EQUIPMENT MAINTENANCE

23.1 PURPOSE

To ensure that equipment in the Forensic Biology Unit is working acceptably for casework.

23.2 RESPONSIBILITY

Personnel qualified to perform Forensic Biology duties.

23.3 DEFINITIONS/ABBREVIATIONS

A. NIST: National Institute of Standards and Technology
B. LIMS: Laboratory Information Management System

23.4 PROCEDURE

23.4.1: General Information/Performance Checks

A. New Equipment:

1. New equipment will be performance checked and deemed acceptable for use before being placed into service.

    a. The performance check will be recorded on the appropriate equipment log sheet (newly generated if needed).

    b. A memo will be generated by a Lead of the Forensic Biology Unit or designee, stating that it is acceptable for use and its effective date.

    c. Once deemed acceptable for use it will be added to the Equipment Inventory located in Appendix 3.

2. New equipment for a new method will be validated along with the new method. (see FB SOP-25 Validation of New Serological Tests).

B. Any equipment that does not produce results per the defined parameters of the performance check will be removed from service.

1. A sign will be attached to the equipment indicating that it is out of service and is not to be used for casework.

2. A Forensic Biology Lead will be notified and the Technical Lead of the unit will investigate and determine a solution.

3. An Incident Report may be opened.

C. Laboratory Equipment will be cleaned as needed with the appropriate disinfecting solution described in FB SOP-21 (General Chemical and Reagent QC) and according to FB SOP-01 (Physical Evidence Examination). Forensic Biology centrifuges may be cleaned according to DNA QR-290 (Centrifuge Cleaning Log).

D. Equipment such as centrifuges and pipettes utilized for the Male Screen Procedure in the Forensic Biology Unit are deemed critical and will be maintained according to DNA SOP-9 (Equipment & Performance Checks).

E. For additional information, please see GL-21 (General Laboratory Equipment) and GL-22 (Policy on Validation and Performance Checks).

23.4.2: Incubators

Incubators have been deemed critical and will be performance checked accordingly.

A. Weekly Performance Checks

1. Incubator temperatures are set for 37°C and checked weekly using the thermometer placed within each unit.
2. The temperature, date and initials are recorded on the appropriate Equipment Log Sheet (form GL 21.4).
3. The temperature range should be 35°C - 39°C.
    a. If the temperature deviates from this range, adjust the temperature according to the manufacturer's instructions as needed and record on the appropriate Equipment Log Sheet (form GL 21.4).
    b. If the temperature continues to deviate from this range, notify Lead, remove from service until the problem is corrected and record on the appropriate Equipment Log Sheet (form GL 21.4).

B. Annual Performance Check

1. Incubators are performance checked annually using a NIST traceable thermometer to monitor the temperature of each unit.
2. The results of the performance check will be recorded on the Incubator Performance Check Equipment Log Sheet.

3. Each unit will be marked to indicate that it is acceptable for use according to step 23.4.2.A. 3 above.

4. A memo will be written to document this performance check.

C. If the set temperature is adjusted for other than 37°C, the incubator will be performance checked with a NIST traceable thermometer before use, and after use once set point is returned to 37°C. Record on the Incubator Performance Check Equipment Log Sheet.

23.4.3: Refrigerators and Freezers

A. Check the temperatures of the refrigerators and freezers weekly.

B. The refrigerator temperature must be maintained above 0°C and no higher than 7°C. For refrigerators with set temperatures, the acceptable range should be no more than +/-3°C of the set point.

C. The freezer temperature must be maintained no higher than -5°C. For freezers with set temperatures, the acceptable range should be no more than +/-5°C of the set point.

D. The temperature, date and initials are recorded on the appropriate Refrigerator or Freezer Equipment Log Sheet (form GL 21.4).

E. If the temperature deviates from either of these ranges, adjust the temperature according to the manufacturer's instructions as needed and record on the appropriate Refrigerator or Freezer Equipment Log Sheet (form GL 21.4).

F. If the temperature continues to deviate from these ranges, notify Lead, remove from service until the problem is corrected. Record actions taken on the appropriate Refrigerator or Freezer Equipment Log Sheet (form GL 21.4).

G. The LIMS location designated as "Freezer Storage" will consist of secure freezer storage units.

1. These units may contain:
   a. Samples, items and/or evidence requiring long term freezer storage.
   b. Sexual assault related evidence retained according to Public Act No. 15-207 and requiring freezer storage.
   c. Evidence requiring temporary freezer storage as needed.

