# Forensic Chemistry Section

Body Fluid Identification Quality Assurance Policy

## 1. Scope

This document details quality assurance policies governing biological screening and evidence handling.

## 2. General Laboratory Guidelines

2.1 Laboratories will be cleaned and maintained according to the Quality Assurance Chart. Once completed, the chart will be reviewed, signed, and dated by the Forensic Chemistry Section Supervisor or designee. The signed charts will be maintained in the Forensic Chemistry Section.

2.2 Instrument performance checks will be checked according to the instrument policies.

2.3 The Forensic Chemistry Section will maintain chemical disposal containers. When containers are determined to be full, the laboratory will dispose of them according to the chemical hygiene plan.

2.4 The Ohaus Scout electronic balance should be used when an accurate measurement between 0.1 to 400.0 grams is needed. The calibration of the balance should be checked monthly using the 200 gram standard weight and documented in the Forensic Chemistry Section Maintenance log book. The accepted tolerance is +/- 0.2 grams. If the balance is out of calibration, the balance will not be used until service has been completed and the balance is within acceptable limits. The balance should be cleaned after each use.

2.5 The Sartorius Entris® II electronic balance should be used when an accurate measurement between 0.01 to 220 grams is needed. The calibration of the balance should be checked monthly using the 30 gram standard weight and documented in the Forensic Chemistry Section Maintenance log book. The accepted tolerance is +/- 0.2 grams. If the balance is out of calibration, the balance will not be used until service has been completed and the balance is within acceptable limits. The balance should be cleaned after each use.

2.6 The laboratory refrigerators / freezers should be periodically cleaned and the temperatures recorded. Temperature recordings should preferably be done daily but must be done at least once (1) a week.

2.6.1 A Quality Assurance Reporting Form will be generated for a lapse in temperature recording over one (1) week per each refrigerator/freezer.

2.6.2 A Corrective Action will be generated for more than four (4) one (1) week lapses in a three (3) month period per each refrigerator/freezer.

2.7 The dishwasher will be used to clean laboratory glassware when necessary. Appropriate dishwashing soaps will be used.

2.8 Lab coats and gloves will be worn during reagent preparation. Reagents should be prepared in the fume hood.

2.9 Utensils and glassware used in the collection of samples and reagent preparation will be cleaned before each use.

2.10 Tape for tape-lifts and gels for gel-lifts will be stored in a way to prevent contamination of the adhesive surfaces.

2.11 Prior to evidence processing, equipment, utensils, and work surfaces will be cleaned with a minimum of 10% bleach solution followed by alcohol. The bench top will be lined with brown paper before processing and as often as necessary during processing to prevent contamination.

2.12 Disposable gloves will be worn at all times when handling biological evidence. Gloves will be changed between handling items of evidence.

2.13 The examiner will be careful not to touch exposed skin prior to handling evidence.

2.14 Disposable laboratory coats will be worn at all times when handling evidence. The coats should be discarded on a regular basis.

2.15 In the event an examiner is aware of contamination of DNA evidence, the examiner will immediately notify their supervisor.

2.15.1 The work surfaces, microscopes, pens and all other utensils will be thoroughly cleaned with 10% bleach solution followed by alcohol.

2.15.2 Consumables such as filter paper, weighing paper, reagents, water, swabs, etc. will be disposed of if those items were used.

2.16 Utensils such as forceps, scissors, scalpels, etc. will be cleaned after each use. Disposable scalpel blades or scalpels will be used whenever possible.

## 3. General Evidence Handling Guidelines

3.1 Documentation will be made of all examinations performed and the results of those examinations on the appropriate worksheets.

3.2 The packaging is considered part of the evidence. The examiner will document the condition of the packaging.

3.3 The examiner will open the package in a way to preserve the original packaging and seal when possible.

3.4 The examiner will date and initial the container upon opening.

3.5 Upon examination, each item and/or container will be marked with the date, laboratory item number, and examiner's initials.

3.6 When examining samples, care must be taken to prevent contamination and the loss of trace evidence.

3.7 When requested, trace evidence will be collected and preserved prior to other examinations.

3.8 Contact between items and examiners before removal of samples will be minimized.

3.9 Lab coats and disposable gloves will be worn to prevent contamination from the clothing of the examiner and to protect the examiner from any biological hazard.

3.10 Items collected for trace evidence removal will be handled as little as possible to minimize the loss of trace evidence and limit exposure to contaminants.

3.11 The examiner will document the evidence with a description of stains, flakes, hairs, etc. through notes, sketches, and/or photographs. The examiner will also note condition of samples including damage.

3.12 The examination of questioned and known items will be separated by time, a change of lab coats and gloves, cleaning the work area and changing the paper.

3.13 Any possible contamination must be documented.

3.14 When selecting collection techniques, circumstances of the case and the effects of each collection technique will be considered.

3.15 The technique of removal other than picking will be documented.

3.16 Detection of evidence may include but is not limited to: visual examination, microscopic examination, alternate light source examination, oblique lighting.

3.17 Evidence recovery will be the most direct and least intrusive technique possible including picking, lifting, scraping, vacuuming, combing, clipping and cutting.

3.18 All known samples will be handled / prepared the same as the unknown samples.

3.19 Unless otherwise noted, any part or portion removed from a parent item, not sub-itemed in LIMS, and preserved via mounting, packaging, etc., will be returned to the investigating agency along with the parent item.

