performed at the end of the linearization procedure.

The microbalance shall be checked and calibrated annually by an external certified company. Documentation of these checks and calibrations shall be maintained in the Microanalysis Unit. If the microbalance does not pass this calibration, remove the balance from service and consult the Unit Supervisor as to next steps.

#### **Pipetters**

Pipetters shall be calibrated annually by an external certified company. The resulting report shall be maintained in the Microanalysis Section. If a pipetter cannot be calibrated, it will be replaced.

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#### **Mettler Balance**

At most, the balance shall be checked with a 1 g and a 20 g weight once a quarter. Because this balance is not routinely used, the examiner should check the Equipment Maintenance Computer Database before each use to determine if the balance has been checked within the last 3 months. If it has not, then the person shall perform the weight check before proceeding. Certified weights will be used for this check. The balance shall maintain an accuracy of +/- .05 grams. The result of the balance check will be maintained in the Equipment Maintenance Computer Database. If the balance is not able to maintain the accuracy, remove the balance from service and consult the Unit Supervisor as to next steps.

Maintain a report of any problems and repairs in the Equipment Maintenance Computer Database. This balance shall be checked and calibrated annually by an external certified company and the report shall be maintained in the Microanalysis Unit.

#### **Polarized Light Microscope with Mettler Hot Stage**

A sample of material with a known melting point shall be analyzed for melting point prior to use for fiber melting point. If sample is within its melting point range, the examiner may proceed with evidence analysis. If it is not, the hot stage will be removed from service and the Unit Supervisor will be consulted as to next steps.

#### **Calipers**

The calipers shall be performance checked quarterly as needed with certified calibrated gauge blocks. The blocks used will be the .200 inch and the .500 inch. This measurement can vary +/- .01 inch. This measurement will be recorded on a sheet with the calipers and in the Equipment Maintenance Computer Database. If the measurement exceeds +/- .01 inch, the calipers will be removed from service and the Unit Supervisor will be consulted as to next steps. Any service or repair shall be documented in the Equipment Maintenance Computer Database.