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Section 1 Chemicals and Reagents

1.1 Introduction

By definition, "critical reagents are determined by empirical studies or routine practice to require testing on established samples before use on evidentiary or casework reference samples" (FBI QAS, 2009). Reagents which are used in pre-amplification procedures directly involved in DNA extraction from forensic casework or database samples, have been deemed critical reagents to prevent unnecessary loss of sample. All post-amplification DNA reagents are hereby listed as non-critical reagents.
Non-critical DNA reagents need not be verified prior to use in casework.

When a reagent fails to meet the criteria for verification, the DNA Technical Manager shall be notified and an appropriate course of action will be determined. The reagent shall not be used in casework unless or until the issue has been resolved and the approval or an alternate course of action suggested by the DNA Technical Manager has been documented.

1.2 General Instructions

- Chemical and reagent quantities may be adjusted to prepare more or less than the specified amount.
- All critical reagents prepared in-house shall be stored in sterile/autoclaved containers.
- Reagent containers are to be labeled with the following:
    - Name of reagent
    - Lot number (the date of preparation and preparer's 2 or 3 letter initials are used as the lot # for reagents prepared in-house and reagents where a lot # is not provided by the commercial vendor; i.e. 06-0101MLC would be the lot # for a reagent prepared on Jan. 1, 2006 by MLC)
    - Reagents prepared or removed from their primary container for daily use need only be labeled with the identity of the reagent and the date and initials of the scientist that prepared or is using the reagent.
- One member of the DNA discipline shall be designated for purchasing of supplies and reagents.
- All chemicals and reagents prepared or purchased shall be logged in the reagent log maintained in the DNA laboratory.
- All purchased chemicals/reagents are assigned the expiration date specified by the manufacturer. If no manufacturer expiration date is provided, the following guidelines apply:
    - Chemicals used in the in-house preparation of a reagent are not assigned an expiration date. Expiration dates are assigned to the prepared reagents as specified below.
    - Reagents used as received will expire one year from the date of receipt.
- All newly received/prepared critical reagents and chemicals shall be verified prior to use on casework/database samples. Chemicals/reagents requiring verification should be clearly marked as such.

1.3 Chemicals and Reagents not Requiring In-House Preparation and/or Verification

Chemicals/Reagents purchased from a commercial vendor and requiring no preparation or verification prior to use in procedures or preparation of other reagents are listed below. They shall be stored as prescribed by the manufacturer and shall expire on the date provided by the manufacturer. Expiration dates are assigned as previously described, if not provided by the manufacturer and unless stated otherwise.

- 7500 RT PCR RNase P plate [liquid]
- α-Naphthyl Phosphate [solid]
- Aluminum Sulfate [solid]
- Anode Buffer Container, 3500 series from Life Technologies [liquid]
- BCIP (5-bromo-4-chloro-3-indolyl phosphate) [solid]
- Cathode Buffer Container, 3500 series from Life Technologies [liquid]
- Conditioning Reagent, 3500 series from Life Technologies [liquid]
- Dithiothreitol [solid]
- EDTA [solid]
- Electrode Storage Solution [liquid]
- Ethanol, anhydrous reagent grade [liquid]
- Fast Blue B (o-Dianisidine Tetrazotized) [solid]
- GeneScan 600 Liz Size Standard [liquid]
- Glacial Acetic Acid [liquid]
- Concentrated Hydrochloric Acid (HCl) [liquid]
- Hydrogen Peroxide [liquid]
- Identifiler Allelic ladder
- Indigo Carmine dye [solid]
- Multi-Capillary DS-36 Matrix Standards (Dye Set J6) [liquid]
- Multi-Capillary DS-33 Matrix Standards (Dye Set G5) [liquid]
- Nuclear Fast Red [solid]
- pH 4, pH 7, and pH 10 buffers [liquid]
- Phenolphthalein [solid]
- Phenolphthalein solution [liquid]
- POP-4 Polymer from Life Technologies [liquid]
- Potassium Hydroxide [solid]
- Saturated Picric Acid [liquid]
- Semen Standard [liquid]
- Sodium Acetate, anhydrous [solid]
- Sodium acetate buffer solution (3M, pH 5.2) [liquid]
- Sodium Hydroxide Solution (NaOH) [liquid]
- Sterikon® plus Bioindicator [ampules]
- Tris base [solid]
- Xmas Tree Stain [liquid]
- Xylene substitute Substitute [liquid]
- Zinc [solid]

1.4 Preparation and Verification

- Unsupervised verification can only be performed by trained, competency tested and authorized scientists.
- Vendor supplied standard samples / positive control samples that are sent with PCR amplification kits may be discontinued or substituted at vendors' discretion. The batch central log information will indicate the identity of positive control samples used in analysis.
- Similarly, variations in vendor supplied materials (changes instituted by the vendor and outside of laboratory control) will be assessed to determine if the change adversely affects the laboratory analysis in which the reagent/chemical is used. This assessment will also be documented in the verification paperwork. Kit component information in the chemicals and reagents section will be updated as required when the manual is revised.
- Verification of a reagent that is only used as a component of another reagent is achieved by verifying the final preparation and does not need to be documented separately.
- Reagents used in the same procedure may be verified simultaneously. If the verification fails, the components will then need to be verified separately.
- Verification paperwork is maintained by calendar year in the LIMS and shall include the DNA Critical Reagent Verification Form, for critical DNA reagents.
- For successful verification of screening reagents, the positive and negative controls must perform as described in the Forensic Biology Casework Procedures Manual. Reagents must be successfully verified prior to use in casework.
- For verifications that include amplification and electrophoresis, the paperwork consists of the electropherograms for the positive control/reference sample(s) and negative control/blank(s). Verification results are assessed as described in the Data Interpretation section of the Forensic Biology Casework Procedures Manual or Forensic Biology Database Manual. The expected results must be obtained for a chemical/reagent to be successfully verified and appropriate for use in casework/database analysis.
- For verifications that include peak height assessments, a copy of the peak height assessment must be included in the verification documentation.
- In the verification of casework amplification kits, the relative fluorescence units (RFU) for the known sample amplified with the new kit are compared to the results obtained with the kit currently in use to estimate the sensitivity of the new kit. This is important for adjusting the target value with the new lot of kits.
- The central log paperwork for verifications may be referenced by noting the batch in which the verification was performed.
- Upon successful verification, the reagent log shall be updated with the verification date and scientist, and the storage location for the reagent.
- When verification fails on a reagent prepared in-house, the reagent may be re-prepared and/or verification repeated. If verification fails again, consult with the DNA Technical Manager to determine the appropriate course of action. For purchased reagents/chemicals, the DNA Technical Manager shall be consulted to determine the appropriate course of action.

Preparation and Verification of Reagents and Chemicals

BCIP Solution (5-bromo-4-chloro-3-indolyl phosphate)

Dissolve 0.025g BCIP in 50mL sodium acetate buffer (0.01M, pH – 5.5). Store at 2-8ºC; solution expires 4 weeks from date of preparation.

Verification procedure
Test the reagent with a positive semen control and a negative dH2O control prior to first use, and on each day used in casework

Buffer ATL (DNA critical reagent)

(when purchased outside of a kit)
Purchased from Qiagen and stored at room temperature

Verification
Extract, amplify and analyze a previously typed reference sample and a corresponding reagent blank using the new lot of buffer.

Buffer G2 (DNA critical reagent)

(when purchased outside of a kit)
Purchased from Qiagen and stored at room temperature

Verification
Extract, amplify and analyze a previously typed reference sample and a corresponding reagent blank using the new lot of buffer.

Buffer MTL (DNA critical reagent)

Purchased from Qiagen and stored at room temperature

Verification
Extract, amplify and analyze a previously typed reference sample and a corresponding reagent blank using the new lot of buffer.

DNAstable® LD (DNA critical reagent)

Purchased from Biomatrica and stored at 2-8ºC.

Verification
The verification process is described and documented on the DNAStable LD Verification Form. Aliquots of 0.5 mL recommended.

DTT (1M) (DNA critical reagent)

Working Solution

Dissolve 0.77g dithiothreitol in 5mL sterile de-ionized water in a sterile conical tube. Add 50µL of 3M Sodium Acetate buffer solution, pH 5.2. Do not autoclave. Aliquot (0.1mL recommended) and store at -15 to -25ºC. Aliquots expire one year from date of first thaw.

Verification

Extract, amplify and analyze a previously typed semen sample and a corresponding reagent blank using the new DTT lot.

EZ1 DNA Investigator Kit (DNA critical reagent)

Components: Reagent Cartridges, Buffer G2, Proteinase K solution, carrier RNA

Purchased from Qiagen and stored at room temperature.

Carrier RNA solution is prepared by reconstituting the carrier RNA in 310µL of sterile, de-ionized water. Vortex and spin briefly. Prepare 20µl, single use aliquots in 0.5mL tubes and store at -15 to -25ºC. Reconstituted carrier RNA expires one year from date of preparation.

Verification

Extract, amplify and analyze a previously typed reference sample and a corresponding reagent blank using all components from the new kit lot.

Brentamine / Fast Blue B

Solution #1

Dissolve 10 mg α-Naphthyl Phosphate in 10 mL deionized water.

Solution #2

Dissolve 2.5 mg Fast Blue B (o-Dianisidine Tetrazotized) in 10 mL sodium acetate buffer (0.14 M, pH ~5.0).

Store both solutions at 2-15°C; solution expires 7 days from date of preparation.

Alternatively, these reagents may be made in bulk, aliquotted and frozen. Frozen reagents expire one year from date of preparation; thawed aliquots expire one day from date of thaw.

Verification

Test the reagent with a positive semen control and a negative dH_2O control prior to first use, and on each day used in casework.

GlobalFiler Amplification and Typing Kit (DNA critical reagent)

Components: GlobalFiler Master Mix, GlobalFiler Primer Set, GlobalFiler Allelic Ladder, DNA Control 007

Purchased from Applied Biosystems. Stored at -15 to -25ºC upon receipt. 2 to 8ºC after initial use for up to 6 months or up to the expiration date stated on the kit (whichever comes first).

Verification

- The verification procedure is detailed and documented on the GlobalFiler Verification Form
- Results must be submitted to the Technical Manager for approval of the kit. Peak height variation between old and new kits must be within 30% for the new kit to be approved.
- The course of action for a kit that fails verification will be determined by the Technical Manager.

