Department of Forensic Science

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FORENSIC BIOLOGY TRAINING MANUAL

VIRGINIA DEPARTMENT OF FORENSIC SCIENCE

FORENSIC LABORATORY SPECIALIST

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1 OVERVIEW OF TRAINING PROGRAM

1.1 Purpose and Scope

The purpose of this document is to provide a training program for Forensic Laboratory Specialists (FLSs) employed in the Forensic Biology Section of the VA DFS. The program is designed to teach an individual with a scientific background to properly handle forensic evidence, to independently collect DNA samples from evidence submitted for examination in the section, to serve as a primary operator of the Biomek® NX^P Automation workstation, to load samples for and run the CE instrument(s), and to perform routine duties that assist and support casework examiners and DNA Data Bank analysts.

The training program is designed to be modular, thereby allowing an individual to be qualified to perform certain tasks while still training in other additional tasks. Training of an FLS is not intended to be a fluid process from start to finish, nor is it intended that the training modules be completed in any particular order. Rather, it is intended to allow for the training of an FLS in any one task at any given time based upon the needs of the Forensic Biology section and Data Bank.

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The documentation of this training program, due to its modular and possibly sporadic nature, will be maintained on the associated Training Documentation Forms rather than in the monthly Qualtrax workflow format. The Training Documentation Forms will be maintained and kept up to date by the training coordinator(s) and made available to the Biology Program Manager for review upon request.

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Due to the sporadic nature of the submission of particular types of evidence, if an opportunity to observe the preservation of a particular type of evidence, such as a condom, arises prior to the trainee entering the Receiving and Handling Physical Evidence module, the trainee may document his/her observation at that time. The documented observation can later be counted toward the required observations during that phase of training.

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1.2 Location of Training

The training will occur in the laboratory to which the individual is assigned.

It is recommended that the trainee accompany an examiner to a local court, if possible, to observe testimony. This may enhance the trainee's understanding of the implication of his/her support work.

1.3 Training Period

Because this training is modular and may start and stop at any time based upon the needs of the section, there is no estimated period for completion of the entire program. An estimated period for completion will be provided for modules that are more comprehensive (e.g., training to become a Biomek® NX^P Automation Workstation Operator, Receiving and Handling Physical Evidence, etc.).

If the trainee cannot meet the criteria expected of him/her during the period allowed for any particular module of the training program, steps will be taken to effect the appropriate action.

1.4 Instructions for the Training Coordinator

1.4.1 If a module requires a specific order in which tasks are to be completed, that order must be followed.

1.4.2 If question and answer sessions are incorporated into a module to ensure the trainee is grasping the significance and importance of each aspect of the module, the trainee is best served by the question and answer sessions being given by more than one examiner or designee, rather than the same person each time.

1.4.3 The Training Documentation Form(s) will be maintained in an up to date fashion, and the notebook will be reviewed periodically throughout a module, if applicable, in order to better monitor the trainee's progress.

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1.5 Instructions for the Trainee

1.5.1 All training will be performed under the **direct supervision** of a qualified examiner or designee.

1.5.1.1 Any training that involves the handling/processing of evidence will be done under the direct supervision of a qualified examiner or designee and after a competency test qualifying the trainee to handle/process evidence in that capacity has been successfully completed.

1.5.2 An organized notebook will be maintained to document all aspects of training.

1.5.2.1 The notebook will periodically be checked by the training coordinator(s) or designee(s).

1.5.2.2 Copies of Request for Laboratory Examination (RFLE) forms and duplicates of case file documentation MAY NOT be retained in the notebook.

1.5.2.3 Names of victims, suspects, or other individuals associated with a case on any documentation maintained in the notebook MUST BE REDACTED.

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2 SAFETY

2.1 Bloodborne Pathogen and Chemical Hygiene Training

All trainees will attend a bloodborne pathogen training course and a chemical hygiene course organized by the Department's Safety Coordinator.

2.2 Hazards

Each individual working in the laboratory of the Forensic Biology Section will be made aware of the hazards inherent in his/her work. These hazards include, but are not limited to:

- Infectious agents, such as those associated with:
  - Hepatitis
  - HIV/AIDS
  - Sexually transmitted diseases
  - Parasitic infections
  - Bacterial infections
- Hazardous materials, such as:
  - Acids and bases
  - Organic chemicals

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2.3 Safety Procedures

2.3.1 All trainees will read and become familiar with the Department of Forensic Science Safety Manual.

2.3.2 All trainees will follow personal protective measures.

2.3.2.1 Gloves, safety glasses and other protective clothing and equipment will be worn.

2.3.2.2 The production of aerosols will be avoided.

2.3.2.3 No mouth pipetting is allowed.

2.3.2.4 Trainees will read and become familiar with the prescribed precautions for the handling of all chemicals used in a particular procedure before performing the procedure.

2.3.2.4.1 This will include a review of any applicable Safety Data Sheets (SDS).

2.3.3 All trainees will follow biosafety practices.

2.3.3.1 Prescribed personal, work space, and equipment cleaning procedures will be followed.

2.3.3.2 All biological materials and containers/supplies that have come in contact with biological materials will be placed in biohazard bags, which will be disposed of according to the procedures outlined in the Department Safety Manual.

2.3.3.3 All glassware for disposal will be placed in broken glass containers, which will be disposed of according to approved guidelines.

2.3.3.4 Organic and other hazardous chemicals (e.g., phenol, tetramethylbenzidine) will be retained in appropriately labeled containers in a designated, marked area in the section or building until disposed of following the procedures outlined in the Department Safety Manual (i.e., picked up by a disposal company).

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3 ROUTINE DUTIES

This chapter addresses the training of a Forensic Laboratory Specialist to perform routine support duties. The trainee may be trained in one or more of these tasks in any order.

For each of the tasks addressed in this chapter, with the exception of those addressed in 3.1, the initialing of the applicable Training Documentation Form by the training coordinator or designee will serve to qualify the trainee to perform the associated task independently.