3.20 The examiner will perform a visual examination to determine the method of processing the evidence.

3.21 Upon removal and packaging of trace evidence, if necessary, the examiner will screen for biological evidence.

3.22 Examiners will determine if photo documentation of evidence or portions of evidence are necessary prior to removing or permanently altering the evidence item. Photos may be included in the case folder as part of the case notes.

## 4. Biological Evidence Screening Guidelines

4.1 Evidence will be visually examined for biological evidence. The alternate light source may be used to aid in the visualization of semen, saliva, or other body fluids.

4.2 The alternate light source will be checked with a known stain prior to use. Positive control testing will be conducted using sperm positive semen stains produced within the laboratory or supplied by Serological Research Institute (or an equivalent provider).

4.3 Biological evidence should be documented with notes, sketches, or photographs. Documentation may include but is not limited to: size, shape, color, position, and pattern.

4.4 If an item of evidence has multiple stains, the examiner will determine which stains will be tested. Presumptive and confirmatory testing results must be documented in specific terms that would allow another trained analyst to repeat the same testing. All stains tested will be documented using one or more of the following methods: by marking the item itself , in the case notes using drawings or photographs, or through specific location description written in the case notes.

4.5 Presumptive chemical tests will be performed to screen for blood or semen / seminal fluid.

4.6 Ortho-tolidine / sodium perborate (OT) and α-naphthyl phosphate / Fast Blue B (AP) reagents will be tested with positive and negative controls prior to daily casework. Positive control testing will be conducted using human blood and sperm positive semen stains produced within the laboratory or supplied by Serological Research Institute (or an equivalent provider).

4.7 All reagents and test kits have expiration dates and should not be used after the expiration date.

4.8 If a sample must be removed from the item for confirmatory testing for the presence of human blood or semen / seminal fluid, a minimal necessary amount will be used.

4.9 HemaTrace test kits will be tested with a positive human blood and negative control with each lot received by the laboratory. If samples are to be extracted in TE buffer for HemaTrace testing, positive and negative controls will be conducted prior to performing daily casework. Positive control testing will be conducted using a human blood stain produced within the laboratory or supplied by Serological Research Institute (or an equivalent provider).

4.10 ABAcard PSA test kits will be tested with a positive and negative control with every batch of samples tested. Positive control testing will be conducted using a sperm positive semen stain produced within the laboratory or supplied by Serological Research Institute (or an equivalent provider).

4.11 RSID-Saliva test kits will be tested with a positive saliva and negative control with every batch of samples tested. Positive control testing will be conducted using a human saliva stain produced within the laboratory or supplied by Serological Research Institute (or an equivalent provider).

4.12 At the examiners discretion, upon completion of confirmatory tests, samples may be submitted to the Forensic Biology Section in the form of cuttings, scrapings, or extracts of a stain.

4.13 Micro-centrifuge tubes must be separately “poured” from the container.

4.14 The three known stain samples will be analyzed prior to use on casework with the appropriate presumptive chemical tests and confirmatory test kits:

- Blood Stain: OT chemical test and HemaTrace test kit
- Semen Stain: alternate light source, AP chemical test and ABAcard PSA test kit
- Saliva Stain: RSID-Saliva test kit

Stain supplier (or individual providing the fluid for in-house production), lot number, the above-listed test results, initial date of use, expiration date (5 years from initial use), and associated test information will be documented on the Known Serological Stains Log (FC-F050). If any of the tests are negative, the known stain in question will be discarded or returned to the supplier.

**5. Bloodstain Description and Selection:**

5.1 All Forensic Chemists will be trained to properly document bloodstains with size, shape, and distribution notation. Such observations will inform stain selection for submission to the Forensic Biology Section for DNA analysis.

5.2 Bloodstain Pattern Analysis (BPA) terminology will only be used by those Forensic Chemists certified to do independent casework in BPA.

5.3 Forensic Chemists not certified in BPA will consult with a BPA certified chemist when additional BPA examinations are necessary on an item of evidence.

**6. Serology Laboratory Guidelines:**

6.1 Extraction of specimens will be performed in the biological safety cabinet only.

6.2 The examiner will note the results of all examinations on the appropriate worksheet.

6.3 Gloves and aerosol pipette tips will be used to minimize contamination. Gloves will be changed when necessary as determined by the examiner.

6.4 Laboratory and biological safety cabinet workspace, pipettors, racks and forceps will be cleaned with 10% bleach and thoroughly dried before using. The forceps will be cleaned between each sample handling.

6.5 The biological safety cabinet will be exposed to ultraviolet light for a minimum of 10 minutes prior to casework.

6.6 Microcentrifuge tubes will be irradiated in an ultraviolet crosslinker with 2 j/cm$^2$.

6.7 The TE Buffer (in 50 ml conical tubes) will be irradiated with 6 j/cm$^2$.

6.8 Irradiation will be conducted by a member of the Forensic Biology Section.

6.9 Only one evidence specimen will be open at any one time.

6.10 Pipette tips will be changed between each transfer or addition of sample or reagent, unless otherwise noted.

6.11 No aliquot of any reagent will be returned to the original stock container.

6.12 A minimum of one reagent blank will be carried throughout the extraction procedure and assayed in parallel with the evidence samples.

6.13 Cell pellets will be frozen upright prior to packaging in heat-sealed bags.