GlobalFiler Express Kit (DNA critical reagent)

Purchased from Life Technologies and stored at -15 to -25ºC until thawed, then stored at 2-8 °C. Expiration date is either six months from date of thaw or manufacturer's expiration date, whichever comes first.

Components: DNA Control 007, Master Mix, Master Mix Additive, Primer Set and GlobalFiler Express Allelic Ladder.

Verification Procedure

Amplify DNA Control 007 and a corresponding negative amplification control using the master mix, master mix additive, and primer set; and analyze using GlobalFiler Express Allelic Ladder.

Hi-Di Formamide

Purchased from Life Technologies. Aliquot (0.5mL and 1.0mL recommended) and store at -15 to -25ºC. Aliquots are intended for one-time use and should not be re-frozen.

Nuclear Fast Red stain

Note: Alternatively, this reagent may be purchased.

Dissolve 5.0g of aluminum sulfate in 100ml of hot deionized water (~40°C). Add 0.1g of Nuclear Fast Red. Stir and let cool. Filter the solution and store at room temperature; expires one year from date of preparation.

One-step PSA ABAcards

Purchased from Abacus Diagnostics. Stored according to manufacturer's instructions.

Verification

A known human semen standard and sample blank are to be run to verify a new lot(s) of cards. Pooled human semen is spotted onto a stain card as a mock semen stain. The sample is processed similar to a casework sample, as described in Section 2 of the Forensic Biology Casework Procedures manual (FBCP, current version). Record the lot number(s) and expiration date(s) and test results.

One-step HemaTrace ABAcards

Purchased from Abacus Diagnostics. Stored according to manufacturer's instructions.

Verification

A known human blood standard (positive control) and a negative control (extraction buffer or deionized water) are run to verify a new lot(s) of cards. Follow the test procedure described in Section 2 of the Forensic Biology Casework Procedures –Part 1. Record the lot number(s) and expiration date(s) and test results.

Permount

Purchased from a commercial vendor and stored at room temperature.

Working Solution: Permount diluted with Xylene substitute if necessary. Use until no longer functioning adequately as a mounting medium.

Phenolphthalein (for Kastle-Meyer Test)

Note: Alternatively, this reagent may be purchased.

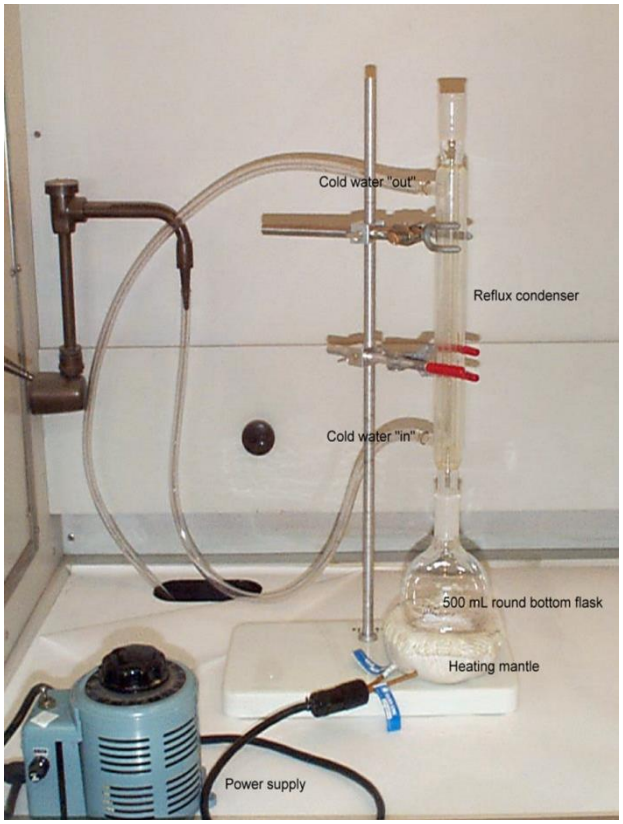
Stock Solution

Reflux 2g phenolphthalein, 20g potassium hydroxide, and 100mL deionized water with 20g of zinc until the solution becomes colorless (approximately 30 minutes to 1 hour after boiling begins – See Figure 1). Store the solution at 2-8ºC in a dark bottle to which some zinc has been added to keep it in the reduced form.

Working Solution

Combine 20mL phenolphthalein stock solution (obtained from the biological screening discipline) with 80mL Ethanol (anhydrous reagent grade). The solution is stored at 2-8ºC in a dark bottle. This reagent has no expiration date and may be used as long as the appropriate reactions are observed with the positive and negative blood controls, prior to use on evidentiary items.

Figure 1. Phenolpthalein Stock Solution Preparation.



- Assemble the reflux apparatus as shown.
- Turn on cold water at source. Allow the system to fill and cool. Adjust flow so that no bubbles are formed in the condenser.
- Add the chemicals, deionized water and zinc to the 500mL round bottom flask.
- Reassemble the apparatus. Place the flask on the heating mantle.
- Turn on the power supply. Heat the flask to a gentle boil (100°C for approximately 15 minutes)
- Adjust temperature setting to 75°C and allow the solution to reflux until colorless (approximately 2-3 hours).
- Store the solution with the zinc from the flask at 2-8°C in a dark bottle.
- Clean glassware with EDTA and water.

Picro-indigo-carmine stain

Note: Alternatively, this reagent may be purchased.

Add 0.33g of Indigo Carmine dye to 100mL of saturated picric acid. Store at room temperature; expires one year from date of preparation.

Prep-N-Go Buffer **(DNA critical reagent)**

Purchased from Life Technologies and stored at room temperature.

Verification

Amplify and analyze a previously typed reference sample and a corresponding positive and negative amplification control using the new lot of buffer.

Proteinase K Solution **(DNA critical reagent)**

(when purchased outside of a kit)

Purchased from Qiagen or another suitable vendor and stored at room temperature

Verification

Extract, amplify and analyze a previously typed reference sample and a corresponding reagent blank with the new Proteinase K lot.

QIAsymphony Investigator Kit (DNA critical reagent)

Components: Reagent Cartridges, Buffer ATL, Proteinase K solution

Purchased from Qiagen and stored at room temperature.

Verification

Extract, amplify and analyze a previously typed reference sample and a corresponding reagent blank using all components from the new kit lot.

Quantifiler Trio Kit (DNA critical reagent)

Components: PCR Reaction Mix, Primer, DNA Standard, Dilution Buffer

Purchased from Life Technologies. All reagents received and stored at –15 to -25 °C until thawed for first use. Once thawed, reagents are stored at 2-8 °C. Standard curves have an expiration date of two weeks after date of preparation.

Verification

- The verification procedure is detailed on the Quantifiler Trio Verification Form.
- Acceptable criteria are defined in Section 4.6.1 of FBCP. Follow the procedure defined in that section for non-passing results.
- Document the passing human and male Y-intercept values in the 7500 instrument logbook.
- Submit the Quantifiler Trio Verification Form and the Experimental Results Report to the DNA Technical Manager for approval.

Sodium Acetate buffer (0.01M, pH 5.5)

(for BCIP preparation)

Dissolve 0.34g Sodium Acetate (anhydrous) in 200mL deionized water. Adjust the pH to 5.5. Bring to a volume of 250mL with deionized water. Store solution at room temperature; expires one year from date of preparation.

Sodium Acetate Buffer (0.14 M, pH ~5.0)

(for FBB preparation)

Dissolve 1.2 g Sodium Acetate (anhydrous) in 100 mL deionized water. Adjust the pH to 5.0 with glacial acetic acid. Store solution at room temperature; expires one year from date of preparation.

Sterile De-ionized Water (H2O) (DNA critical reagent)

Fill glass bottles with nanopure de-ionized H2O. Autoclave (alongside a Sterikon™ plus Bio-indicator, or equivalent) for 30 minutes and store at room temperature. Expires 1 year from date prepared.

The autoclaved ampoule and a control ampoule that are placed in an incubator (at ~56ºC) for 48 hours. Evaluate as per manufacturer's instructions. Seek Technical Manager guidance when the autoclaved ampoule does not perform as expected. The DNA Technical Manager must approve use of reagents autoclaved without a Sterikon™ (or equivalent). This approval will be documented in the Reagent Log.

Verification
Amplify and analyze a previously typed reference sample (diluted with the new lot of water) along with a negative amplification control using the new water lot.

TE $^{-4}$ Buffer (DNA critical reagent)
Purchased from Life Technologies, aliquotted, and stored at room temperature.

Verification
Amplify and analyze a previously typed reference sample and a corresponding positive and negative amplification control using the new lot of buffer.

Section 2 General Laboratory Maintenance

The Forensic Biology Staff are responsible for the housekeeping in the laboratory and for the routine maintenance of equipment and instruments. These tasks are delegated to a designated scientist. Other discipline members will assist as needed. Log sheets for maintenance and housekeeping are completed as appropriate.

- Receipt of packages and logging of chemicals/reagents.
    - Indicate date received on packing slip, initial and provide to the unit supervisor.
    - Unpack contents, label with date received and initials, store them in the proper location, record in logbook
    - If there are multiples of the same lot number (i.e. kits) then label the boxes or reagents with sequential numbers
    - Label with “needs verification” stickers and note on board that verification is required (if appropriate)
- Clean laboratories weekly, wiping down counters, computers, centrifuges, phones, door handles, etc. with 10% bleach. Each scientist is responsible for bleaching his/her own personal computer and workspace.
- UV PCR set-up hoods weekly (for at least four hours)
- Wipe down equipment/instruments weekly.
- Reboot genetic analyzer computers weekly.
- Sweep and mop floors monthly.
- Perform weekly, monthly, and semi-annual maintenance on instruments.
- Defragment instrument computer hard drives monthly.
- Put away clean laboratory dishes as needed.
- Keep both labs well stocked and inform the designated discipline purchasing agent of reagents and supplies that need to be ordered.
- Replenish reagents on genetic analyzers, as needed.
- Autoclave water as needed. Make sure that new kits/reagents are verified in a timely fashion.