3.1 General Duties

The training of the following tasks does not require documentation on a Training Documentation Form and will consist of the trainee observing the task a minimum of one time prior to performing the task independently:

- Empty and prepare biohazard trash, trash, recycling, etc. for pick up
- Empty examiner shred boxes into the shred bins
- Stock commonly used supplies
- Clean hoods as necessary
- Wipe down common countertops
- Clean and autoclave glassware
- Inventory and order supplies
- Clean pipettes as necessary
- Copy case file documentation for discovery orders, etc.

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At the discretion of the Section Supervisor, other tasks of a similar nature may also be taught without the need to document the training on a Training Documentation Form.

3.2 Reagent Preparation

3.2.1 The trainee will observe the use of the pH meter by a qualified individual.

NOTE: This requirement may be met in conjunction with 3.2.2.

3.2.2 The trainee will observe a qualified individual making a minimum of two in-house reagents.

3.2.2.1 At least one reagent must involve the use of the balance for a solid to liquid preparation.

3.2.2.2 At least one reagent must involve a liquid to liquid preparation.

3.2.2.3 At least one reagent must involve the use of the autoclave.

3.2.3 The trainee will make a minimum of three in-house reagents under direct supervision of a qualified individual.

3.2.3.1 The preparation of a dilution and multiple aliquots of OR multiple aliquots of a reagent not requiring dilution may also meet the requirement of one of these preparations.

3.2.3.2 These will serve as the competency set for the trainee.

3.3 Quality Control/Maintenance of Equipment

The trainee will be qualified to perform quality control (QC)/routine maintenance on equipment once s/he has observed a qualified individual perform the QC task on the same type of equipment a minimum of one time.

This includes routine minor maintenance/cleaning of equipment. This does not include QC/maintenance requiring an outside technician/vendor such as yearly certification of pipettes.

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The equipment on which the trainee will be trained to perform quality control measures may include, but is not limited to:

- ABAcard® p30 Test cards
- Autoclave
- Balances
- Centrifuges
- DNA concentrator/evaporator
- Heat blocks
- Incubators/ovens
- Pipettes
- Refrigerators/freezers
- Thermal cyclers
- Thermometers
- Type I H_2O system

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At the discretion of the supervisor and/or section supervisor, a trainee may also be required to conduct the quality control measures/maintenance under direct supervision prior to qualifying the trainee to conduct such quality control independently on a particular type of equipment.

Once the appropriate place on the Training Documentation Form is dated and initialed by the training coordinator or designee, the FLS will be qualified to perform QC/maintenance on that same type of equipment independently.

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3.4 Amplification Set Up for Quality Control of PCR-based System Kits

Each of the tasks described below must be met individually for each type of Kit (i.e., the trainee will be qualified separately to perform the quality control measures on the PowerPlex® Fusion Kit, the AmpFℓSTR® Yfiler™ Kit, etc.)

NOTE: Once the trainee has been qualified to load and run the applicable capillary electrophoresis instrument, s/he may complete the post-amplification portion of the quality control of the PCR-based System Kit(s) as well.

3.4.1 The trainee will observe a qualified individual performing the amplification set up portion of the quality control measures a minimum of one time.

3.4.2 The trainee will perform the amplification set up of the quality control measures under **direct supervision** of a qualified individual a minimum of one time.

3.4.2.1 This will serve as the competency for the trainee.

3.5 Amplification Set Up for Quality Control of Standard Reference Material (SRM) Kits or NIST Traceable Samples

NOTE: Once the trainee has been qualified to load and run the applicable capillary electrophoresis instrument(s), s/he may complete the post-amplification portion of the quality control of the SRM Kits or NIST Traceable samples as well.

3.5.1 The trainee will observe a qualified individual performing the amplification set up portion of the quality control measures a minimum of one time.

3.5.2 The trainee will perform the amplification set up of the quality control measures under **direct supervision** of a qualified individual a minimum of one time.

3.5.2.1 This will serve as the competency for the trainee.

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3.6 Quality Control of Internal Lane Standards

NOTE: The trainee must not perform quality control of Internal Lane Standards unless s/he is qualified to load and run the applicable capillary electrophoresis instrument(s).

3.6.1 The trainee will observe a qualified individual performing the quality control measures a minimum of one time.

3.6.2 The trainee will perform the quality control measures under **direct supervision** of a qualified individual a minimum of one time.

3.6.2.1 This will serve as the competency for the trainee.

3.7 Fixing and Staining Smears

NOTE: This training may be combined with and conducted with the inventory and preservation of VPERK training (see Chapter 4 – phase II).

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3.7.1 The trainee will observe a qualified individual fix and stain a minimum of one smear a minimum of one time.

3.7.2 The trainee will fix and stain a minimum of one fabricated smear under **direct supervision** a minimum of one time.

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3.7.2.1 This will serve as the competency for the trainee to continue to 3.7.3.

3.7.3 The trainee will fix and stain a minimum of one evidence smear under **direct supervision** a minimum of one time.

3.7.3.1 This will serve as the competency for the trainee to fix and stain smears independently.

3.8 Assisting Examiners in the Location of Stains Using an Alternate Light Source (ALS)

Once qualified in Phase II of Receiving and Handling Physical Evidence (see Chapter 4 of this manual), the trainee may, at the examiner's discretion, assist in the location of stains with an ALS as long as this is conducted under the examiner's **direct supervision** and at the examiner's direction at all times.

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4 RECEVING AND HANDLING PHYSICAL EVIDENCE

The receiving and handling physical evidence training consists of the following four phases, which are to be completed in succession. Based upon the needs of the section, phases III and IV may be completed concurrently or as separate phases.

- Phase I: Receipt and transfers of evidence (closed containers)
- Phase II: Preservation of evidence (no sampling)
- Phase III: Preservation of evidence (to include independent sampling/assessment as to how/where to sample)
- Phase IV: Cutting evidence for extraction

Whenever possible, the training coordinator will identify and utilize actual evidence arriving at the laboratory. Fabricated (mock) materials may be used in place of real evidence to provide the experience and to expedite the training, if necessary. The use of real evidence is always preferred.

