3 Equipment Quality Control and Maintenance

3.1 Maintenance and Calibration

In order to provide and maintain the quality of the work provided in the Biology section, it is necessary to ensure laboratory equipment is in good working order. Routine quality control and maintenance accomplishes this. The calibration intervals listed below are generally considered to be the minimum appropriate in each case, provided that the equipment is of good quality and of proven stability and the laboratory has both the equipment capability and expertise to perform adequate internal checks. More frequent checks are acceptable. If there is any question concerning the reliability of an instrument or piece of equipment, a maintenance check should be performed immediately.

Full maintenance, calibration records, and repair activities shall be maintained and recorded in an equipment calibration and maintenance log. This log will include at a minimum: the date, activity, laboratory personnel performing or overseeing the activity, non-HPD technician(s) performing or overseeing the activity, and a record of quality control checks performed to verify operation prior to returning a piece of equipment to casework use. The section supervisor and QA Manager are responsible for ensuring all systems are checked and maintained as required.

Critical equipment is any piece of equipment that must be maintained in a proper working order to ensure the reliability of results produced. Some critical equipment and associated maintenance requirements can be found in the Quality Manual. Additional equipment and maintenance requirements are included here.

Equipment Operation Manuals

Equipment operation manuals will be readily available to each examiner approved to use the equipment.

3.2 Equipment

Ultrasonic Cleaner

Ultrasonic cleaners use ultrasonic energy in the form of sound waves to create a mechanical “scrubbing” action to loosen debris from all surfaces that the solution touches.

This equipment’s condition is routinely maintained for the Biology section’s procedures. The water should be clear and clean with no evidence of bacterial/fungal growth or rust. The following procedure should be performed as needed: Wash the inside of the ultrasonic cleaner with detergent and rinse well with water. Fill bath with the appropriate quantity of diH_2O water.

Mini-centrifuges

Mini-centrifuges are bench top, unrefrigerated centrifuges that have been designed for **quick spin-downs from tube walls and caps** of tubes. These mini-centrifuges are equipped with a circular, one sized rotor. The maximum speed is 6000 rpm. The relative centrifugal force can be determined as outlined in the manufacturer’s instructions, if required.

Please consult the appropriate equipment manual for specific instructions on maintenance and operation of the mini-centrifuge. These centrifuges will primarily be used for removing liquid from the cap of a microcentrifuge tube. They will not be used for pelleting cellular material.

Thermometers

All thermometers must be either calibrated or their accuracy must be verified to ensure the temperature is being accurately measured.

NIST-traceable thermometers must be purchased or re-certified at least once every two years. A NIST-traceable thermometer certified for two years and used for conducting performance checks on equipment shall require the annual performance check. A NIST-traceable thermometer certified for two years that is not used for conducting performance checks does not require the annual performance checks and may be used until the certification expires. A NIST-traceable thermometer to be used beyond its certification date shall be recertified or be subject to the annual performance check requirements.

The minimum requirements of a performance check of a thermometer used for performing performance checks may be accomplished: (1) through certification by an outside vendor; or (2) in-house by the comparison of one or more temperature readings at various time intervals against another NIST-traceable thermometer.

Thermometers that are not NIST-traceable must be verified annually by comparison against a NIST-traceable thermometer. Any deviation from the NIST-traceable thermometer will be noted and all other readings adjusted by the same amount, and in the same direction for each thermometer. If the deviation is greater than 3°C, the thermometer should be serviced or replaced.

Thermometers should be handled carefully to avoid breakage. Thermometers may be wiped clean to facilitate easy and accurate readings. If any discontinuities are detected, repair or replace the thermometer.

Autoclaves

Autoclaves are used to sterilize solutions, glassware, and instruments by subjecting them to high pressure and high heat simultaneously. Autoclaves also may be used to sterilize biohazard trash prior to discarding. Please consult the instructions on the outside of the unit for specific information on operation of the autoclave.

Whenever an item is autoclaved, a small piece of autoclave tape must be adhered to the item, to verify correct functioning of the autoclave. Use proper sterilizer-loading procedures when placing materials in sterilizer chamber. Those include: all solid containers/ instruments must be placed so that water or air will not be trapped in them and sufficient space must be left between items to allow steam circulation. The temperature gauge should read 120^0C at the start and during the appropriate cycle.

If the autoclave is not functioning properly, a qualified service technician may repair the instrument.

Alternate Light Source (ALS) Machines

ALS machines are used to presumptively identify semen in forensic casework. The fan air filter, optical filters, and lenses should be cleaned on a regular basis (approximately every 6 months), where applicable. Please consult the appropriate equipment manuals for more specific instructions on maintenance and operation of the ALS machines.

Swab Drying Box E025

Swab drying boxes are used to dry swabs created in the lab during forensic casework. Before and after each use, the box should be wiped inside and out with a 10% bleach solution or other lab-approved decontaminant and dried with a soft cloth. Do not autoclave, immerse, or abrade the unit.

Refrigerators and Freezers

Please refer the Houston Police Department Crime Laboratory Quality Manual for refrigerator and freezer maintenance. Reagents and evidence will be stored separately, either in separate cooling units or in separate space within those units.

Pipettes

Accuracy and precision in dispensing of volumes are important during many routine operations. The DNA section is supplied with pipettes that cover the volume range from 0.1 - 1000 µl. Calibration will be performed at least annually on these instruments. When a pipette is determined to be performing improperly, it will be returned to the manufacturer, or another qualified repair technician, so that the problem may be identified and corrected.

Quality control data should include the type of pipette, volume range, model, and serial number.

The operating manual should be consulted for operation instructions prior to utilizing a pipette.

In case of accidental entry of liquids into the pipette mechanism, remove the shaft from the assembly and clean with distilled water. Dry with lint free tissue (i.e., Kimwipe). Inspect the seal assembly and piston for liquid. Inspect the entire instrument for staining or corrosion. If evident, do not use the pipette, and submit for service. If no further problems are identified, reassemble.

Water Filtration System

Water is used in reagents that are prepared in the laboratory. Therefore, it is necessary to ensure only high quality, reagent grade water is being utilized. Generally, 15MΩ-cm or greater deionized water is sufficient for the reagents utilized in our laboratory.

Water quality should be checked on a weekly basis. The following procedure will be utilized:

1. Turn on the deionized water.
2. Allow water to run for 1-2 minutes.

3. Record both the MΩ-cm reading and the temperature reading displayed on the resistivity monitor in the Water Quality logbook.
4. If reading is below 15MΩ-cm, call for service. A qualified service technician may repair the system. Label the system as being "out of service" until the appropriate service is performed and the instrument is functioning properly.

Balances

Please refer to the Houston Police Department Crime Laboratory Quality Manual for the balance calibration schedule.