Section 3 Equipment / Instrument Maintenance

All maintenance and performance check records are maintained with the instrument, unless otherwise specified. Each calendar year, records are archived in the annual Forensic Biology case record in the LIMS.

When laboratory equipment is placed out of service for any reason, a note will be made in the equipment/instrument maintenance log (if applicable, as not all equipment has a maintenance log) and the equipment clearly marked with a note to alert scientists not to use the equipment until further notice. Routine maintenance and performance checks are not required while an instrument is out of service.

Equipment/instrument manuals referenced in this section are either available online, on the laboratory network or in the designated location in the Forensic Biology discipline. Instrument manuals will be retained indefinitely. Equipment manuals are not required and do not need to be retained for equipment no longer in use.

3.1 Temperature Logs

Temperatures for refrigerators/freezer that contain chemicals, reagents and evidence are monitored electronically as a component of the laboratory security system. Temperatures for incubators are recorded by the scientists, when equipment is in use.

The discipline supervisor or DNA Technical Manager will be notified (by the lab manager or maintenance specialist) if a temperature falls outside of the acceptable range. Temperatures may be out of range following a prolonged period of the unit's door being opened. If the temperature falls outside of the acceptable range and is not corrected by a later second reading or a minor adjustment of the unit's temperature control, the DNA Technical Manager is consulted to determine a course of action.

3.2 Microscopes

Reference: http://www.leica-microsystems.com/
Leica DM1000/Leica DM1000 LED Operating Manual

<u>General Instructions</u>

- Simple dust is the number one enemy of microscopes and optical quality. When the scope is not in use, it should be covered with a plastic dust cover. Never leave a tube or an objective port open so that dust can get to the internal surfaces.

- When cleaning of the microscope stand is required, use a clean, lint free cloth lightly moistened with water containing a small amount of mild detergent. Quickly follow the cleaning by wiping with a dry lint free cloth.
- Any residue of mounting medium or immersion oil on the stand or stage should be removed immediately after examinations are completed, using a cotton-tipped swab or cloth lightly moistened with xylene substitute. Following this solvent cleaning, the xylene substitute should be removed as quickly as possible using a clean, dry cloth. It is wise to follow the solvent removal with the above detergent cleaning.
- Before any physical contact is made with the lens surfaces (eyepieces, objectives, condenser, field diaphragm), any loose dust or debris should be blown off using compressed gas. Any stubborn dust, dirt or oil can be removed using lens cleaning fluid and a cotton-tipped swab.
- Proceed to clean the lens with a moistened swab by placing the tip at the center of the lens and working with light pressure toward the outside of the lens in a spiral motion. Immediately repeat this process using a dry swab. For very small objective lenses, the swab may be gently rotated between the thumb and forefinger while it contacts the lens. Examine the surface of the lens in reflected light for any evidence of smearing; if the surface is not completely clean repeat the process. When clean, a coated lens will have a uniform bluish color. It may be necessary to use a small amount of xylene substitute to remove oil or other mounting mediums (see above).
- Scopes should be cleaned, lubricated and aligned when necessary by a competent microscope mechanic.
- If artifacts caused by dirt are seen in the microscope image, one can locate their source in the following manner:
  - If the trouble can be eliminated by a slight adjustment of the condenser, look for the cause in the lamp bulb, lamp condenser, or filter in front of it.
  - If a change of focus control eliminates the artifact, look to the condenser or specimen itself.
  - If rotation of the objective lens causes the artifact to move, the soil is obviously on the objective. Similarly, if rotation of the eyepieces causes the artifact to move, the soiling is on the eyepiece.

<u>Operation / Troubleshooting / Maintenance</u>
See referenced manuals.

3.3 Magni Whirl® Constant Temperature Water Bath

Reference: Magni Whirl® Constant Temperature Water Bath Operation and Maintenance Manual

Operation

- Turn on main switch.
- Set Microtrol switch to LOW positions (37°C).
- The unit is now in operation and will control at the desired set point. Agitator light will cycle on and off with movement of the agitator. Heater pilot light will remain on until set point temperature is reached. At that point, the heater pilot light will cycle on and off with the heaters as control calls for heat to maintain set point temperature.
- Allow the temperature to stabilize for 30 minutes after adjustment.

Cleaning and Maintenance

- See referenced manual.

3.4 Thermo Scientific *Orion Star A111 Benchtop pH Meter and Electrode*

Reference: Thermo Scientific Orion Star A111 Benchtop pH Meter Reference Guide
Thermo Scientific Refillable Ag/AgCl pH Electrode User Guide

Operating Instructions

- Prior to use in reagent preparation, prepare and calibrate the electrode as described in the referenced User Manual.
- The calibration buffer should be selected to be near the pH of the reagent being prepared.
- Calibration is recorded on the log provided at the back of this manual and is maintained with the equipment.
- Calibration records are archived annually in the LIMS.

Maintenance and Troubleshooting

- See referenced manual.

3.5 Mettler Toledo XS204 Analytical Balance

Reference: Excellence Analytical Balances XS Models Operating Instructions

Records of calibration and maintenance are retained by the laboratory Quality Manager in the Quality Assurance records. The weight set is calibrated every two years.

Semi-annual performance checks are performed approximately every 6 months, prior to the EZ1 Advanced XL performance checks. The check is recorded on the form provided at the back of this manual.

3.6 Qiagen BioRobot EZ1 Advanced-XL

Reference: EZ1 Advanced XL User Manual
Qiagen supplementary protocol MA67 (Evaluating pipetting accuracy of the EZ1® Advanced XL using the EZ1 Advanced XL Test Card)
Qiagen supplementary protocol MA68 (Evaluating the temperature accuracy of theEZ1® Advanced XL)

Maintenance Procedures

Preventive Maintenance procedures are described in Section 6 of the EZ1 Advanced XL User Manual and recorded on the log provided at the back of this manual. Regular maintenance (6.1) is performed after each run and Daily maintenance (6.2) is performed at the end of each day the robot is in use.

Weekly maintenance will consist of UV decontamination (for 30 minutes as described in Section 5.7 of the User Manual). Weekly maintenance is not required if the instrument was not used during the week. Therefore, the first scientist to use an instrument during a given week will initial in the box provided on the log sheet.

NOTE: The instrument will give a warning when the lamp needs to be replaced. Notify the discipline supervisor if this warning is received.

O-rings will be greased (refer to section 6.3 of the User Manual) during the last week of the month (+/- one week).

Any preventive maintenance (PM) and service to the instrument, as well as the dates that an instrument is taken out of service or returned to service are also recorded.

Performance Checks

Performance checks shall be run bi-annually, regardless of whether or not service was performed on the instrument. Additionally, any instrument having PM or service performed shall be subjected to a performance check to being used again for casework analyses. Performance checks are performed in accordance with Qiagen supplementary protocols MA67 and MA68 and are documented on the Maintenance Log.

The Maintenance Log (one page) and the form for recording the results of a performance check (four pages) are located at the back of this document.

3.7 QIAsymphony® SP

References: QIAsymphony® SP/AS User Manual - Operating the QIAsymphony SP, Software version 3.5, 10/2010.
QIAsymphony® SP/AS User Manual - General Description, 10/2010.

Daily maintenance is performed at the end of each day the instrument is in use and is described in the Forensic Biology Database Procedures manual. Additional maintenance is as follows. All maintenance is recorded on the QIAsymphony SP Maintenance Log provided at the back of this document.

Type of task	Frequency	Personnel
Weekly maintenance	Once per week, if the instrument is in use, after the daily maintenance	Designated scientist
Monthly maintenance	Once per month, if the instrument is in use, after the daily and weekly maintenance	Designated scientist
Annual preventive maintenance and servicing	Once per year	QIAGEN Field Service Specialists only

<u>Weekly Maintenance Procedure</u>

- Delete result files older than 10 days:
  - Press "**File Transfer**" in the "Main Menu".
  - Select the "**In-/Output Files**" tab.
  - Press "**Delete Old Files**" in the command bar of the screen. A message appears asking if you want to delete files. Press "**Yes**" to delete the old files. After the files have been successfully deleted, a message will appear confirming the deletion. Press "**OK**" to confirm the message.

- Clean the touchscreen by wiping with ethanol. Then wipe with a cloth moistened with water and dry with paper towels.
- Clean the QIAsymphony SP hood by wiping the surface with a soft lint-free cloth moistened with deionized water. Then wipe dry with a dry soft lint-free cloth or paper towel. **Important:** Do not use ethanol only use distilled water.
- Check the tightness of the tip adapter O-ring
  - In the "Main Menu" screen, press "**Service SP**".
  - Select the service script "**CheckPipettingChannelORing.lua**".
  - Press "**Start**" to start the tightness test.

- Follow the instructions in the messages displayed on the touchscreen. When instructed to do so by the software, place an empty tip-rack containing 4 test tips into the tip rack slot given in the software message (see picture below).

Note: Do not start an inventory scan during the protocol run. When the inventory scan message appears, press "**No, nothing changed**".

- If after running the tightness test for a particular tip adapter, a message is displayed with "Failed", the O-ring must be changed. If one tip-adapter fails the tightness test, we recommend changing all 4 O-rings at the same time.

- Replace the tip-adapter O-ring if necessary
  - Reference 9.5 Maintenance of the tip adapter O-ring in the QIAsymphony® SP/AS User Manual — General Description for instructions.

<u>Monthly Maintenance Procedure</u>

- Replace the tip-adapter O-rings
  - Reference Section 9.5 Maintenance of the tip adapter O-ring in the QIAsymphony® SP/AS User Manual - General Description for instructions.

<u>Performance Checks</u>

Performance checks shall be run annually, regardless of whether or not service was performed on the instrument. The annual performance check consists of preventive maintenance performed by the vendor, followed by a run of 7 previously typed reference samples and a corresponding reagent blank. The samples are carried through the entire database analysis procedure to generate DNA profiles. All samples must yield the

expected result; to include complete, concordant profiles for the previously typed samples. If this does not occur, the Technical Manager will be consulted to determine the appropriate course of action.

In addition to the annual performance check, any instrument having service performed shall be subjected to a performance check prior to being used again for reference sample analyses.

The performance check is documented on the QIAsymphony Maintenance Log provided at the back of this document. The Database Batch Worksheet is also retained with the log. The analyst shall document profile concordance. Reviewer comments and initials are not required and these columns shall be marked as not applicable or n/a.