The use of the Laboratory Information Management System (LIMS) is an integral part of receiving and handling physical evidence and in maintaining a proper chain of custody. Therefore, for each task listed in this chapter to which the use of the LIMS is applicable, the proper use of the LIMS will be observed and/or demonstrated as a part of the task at hand.

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4.1 Purpose and Scope

During the completion of this training, the trainee will:

- develop an understanding of the factors influencing the deterioration of biological evidence as these relate to proper vs. improper packaging, handling, and storage.
- develop an understanding of evidence handling procedures, including documentation of a chain of custody, use of the LIMS, and intra- and inter-laboratory transfers of evidence.
- develop an understanding of court procedures involving the identification and introduction of evidence and general testimony regarding evidence preservation and handling.
- develop an understanding of the necessity for:
    - detailed, comprehensive notes, including:
        - abbreviations and common symbols.
        - condition and description of evidence.
        - number of items/packages/containers.
        - procedures conducted.
        - use of drawings and/or photographs for documentation purposes.
    - adequate labeling of evidentiary materials.
    - sealing of evidence with both permanent and temporary seals.
    - taking precautions against loss and contamination of evidence.
    - performing steps in compliance with the Department Quality Manual.
- develop good oral and written communication skills, including understanding the importance of effective communication with forensic examiners and law enforcement, and proper documentation thereof.
- learn to handle evidence in a safe manner as prescribed in the Department Safety Manual.
- learn to verify the listing of evidence on the RFLE against the actual items received.
- learn to rectify discrepancies with proper documentation and to notify the appropriate people.
- learn to identify evidence which needs to be immediately transferred to other sections versus evidence which needs to be retained in the section for analysis prior to transferring to another section.
- learn to transfer evidence to other sections, as appropriate, paying attention to the sequence of section transfer.
- learn to prepare evidence for return to the submitting agency by collecting the evidence, checking the items against the RFLE, and ensuring that all containers are sealed and appropriately labeled.

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A trainee, once qualified in a phase, may be independently performing the associated tasks of that phase while completing training in the other aspects of the job or other Receiving and Handling Physical Evidence phase(s).

All training will be performed under the **direct supervision** of a qualified examiner or designee.

At no time will an FLS be trained to perform body fluid identification testing. If an item is opened for preservation, and a potential body fluid is observed (e.g., a possible blood stain is observed), an examiner will be recruited to perform any applicable body fluid testing/collection prior to the completion of the preservation by the FLS. In some cases, it may be determined that the best course of action is to simply repackage the evidence and transfer it to an examiner for preservation/collection for DNA.

4.2 Training period

It is estimated that each of the four phases of training can be completed within approximately two to three months. Timing for phases II, III, and IV will depend upon the availability of multiple types of evidence for which training is required and will likely take longer than phase I.

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4.3 Documentation and Evaluation

4.3.1 The training will be documented in the trainee's notebook and on the applicable Training Documentation Form(s).

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4.3.2 Knowledge of the trainee will be evaluated through:

- review of notes in the training notebook by the training coordinator.
- review of documentation skills (e.g., documentation of communications regarding cases, note taking skills, etc.)
- question and answer session(s).

4.3.3 The trainee will handle a sufficient number of cases and items of evidence to develop and exhibit an unquestionably sound technique for handling physical evidence with a wide variety of evidentiary materials. This will be monitored by continual observation by the training coordinator or designee.

4.4 Qualification

Upon successful completion of each phase of training, including the designated competency set for that phase and a final oral question and answer session for that phase, which is used to evaluate the trainee's competency as well as the trainee's oral communication skills, a Memorandum for Record (MFR) detailing the recommendation to qualify the trainee in the applicable phase will be submitted to the Biology Program Manager. Once this MFR is accepted and signed by the Biology Program Manager, it will be forwarded to the appropriate Laboratory Director, and the FLS will be deemed qualified to perform the duties associated with that phase of training independently.

4.5 Phase I Tasks

4.5.1 Read the applicable chapter(s) of the Department Quality Manual.

4.5.2 Read the applicable Regional Operating Procedures.

4.5.3 Read the FB PM QA.

4.5.4 Read the FB PM Documentation and Evidence Handling Requirements.

4.5.5 Observe examiners receiving, transferring, and returning evidence to/from the Evidence Receiving section and other sections within the Department.

4.5.6 Participate in a competency oral question and answer session.

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4.5.6.1 Satisfactory performance qualifies the individual to continue to 4.5.7.

4.5.7 Properly receive, transfer and return evidence to/from Evidence Receiving section and other sections within the Department under the **direct supervision** of the training coordinator or designee.

NOTE: This supervised receipt, transfer and return of evidence serves as the competency set for the trainee. The number of cases/containers required to demonstrate competency will vary with each trainee and will therefore be determined individually.

4.5.7.1 Reconcile the listing of evidence on the RFLE with the actual items received.

4.5.7.2 Rectify any discrepancies between the RFLE and the submitted evidence with proper documentation and notification of proper personnel, if applicable.

4.5.7.2.1 Contact Investigators and/or Commonwealth's Attorneys, as necessary, to request additional known samples and/or clarify requests for laboratory examination and prepare proper documentation of such contact.

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4.5.7.3 Identify which evidence will need to be transferred to other sections and when these transfers are necessary (i.e., prior to or after forensic biology examinations have been conducted or a DNA sample has been preserved). If possible, consult informally with a qualified examiner in the Firearms, Latent Prints, Trace Evidence, and Controlled Substances sections to learn any special procedures or requirements that these sections have regarding evidence examinations.

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NOTE: It may be necessary for an examiner to collect DNA from certain items of evidence by swabbing the item(s) and preserving the swab(s) for possible future DNA analysis prior to transferring the evidence to another section. The FLS trainee must learn to recognize when this is necessary and seek the qualified individual to carry out this task. If this task is observed by the trainee, this will be documented and can later be counted toward the required observations in subsequent phases of training

4.5.7.3.1 Create sub-items in the LIMS, as applicable, for transfer to another section, PERK inventory, etc.

4.5.7.4 Prepare evidence for return to the submitting agency by collecting the evidence, checking the items against the RFLE, and ensuring all containers are sealed and appropriately labeled.