2. In general, the contents will be organized by case number beginning with the oldest cases in the Forensic Biology walk-in-freezer up to the most current cases in individual freezer units as they are obtained by the unit. The specific case ranges within each unit will be clearly marked on each unit.

3. See Equipment Inventory (Appendix 3) for a list of freezer storage units and their location.

23.4.4: Thermometers

Thermometers have been deemed critical and will be performance checked annually.

A. Check the thermometers from each unit annually against a NIST traceable thermometer. The temperatures must read within ± 2°C of the NIST thermometer.

B. For units with placed thermometers, remove and place with the appropriate NIST traceable thermometer as follows:
   1. The freezer thermometers will be placed in the walk-in freezer (room 1-186).
   2. The refrigerator thermometers will be placed in the walk-in refrigerator (room 1-185).
   3. The incubator thermometers will be placed in one (1) incubator.

C. For units with built-in temperature displays, place the appropriate NIST traceable thermometer directly into the unit.

D. Allow thermometers to remain for approximately one-half hour and record the temperature readings on the appropriate Thermometer Equipment Log Sheet (form GL 21.3). If the readings deviate from the range, leave the thermometers in the units for up to 24 hours and record the readings.

E. If the readings still deviate from the range, notify Lead, remove the thermometer/unit from service and replace. Record on the appropriate Thermometer Equipment Log Sheet (form GL 21.3).

F. Each acceptable thermometer/unit will be marked to indicate that they are acceptable for use (according to steps 23.4.4.A - E above).

G. A memo will be written to document this performance check.

H. For additional information on NIST traceable thermometers see GL-21 (General Laboratory Equipment).

23.4.5: Micropipettes

A. Micropipettes have been deemed critical. An annual preventative maintenance check will be conducted by an approved outside vendor.

The maintenance check will be recorded on the equipment and on the appropriate Micropipette Equipment Log Sheet.

B. If necessary, a performance check may be conducted in-house before use as follows:
   1. Weigh the maximum and minimum volumes of dH_2O dispensed with that particular model.
   2. Repeat the measurement 10 times for each volume recording the empirical (observed) weight for each replicate, along with additional information, according to the Micropipette Performance Check Equipment Log Sheet.
   3. Attach this log sheet to the appropriate Micropipette Equipment Log Sheet and/or record the date, initials and final result on the appropriate Micropipette Equipment Log Sheet.
   4. If the unit does not meet the following specifications, notify Lead, remove from service and record on the appropriate Micropipette Equipment Log Sheet.
   5. Acceptable ranges at minimum and maximum volumes:
      a. 10µl pipette: ± 10% @ 1µl (0.009g - 0.011g) and 10µl (0.09g - 0.11g)
      b. 20µl pipette: ± 10% @ 2µl (0.018g - 0.022g) and 20µl (0.18g - 0.22g)
      c. 100µl pipette: ± 10% @ 10µl (0.09g - 0.11g) and ± 5% @ 100µl (0.95g - 1.05g)
      d. 200µl pipette: ± 10% @ 20µl (0.18 - 0.22g) and ± 5% @ 200µl (1.90g - 2.10g)
      e. 1000µl pipette: ± 5% @ 100µl (0.95g - 1.05g) and 1000µl (9.5g - 10.5g)

23.4.6: Alternate Light Sources

A. Crime-lites (except those with white light) have been deemed critical and will be maintained accordingly.

Performance Checks

1. Known stains/standards (semen, saliva, urine and/or blood) will be checked for fluorescence or stain detection under the appropriate Crime-lite/wavelength.
   a. Handheld Crime-lites (except those with white light) will be checked before each use but no more than once per week.
   b. The ML2-IR Crime-lite will be checked before each use. For additional information on the use of the ML2-IR, see FB SOP-28 (ML2-IR Crime-lite).
2. The date, standard, Crime-lite number and/or wavelength used, initials and results are recorded on the appropriate Crime-Lite Equipment Log Sheet.

3. If the known stains are not fluorescent at the expected intensity or visible under these Crime-lites/wavelength(s), remove from service until the problem is corrected and record on the appropriate Crime-Lite Equipment Log Sheet.