3.8 QIAgility

References: QIAgility® User Manual, 11/2011

Daily maintenance is performed at the end of each day the instrument is in use and is described in the Forensic Biology Database Procedures manual. Weekly maintenance is performed once per week, if the instrument is in use, after the regular and daily maintenance. All maintenance is recorded on the QIAgility Maintenance Log provided at the back of this document.

Weekly Maintenance Procedure

- Remove all loading blocks and the tip ejector chute from the worktable.

  Note: Reference Section 8.2.2 of the QIAgility® User Manual for instructions on how to remove and replace the tip ejector chute.

- Rinse the blocks and the tip ejector chute with ethanol and rinse with de-ionized water.
- Dry with a soft paper towel.
- Replace the blocks and the tip ejector chute.
- UV decontaminate the worktable for a minimum of 30 minutes ensuring all samples, reagents, and consumables have been removed.
  - Click the light bulb button on the top bar of the software screen.
  - Use the arrows to adjust the time.
  - Press "**Start**". An alert window appears. Verify all conditions are met and press "**Yes**" to start.
- Document the completion of the weekly maintenance on the QIAgility® Maintenance Log.
- Switch off the QIAgility instrument.

Performance Checks

Performance checks of the QIAgility are conducted annually by the vendor representative as a part of the annual service contract. They are also performed following repair work, if applicable. Performance checks are documented on the QIAgility Maintenance Log provided at the back of this document.

3.9 Applied Biosystems 7500 Real-Time PCR System

Reference: ABI Prism 7000 Sequence Detection and Applied Biosystems 7500 Real Time PCR System User Bulletin
Applied Biosystems 7500/7500 Fast Real-Time PCR System Maintenance Guide

Maintenance Procedures

Directions for performing the checks listed below are located in *ABI Prism 7000 Sequence Detection and Applied Biosystems 7500 Real Time PCR System Maintenance Guide*. Maintenance is recorded on the Maintenance Log (located at the end of this document). **Note**: it is not necessary to perform maintenance if the instrument is not in use for the relevant time period. Record as "Not In Use" in the Maintenance Log as applicable.

Weekly

- Power off the computer controlling the 7500 instrument, then after 30 seconds, power on the computer.
- Clean the surface of the 7500 instrument with a lint-free cloth.

Monthly

- Check the lamp status. If necessary, replace the halogen lamp.
- Perform a background calibration
- Run disk cleanup and disk defragmentation.

Semiannually

- Perform a regions of interest (ROI) calibration
- Perform a background calibration.
- Perform an optical calibration.
- Perform a dye calibration.
- Perform an RNase P instrument verification run.

As needed

- Decontaminate the 7500 instrument
- Replace the halogen lamp

- Replace the 7500 instrument fuses
- Update the Windows operating system
- Update the 7500 software.
- Check computer disk space. If necessary, archive experiment files.

Performance Checks
Performance of the instrument is monitored with each run by the use of non-template controls and a standard curve with defined quality metrics for evaluation. Documentation, including printout of the report and the reagent worksheet, is added to the Maintenance Log binder. Any plate not meeting the defined specifications (refer to Forensic Biology Casework Procedures Manual) is brought to the attention of the DNA Technical Manager.

Additionally, any instrument having service performed shall undergo a performance check of a standard curve and NTCs before being used again for casework/database analysis.

3.10 Applied Biosystems 9700 Thermal Cyclers

Reference: GeneAmp® PCR System 9700 96-Well Sample Block Module User's Manual (http://www3.appliedbiosystems.com/cms/groups/mcb_support/documents/generaldocuments/cms_041143.pdf)

Maintenance Procedures
Regular maintenance of the 9700 includes cleaning the sample wells and the heated cover (refer to pages 16-17 of the User's Manual). The wells and cover should be cleaned during the last week of each month (+/- one week) and recorded on the Maintenance Log. Any preventive maintenance (PM) and service to the instrument, as well as the dates that an instrument is taken out of service or returned to service are also recorded

Performance Checks
Performance checks for the 9700 thermal cyclers include the Temperature Calibration Verification Test, the Temperature Non-Uniformity Test, and the Hardware Diagnostics/System Performance Tests. Performance checks are recorded on the Maintenance Log and test results are recorded on the corresponding laboratory forms.

The Temperature Calibration Verification test is performed monthly +/- one week. The Temperature Non-Uniformity Test and the Hardware Diagnostics/System Performance Tests are performed bi-annually.

The temperature verification system (used in the 9700 performance checks) is calibrated annually by an ISO 17025 external vendor. The calibration records are retained in the LIMS.

Additionally, any instrument having PM or service performed shall be subjected to the performance check tests prior to being used again for casework/database analyses.

The maintenance log form (one page) and the performance check results pages (three pages) are provided at the back of this document.

3.11 Applied Biosystems 3500xl

References: Applied Biosystems 3500xl Genetic Analyzers User Guide
http://www3.appliedbiosystems.com/cms/groups/mcb_support/documents/generaldocuments/cms_104815.pdf

Annual Preventive Maintenance is performed in-house by manufacturer personnel. The maintenance is recorded on the maintenance log in a binder near the instruments. The service report is also maintained with the instrument records. Additional maintenance, also recorded in the log, is described below. Instrument maintenance records are archived in the LIMS annually.

3.11.1 Maintenance to be performed as needed

- Ensure adequate levels of buffer in reservoirs
- Purge old plate records
  - Click **Library** and select **Plates** in the navigation pane. All plates stored within the library will appear on the screen.
  - Select the plates to be deleted (more than one can be selected at a time).
  - Right click the mouse and select **delete.**

Note: Do not use the purge feature to delete items in the library. Doing so will delete all items with the exception of factory stored items. Thus, all multiplex assays and protocols from other manufacturers will be deleted.

3.11.1.1 Replacing Anode Buffer Container (ABC)

The Anode Buffer Container (ABC) must be replaced after 14 days or 50 injections.

- Allow buffer container to equilibrate to room temperature prior to placing on the instrument.

- Ensure that most of the 1X buffer is in the larger side of the ABC container prior to removing the seal by tilting the container slightly.
- Place the ABC into the Anode end of the instrument, below the pump. (RFID tag will face the instrument).

3.11.1.2 Replacing Cathode Buffer Container (CBC)

The Cathode Buffer Container (CBC) must be replaced after 14 days or 50 injections.

- Allow buffer container to equilibrate to room temperature prior to placing on the instrument.
- Press the tray button on the instrument to bring the autosampler to the forward position.
- Wipe away any condensation on the exterior of the CBC using lint free lab cloth.
- Tilt the CBC back and forth gently to ensure the buffer is evenly distributed and remove the seal.
- Ensure the top of the CBC is dry (failure to do this may result in arcing) and place the appropriate septa on both sides of the CBC.
- Install the CBC on the autosampler.

3.11.1.3 Replenishing Polymer

The polymer must be replaced after 960 samples (or 120 injections) or when it has passed the expiration date.

- Click **Maintenance** (top right of the screen). In the Maintenance Wizards screen, click **Replenish Polymer** (this will take 10 to 20 minutes to complete) and follow the prompts.
- Polymer may be replenished as part of the water wash wizard.

3.11.1.4 Replacing the Capillary Array

The capillary is replaced as needed; when indicated by poor data quality.

- The following indications may suggest that a new capillary array is required:
  - Poor sizing precision or allele calling
  - Poor resolution and/or decreased signal intensity
- In the Maintenance Wizards screen click **Install Capillary Array** (this will take 15-45 minutes to complete) and follow the prompts.

Note: Spatial and Spectral Calibrations must be performed anytime an array is replaced. A water wash, water trap flush and performance check must also be completed to verify performance of the array.

3.11.1.5 Spatial Calibration

A spatial calibration establishes a relationship between the signal emitted by each capillary and the position where that signal falls on and is detected by the CCD camera. A spatial calibration must be performed when the capillary array has been replaced, the detector door has been opened, or the instrument has been moved.

Performing a Spatial Calibration

- Access the Spatial Calibration screen:
  - Click **Maintenance** and then select **Spatial Calibration** in the navigation pane.
- Under Options, select **NO-Fill** or select **Fill** to fill the array with polymer before starting the calibration.
- Select **Perform QC Checks** to enable the system to check each capillary against the specified range for spacing and intensity.
- Click **Start Calibration**.

Evaluating a Spatial Calibration

- Evaluate the spatial calibration profile to ensure that you see:
  - One sharp peak for each capillary. Small shoulders are acceptable
  - One marker (+) at the top of every peak.
  - Peaks are about the same height.
- If the results meet the above criteria, click Accept Results. If the results do not meet the above criteria, click Reject Results and refer to the Applied Biosystems 3500/3500xl Genetic Analyzer User guide, "Spatial calibration troubleshooting" page 300.
- If the results are acceptable, a printed copy of the passing spatial calibration report is placed in the 3500 Maintenance Logbook. To print a copy of the report, click **View Detail Report**, then click **Print.** In the printer dialog box, select **CutePDF Writer** as the printer. Save this to a thumb drive, which can then be printed from a computer that is networked to a printer.

3.11.1.6 Spectral Calibration

A spectral calibration creates a de-convolution matrix that compensates for dye overlap. A spectral calibration should be performed for each chemistry used whenever the capillary array is changed, the CCD camera or laser are realigned or replaced, or if you see a decrease in spectral separation.

Performing a Spectral Calibration – Dye Set J6 (for use with Global Filer / Global Filer Express)

- In the Dashboard, Click **Start Pre-heat 60°** at least 30 minutes prior to the start of the run.
- Ensure the consumables are not expired and adequate injections remain.
- Ensure the pump assembly is free of bubbles, run the Remove bubble wizard if needed.
- Thoroughly mix the contents of the DS-36 Matrix Standard (Dye Set J6) tube and spin briefly in a microcentrifuge.