4.5.8 Participate in a final oral question and answer session with the training coordinator.

4.6 Phase II Tasks

NOTE: Because condoms are often encountered during the inventory of a Victim Physical Evidence Recovery Kit, the preservation of and sampling from condoms is included in Phase II. All other sampling is addressed in phase III training.

4.6.1 Review the applicable chapter(s) of the Department Quality Manual.

4.6.2 Review the applicable Regional Operating Procedures.

4.6.3 Review the FB PM QA, focusing particularly on the contamination prevention procedures of the section.

4.6.4 Review the FB PM Documentation and Evidence Handling Requirements.

4.6.5 Read the Virginia Department of Forensic Science Training Academy Evidence Handling Guide.

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4.6.6 Observe qualified individuals opening, preserving, repackaging, and storing a variety of different case materials.

4.6.6.1 At a minimum, two (2) cases must include the inventory/preservation of a Victim Physical Evidence Recovery Kit (VPERK).

4.6.6.2 The preservation of a minimum of one (1) condom must be observed.

4.6.7 Participate in a competency oral question and answer session.

4.6.7.1 Satisfactory performance qualifies the individual to continue to 4.6.8.

4.6.8 Preserve and store a variety of evidence associated with a minimum of five (5) cases under the **direct supervision** of the training coordinator or designee.

NOTES: This supervised preservation and storage of evidence serves as the competency set for the trainee. The number of cases/containers required to demonstrate competency may vary with each trainee and will therefore be determined individually. However, the minimum number of cases required for all trainees, as listed above, is five.

Any case notes generated will be initialed by both the trainee and the supervising examiner, with the examiner having responsibility for ensuring that the notes are accurate and complete. To ensure that it is clear that the notes and sample preservation was performed during training under the supervision of an examiner versus once the FLS is qualified and no longer needs direct supervision, the notes prepared during training will contain a statement such as, "evidence examined under the direct supervision of SUPERVISING EXAMINER."

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4.6.8.1 A minimum of three (3) VPERKs must be inventoried/preserved under direct supervision.

4.6.8.2 A minimum of one (1) condom , whether included within a VPERK or submitted separately, must be preserved under direct supervision.

4.6.8.3 Take notes as to the form and condition of the packaging and, when appropriate, determine if the evidence is dry.

4.6.8.3.1 If necessary, the evidence will be air-dried and repackaged the next day or when it is dry.

4.6.8.3.1.1 Appropriately store the evidence until it is air-dried, then seal all evidence and store it for future examination.

4.6.8.3.2 Notes will include what preservation tasks, if any, are performed.

4.6.8.4 Handle other routine and non-routine items in accordance with Forensic Biology section protocols and by conferring with the examiner assigned to the particular case. If no examiner has been assigned to the case, the training coordinator or designee will be consulted. These items may include, but are not limited to: liquid samples suspected of containing seminal fluid, urine, and/or blood, clothing (collected by the medical examiner or otherwise), burned evidence, and fetal tissue.

4.6.9 Participate in a final oral question and answer session with the training coordinator.

4.7 Phase III Tasks

The following tasks will be conducted in a sequential manner, such that the trainee first observes, then conducts DNA sample preservation from evidence under the **direct supervision** of an examiner. The sample preservation should be conducted in an increasingly independent manner so that the trainee gains confidence as his/her

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knowledge of procedures grows while the examiner is observing. For those cases in the administrative backlog, the tasks can be conducted under the **direct supervision** of an examiner while the evidence is in the FLS's custody. For those cases already assigned to an examiner, the tasks will be conducted while the evidence is in the custody of that examiner.

There are four general categories of evidence materials in which the FLS may be trained. Training in a specific category of evidence will depend on the needs of the laboratory. The training may include only one category, multiple categories, or all four. **The minimum numbers of items/samples denoted in the task list applies to each category individually and must be met individually for each category in which the FLS is eventually qualified**.

The four general categories are:

- Mouth contact items (e.g., cigar tips, envelopes, stamps, smoking devices, drink containers, drinking straws, etc.)
- Clothing (looking for potential wearer - e.g., shirts, underclothes, pants, gloves, masks/face coverings where sloughed cells may have been deposited)
- Trace DNA evidence (e.g., firearms, cartridges, weapons, tools, baggies, miscellaneous objects where trace amounts of DNA may be present, but no staining is visible)
- Objects used in sexual assaults (e.g., inanimate items used to penetrate)

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If deemed necessary or useful to the laboratory, other categories may be included or added to this list by the FLS's supervisor and/or section supervisor in consultation with the Biology Program Manager. The required training tasks, as detailed below, apply to any additional category.

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4.7.1 Review the applicable chapter(s) of the Department Quality Manual.

4.7.2 Review the applicable Regional Operating Procedures.

4.7.3 Review the FB PM QA, focusing particularly on the contamination prevention procedures of the section.

4.7.4 Review the FB PM Documentation and Evidence Handling Requirements.

4.7.5 Review the Virginia Department of Forensic Science Training Academy Evidence Handling Guide.

4.7.6 If not already completed, consult informally with a qualified examiner in the Firearms, Latent Prints, Trace Evidence, and Controlled Substances sections to learn any special procedures or requirements that these sections have regarding evidence examinations.

4.7.6.1 Learn to avoid alteration or destruction/loss of evidence for analysis in each of these sections.

4.7.6.2 Review this information with the training coordinator and discuss methods to prevent loss and alteration of evidence prior to and during the tasks that follow.

4.7.7 Discuss with the training coordinator when appropriate communication needs to be made with a Forensic Biology section examiner or supervisor, other section examiners, or investigators in order to coordinate and clarify examinations or prioritize examinations when DNA sample collection may preclude or destroy another form of evidence on an item.

