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**Department of Forensic Science**

VIRGINIA

DEPARTMENT

**FORENSIC BIOLOGY SECTION**

**TRAINING MANUAL**

**FORENSIC LABORATORY SPECIALISTS**

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## 1 OVERVIEW OF TRAINING PROGRAM

### 1.1 Purpose and Scope

- 1.1.1 The purpose of this document is to provide a uniform training program for Forensic Laboratory Specialists (FLSs) employed in the Forensic Biology Section of the Commonwealth of Virginia Department of Forensic Science. It is designed to teach an individual with a scientific background to properly handle forensic evidence, with special emphasis on evidence of a biological nature, to independently collect DNA samples from evidence submitted for examination in the section, to serve as the primary operator of the Biomek<sup>®</sup> Automation Workstation, to load and run gels, to load and run the capillary electrophoresis instrument, and to conduct other routine duties that assist the casework examiners and DNA Data Bank analysts.
- 1.1.2 This training program is designed to be completed in a modular format, thereby allowing the individual to be qualified in a specific area, while still being trained to complete additional tasks.

### 1.2 Location and Coordination of Training

- 1.2.1 All of the training will occur in the laboratory to which the individual is assigned.
- 1.2.2 The training modules in Sections 2, 4, 5, and 6 will be conducted by a training coordinator. If the training coordinator delegates a portion of the training module to another qualified individual, the training coordinator remains responsible for that aspect of the training. The training in Section 3 will be conducted by the Biomek<sup>®</sup> Automation Workstation Project Coordinator.

### 1.3 Training Period

- 1.3.1 It is estimated that the first part of the evidence handling training module will take approximately two months to complete. Refer to Section 2, Phase I. Satisfactory completion of this portion will be followed by a period of time for the FLS to gain experience and confidence performing those tasks independently. The FLS will also be trained to collect DNA samples from evidence submitted for examination in the section. Refer to Section 2, Phase II. It is estimated that this portion of the evidence handling training module can be completed within two months, depending on such factors as the availability of the specified evidential material on which the FLS must be trained. Subsequently the FLS will be trained to prepare samples for DNA extraction. Refer to Section 2, Phase III. It is estimated that this final portion of the evidence handling training module can be completed in two to three months working with a qualified examiner, depending on such factors as the availability of evidence materials on which the FLS must be trained.
- 1.3.2 Learning to operate the BioMek<sup>®</sup> Automation Workstation (Section 3) is anticipated to take approximately two to three months to complete all training modules.
- 1.3.3 Learning to load and run yield, product and typing gels (Section 4) is anticipated to take two to four weeks depending on the availability of training samples.
- 1.3.4 Learning to load and run the capillary electrophoresis instrumentation (Section 5) is anticipated to take two to four weeks depending on the availability of training samples.
- 1.3.5 The remaining module of the training program covering additional support duties (Section 6) may be taught over a period of time while the FLS is conducting other duties or may be concentrated into a period of approximately one month.
- 1.3.6 Some individuals may require more or less time for training than others, depending on such factors as experience and education. The length of the training period is a matter which will be left to the discretion of the Biology Program Manager in consultation with the with the Section Supervisor and training coordinator or Biomek<sup>®</sup> Automation Workstation Project Coordination, as applicable, and the FLS' supervisor.