- Prepare the matrix standard by combining the following in a 1.5 mL microcentrifuge tube:
  - Standard: 6 µL
  - Hi-Di Formamide: 294 µL
- Dispense 10 µL of the matrix standard/Hi-Di formamide mixture into the first 24 wells (three columns) of a 96 well CE plate and cover with a plate septa.
- Briefly centrifuge the plate containing the standards and verify that each sample does not contain bubbles and is positioned correctly in the bottom of the well.
- Denature at 95°C for 5 minutes. Snap chill for three minutes.
- Place the sample plate into the plate base provided with the instrument.
- Snap the plate cover onto the plate, septa, and plate base.
- Verify that the holes of the plate retainer and the septa are aligned.
- Press the tray button on the instrument to bring the autosampler to the forward position.
- Place the plate in the autosampler with the labels facing you and the notched corner of the plate in the notched corner of the autosampler. Close the instrument doors.
- Access the Spectral Calibration screen:
  - Select **Maintenance**, then click **Spectral Calibration** in the navigation pane.
- Select **96** for the number of wells in the spectral calibration plate and specify the plate location (A or B) in the instrument.
- Select **Matrix Standard** as the chemistry standard and **J6** as the dye set.
- Select **Allow Borrowing**.
- Click **Start Run**.

<u>Evaluating a Spectral Calibration</u>

- Passing and failing capillaries are shown in green and red respectively. Borrowed capillaries are shown in yellow with an arrow indicating the adjacent capillary from which results were borrowed. Up to three adjacent-capillary borrowing events are allowed.
- If fewer than the recommended number of capillaries pass, the spectral calibration run will be repeated automatically up to three times.
- View the raw data for each capillary. Ensure that the data meet the following criteria:
  - Order of the peaks in the raw data profile from left to right is red-yellow-green-blue for Promega dyes, orange-red-yellow-green-blue-purple for Dye Set J6
  - The Quality Value is ≥ 0.95 and the Condition Number is ≤ 8.5
- If the data for all capillaries meet the above criteria, click **Accept Results**.

- If any capillary data does not meet the criteria click **Reject Results** and refer to the Applied Biosystems 3500/3500xl Genetic Analyzer User guide "Spectral calibration troubleshooting" page 301.
- If the results are acceptable, a printed copy of the passing spectral report is placed in the 3500 Maintenance Logbook. To print a copy of the report, click **View Detail Report**, then click **Print.** In the printer dialog box, select **CutePDF Writer** as the printer. Save this to a thumb drive, which can then be printed from a computer that is networked to a printer.

3.11.2 Monthly Maintenance

The water wash and water trap flush are performed as part of monthly maintenance and/or anytime an array is replaced.

3.11.2.1 Computer maintenance

- Defragment the hard drive
  Start > Programs > Accessories > System Tools > Disk Defragmenter

3.11.2.2 Water Wash

- The water wash may take over 40 minutes to compete
- Click **Maintenance** (top left of screen) on the dashboard.
- Select Wash Pump and Channels to run the wizard. Follow the prompts to completion.

Note: An empty ABC reservoir may be used instead of emptying the reservoir currently on the instrument. Simply remove from the instrument, cover, and set aside. At the completion of the Water Wash Wizard replace the ABC with the reservoir previously removed from the instrument or a new reservoir.

3.11.2.3 Water Trap Flush

- Fill the supplied 20ml Luer lock syringe with warm deionized water. Expel any bubbles from the syringe.
- Attach the syringe to the forward-facing Luer fitting at the top of the pump block. Hold the fitting with one hand while threading the syringe clockwise.
- Open the Luer fitting by grasping the body of the fitting and turning it counterclockwise approximately one-half turn to loosen.
- Flush 5ml of deionized water through the trap taking extra care not to use excessive force.
- Remove the syringe from the Luer fitting by holding the fitting with one hand while turning the syringe counterclockwise.
- Close the Luer fitting by lightly turning clockwise until the fitting seals against the block.
- Empty the water trap waste container.

3.11.3 Performance Check

A performance check provides for assessment of the instrument system's resolution and its ability to adequately resolve the peaks of an allelic ladder within one base pair. Also, it monitors the ability of the instrument to produce consistent peak heights over the relevant sizing range.

This performance check is performed quarterly. This performance check is also performed after capillary array changes and after PM or service has been performed on a 3500 instrument prior to resuming use for casework or database analysis.

- Follow the instructions in the Forensic Biology Casework Procedures Manual to prepare the 3500xl for a run
- Follow the manufacturer's instructions to run a DS-33 (dyes et G5) spectral calibration, specifically for the use of the Identifiler allelic ladder.
- Prepare an allelic ladder master mix by adding the following volumes of reagents to an appropriately sized tube:
    - 15µl GeneScan 600 LIZ
    - 30ul Identifiler allelic ladder
    - 255µl Hi-Di Formamide
- Vortex the master mix and spin briefly. Transfer 10µl of the master mix to the appropriate wells (i.e. A1-H3). Briefly centrifuge the plate, then heat and snap chill the plate. Prepare plate assembly and load on the 3500.
- To access the Fragment Install Standard screen: Select **Maintenance**, then select **HID Install Standard** in the navigation pane.
- Select the plate type and plate position in the instrument. Note: you do not create a plate for the performance check – the software uses predetermined positions for the run.
- Click **Start Run**. The run takes about 30 minutes.
- The software evaluates data for all capillaries, including:
    - Nominal allele sizes for all markers
    - Average peak heights
    - Sizing precision
    - Pass/fail
- Evaluate the standard data as follows:
    - Examine the number of size standard and allele peaks found for each capillary. The number of expected peaks is shown above the observed number of peaks for each of the capillaries.
    - If the expected number of alleles and size standard peaks are found, click Accept Results.
    - If the expected number of alleles and size standard peaks are not found, click Reject results. Rerun the plate. If the check is still not successful, consult the 3500 User Guide for troubleshooting suggestions. If the instrument still does not pass, consult the DNA Technical Manager and

notify discipline scientists that the instrument is offline until the issue is resolved.
  - A printed copy of the passing performance check is placed in the 3500 Maintenance Logbook. To print a copy of the report, click **View Detail Report**, then click **Print.** In the printer dialog box, select **CutePDF Writer** as the printer. Save this to a thumb drive, which can then be printed from a computer that is networked to a printer.

3.11.4 Annual Performance Check

At least once per calendar year, the laboratory shall complete a performance check of its analytical platform(s) as follows:

- Amplify a NIST traceable positive control with each amplification kit currently online.
- Analyze following laboratory procedures for casework
- Verify as per casework interpretation guidelines
- Required documentation (as described for amplification kit verification), is retained in the annual DNA case record in LIMS.

3.12 Pipettes

Pipettes are calibrated annually in-house by a suitable vendor, and tracked in the LIMS (DNA case record) as items of evidence. ISO certificates of calibration received from the vendor are archived in the LIMS.

3.13 Thermometers

Thermometers are tracked on an uncontrolled spreadsheet. The spreadsheet includes, for each thermometer, the date of calibration, in-service date, and date due for replacement. Thermometers (including the probes used in robotic performance checks) are replaced annually, or when they are found to not be measuring accurately.

3.14 QIAcube®

References: QIAcube® User Manual, Version 1.1, 06/2008

3.14.1 Regular maintenance procedure

After running a protocol, perform the regular maintenance procedure:

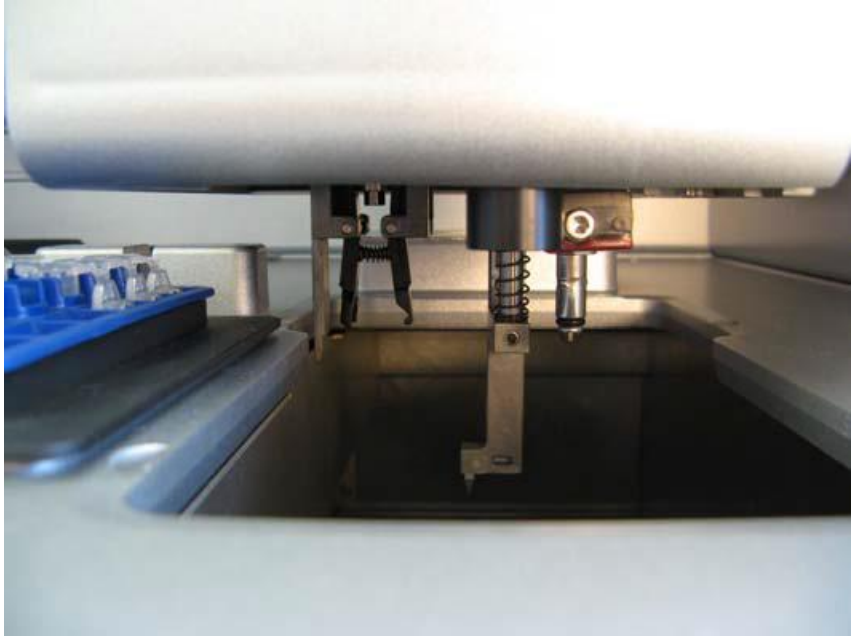
- Wipe down platform with a kimwipe moistened with ethanol and then distilled water.
  - Do not directly spray the inside of the QIAcube with water or ethanol!
- Empty the waste drawer.

- If necessary, wipe down with a kimwipe moistened with ethanol and then distilled water.

- Remove used disposable labware and unwanted samples and reagents from the worktable. Discard in biohazardous waste.
  - Plastic rotor adaptors are single use only
- Replace the lids of the reagent bottles and close tightly.
- Rerack tips if there are any partially used racks.

3.14.2 Monthly Maintenance Procedure

- Perform regular maintenance procedure but remove reagent bottles from QIAcube.
- Clean the optical sensor, tip adapter, gripper unit (including the gripper), the stabilizing rod, and the spin column lid holder, by wiping these modules with a soft lint-free cloth moistened with water.
  - To gain access to the modules within the robotic arm:
    - “Tools” => “Maintenance” => “Cleaning position”
    - Be sure to remove the waste drawer and the labware tray to prevent robotic arm from crashing into tray.



- After cleaning the modules of the robotic arm, turn off the QIAcube.
- Wipe down the following with a kimwipe moistened with ethanol and then distilled water. Wipe dry.
  - Worktable
  - Underneath centrifuge rotor

- Centrifuge, centrifuge gasket, and centrifuge lid
- Shaker rack, labware tray, heating adapter, reagent bottle rack, rotor plastic holder
- Waste drawer liner (and drawer, if needed)

- Wipe the inside and outside of the QIAcube with distilled water.
  - Do not use alcohol or alcohol-based disinfectants on the QIAcube door.
  - Wipe the touchscreen with a kimwipe moistened with ethanol and then distilled water. Wipe dry with a paper towel.