4.7.8 Observe and obtain instruction from qualified examiners performing routine examinations on case material.

4.7.8.1 Observe and take note of the preservation and/or method of collection for DNA extraction from several different items in each category/categories of interest, including items that require different selection processes and sample sizes.

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NOTE: This task will continue throughout the training process and should encompass as many different types of evidence within the category/categories of interest as possible.

4.7.9 Document the DNA sample preservation/collection process from several different items in each category/categories of interest properly using approved methods and in accordance with Virginia Department of Forensic Science and Forensic Biology section procedures during the observation of qualified examiners (FLS training notes to be maintained in the training notebook).

4.7.9.1 This task may be conducted concurrently with 4.7.8.1.

4.7.9.2 Diagram and photograph evidence for documentation of condition.

4.7.9.3 Take practice notes covering:

- the use of protective material, such as Kimwipes.
- labeling of evidence, observing when only the container is to be labeled.
- condition and description of evidence.
- procedures and materials used to visualize stains.
- Materials (including quantity) used to collect samples.
- amount of sample left on an item, if any.
- preservation and packaging of collected samples.

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4.7.10 Participate in a competency oral question and answer session.

4.7.10.1 Satisfactory performance qualifies the individual to continue to 4.7.11.

4.7.11 Examine, describe and take notes on a minimum of five (5) different items of evidence for each category of interest under the **direct supervision** of a qualified examiner.

NOTES: This supervised examination, description and note-taking on casework serves as the competency set for the trainee. The number of cases/items required to demonstrate competency may vary with each trainee and will therefore be determined individually. However, the minimum number of different items required for all trainees in each category of interest, as listed above, is five.

Any case notes generated will be initialed by both the trainee and the supervising examiner, with the examiner having responsibility for ensuring that the notes are accurate and complete. To ensure that it is clear that the notes and sample preservation was performed during training under the supervision of an examiner versus once the FLS is qualified and no longer needs direct supervision, the notes prepared during training will contain a statement such as, "evidence examined under the direct supervision of SUPERVISING EXAMINER."

4.7.11.1 Take precautions to prevent loss or contamination of samples.

4.7.11.2 Use photographs and/or diagrams for documentation of condition.

4.7.11.3 Take case notes covering:

- the use of protective material, such as Kimwipes.
- labeling of evidence, observing when only the container is to be labeled.
- condition and description of the evidence.
- procedures and materials used to visualize stains.
- materials (including quantity) used to collect samples.
- amount of sample left on an item, if any.
- preservation and packaging of collected samples.

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4.7.11.4 Preserve, package, and label the items/samples properly.

4.7.11.5 Expedite the transfer of evidence to other sections, as appropriate.

4.7.12 Participate in a final oral question and answer session with the training coordinator.

4.8 Phase IV Tasks

If this training is conducted in conjunction with the phase III training, the duplicate tasks listed may be completed once, as applicable and as deemed appropriate by the training coordinator and supervisor.

If this training is conducted independently of the phase III training, the tasks listed below will be completed in their entirety.

The following tasks will be conducted in a sequential manner, such that the trainee first observes, then conducts DNA sample collection from evidence under the **direct supervision** of an examiner. The sample collection should be conducted in an increasingly independent manner so that the trainee gains confidence as his/her knowledge of procedures grows while the examiner is observing. For those cases in the administrative backlog, the tasks can be conducted under the **direct supervision** of an examiner while the evidence is in the FLS's custody. For those cases already assigned to an examiner, the tasks will be conducted while the evidence is in the custody of that examiner.

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There are four general categories of evidence materials in which the FLS may be trained. Training in a specific category of evidence will depend on the needs of the laboratory. The training may include only one category, multiple categories, or all four. **The minimum numbers of items/samples denoted in the task list applies to each category individually and must be met individually for each category in which the FLS is eventually qualified**.

The four general categories are:

- Mouth contact items (e.g., cigarette butts, cigar tips, envelopes, stamps, smoking devices, drink containers, drinking straws, etc.)
- Clothing (looking for potential wearer - e.g., shirts, underclothes, pants, gloves, masks/face coverings where sloughed cells may have been deposited)
- Trace DNA evidence (e.g., firearms, cartridges, weapons, tools, baggies, miscellaneous objects where trace amounts of DNA may be present, but no staining is visible)
- Objects used in sexual assaults (e.g., inanimate items used to penetrate)

If deemed necessary or useful to the laboratory, other categories may be included or added to this list by the FLS's supervisor and section supervisor in consultation with the Biology Program Manager. The required training tasks, as detailed below, apply to any additional category.

4.8.1 Review the applicable chapter(s) of the Department Quality Manual.

4.8.2 Review the applicable Regional Operating Procedures.

4.8.3 Review the FB PM QA, focusing particularly on the contamination prevention procedures of the section.

4.8.4 Review the FB PM Documentation and Evidence Handling Requirements.

4.8.5 Review the Virginia Department of Forensic Science Training Academy Evidence Handling Guide.

4.8.6 If not already completed, consult informally with a qualified examiner in the Firearms, Latent Prints, Trace Evidence, and Controlled Substances sections to learn any special procedures or requirements that these sections have regarding evidence examinations.

4.8.6.1 Learn to avoid alteration or destruction/loss of evidence for analysis in each of these sections.

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4.8.6.2 Review this information with the training coordinator and discuss methods to prevent loss and alteration of evidence prior to and during the tasks that follow.

4.8.7 Discuss with the training coordinator when appropriate communication needs to be made with a Forensic Biology section examiner or supervisor, other section examiners, or investigators in order to coordinate and clarify examinations or prioritize examinations when DNA sample collection may preclude or destroy another form of evidence on an item.

4.8.8 Observe and obtain instruction from qualified examiners performing routine examinations on case material.

4.8.8.1 Observe and take note of the selection process and approximate size of sample utilized/cut for DNA extraction from several different items in each category/categories of interest, including items that require different selection processes and sample sizes.

NOTE: This task will continue throughout the training process and should encompass as many different types of evidence within the category/categories of interest as possible.