## 1.4 Instructions for the Training Coordinator

- 1.4.1 The intent of the training program is to ensure that the FLS is provided with certain basic principles and fundamentals necessary for clearly understanding how to independently handle forensic evidence, for developing sound evidence handling methods and techniques, including but not limited to the collection of DNA samples from evidence and preparation for DNA extraction, for independently operating the Biomek® Automation Workstation, for loading and running yield and product gels, for loading and running the capillary electrophoresis instrumentation, and for providing support in other areas to the casework examiners and the DNA Data Bank analysts.
- 1.4.2 All of the tasks listed in each training module must be incorporated into the training. Most of these tasks will be performed more than one time and many will be performed a number of times during the training. Some of the tasks will suggest an order of events and that ranking should be followed.
- 1.4.3 Question and answer sessions will be held with the FLS throughout each of the training modules to ensure that he/she is grasping the significance and importance of each aspect of the training module. Other examiners should be encouraged to participate in one-on-one sessions with the FLS.
- 1.4.4 The checklist and, as appropriate, the training notebook, will be reviewed with the FLS on a regular periodic basis throughout each training module. This will enhance the training coordinator's ability to monitor training progress and may also give the trainee a greater sense of accomplishment.
- 1.4.5 It is recommended that the FLS accompany an examiner to local court, if possible, to observe testimony regarding chain of custody and evidence preservation. Additionally, observation of testimony regarding forensic procedures and QA/QC may enhance the FLS' understanding of the implications of his/her support work. Subsequent discussion between the examiner and the FLS regarding the case and testimony will also be helpful.
- 1.4.6 The completion of each task within each training module will be documented by the training coordinator or designee or the Biomek® Automation Workstation Project Coordinator, as applicable, on the appropriate checklist as the task is completed.
- 1.4.7 The training on each module should culminate with the FLS attaining each of the goals set forth in that training module.
- 1.4.7.1 Upon satisfactory completion of the specified tasks, the training coordinator or the Biomek Project Coordinator will conduct a review of the appropriate checklist and the portion of the training notebook for the specified module and will recommend the FLS for qualification in that particular area by noting "Recommended for Qualification" at the bottom of the checklist with initials and date. Alternatively, this may be done in the comments section of an individual task (i.e., for 'Other Duties') if the training is spread out over a longer period of time.
- 1.4.7.1.1 The training coordinator/Biomek Project Coordinator will discuss the FLS' overall performance with him/her prior to forwarding the training materials and recommendation for qualification to the section supervisor.

## 1.5 Instructions for the FLS

- 1.5.1 All training will be performed under the DIRECT SUPERVISION OF A QUALIFIED EXAMINER.
- 1.5.2 A notebook must be kept to document all aspects of training for Receiving and Handling Physical Evidence (Section 2, Phases I, II, and III of this manual), operating the Biomek® Automation Workstation (Section 3 of this manual), Loading and Running Yield and Product Gels (Section 4 of this manual), Loading and Running the Capillary Electrophoresis Instrumentation (Section 5 of this manual), and Other Duties (Section 6 of this manual).

- 1.5.2.1 The notebook for Receiving and Handling Physical Evidence should include, at a minimum, the checklist for the appropriate training module (Phase I, Phase II or Phase III) accurately documenting the completion of each task and documenting general information on the types of cases and evidence handled with an accompanying description of what was done with the case/evidence.
- 1.5.2.1.1 Copies of Request for Laboratory Examination (RFLE) forms and duplicates of case file documentation CANNOT be retained in the notebook.
- 1.5.2.1.2 Names of victims, suspects, or other individuals associated with a case on any documentation maintained in the notebook MUST BE REDACTED.
- 1.5.2.2 The notebook for the Loading and Running Yield and Product Gels training module should include, at a minimum, the checklist accurately documenting the completion of each task and copies of all photographs, and the analytical worksheets associated with these steps.
- 1.5.2.2.1 Names of victims, suspects, or other individuals associated with a case on any documentation maintained in the notebook MUST BE REDACTED.
- 1.5.2.3 The notebook for the Loading and Running the Capillary Electrophoresis Instrumentation training module should include, at minimum, the checklist accurately documenting the completion of each task and copies of all electropherograms, and the analytical worksheets associated with these steps.
- 1.5.2.3.1 Names of victims, suspects, or other individuals associated with a case on any documentation maintained in the notebook MUST BE REDACTED.
- 1.5.2.4 The notebook will be periodically checked by the training coordinator.
- 1.5.3 Upon final qualification by the Biology Program Manager the tasks associated with that module may be performed independently.

## 1.6 Completion of Training

The original checklist signed and dated by the training coordinator/Biomek Project Coordinator indicating that the FLS has completed his/her training for the specified task, will be forwarded to the section supervisor for review and approval.

- 1.6.1 Upon receiving the recommendation for qualification, the supervisor will review the appropriate completed checklist and the portion of the training notebook for the specified module to ensure that all tasks associated with the training have been satisfactorily completed in accordance with the requirements set forth in this manual. When satisfied, the supervisor will document the FLS' qualification for the specified module or task, as appropriate, by signing and dating the designated place at the bottom of the checklist.
- 1.6.1.1 Upon satisfactory completion of the training module, the supervisor will forward a copy of the signed checklist to the Biology Program Manager for final qualification. The documents will then be forwarded to the appropriate lab director or their designee in accordance with the Department Quality Manual.
- 1.6.2 If the FLS cannot meet the criteria expected of him/her during the period allowed for training, steps will be taken to effect appropriate action.