3.14.3 Bi-yearly Maintenance Procedure

- Perform monthly maintenance procedure
- Access to the inside of the centrifuge is required. Lid should be open provided that a protocol is not being run. In case it is closed, to open centrifuge lid:
  - “Tools” => “Maintenance” => “Open lid”
- Switch off the QIAcube at the power switch.
- Remove the buckets from the rotor. Undo the rotor nut on rotor top using the rotor key, and lift the rotor off the rotor shaft.
- Rinse the rotor, buckets, and rotor nut in ethanol then distilled water. Use a swab to reach narrow areas. Wipe surfaces dry with a soft lint-free cloth.

- Apply a few drops of mineral oil (Anti-Corrosion Oil (rotor), cat. no. 9018543) on a soft, lint-free cloth, and wipe the bucket mount and rotor claw. A thin, invisible oil film should cover the bucket mount and rotor claw, but no droplets or smear should be apparent.
  - Important: Before applying oil to the rotor buckets on the rotor, make sure that the rotor and all buckets are completely dry.

- Clean the inside of the centrifuge, centrifuge gasket, and centrifuge lid with ethanol then distilled water. Wipe dry with lint-free paper towel.
- Check the centrifuge gasket for damage. If the gasket is damaged or shows signs of wear, contact QIAGEN Technical Services.
- Reinstall rotor and buckets
    - The rotor can be mounted in only one orientation. The pin on the rotor shaft fits into a notch on the underside of the rotor directly underneath rotor position
        - Line up position 1 of the rotor with the pin on the rotor shaft and carefully lower the rotor onto the shaft. Install the rotor nut on top of the rotor and tighten using the rotor key supplied with the QIAcube. Make sure that the rotor is securely seated.
    - When replacing the rotor buckets, the side of the rotor bucket that must face toward the rotor shaft is marked with a gray line. Hold the bucket at an angle with the gray line facing the center of the rotor and hang the bucket on the rotor. Check that all buckets are properly suspended and can swing freely.
        - Important: All centrifuge buckets must be mounted before starting a run.

- Perform a Tightness Test
    - The tightness test is performed to check whether the tightness of the pipetting system, including the attached pipetting tip, is sufficient.
    - Load an empty 2 ml microcentrifuge tube in position 1 of the shaker.
    - Fill a reagent bottle with reagent alcohol and place in position 1 of the reagent bottle rack.
    - Load a tip rack of 1000 µl wide-bore filter tips onto the QIAcube.
    - Start Tightness Test
        - In the main menu, press “Tools”.
        - Select “Maintenance”
        - Select “Tightness test”
        - Select the appropriate type of filter-tips (“1000 µl wide-bore tips”)
        - Press “Start” to start the tightness test with the selected type of filter-tips.
        - Follow the instructions displayed in the touchscreen, and press “Start” to start the tightness test.
    - After the load check, the robotic arm will pick up a tip, aspirate ethanol, and move to the tube. The tip will remain in place above the tube for 2 minutes. The tip will be detached.
    - After the protocol is completed, open the QIAcube door and check if the tube contains liquid.

- PASS: If the tube is still empty and dry, the tightness of the pipetting system is adequate and the test result is passing.
- FAIL: Liquid present in the tube at the end of the test indicates a failure of the test. If you find liquid in the tube, change the O-ring and repeat the test. If the second test fails, the instrument must be taken offline until the issue is resolved. Note the test results in the maintenance documentation, and put a note on the instrument to show that it is offline. Notify the technical manager.

- Based on results of tightness test, if necessary, change O-rings (see QIAcube® Tip-Adapter Ring Replacement protocol)
  - "Tools"=>"Maintenance"=>"Cleaning position"

3.14.4 Bi-yearly Performance Check

Approximately once every six months, or after service, a performance check will be run on each QIAcube instrument. The performance check will consist of one known sample (including both sperm and epithelial cells), and one reagent blank sample. Performance check samples will be taken through the casework protocol for differential extraction with automated wash protocol.

PASS: A passing performance check consists of correct and complete profiles for both the sperm and epithelial fractions of the positive control sample, plus amplified reagent blank profiles without extraneous DNA.

FAIL: A performance check failure would be an incomplete or incorrect positive control profile, or a reagent blank profile with detected DNA. However, an incomplete profile, and some instances of reagent blank contamination, may be indicative of an issue at the amplification stage. Such samples should be re-amplified. If re-amplification does not yield a full, correct profile for a positive control sample and/or a reagent blank profile without extraneous DNA, then the performance check fails. The instrument must be taken offline and the Technical Manager must be notified, so that a further course of action can be determined by the Technical Manager.

Documentation: Performance check documentation includes electropherograms of the successful positive and negative controls. If the performance check was performed as a part of a casework central log, the central log may be referenced. If the performance check was performed alone, documentation such as allelic ladders, amplification controls, etc. should be included with the performance check paperwork. An electronic scan of the compiled performance checks documentation is then stored on the laboratory network.

3.15 Thermo-Mixer

3.15.1 Operation

• Turn on main switch.
• Calibrated set points for the digital display in the thermomixer unit are checked semi-annually and noted on the instrument, with analyst date and initials. Choose digital temperature set point accordingly. Completion of maintenance is documented on the DNA Casework Extraction Room Cleaning Log.
• Allow thermomixer to come to temperature, as shown on the digital display.

3.15.2 Maintenance

• Bi-yearly, the digital set-points for specified temperatures (i.e. 56°C and 70°C) will be re-assessed:

- Put ~1000uL of sterile water in a tube and place in the thermomixer (without shaking).
- Set temperature on the digital display to the previously calibrated value noted on the instrument. Allow thermomixer to come to temperature, as shown on the digital display.
- Use a temperature probe to determine actual temperature.
- If the digital set point is no longer correct, adjust gradually until the correct set-point is found, allowing adequate time for temperature stabilization during the adjustment process.
- Note any changes to the digital set-points on the instrument.
- Completion of maintenance is documented on the Thermomixer Temperature Log.

Reagent and Chemical Log

Reagent	Date Rec'd/Prep'd	Lot #	Rec'd/Prep'd by	Expiration Date	Components and lot #s	QC pass/fail	Storage Location	Autoclave verified with Bioindicator	Verification Date and Analyst

DNA Critical Reagent Verification Form

Scientist:
Date:
3500 data folder:

	Lot #	Expiration Date
Buffer ATL		
Buffer MTL		
DTT		
EZ1 Kits		
EZ1 Reagent Cartridges		
Proteinase K		
G2 Buffer		
Carrier RNA		
G2 Buffer		
GlobalFiler Express Kit		
DNA Control 007		
Master Mix		
Master Mix Additive		
Primer Set		
GlobalFiler Express Allelic Ladder		
Prep-N-Go Buffer		
Proteinase K		
QIASymphony Investigator Kit		
QIAsymphony Reagent Cartridges		
Buffer ATL		
Proteinase K		
Sterile Water		
TE^{-4} Buffer		

Quantifiler Trio Verification Form

Scientist:
Date:

New Kit Lot# _____

Expiration Date: _____

PCR Reaction Mix: _____

Primer: _____

DNA Standard: _____

Dilution Buffer: _____

PREVIOUS QT Y-intercept values

T-Large Autosomal: _____ T-Small Autosomal _____: T-Y_____

NEW QT Y-intercept values

T-Large Autosomal: _____ T-Small Autosomal _____: T-Y_____

1. Set up and run a standard curve and two NTC wells with the new kit reagents.
2. Confirm that passive references (ROX) values are acceptable and note as such on front page of Experimental Results Report.
3. Passing value for R^2 is >= 0.98. Passing value for slopes is -3.0 to -3.6. If either of these results is outside range, run a new standard curve and two NTC wells. If second attempt also fails, notify the DNA TM.
4. Provide this sheet and the Experimental Results Report (to include the summary page, plate layout, human and male standard curves, and results table) to the DNA TM.

_____

DNA Technical Manager

Kit is acceptable for use:

Conditions / observations / notes:

GlobalFiler Verification

Scientist:
Date:

Identity of known sample used for verification: _____

OLD Kit **Lot #**_____ **Expiration Date:** _____
NEW Kit **Lot#** _____ **Expiration Date:** _____

DNA Control 007 _____ Allelic Ladder _____

Primer Set _____ Master Mix _____

1. Amplify the positive control, a negative TE^{-4} control, and a known sample extract using the kit currently in use (OLD kit).
2. Amplify the positive control, a negative TE^{-4} control, and the same known sample extract using the kit to be validated (NEW kit).
3. Run all samples using the Allelic Ladder from the kit to be validated (NEW kit).
4. Assess peak height variation:
    a. Export peak heights and allele calls for both the known sample extract run with the OLD kit and the same known sample extract run with the NEW kit.
    b. Calculate average peak height for each kit.
5. Print the following and submit to DNA TM along with this page:
    a. Amplification worksheet (can write “see verification worksheet” in reagent section)
    b. Positive control (NEW kit)
    c. Negative control (NEW kit)
    d. Allelic Ladder (NEW kit)
    e. Known sample (NEW kit)
    f. Known sample (OLD kit)
    g. Average Peak Height assessment (as described in step 4)

_____

DNA Technical Manager

30% Range from OLD kit: _____ NEW kit within 30%? _____

Kit is acceptable for use:

Conditions / Observations / Notes:

DNAStable LD Verification

Scientist:
Date:

Identity of known sample used for verification: _____

DNAStable LD **Lot#** _____ **Expiration Date:** _____

1. Use DNAStable LD to dry down a previously typed reference sample extract (example: 50 µL) and a corresponding reagent blank extract (example: 50 µL). Note: the volume used does not have to be 50 µL, but it must be at least 15 µL and must be consistent between the sample and the blank.
2. Rehydrate each of the extracts back to its previous volume (example: 50 µL) and amplify, using the same amplification volumes previously used.
3. Assess peak height variation in the known sample:
    a. Export peak heights and allele calls for both the known sample extract amplified PRIOR to DNAStable LD, and the same known sample extract amplified AFTER DNAStable LD dry-down and re-hydration.
    b. Calculate average peak height for each amplification of the reference sample extract.
    c. Comparison of the original amplification results to the results of the rehydrated extract should not demonstrate a significant (>20%) overall reduction in the average peak heights.
4. Documentation in LIMS: Peak Height Assessment (see FBGLM for example), along with this form and cover page.