Annual Preventative Maintenance and Performance Check

1. An annual preventative maintenance check will be conducted on the ML2-IR Crime-lite by an approved outside vendor. This maintenance check will be recorded on the equipment and on the appropriate Crime-lite Equipment Log Sheet.

   An annual in-house performance check will be conducted as part of or after the annual preventative maintenance by checking known stains/standards for fluorescence or stain detection and recording the results as above. This may be done by the vendor or laboratory personnel.

2. The handheld Crime-lites (except those with white light) will be performance checked in-house annually.

   a. The contacts on the inside of each Crime-lite, including the end cap, will be checked to ensure clean and checked for any wear.

   b. The lens on each Crime-lite will be checked to ensure clean.

   c. Known stains/standards (semen, saliva, urine and/or blood) will be checked for fluorescence or stain detection under the appropriate Crime-lite/wavelength.

      The light intensity of each will be checked at this time. If it appears low, ensure the battery is fully charged.

   d. The results of the performance check will be recorded on the appropriate Crime-Lite Equipment Log Sheet.

   e. Each Crime-lite will be marked to indicate that it is acceptable for use according to steps 23.4.6.A.1 and 3.

   f. A memo will be written to document this performance check.

B. Crimescopes (handheld)

Only the white light on the hand-held Crimescopes will be used. Other available alternate light source wavelengths will not be used and therefore the Crimescopes will not be performance checked.

23.4.7: Ultrasonic Bath

A. Drain, clean bath and replace water quarterly or as often as needed. Fill the tank with tap water to approximately one (1) inch from the top. Note: dH_2O is not recommended per manufacturer.

B. The date and initials are recorded on the Ultrasonic Bath Equipment Log Sheet.

C. If necessary, tap water may be added to the bath before use to ensure the level is approximately one (1) inch from the top of the tank.

D. If the bath fails to work according to the manufacturer's instructions, remove from service until problem is corrected and record on the Ultrasonic Bath Equipment Log Sheet.

23.4.8: Balance

The balance has been deemed critical and will be maintained accordingly.

A. Quarterly Performance Checks

1. The balance is checked quarterly by weighing the appropriate NIST traceable weight (80g, 20g and 1g).

2. The date, initials and results are recorded on the Balance Performance Check Equipment Log Sheet.

3. If the empirical (observed) weight deviates ± 2% from the NIST weight, remove from service until the problem is corrected and record on the Balance Performance Check Equipment Log Sheet.

B. Preventative Maintenance

An annual preventative maintenance check will be conducted on the balance by an approved outside vendor and recorded on the equipment and on the Balance Performance Check Equipment Log Sheet.

C. If an incident occurs that requires the balance to be performance checked outside of its normal schedule (such as a significant move or a failure to perform as expected) the balance must be performance checked according to GL-21 (General Laboratory Equipment) and GL-21.1 (Balance Performance Check).

23.4.9: Microscopes

A. Microscopes have been deemed critical. An annual preventative maintenance check will be conducted by an approved outside vendor.

B. The maintenance checks will be recorded on the equipment and on the appropriate Microscope Equipment Log Sheet.

23.4.10: Hoods

A. Generally, venting hoods will be serviced annually by an approved outside vendor and recorded on the equipment.

B. Filters in non-venting hoods will be replaced every (5) five years or sooner as necessary. Record on the Hood Filter Replacement Equipment Log Sheet.

23.5 REFERENCES

A. Boekel Scientific. Boekel Incubator Operating Instructions.
B. Mettler Toledo. Operating Instructions Line of Balances.
C. Sears Kenmore. Refrigerator Owner's Guide.
D. Rainin Instrument CO. INC. Pipetmen Operating Instructions.
E. Rainin. Pipet-Lite Operating Instructions.
F. Foster + Freemen. Crime-lite Information Sheets.
G. Spex Forensics. Mini-CrimeScope Operation Manual v. 2.0.
H. Fisher Scientific. Operator's Manual Tabletop Ultrasonic Cleaners.
I. Traulsen. "N-Width" Reach in Refrigerator/Freezer Models/Self-Contained Owner's Manual.
J. Firgidaire. "All About the Use & Care of your Refrigerator".
K. Norlake. "General Laboratory Refrigerators and Freezers Manual Defrost Instillation, Operation and Maintenance Instructions".
L. GL-21 (General Laboratory Equipment)
M. GL-22 (Policy on Validation and Performance Checks)