## 2 RECEIVING AND HANDLING PHYSICAL EVIDENCE

### 2.1 Introduction

The receiving and handling physical evidence training is divided into three Phases.

### 2.2 Phase I Goals

- 2.2.1 To obtain a working knowledge of factors influencing the deterioration of biological evidence as these relate to proper vs. improper packaging, handling, and storage.
- 2.2.2 To develop a thorough understanding of evidence handling procedures, including preservation of chain of custody, use of the laboratory information management system (F.A.C.E.), and intra- and inter-laboratory transfer of evidence.
- 2.2.3 To develop knowledge of court procedures involving the identification and introduction of evidence and general testimony regarding evidence preservation and handling.
- 2.2.4 To develop a thorough understanding of the necessity for:
- 2.2.4.1 Detailed, comprehensive notes, including:
    - 2.2.4.1.1 Abbreviations and common symbols.
    - 2.2.4.1.2 Condition and description of evidence.
    - 2.2.4.1.3 Number of items/packages/containers.
    - 2.2.4.1.4 Procedures conducted.
    - 2.2.4.1.5 Use of drawings and/or photographs for documentation purposes.
  - 2.2.4.2 Adequate labeling of evidentiary materials.
  - 2.2.4.3 Sealing of evidence with both permanent and temporary seals.
  - 2.2.4.4 Taking precautions against loss and contamination of evidence.
  - 2.2.4.5 Performing steps in compliance with the Virginia Department of Forensic Science Quality Manual.
- 2.2.5 To develop good oral and written communication skills, including understanding the importance of effective communication with forensic examiners, law enforcement and medical personnel, and proper documentation thereof.
- 2.2.6 To learn to handle evidence in a safe manner as prescribed in the Virginia Department of Forensic Science Safety Manual.

### 2.3 Phase I Evidence Handling Tasks

- 2.3.1 Read and become familiar with:
- 2.3.1.1 Department policy on evidence handling (Virginia Department of Forensic Science Quality Manual, Section 20).
  - 2.3.1.2 Regional Laboratory Operating Procedures (if applicable).

- 2.3.1.3 Virginia Department of Forensic Science Safety Manual.
- 2.3.1.4 Virginia Department of Forensic Science Forensic Biology Section Procedure Manual, Section I.
- 2.3.2 Observe examiners receiving, transferring and returning evidence to/from security and other sections within the Department.
- 2.3.3 Observe examiners opening, preserving a variety of different evidential materials, and repackaging and storing case materials.
- 2.3.4 Properly receive, transfer and return evidence to/from security and other sections within the Department. Initially this will be done UNDER THE DIRECT SUPERVISION OF THE TRAINING COORDINATOR OR ANOTHER QUALIFIED EXAMINER. When a determination is made by the training coordinator that the FLS can properly receive, transfer, and return SEALED evidence, these tasks may be done by the FLS without direct supervision.
  - 2.3.4.1 Learn to verify the listing of evidence on the RFL E against the actual items received. Learn to rectify discrepancies with proper documentation and to notify the appropriate people.
  - 2.3.4.2 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. Transfer evidence to other sections, as appropriate, paying attention to the sequence of section transfer. Learn to perform primary examiner duties, as appropriate.
    - 2.3.4.2.1 It may be necessary for an examiner or Phase II certified FLS 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. This task can be first observed and then conducted by the Phase I trainee under the **DIRECT SUPERVISION** of the training coordinator or designee and to his/her satisfaction. This should be documented on the checklist and may be accepted by the Phase II training coordinator as partial completion of this Phase II task.
  - 2.3.4.3 Learn to prepare evidence for return to the submitting agency by collecting the evidence, checking the items against the RFL E, and ensuring that all items are sealed and appropriately labeled.