Conditions / Observations / Notes:

Example of Peak Height Assessment for DNAStable or GF Kit Verification

Sample Name	Sample File	Marker	Allele 1	Height 1	Allele 2	Height 2
K1.1	K1.1_B01_04.hid	D3S1358	16	4360	18	3924
K1.1	K1.1_B01_04.hid	TH01	6	4770	9.3	3711
K1.1	K1.1_B01_04.hid	D21S11	28	3043	30	2349
K1.1	K1.1_B01_04.hid	D18S51	12	2109	19	2114
K1.1	K1.1_B01_04.hid	Penta E	5	1313	7	2518
K1.1	K1.1_B01_04.hid	D5S818	11	6542		
K1.1	K1.1_B01_04.hid	D13S317	11	2862	12	2489
K1.1	K1.1_B01_04.hid	D7S820	8	3565	11	2046
K1.1	K1.1_B01_04.hid	D16S539	10	5548	13	4588
K1.1	K1.1_B01_04.hid	CSF1PO	10	2002	12	2770
K1.1	K1.1_B01_04.hid	Penta D	9	2144	11	1643
K1.1	K1.1_B01_04.hid	AMEL	X	8364		
K1.1	K1.1_B01_04.hid	vWA	15	4218	17	4125
K1.1	K1.1_B01_04.hid	D8S1179	12	3603	13	4808
K1.1	K1.1_B01_04.hid	TPOX	8	3609	11	4034
K1.1	K1.1_B01_04.hid	FGA	22	1806	24	1484
K1 11-05817 877188	K1_B01_04.hid	D3S1358	16	3743	18	3976
K1 11-05817 877188	K1_B01_04.hid	TH01	6	3347	9.3	4170
K1 11-05817 877188	K1_B01_04.hid	D21S11	28	2530	30	2935
K1 11-05817 877188	K1_B01_04.hid	D18S51	12	2584	19	1833
K1 11-05817 877188	K1_B01_04.hid	Penta E	5	2028	7	1476
K1 11-05817 877188	K1_B01_04.hid	D5S818	11	8075		
K1 11-05817 877188	K1_B01_04.hid	D13S317	11	2597	12	3252
K1 11-05817 877188	K1_B01_04.hid	D7S820	8	2877	11	2866
K1 11-05817 877188	K1_B01_04.hid	D16S539	10	4477	13	4490
K1 11-05817 877188	K1_B01_04.hid	CSF1PO	10	1561	12	1933
K1 11-05817 877188	K1_B01_04.hid	Penta D	9	2889	11	1836
K1 11-05817 877188	K1_B01_04.hid	AMEL	X	11006		
K1 11-05817 877188	K1_B01_04.hid	vWA	15	5974	17	5112
K1 11-05817 877188	K1_B01_04.hid	D8S1179	12	4187	13	4241
K1 11-05817 877188	K1_B01_04.hid	TPOX	8	4654	11	4502
K1 11-05817 877188	K1_B01_04.hid	FGA	22	2130	24	2503

Ave peak height original amp (K1)	3659.5
Ave peak height after DNAstable (K1.1)	3415.4
20% range from original amp	2927.6 - 4391.4
reamp after DNAstable within 20%	Yes

Biological Screening Lab Cleaning Log

Date /Initial	Task Completed	Comments
	☐ Floors cleaned ☐ Counters and equipment bleached	
	☐ Floors cleaned ☐ Counters and equipment bleached	
	☐ Floors cleaned ☐ Counters and equipment bleached	
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DNA Casework Extraction Lab Cleaning Log

Date /Initial	Task Completed	Comments
	☐ Floors cleaned ☐ Counters and equipment bleached	
	☐ Floors cleaned ☐ Counters and equipment bleached	
	☐ Floors cleaned ☐ Counters and equipment bleached	
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	☐ Floors cleaned ☐ Counters and equipment bleached	

PCR Prep Lab Cleaning Log

Date /Initial	Task Completed	Comments
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ PCR hood UV sterilization	
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ PCR hood UV sterilization	
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ PCR hood UV sterilization	
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ PCR hood UV sterilization	
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	☐ Floors cleaned ☐ Counters and equipment bleached ☐ PCR hood UV sterilization	

PCR Lab Cleaning Log

Date /Initial	Task Completed	Comments
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ Genetic Analyzers wiped down ☐ Monthly computer defrag	
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ Genetic Analyzers wiped down ☐ Monthly computer defrag	
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ Genetic Analyzers wiped down ☐ Monthly computer defrag	
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ Genetic Analyzers wiped down ☐ Monthly computer defrag	
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ Genetic Analyzers wiped down ☐ Monthly computer defrag	
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	☐ Floors cleaned ☐ Counters and equipment bleached ☐ Genetic Analyzers wiped down ☐ Monthly computer defrag	
	☐ Floors cleaned ☐ Counters and equipment bleached ☐ Genetic Analyzers wiped down ☐ Monthly computer defrag	

BIOLOGICAL SCREENING LAB INCUBATOR

Make/Model _____
S/N _____
Acceptable Temperature Range is 27ºC to 47ºC

Scientist	Date, Time & Temperature at start of incubation	Date, Time & Temperature at end of incubation

BIOLOGICAL SCREENING LAB WATER BATH
MagniWhirl Model
S/N M5-11103
Acceptable Temperature Range is 36ºC to 38ºC

Scientist	Date	Temperature

CASEWORK EXTRACTION LAB INCUBATOR

Model _____

S/N _____

Acceptable Temperature Range is 50ºC to 60ºC

Scientist	Date, Time & Temperature at start of incubation	Date, Time & Temperature at end of incubation

CASEWORK EXTRACTION LAB INCUBATOR

Model _____

S/N _____

Acceptable Temperature Range is 27ºC to 47ºC

Scientist	Date, Time & Temperature at start of incubation	Date, Time & Temperature at end of incubation

THERMOMIXER TEMPERATURE LOG

Model _____

S/N _____

Appropriate temperature set points are noted on instrument

Bi-yearly calibration is documented at the bottom of page, including date, analyst, actual temperatures, and corresponding set points.

Scientist	Date, Time & Set point at start of incubation	Date & Time at end of incubation

pH Meter / Electrode Calibration Log

- Prepare the balance for calibration as described in the electrode User Manual
- Record the following measurements

Date Calibrated	pH of Calibration buffer	Calibration buffer lot #	Calibration buffer expiration date	Successful calibration denoted by Scientist initials

Analytical Balance Performance Check

- Check that balance is level and adjust if necessary
- Weight set should be equilibrated to room temperature prior to use
- Airflow in the room should be minimized
- Weights should be taken while the scientist is seated, without applying pressure to the counter
- The same door of the balance should be used throughout a weighing session
- Weights should be handled with the supplied tweezers and always placed in the center of the weigh pan
- The first weight should be placed and removed 3-5 times before recording the first measurement. This allows for the electronics of the balance to "warm up"
- Ensure that the measurement has stabilized prior to recording
- Ensure that the display is zeroed (while the door is closed) in between measurements
- If the balance check fails at any weight, repeat the entire test. If it fails a second time, notify the DNA Technical Manager, who will determine an appropriate course of action

- Record the following measurements

Weight Measured	Balance Readout (X.XXXX)	Acceptable Range	Result (pass/fail)
1g		0.9990-1.0010	
2g		1.9990-2.0010	
5g		4.9990-5.0010	
10g		9.9990-10.0010	

Troemner weight set (S/N 4000013561) Date of last cal_____

Mettler Toledo XS204 Balance (S/N B208726643) Date of last cal_____

_____ _____

Scientist Signature Date Check Performed

EZ1 Advanced-XL-___ Maintenance Log for Calendar Year _____
Alaska State Tag #_____
S/N: _____

Week of	Task Completed (scientist initial in box)	Comments
	☐ instrument in use ☐ EZ1 maintenance/performance check completed ☐ weekly ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ EZ1 maintenance/performance check completed ☐ weekly ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ EZ1 maintenance/performance check completed ☐ weekly ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ EZ1 maintenance/performance check completed ☐ weekly ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ EZ1 maintenance/performance check completed ☐ weekly ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ EZ1 maintenance/performance check completed ☐ weekly ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	

EZ1 ADVANCED-XL-___ PIPETTING ACCURACY TEST
Alaska State Tag #_____S/N _____

The following performance checks are to be performed approximately every 6 months. Upon completion of the tests, record the appropriate information for the laboratory balance and thermometer used in the spaces provided.

1. The Pipetting Accuracy Test is performed using Qiagen Supplementary Protocol MA67.
2. Read the instructions completely prior to beginning the test. Perform both the 100µL and 500µL tests.
3. Record the weights in the tables below and calculate the weight differences.
4. If the robot does not pass one of these tests, repeat the test.
5. If the robot fails the test a second time, consult the Technical Manager to determine the appropriate course of action.

Pipetting 100µL of water (acceptable range 92-108µL)

Tube	Weight before Run (g)	Weight after Run (g)	Difference (g)	Pipetted volume (µL)	Pass/Fail
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

EZ1 ADVANCED-XL-___ PIPETTING ACCURACY TEST

Pipetting 500µL of water (acceptable range 460-540µL)

Tube	Weight before Run (g)	Weight after Run (g)	Difference (g)	Pipetted volume (µL)	Pass/Fail
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

EZ1 ADVANCED-XL-___ LEAKAGE TEST

1. The Leakage Test is performed using Qiagen Supplementary Protocol MA67.
2. Read the instructions completely prior to beginning the test.
3. Record the results in the space provided below.
4. There must be no dripping from the tips during the test.
5. If the robot does not pass this test, repeat the test.
6. If the robot fails the test a second time, consult the Technical Manager to determine the appropriate course of action.

