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
C. SEC: Support Equipment Case (M-Vac®)

23.4 PROCEDURE

23.4.1: General Information

A. Maintenance and performance checks will be conducted at specified intervals and recorded on the appropriate equipment log sheets.

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. The sign will be dated and initialed.
   2. Removal from service will be recorded on the appropriate equipment log sheet.
   3. A Forensic Biology Lead will be notified and the Technical Lead of the unit will investigate and determine a solution.
   4. An Incident Report may be opened.

C. <u>New Equipment:</u>
   1. New equipment will be performance checked and deemed acceptable for use before being placed into service.
      a. A new equipment log sheet will be generated as 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 the new method will be validated along with the new method. (see FB SOP-25 Validation of New Serological Tests).

D. 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).

E. Equipment used by FB for limited Latent Print (LP) processing, will be maintained per the LP Unit.

F. 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 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 and remove from service until the problem is corrected.

B. Annual Performance Check

1. Incubators are performance checked annually using a NIST traceable thermometer to monitor the temperature of each unit.

2. Each unit will be marked to indicate that it is acceptable for use according to step 23.4.2.A.2 above.

3. 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.

23.4.3: Refrigerators and Freezers

A. The refrigerator and freezer temperatures will be checked no less than once per week (or as often as daily when necessary).

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. 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).

E. If the temperature continues to deviate from these ranges, notify Lead, remove from service until the problem is corrected.

F. 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. The thermometers from each unit will be checked 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 1-188).
   2. The refrigerator thermometers will be placed in the walk-in refrigerator (room 1-187).
   3. The incubator thermometers will be placed in one (1) incubator.

C. For units with built-in, external 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.

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

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

23.4.6: Alternate Light Sources

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

A. <u>Performance Checks</u>
   1. Known stains/standards (semen, saliva, and/or blood) will be checked for fluorescence/stain detection under the appropriate Crime-lite/wavelength.
      a. Handheld Crime-lites (except those with white light) and the ML2-IR Crime-lite will be checked before each use, however, it is not necessary to check them more than once per week.

b. For additional information on the use of the ML2-IR, see FB SOP-28 (ML2-IR Crime-lite).

2. 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.

B. Annual Preventative Maintenance and Performance Check

1. An annual preventative maintenance service will be conducted on the ML2-IR Crime-lite by an approved outside vendor.

   a. A performance check will be conducted following the annual preventative maintenance by checking known stains/standards for fluorescence/stain detection.

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

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 and urine) will be checked for fluorescence/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. Each Crime-lite will be marked to indicate that it is acceptable for use according to steps 23.4.6.A.1 - 2 above.

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

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. 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.

C. If the bath fails to work according to the manufacturer's instructions, remove from service until the problem is corrected.

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.

a. A low, mid and high weight value should be used; 1g, 20g and 80g are suggested.
- ± 2% acceptable ranges have been calculated, see the Balance Equipment Log Sheet (FB QR-100).

b. If unable to use the suggested weight values, then other similar low, mid and high value weights may be used.
- A ± 2% acceptable range will be calculated for each weight value.
- Each weight and range will be verified by a Unit Lead or higher and recorded on the Balance Equipment Log sheet (FB QR-100).

2. If the empirical (observed) weight deviates ± 2% from the NIST weight, remove from service until the problem is corrected.

B. Preventative Maintenance
An annual preventative maintenance service will be conducted on the balance by an approved outside vendor.

C. If an incident occurs that requires the balance to be performance checked outside of its normal schedule (i.e. 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
Microscopes have been deemed critical. An annual preventative maintenance service will be conducted by an approved outside vendor.

23.4.10: Hoods
A. Generally, venting hoods will be serviced annually by an approved outside vendor.

B. Filters in non-venting hoods will be replaced every (5) five years or sooner as necessary.

23.4.11: M-Vac®
The M-Vac® has been deemed critical and will be maintained accordingly.

A. Liquid Trap Maintenance

1. The liquid trap will be checked before each use, however, it is not necessary to check it more than once per month.

2. Emptying the Liquid Trap:
   Required when moisture has entered the SEC by way of the vacuum port. The trap is visible through the window on the back of the SEC. The trap should be checked and addressed if moisture enters the SEC by way the vacuum port at any point during use.
   a. Unplug the SEC.
   b. Unscrew the back panel and remove.
   c. Carefully reach into the back of the SEC, tilt the bottle of the trap towards the opening and unthread the clear bowl of the trap from the lid by rotating counterclockwise.
   d. Remove the filter, floats, and rubber ball from inside the bowl.
   e. Discard the liquid in the bowl appropriately.
   f. Disinfect the bowl, floats, rubber ball, and filter.
   g. Reattach the bowl to the lid in the SEC.
   h. Replace the back panel making sure to replace all screws.

B. Annual Maintenance

1. Check the liquid trap (see 23.4.11.A).
2. Check the ventilation filter (this is serviced/replaced every one to four years based on instrument use).

   Servicing/replacing the ventilation filter:
   a. Unplug the SEC.
   b. Unscrew the ventilation cover and remove.
      i. If the filter is a foam filter, wash the filter in mild soap and water, and replace once dry.
      ii. If the filter is a HEPA filter, replace the filter.
   c. Reattach the ventilation filter cover.

3. Check the exhaust filter (this is replaced every four years).

   Replacing the exhaust filter:
   a. Unplug the SEC.
   b. Unscrew the back panel and remove.
   c. Carefully reach into the back of the SEC on the right side and disconnect the HEPA filter from the upper coupling by pressing the release button.
   d. Remove the HEPA filter from the clip by firmly pulling it to the left (toward the opening on the back panel).
   e. Disconnect the lower coupling by rotating the filter ¼ turn counterclockwise and then gently pulling to separate.

f. To install a new HEPA filter, reverse steps c-e.
g. Replace the back panel making sure to replace all screws.

C. Performance Check - conducted after the liquid trap is emptied, an annual maintenance, or a preventative maintenance.

1. A negative buffer control and known positive body fluid control (typically saliva) will be tested prior to using the M-Vac® for case work.

a. The M-Vac® is acceptable for sample collection in case work when the appropriate results are obtained with the positive and negative controls by the DNA Unit.

b. The unit will be marked to indicate that it is acceptable for use.

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

D. Preventative Maintenance - conducted off-site by an approved outside vendor every four years.

E. If the M-Vac® fails to work according to the manufacturer's instructions, remove from service until the problem is corrected.

F. For additional information, refer to the M-Vac® SEC 100 User Guide.

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. M-Vac® SEC 100 User Guide.
M. GL-21 (General Laboratory Equipment)
N. GL-22 (Policy on Validation and Performance Checks)