**NOTE: The following tasks will be conducted repeatedly with the training coordinator or designee.**
- 2.3.5 Preserve and store a variety of different evidential materials UNDER THE DIRECT SUPERVISION OF THE TRAINING COORDINATOR OR ANOTHER QUALIFIED EXAMINER. Direct supervision is required throughout this aspect of the training.
  - 2.3.5.1 Take notes as to the form and condition of the packaging and, when appropriate, determine if the evidence is dry. If necessary, the evidence will be air-dried and repackaging will occur the next day or when the evidence is dry. Appropriately store the evidence until it is air-dried, then seal all evidence and store it for future examination.
  - 2.3.5.2 Learn to handle routine and non-routine items in accordance with Forensic Biology section protocols and by conferring with the examiner assigned to the particular case or if no examiner has been assigned to the case, with the training coordinator or designee. These items may include, but are not limited to: condoms, deer meat, liquid samples suspected of containing seminal fluid, urine, and/or blood, clothing collected by the medical examiner, burned evidence, and fetal tissue.

- 2.3.6 Open appropriate evidence, describe and take notes on what preservation tasks are being performed on case materials UNDER THE DIRECT SUPERVISION OF THE TRAINING COORDINATOR OR ANOTHER QUALIFIED EXAMINER. Direct supervision is required throughout this aspect of the training.
- 2.3.7 In summary, learn and completely understand laboratory capabilities and sequence of examinations, evidence submission and packaging, RFLE reconciling, proper evidence handling techniques, and proper documentation, including note-taking.

**2.4 Phase I F.A.C.E. Tasks**

**NOTE: The following tasks will be performed by the FLS using the training module in F.A.C.E. and working under the supervision of the training coordinator.**

- 2.4.1 Learn to accept evidence into the Forensic Biology Section administrative storage area under the supervising examiner's sign-on in F.A.C.E.
- 2.4.2 Learn how to transfer evidence in F.A.C.E. to other sections or other laboratories, including the creation of item descriptions and cases (if necessary).
- 2.4.3 Learn how to use F.A.C.E. to conduct a search of a particular case to determine the forensic laboratory number and examiner assigned to the case.
- 2.4.4 Learn and completely understand F.A.C.E. terminology and capabilities, as well as how to create item descriptions and perform searches.

**2.5 Phase I Communication and Documentation Tasks**

- 2.5.1 Learn to communicate effectively with forensic examiners, law enforcement and medical personnel.
- 2.5.2 Learn to properly document communications.

**2.6 Phase I Training Evaluation**

- 2.6.1 Evaluation of documentation skills by the training coordinator.
- 2.6.2 Evaluation of F.A.C.E. skills by the training coordinator.
- 2.6.3 The FLS II should open, preserve, and repackage a sufficient number of cases to develop and exhibit an unquestionably sound technique for handling physical evidence. This will be monitored by continual observation by the training coordinator or designee.
- 2.6.4 Evaluation of knowledge through question and answer sessions.

**2.7 Phase II Goals**

- 2.7.1 To develop a thorough understanding of:
  - 2.7.1.1 DNA sample collection procedures, including techniques for visualization of biological stains.
  - 2.7.1.2 DNA sample recovery techniques used for a variety of materials commonly encountered in the laboratory.
  - 2.7.1.3 Preservation, labeling, and storage of recovered DNA samples.
  - 2.7.1.4 Expanded responsibilities for using the laboratory information management system (F.A.C.E.) relating to DNA sample collection.



- 2.7.1.5 Measures required for proper documentation of DNA sample collection from evidence, including proper electronic and written chain of custody maintenance, materials and techniques used, description of evidence, and, as appropriate, diagrammatic or photographic recording of evidence prior to DNA sample collection.

**NOTE: The FLS will not conduct any analysis of samples to identify the stains prior to or following DNA sample collection**

- 2.7.2 To expand the previously gained skills of communication with forensic examiners, law enforcement and medical personnel.
- 2.7.3 To expand the previously gained courtroom testimony skills to include DNA sample collection from evidence.