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4.8.9 Document the DNA sample collection process from several different items in each category/categories of interest properly using approved methods and in accordance with Virginia Department of Forensic Science and Forensic Biology section procedures during the observation of qualified examiners and/or Phase IV qualified FLSs (FLS training notes to be maintained in the training notebook).

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4.8.9.1 This task may be conducted concurrently with 4.8.8.1.

4.8.9.2 Diagram and photograph evidence for documentation of condition.

4.8.9.3 Take practice notes covering:

- the use of protective material, such as Kimwipes.
- labeling of evidence, observing when only the container is to be labeled.
- condition and description of evidence.
- procedures and materials used to visualize stains.
- materials, and quantities thereof, used to collect samples.
- amount of sample left on an item, if any.
- preservation and packaging of collected samples.

4.8.10 Participate in a competency oral question and answer session.

4.8.10.1 Satisfactory performance qualifies the individual to continue to 4.8.11.

4.8.11 Examine, describe and cut a portion of the sample/item for DNA extraction for at least five (5) different items of evidence within each category of interest under the **direct supervision** of a qualified examiner.

NOTES: This supervised examination, description, and cutting/sampling of casework serves as the competency set for the trainee. The number of cases/items required to demonstrate competency may vary with each trainee and will therefore be determined individually. However, the minimum number of different items required for all trainees in each category of interest, as listed above, is five.

Any case notes generated will be initialed by both the trainee and the supervising examiner, with the examiner having responsibility for ensuring that the notes are accurate and complete. To ensure that it is clear that the notes and sample collection was performed during training under the supervision of an examiner versus once the FLS is qualified and no longer needs direct supervision, the notes prepared during training will contain a statement such as, "evidence examined under the direct supervision of SUPERVISING EXAMINER."

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4.8.11.1 Diagram and photograph evidence for documentation of condition.

4.8.11.2 Take case notes covering:

- the use of protective material, such as Kimwipes.
- labeling of evidence, observing when only the container is to be labeled.
- condition and description of evidence.
- procedures and materials used to visualize stains.
- materials, and quantities thereof, used to collect samples.
- amount of sample left on an item, if any.
- preservation and packaging of collected samples.

4.8.11.3 Take precautions to prevent loss or contamination of samples.

4.8.11.4 Preserve, package, and label the samples and tubes properly.

4.8.12 Participate in a final oral question and answer session with the training coordinator.

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5 CUTTING KNOWN REFERENCE SAMPLES FOR DNA EXTRACTION

The prerequisite for this training module is qualification in both phase I and phase II of Receiving and Handling Physical Evidence training. Phase III qualification is a preferred prerequisite. The trainee may be trained in this module concurrently with phase III and/or phase IV of Receiving and Handling Physical Evidence or completely independently of them.

The tasks will be conducted in a sequential manner, such that the trainee first observes, then conducts DNA sample collection from known reference buccal swabs, buccal samples and/or DNA cards/bloodstain cards under the **direct supervision** of an examiner. The sample collection should be conducted in an increasingly independent manner so that the trainee gains confidence as his/her knowledge of procedures grows while the examiner is observing. For those cases in the administrative backlog, the tasks can be conducted under the **direct supervision** of an examiner while the evidence is in the FLS's custody. For those cases already assigned to an examiner, the tasks will be conducted while the evidence is in the custody of that examiner.

5.1 Purpose and Scope

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During the completion of this training, the trainee will:

- Continue to develop an understanding of the necessity for:
  - detailed, comprehensive notes, including:
    - abbreviations and common symbols.
    - condition and description of evidence.
    - number of items/packages/containers.
    - procedures conducted.
  - adequate labeling of evidentiary materials.
  - sealing of evidence with both permanent and temporary seals.
  - taking precautions against loss and contamination of evidence.
  - performing steps in compliance with the Department Quality Manual.

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5.2 Training Period

This training is expected to be completed within two to three months.

5.3 Documentation and Evaluation

5.3.1 The training will be documented in the trainee's notebook and on the applicable Training Documentation Form(s).

5.3.2 Knowledge of the trainee will be evaluated through:

- review of notes in the training notebook by the training coordinator.
- review of documentation skills (e.g., documentation of communications regarding cases (if applicable), note taking skills, etc.)

5.4 Qualification

Upon the successful completion of the training requirements detailed in this module, including a satisfactory performance on the competency set and during the final question and answer session, which is used to evaluate the trainee's competency as well as the trainee's oral communication skills, a Memorandum for Record (MFR) detailing the recommendation to qualify the trainee to cut known reference samples for DNA extraction will be submitted to the Biology Program Manager. Once this MFR is accepted and signed by the Biology Program Manager, the FLS will be deemed qualified to perform the duties associated with cutting known reference samples for DNA extraction independently.

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5.5 Tasks

5.5.1 Review the applicable chapter(s) of the Department Quality Manual.

5.5.2 Review the applicable Regional Operating Procedures.

5.5.3 Review the FB PM QA, focusing particularly on the contamination prevention procedures of the section.

5.5.4 Review the FB PM Documentation and Evidence Handling Requirements.

5.5.5 Observe and obtain instruction from qualified examiners while cutting known reference samples for extraction.

5.5.5.1 Observe and take note of the selection process and approximate size of sample utilized/cut for DNA extraction from different types of known reference samples.

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5.5.6 Document the cutting of a minimum of five (5) known reference samples by a qualified examiner or qualified designee (FLS training notes to be maintained in the training notebook).

5.5.6.1 This task may be conducted concurrently with 5.5.5.1.

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5.5.6.2 Include a minimum of one (1) DNA/bloodstain card and a minimum of one (1) set of buccal swabs in this set of five (5) known reference samples.

5.5.6.3 If possible, include a minimum of one (1) non-swab buccal sample.

5.5.6.4 Take practice notes covering:

- the use of protective material, such as Kimwipes.
- labeling of evidence.
- condition and description of evidence.
- amount of sample cut/amount remaining.
- preservation and packaging of collected samples.