Tube	Tips dripped during run	Pass/Fail
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

EZ1 ADVANCED-XL-___ TEMPERATURE ACCURACY TEST

1. The Temperature Accuracy Test is performed using Qiagen Supplementary Protocol MA68.
2. Read the instructions completely prior to beginning the test; be sure to wait the entire 20 minutes as described in Step 7 of the protocol.
3. Record the results in the space provided below.
4. If the measured temperature is within +/- 3ºC, then the accuracy is within the defined specifications.
5. If the robot does not pass this test, repeat the test.
6. If the robot fails the test a second time, consult the Technical Manager to determine the appropriate course of action.

	Measured Temperature	**Test Results (Pass/Fail)**
60ºC	_____	_____

<u>Equipment used</u>

Laboratory Balance
Make/Model: _____

Serial Number: _____

Last Calibration Date:_____

Thermometer
Make/Model: _____

Serial Number: _____

Last Calibration Date:_____

Scientist:_____

Date: _____

QIAsymphony® SP-___ Maintenance Log for Calendar Year _____
Alaska State Tag #_____
S/N: _____

Day of	Task Completed (scientist initial in box)	Comments
	☐ QIAsymphony maintenance/performance check completed ☐daily ☐weekly ☐monthly ☐annual ☐ preventative maintenance ☐ service call	
	☐ QIAsymphony maintenance/performance check completed ☐daily ☐weekly ☐monthly ☐annual ☐ preventative maintenance ☐ service call	
	☐ QIAsymphony maintenance/performance check completed ☐daily ☐weekly ☐monthly ☐annual ☐ preventative maintenance ☐ service call	
	☐ QIAsymphony maintenance/performance check completed ☐daily ☐weekly ☐monthly ☐annual ☐ preventative maintenance ☐ service call	
	☐ QIAsymphony maintenance/performance check completed ☐daily ☐weekly ☐monthly ☐annual ☐ preventative maintenance ☐ service call	
	☐ QIAsymphony maintenance/performance check completed ☐daily ☐weekly ☐monthly ☐annual ☐ preventative maintenance ☐ service call	
	☐ QIAsymphony maintenance/performance check completed ☐daily ☐weekly ☐monthly ☐annual ☐ preventative maintenance ☐ service call	
	☐ QIAsymphony maintenance/performance check completed ☐daily ☐weekly ☐monthly ☐annual ☐ preventative maintenance ☐ service call	

QIAgility®-___ Maintenance Log for Calendar Year _____
Alaska State Tag #_____
S/N: _____

Day of	Task Completed (scientist initial in box)	Comments
	☐ instrument in use ☐ QIAgility maintenance/performance check completed ☐ daily ☐ weekly ☐ annual ☐ service call	
	☐ instrument in use ☐ QIAgility maintenance/performance check completed ☐ daily ☐ weekly ☐ annual ☐ service call	
	☐ instrument in use ☐ QIAgility maintenance/performance check completed ☐ daily ☐ weekly ☐ annual ☐ service call	
	☐ instrument in use ☐ QIAgility maintenance/performance check completed ☐ daily ☐ weekly ☐ annual ☐ service call	
	☐ instrument in use ☐ QIAgility maintenance/performance check completed ☐ daily ☐ weekly ☐ annual ☐ service call	
	☐ instrument in use ☐ QIAgility maintenance/performance check completed ☐ daily ☐ weekly ☐ annual ☐ service call	
	☐ instrument in use ☐ QIAgility maintenance/performance check completed ☐ daily ☐ weekly ☐ annual ☐ service call	

7500-__ Real-Time PCR Maintenance Log for Calendar Year _____
Alaska State Tag #_____
S/N: _____

Week of	Task Completed (scientist initial in box)	Comments
	☐ instrument in use ☐ 7500 maintenance completed ☐ weekly ☐ monthly ☐ semiannual ☐ other ☐ service call	
	☐ instrument in use ☐ 7500 maintenance completed ☐ weekly ☐ monthly ☐ semiannual ☐ other ☐ service call	
	☐ instrument in use ☐ 7500 maintenance completed ☐ weekly ☐ monthly ☐ semiannual ☐ other ☐ service call	
	☐ instrument in use ☐ 7500 maintenance completed ☐ weekly ☐ monthly ☐ semiannual ☐ other ☐ service call	
	☐ instrument in use ☐ 7500 maintenance completed ☐ weekly ☐ monthly ☐ semiannual ☐ other ☐ service call	
	☐ instrument in use ☐ 7500 maintenance completed ☐ weekly ☐ monthly ☐ semiannual ☐ other ☐ service call	

7500-__ Temperature Calibration Verification Test
Alaska State Tag # _____
S/N _____

Scientist: _____

Date: _____

- **Select Instrument > Lamp Status / Replacement**
  - **Lamp status condition**: Good / Failed / Change soon
  - **Usage (Hours)**: _____
- **Region of Interest Calibration**: Passed / Failed
- **Background Calibration**: Passed / Failed
- **Optical Calibration**: Passed / Failed
- **Dye Calibration**: Passed / Failed
- **RNase P instrument verification run**: Passed / Failed

7500-___ Standard Curve Y-Intercepts – Calendar Year _____

Alaska State Tag #_____
S/N: _____

Date	Analyst	Kit Lot #	Ver / CW / DB	Y-intercept			Within +/- 1 of verified?
				T-Large	T-Small	T- Male	

9700-__ Maintenance Log for Calendar Year_____
Alaska State Tag # _____
Base S/N _____
Block S/N _____

Name	Date	Maintenance Performed

9700-__ Temperature Calibration Verification Test
Alaska State Tag # _____
Base S/N _____
Block S/N _____

1. Turn the thermal cycler on at least one hour before performing this test
2. Use the Temperature Verification System Instrument
3. Follow the testing instructions in the thermal cycler display; additional guidance is given in the GeneAmp® PCR System 9700 96-well Sample Block Module User's Manual
4. If the thermal cycler does not pass this test, repeat the test
5. If the thermal cycler fails the test a second time, consult the Technical Manager and mark the instrument as being out of service.

Date	Tested by	Probe Serial No.	Thermometer Serial No.	Setpoint Value: Well A6		Results Pass/Fail
				85°C	45°C	

9700-__ Diagnostics and Performance Tests

Alaska State Tag # _____
Base S/N _____
Block S/N _____

1. Turn the thermal cycler on at least one hour before performing this test
2. Use the Temperature Verification System Instrument
3. Follow the testing instructions in the thermal cycler display; additional guidance is given in the GeneAmp® PCR System 9700 96-well Sample Block Module User's Manual
4. If the thermal cycler does not pass this test, repeat the test
5. If the thermal cycler fails the test a second time, consult the Technical Manager and mark the instrument as being out of service.

Date: _____

Operator: _____

Liquid Crystal Display (Disp)

All pixels ON Pass or Fail
All pixels OFF Pass or Fail

Keypad Diagnostic (Keypad) Pass or Fail

Cool and Heat Rate Test

Heating Rate: _____ºC/sec Pass or Fail
Cooling Rate: _____ºC/sec Pass or Fail

Cycle Performance Test

Average Cycle Time: _____sec Pass or Fail

Cycle time STD: _____sec Pass or Fail

9700-__ Temperature Non-Uniformity Test

Alaska State Tag # _____
Base S/N _____
Block S/N _____

1. Turn the thermal cycler on at least one hour before performing this test
2. Do the Temperature Calibration Verification Test before performing this test
3. Use the Temperature Verification System Instrument
4. Follow the testing instructions in the thermal cycler display; additional guidance is given in the GeneAmp® PCR System 9700 96-well Sample Block Module User's Manual
5. If the thermal cycler does not pass this test, repeat the test
6. If the thermal cycler fails the test a second time, consult the Technical Manager and mark the instrument as being out of service.

Date		
Tested By		
Probe Serial No.		
Thermometer Serial No.		
Setpoint Value	94 °C	37 °C
A1		
A12		
C4		
C9		
F4		
F9		
H1		
H12		

	Temperature Non-Uniformity	Test Results (Pass/Fail)
94ºC	_____	_____
37ºC	_____	_____

3500xl-__ Maintenance Log for Calendar Year_____
Alaska State Tag # _____

Scientist	Date	Maintenance Performed	Lot # & Expiration (if applicable)

QIAcube-___ Maintenance Log for Calendar Year _____
Alaska State Tag #_____
S/N: _____

Date	Task Completed (scientist initial in box)	Comments
	☐ instrument in use ☐ Maintenance/performance check completed ☐ regular ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ Maintenance/performance check completed ☐ regular ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ Maintenance/performance check completed ☐ regular ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ Maintenance/performance check completed ☐ regular ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ Maintenance/performance check completed ☐ regular ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	
	☐ instrument in use ☐ Maintenance/performance check completed ☐ regular ☐ monthly ☐ bi-annual ☐ preventative maintenance ☐ service call	

Appendix A: Revision History

FBGLM 2016 R0 Page	FBGLM 2015 R1 Page	Location	Revision made
3	3	1.3	**Removed** "3%" from Hydrogen peroxide and "stock" from Phenolphthalein solution.
6	6-7, 10	1.4	**Changed** storage at -20°C to storage at -15 to -25°C for DTT, carrier RNA, GlobalFiler Express, Hi-Di Formamide, and Quantifiler Trio.
7	7	1.4	**Changed** expiration for GlobalFiler Express reagents from one month after date of thaw to six months after date of thaw.
9	9	1.4	**Added** verification procedure for Proteinase K.
10	10	1.4	Under Quantifiler Trio verification, second bullet point, **changed** Section 5.6.1 to 4.6.1.
22	22	3.11.1.1	**Changed "**The Anode Buffer Container (ABC) must be replaced after 7 days…" to 14 days.
23	23	3.11.1.2	**Changed "**The Cathode Buffer Container (ABC) must be replaced after 7 days…" to 14 days.
33	33	3.15.2	**Changed** documentation location to Thermomixer Temperature Log.
35	35-36, 38	Critical Reagent Verification Form	**Added** space to record 3500 data folder; **added** Proteinase K to front page; **removed** DNA Stable LD from front page; **changed** QD to QT on Quantifiler Trio form; **changed** DNA Stable LD verification to allow for volumes other than 50 µL.
41	41	DNA Casework Cleaning Log	**Removed** check for thermomixer maintenance
48	48	Thermomixer Log	**Changed** name to Thermomixer Temperature Log**; Added "**Bi-yearly calibration is documented at the bottom of page, including date, analyst, actual temperatures, and corresponding set points."