## 2.8 Phase II DNA Sample Collection Tasks

- 2.8.1 Review the following documents previously read during the Phase I training:
- 2.8.1.1 Department policy on evidence handling (Virginia Department of Forensic Science Quality Manual, Section 20), with special attention to the evidence handling requirements for individuals in other laboratory sections.
  - 2.8.1.2 Virginia Department of Forensic Science Training Academy Evidence Handling Guide.
  - 2.8.1.3 Regional Laboratory Operating Procedures (if applicable).
  - 2.8.1.4 Virginia Department of Forensic Science Safety Manual.
  - 2.8.1.5 Virginia Department of Forensic Science Forensic Biology Section Procedure Manual, Section I.
- 2.8.2 Read and become familiar with the Forensic Biology Section's Contamination Prevention Guidelines. You will be handling low level DNA samples.
- 2.8.3 Consult informally with a qualified examiner in the Firearms, Latent Prints, Trace Evidence, Controlled Substances, and Questioned Documents sections to learn any special procedures or requirements that these sections have regarding evidence examinations. Learn to avoid alteration or destruction/loss of evidence for analysis in each of these sections. 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.
- 2.8.4 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.

**NOTES: 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' custody. For those cases already assigned to an examiner, the tasks will be conducted while the evidence is in the custody of that examiner. Any case notes generated will be initialed by both the FLS 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 should contain a statement, such as “notes/sample collection was prepared/preformed under NAME OF THE EXAMINER supervision”.

There are four general categories of evidence materials listed below in which the FLS can 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 training coordinator will identify and utilize actual evidence arriving at the laboratory. For more rarely encountered types of evidence, mock materials may be utilized in place of real evidence to provide the experience and to expedite the training. The use of mock evidence should be an exception to the always preferred use of real evidence.

2.8.5 Observe the examination and DNA sample collection from several different items in each category that require different collection techniques and approaches. Then, under **DIRECT SUPERVISION**, examine at least 5 different items of evidence within the specific evidence training category that require different collection techniques and approaches. Take precautions to prevent loss or contamination of samples. Preserve, package, and label the samples properly. Expedite the transfer of the evidence to the appropriate section using knowledge of prioritizing multiple examinations.

2.8.5.1 Mouth contact items (such as envelopes, stamps, smoking devices, pipes, drink containers, drinking straws)

2.8.5.2 Clothing (such as shirts, underclothes, pants, gloves, masks/face coverings)

2.8.5.3 Touch evidence (such as firearms, cartridges, bullets, weapons, tools, syringes, baggies, miscellaneous objects)

2.8.5.4 Objects used in sexual assaults (such as condoms and inanimate objects used for penetration)

**NOTE: Although the above list of evidence categories is sufficient to teach handling of commonly encountered evidence and to certify the Phase II trainee, other categories of evidence may be included or added to the list during or following the Phase II training as deemed necessary or useful to the laboratory, under the guidance of the Biology Program Manager and the FLS’ supervisor. If the FLS is trained in the collection of DNA from other categories, it is recommended that the training coordinator follow the same approach as that defined above for the four categories. That approach is observation, collection under supervision, then checklist initialing under a new entry, and approval as an independent collector of such evidence.**

2.8.6 Learn to document the DNA sample collection process properly using approved methods and in accordance with Virginia Department of Forensic Science and Forensic Biology Section procedures by observing other qualified examiners and/or Phase II qualified FLSs. This can take place concurrently with the observation of actual examinations being conducted for the previous task.

2.8.7 Document the DNA sample collection process under **DIRECT SUPERVISION**, using approved methods and in accordance with Virginia Department of Forensic Science and Forensic Biology Section procedures. This **MUST** be done concurrently with the collection of DNA samples being conducted under **DIRECT SUPERVISION** for the four categories of evidence specified above.

2.8.7.1 Learn to diagram and photograph evidence for documentation of condition.

2.8.7.2 Take case notes covering:

2.8.7.2.1 The use of protective material, such as Kimwipes.

- 2.8.7.2.2 Labeling of evidence, observing when only the container is to be labeled.
- 2.8.7.2.3 Condition and description of evidence.
- 2.8.7.2.4 Procedures and materials used to visualize stains.
- 2.8.7.2.5 Materials, and quantities thereof, used to collect samples.
- 2.8.7.2.6 Amount of sample left on an item, if any.
- 2.8.7.2.7 Preservation and packaging of collected samples.

**2.9 Phase II F.A.C.E. Tasks**

Learn to conduct F.A.C.E. entry of item descriptions and create sub-items as necessary following the Virginia Department of Forensic Science policies and procedures and using the F.A.C.E. protocol.