5.5.7 Participate in a competency oral question and answer session.

5.5.7.1 Satisfactory performance qualifies the individual to continue to 5.5.8.

5.5.8 Examine, describe and cut a minimum of five (5) known reference samples for DNA extraction under the **direct supervision** of a qualified examiner.

NOTES: This set of a minimum of five (5) known reference samples serves as the trainee's competency set.

Any case notes generated will be initialed by both the trainee and the supervising examiner, with the examiner having responsibility for ensuring that the notes are accurate and complete. To ensure that it is clear that the notes and sample collection was performed during training under the supervision of an examiner versus once the FLS is qualified and no longer needs direct supervision, the notes prepared during training will contain a statement such as, "evidence examined under the direct supervision of SUPERVISING EXAMINER."

5.5.8.1 Include a minimum of one (1) DNA/bloodstain card and a minimum of one (1) set of buccal swabs within this set of five (5).

5.5.8.2 If available, include a minimum of one (1) non-swab buccal sample.

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5.5.8.3 Take case notes covering:

- the use of protective material, such as Kimwipes.
- labeling of evidence.
- condition and description of evidence.
- amount of sample cut/amount remaining.
- preservation and packaging of collected samples.

5.5.8.4 Take precautions to prevent loss or contamination of samples.

5.5.8.5 Preserve, package, and label the samples and tubes properly.

5.5.9 Participate in a final oral question and answer session with the training coordinator.

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6 OPERATION OF THE BIOMEK® NX^P AUTOMATION WORKSTATION

This training will be monitored by a currently qualified project coordinator or currently qualified examiner operator designated by the Biology Program Manager.

If the needs of the laboratory to which the trainee is assigned are better met by approaching this training in a more modular format (i.e., training to conduct just DNA isolation, just quantitation, just dilution and/or just amplification set up), this may be done at the discretion of the Section Supervisor. In this case, the minimum applicable tasks will be required for each modular portion.

6.1 Purpose and Scope

During the completion of this module the trainee will:

- learn how to initiate the Biomek® NX^P Software.
- learn how to set up the deck for isolation of DNA, quantitation of DNA, amplification set up, and the 1.5 mL transfer.
- become familiar with the QC procedures for the Biomek® NX^P Automation Workstation and Stratagene.

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6.2 Training Period

The training is expected to be completed within approximately two to three months. Availability of casework runs may impact the length of training.

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6.3 Documentation and Evaluation

6.3.1 The training will be documented in the trainee's notebook and on the applicable Training Documentation Form(s).

6.3.2 Knowledge of the trainee will be evaluated through:

- review of notes in the training notebook by the training coordinator.
- question and answer sessions throughout the training covering robot operation, Stratagene operation, Plexor® procedures, and QC.

6.3.3 The trainee should demonstrate a thorough understanding of and be able to independently operate the Biomek® NX^P Automation Workstation and Stratagene. This will be monitored throughout the training by a qualified project coordinator or currently qualified examiner operator.

6.4 Qualification

Upon successful completion of the training requirements detailed in this module, including a satisfactory performance on the checkerboard competency set and during the final question and answer session, which is used to evaluate the trainee's competency as well as the trainee's oral communication skills, a Memorandum for Record (MFR) detailing the recommendation to qualify the trainee as a Biomek® NX^P Automation Workstation operator will be submitted to the Biology Program Manager. Once this MFR is accepted and signed by the Biology Program Manager, the FLS will be deemed qualified to perform the duties of a Biomek® NX^P Automation Workstation operator.

6.5 Tasks

6.5.1 Read the applicable sections of the following Forensic Biology Procedures Manuals:

- Quality Assurance
- Extraction of DNA
- Plexor® HY Quantitation of DNA

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- PowerPlex® 16 Amplification and Long Term Storage
- PowerPlex® Fusion Amplification and Long Term Storage

6.5.2 Observe a currently qualified operator perform isolation, quantitation, dilution, amplification setup, and the 1.5 mL transfer on at least one plate of casework samples.

6.5.3 Observe a currently qualified project coordinator perform isolation, quantitation, dilution, amplification setup, and the 1.5 mL transfer on at least one plate of casework samples.

6.5.4 Observe a currently qualified project coordinator perform the deselection of data points on the standard curve in order to improve the quality of the Plexor® HY System Standard Curves used to estimate the concentration of the sample DNA and trouble-shoot a Plexor® HY quantitation run.

6.5.5 Successfully perform isolation, quantitation, dilution, amplification setup, 1.5 mL transfer, and typing on a minimum of four (4) fabricated competency samples (i.e., training samples) and four (4) blanks under the **direct supervision** of a qualified project coordinator.

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NOTE: If the trainee is not yet qualified to load and run the samples on the CE instrument, the training coordinator may run them and analyze the data to verify the correct results are obtained OR the trainee may run and/or analyze them under the direct supervision and direction of the training coordinator.

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6.5.5.1 Satisfactory performance (correct types obtained for the samples and no types obtained for the blanks) qualifies the trainee to continue to 6.5.6.

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6.5.6 Perform isolation, quantitation, dilution, amplification setup, and 1.5 mL transfer on a minimum of sixty (60) casework samples under the **direct supervision** of a qualified project coordinator or designee.

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6.5.6.1 A minimum of five (5) separate runs are to be performed.

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6.5.6.2 Multiple sample types are to be included (e.g., blood, buccal, trace/wearer DNA, seminal fluid, etc.).

6.5.6.3 Multiple extraction methods are to be included (e.g., DNA IQ™, IQP, IQD, etc.).

6.5.6.4 Proper documentation will be maintained in the training notebook for all runs.

6.5.7 Prepare and perform a minimum of two (2) sensitivity series using the Biomek® NX^P Automation Workstation, the Plexor® HY System, and the Stratgene under the **direct supervision** of a qualified project coordinator or designee.

6.5.7.1 Each series must contain a minimum of six (6) DNA samples.

6.5.8 Observe a project coordinator or designee perform the Biomek® NX^P Automation Workstation calibration programs (e.g., homing axes, deck framing) and Stratagene QC.