**2.10 Phase II Training Evaluation**

- 2.10.1 Evaluation of documentation skills by the training coordinator.
- 2.10.2 Evaluation of F.A.C.E. entry skills by the training coordinator.
- 2.10.3 Continuous evaluation of the skill and care used to handle and collect the DNA samples from at least five items evidence within a specific category of evidence outlined in the Phase II tasks. The training coordinator or designee should offer constructive criticism as the collection procedure is ongoing, but should strive to allow increasing independence as more experience is gained to promote the trainee's confidence.

**2.11 Phase III Goals**

- 2.11.1 To develop a thorough understanding of:
  - 2.11.1.1 Sample selection procedures for DNA extraction.
  - 2.11.1.2 Preservation, labeling, and storage of prepared samples for DNA extraction.
  - 2.11.1.3 Measures required for proper documentation of DNA extraction preparation from evidence, including proper electronic and written chain of custody maintenance, materials and techniques used, description of evidence, and, as appropriate, diagrammatic or photographic recording of evidence prior to cutting the evidence sample for DNA extraction.
- 2.11.2 To expand the previously gained skills of communication with forensic examiners, law enforcement and medical personnel.
- 2.11.3 To expand the previously gained courtroom testimony skills to include preparation of the sample for DNA extraction.

**NOTE: The types of samples the FLS will prepare for DNA extraction will not require any analysis to identify the biological fluid prior to the extraction process.**

**2.12 Phase III DNA Sample Preparation Tasks**

- 2.12.1 Review the following documents previously read during the Phase I and II training:

- 2.12.1.1 Department policy on evidence handling (Virginia Department of Forensic Science Quality Manual, Section 20), with special attention to the evidence handling requirements for individuals in other laboratory sections.
- 2.12.1.2 Virginia Department of Forensic Science Training Academy Evidence Handling Guide.
- 2.12.1.3 Regional Laboratory Operating Procedures (if applicable).
- 2.12.1.4 Virginia Department of Forensic Science Safety Manual.
- 2.12.1.5 Virginia Department of Forensic Science Forensic Biology Section Procedure Manual, Section I.
- 2.12.2 Read and become familiar with the Forensic Biology Section's Contamination Prevention Guidelines. You will be handling low level DNA samples.
- 2.12.3 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 sampling/selecting the evidence for DNA extraction may consume the evidence and preclude additional testing.

**NOTES: The following tasks will be conducted in a sequential manner, such that the trainee first observes, then conducts sample selection for DNA extraction under the DIRECT SUPERVISION of an examiner. The sample selection should be conducted in an increasingly independent manner so that the trainee gains confidence as his/her knowledge of procedures and experience to determine the size of the sample to use 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' custody. For those cases already assigned to an examiner, the tasks will be conducted while the evidence is in the custody of that examiner. Any case notes generated will be initialed by both the FLS 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 should contain a statement, such as "notes/sample selection/cutting was prepared/performed under NAME OF THE EXAMINER supervision".**

**There are five general categories of evidence types listed below in which the FLS can be trained to collect and then prepare/cut for DNA extraction in order to aid the casework examiners. 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 five. The training coordinator will identify and utilize actual evidence arriving at the laboratory. For more rarely encountered types of evidence, mock materials may be utilized in place of real evidence to provide the experience and to expedite the training. The use of mock evidence should be an exception to the always preferred use of real evidence.**

- 2.12.4 Observe the selection process and the approximate size of sample utilized/cut for DNA extraction from several different items in each category that require different selection processes and sample size. Then, under **DIRECT SUPERVISION**, select and cut a portion of the sample for DNA extraction from at least 5 different items of evidence within the specific evidence training category listed below. Take precautions to prevent loss or contamination of samples. Preserve, package, and label the samples and tubes properly.