6.5.9 Perform the Biomek® NX^P Automation Workstation calibration programs (e.g., homing axes, deck framing) and Stratagene QC under the **direct supervision** of a project coordinator or designee.

6.5.10 Observe a qualified project coordinator abort a 16 sample water run and perform the Recovery Dispense Only and Recovery methods on the run.

6.5.11 Run a checkerboard competency set of samples under the **direct supervision** of a project coordinator.

6.5.11.1 The samples will consist of eight (8) blood and/or buccal samples and eight (8) blanks.

6.5.11.2 Perform the Recovery Dispense Only and Recovery Methods on the aborted run.

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6.5.11.3 Carry the samples through the typing process.

6.5.11.4 This serves as the competency set for the trainee.

6.5.12 Participate in a final oral question and answer session with the training coordinator.

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7 LOADING AND RUNNING THE CAPILLARY ELECTROPHORESIS INSTRUMENT

The trainee may be trained to load and run either the 3130*xl*, the 3500*xl*, or both, depending upon the needs of the section. The training tasks listed below must be completed independently for each model instrument.

7.1 Purpose and Scope

Once trained, the FLS will be permitted to:

- perform maintenance tasks
    - The minimum number of observations/performances under observation will be met for each task listed.
        - It is possible the FLS will complete this module without having fully trained on maintenance tasks conducted less often (i.e., capillary array change, spectral calibration). The training in these tasks may continue, as the opportunities to conduct them arise, after qualification in the remaining tasks in this module.

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- load and run quality control samples independently
- set up reinjections of samples/plates previously loaded by an examiner independently

During the completion of this module the trainee will:

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- develop an understanding and working knowledge of the use of the CE used during the DNA analysis process, including the parameters used for electrophoresis and proper documentation.
- become familiar with the use of controls on the CE.
- develop an unquestionably sound technique for preventing sample contamination and sample mix up while loading the sample plate.
- become proficient at utilizing the software programs associated with the instrument operation and subsequent data analysis.

7.2 Training Period

This training is expected to be completed in approximately two to three months. The availability of samples and examiner CE runs may impact the length of training.

7.3 Documentation and Evaluation

7.3.1 The training will be documented in the trainee's notebook and on the applicable Training Documentation Form(s).

7.3.2 Knowledge of the trainee will be evaluated through:

- review of notes in the training notebook by the training coordinator.
- question and answer sessions throughout the training covering applicable instrumentation, sample preparation (including the use of controls), and associated software.

7.3.3 The trainee should develop and exhibit an unquestionably sound technique and demonstrate the ability to independently prepare samples for the instrument model of interest, prepare the instrument model of interest for use, run the instrument model of interest, and analyze resultant data.

7.3.3.1 This includes running consistently interpretable CE runs and maintaining proper documentation.

7.3.3.2 This will be monitored by the training coordinator throughout the training through direct observation and review of the training notebook.

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7.4 Qualification

Upon successful completion of the training requirements detailed in this module, including a satisfactory performance on the competency set and during the final question and answer session, which is used to evaluate the trainee's competency as well as the trainee's oral communication skills, a Memorandum for Record (MFR) detailing the recommendation to qualify the trainee to load and run the instrument model(s) of interest will be submitted to the Biology Program Manager. Once this MFR is accepted and signed by the Biology Program Manager, the FLS will be deemed qualified to perform the duties associated with loading and running the CE instrument model(s) of interest.

7.5 Tasks

7.5.1 Read and become familiar with the applicable portions of the following:

- FB PM QA (particularly the QC and maintenance requirements for the 3130*xl* and/or the 3500*xl*)
- FB PM CE PP16, as applicable
- FB PM CE Fusion, as applicable
- FB PM CE Yfiler, as applicable
- FB PM GMID, as applicable
- FB PM GMID-X, as applicable

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7.5.2 Observe the training coordinator or designee load a sample plate and run the CE.

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7.5.3 Observe the training coordinator or designee analyze data from the CE using GMID or GMID-X, as applicable.

7.5.4 Observe the training coordinator or designee complete the following maintenance tasks, as applicable to the instrument model of interest:

- changing the polymer (replenish polymer)
- preparation of and changing the 1X Genetic Analyzer Buffer (3130*xl*)
- replacing the anode and cathode buffer cartridges (3500*xl*)
- running the water wash wizard (3130*xl*)
- running the wash pump channels wizard (3500*xl*)
- flushing the water trap
- defragmenting the hard drive (3130*xl*)
- changing the capillary array (including the spatial calibration)
- performing a spectral calibration

7.5.5 Perform the following common maintenance tasks, as applicable to the instrument model of interest, under the direct supervision of the training coordinator or designee a minimum of three (3) times maintaining proper documentation:

NOTE: These tasks may be conducted intermittently along with the other training tasks as the need to complete these tasks arises as long as the task in question has first been observed as required in 7.5.4.

- changing the polymer (replenish polymer)
- preparation of and changing the 1X Genetic Analyzer Buffer (3130*xl*)
- replacing the anode and cathode buffer cartridges (3500*xl*)
- running the water wash wizard (3130*xl*)
- running the wash pump channels wizard (3500*xl*)
- flushing the water trap
- defragmenting the hard drive (3130*xl*)
- changing the capillary array (including the spatial calibration)

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- performing a spectral calibration

7.5.6 Load and run a minimum of five (5) sample plates consisting of at least 10 samples each, plus appropriate controls, under the **direct supervision** of the training coordinator or designee.

NOTE: The samples (amplified product) used for this task may be fabricated training samples or casework samples for which the casework analysis has been completed and are therefore considered disposable.

7.5.6.1 Proper documentation will be maintained.

7.5.7 Complete the data analysis for five (5) sample plates using GMID or GMID-X, as applicable, under the **direct supervision** of the training coordinator or designee.

7.5.7.1 Proper documentation will be maintained.

7.5.8 Load and run 10 competency samples (assigned by the training coordinator) on the CE, including data analysis with the appropriate software.

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7.5.8.1 Provide all proper documentation to the training coordinator.

7.5.9 Participate in a final oral question and answer session with the training coordinator.

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