- 2.12.4.1 Mouth contact items (such as cigarettes/cigars, envelopes, stamps, smoking devices, pipes, drink containers, drinking straws)
- 2.12.4.2 Clothing (such as shirts, underclothes, pants, gloves, masks/face coverings where sloughed cells may believe to have been deposited due to perspiration)
- 2.12.4.3 Touch evidence (such as firearms, cartridges, bullets, weapons, tools , syringes, baggies, miscellaneous objects where not visible biological material is present)
- 2.12.4.4 Objects used in sexual assaults (such as condoms and inanimate objects used for penetration)
- 2.12.4.5 Known samples (blood, buccal swabs and hair)

**NOTE: Although the above list of evidence categories is sufficient to teach sampling/selection of commonly encountered evidence and to certify the Phase III trainee, other categories of evidence may be included or added to the list during or following the Phase III training as deemed necessary or useful to the laboratory, under the guidance of the Biology Program Manager and the FLS' supervisor. If the FLS is trained in the sampling/selection of evidence for DNA extraction from other categories, it is recommended that the training coordinator follow the same approach as that defined above for the five categories. That approach is observation, sampling/selection under supervision, then checklist initialing under a new entry, and approval as an independent sampler/selector of such evidence for DNA extraction.**

- 2.12.5 Learn to document the DNA sample sampling/selection process properly using approved methods and in accordance with Virginia Department of Forensic Science and Forensic Biology Section procedures by observing other qualified examiners.
- 2.12.6 Document the DNA sample sampling/selection process under **DIRECT SUPERVISION**, using approved methods and in accordance with Virginia Department of Forensic Science and Forensic Biology Section procedures. This **MUST** be done concurrently with the sampling/selection of the samples for DNA extraction under **DIRECT SUPERVISION** for the five categories of evidence specified above.
  - 2.12.6.1 Learn to diagram and photograph evidence for documentation of condition.
  - 2.12.6.2 Take case notes covering:
    - 2.12.6.2.1 The use of protective material, such as Kimwipe.
    - 2.12.6.2.2 Labeling of evidence, observing when only the container is to be labeled.
    - 2.12.6.2.3 Condition and description of evidence.
    - 2.12.6.2.4 Procedures and materials used to visualize stains.
    - 2.12.6.2.5 Materials, and quantities thereof, used to collect samples.
    - 2.12.6.2.6 Amount of sample left after a portion has been removed for DNA extraction, if any.
    - 2.12.6.2.7 Preservation, packaging, and storage of samples selected for DNA extraction.

### 2.13 Phase III F.A.C.E. Tasks

Learn to conduct F.A.C.E. entry of item descriptions and create sub-items as necessary following the Virginia Department of Forensic Science policies and procedures and using the F.A.C.E. protocol.

**2.14 Phase III Training Evaluation**

2.14.1 Evaluation of documentation skills by the training coordinator.

2.14.2 Evaluation of F.A.C.E. entry skills by the training coordinator.

2.14.3 Continuous evaluation of the skill and care used to handle, collect, and sample the evidence for DNA extraction from at least five items evidence within a specific category of evidence outlined in the Phase III tasks. The training coordinator or designee should offer constructive criticism as the sampling/selection procedure is ongoing, but should strive to allow increasing independence as more experience is gained to promote the trainee's confidence.

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### 3 OPERATING THE BIOMEK® AUTOMATION WORKSTATION

**NOTE:** The training in this section is primary operator training which will be conducted under the direct supervision of the Project Coordinator.

The Biomek® Automation Workstation training program for the Forensic Laboratory Specialist (FLS) is designed in a modular format. Therefore, the FLS may be trained to conduct each task sequentially or one task (i.e., DNA isolation, quantitation, dilution and amplification) outlined in this section at a time. As the FLS completes each of these duties, the corresponding checklist will be completed by the Project Coordinator.

#### 3.1 Goal

To assist examiners by becoming the primary operator of the Biomek® Automation Workstation.

#### 3.2 Tasks

- 3.2.1 Read and become familiar with the Commonwealth of Virginia Department of Forensic Science Forensic Biology Section Procedure Manual, Section IX- Biomek® Automation Workstation Procedure Manual.
- 3.2.2 Learn about the overall operation of the Biomek® Automation Workstation, including each step of the Biomek® software, and the programs used with the DNA IQ™ System, the Plexor® HY System, the Normalization Wizard and amplification set up processes.
- 3.2.3 Learn to initiate the appropriate DNA IQ™ System program.
- 3.2.3.1 Observe the Project Coordinator set up the Biomek® Automation Workstation to run the DNA IQ™ System program.
- 3.2.3.2 Isolate DNA from a minimum of 60 casework samples in a minimum of 5 runs under the direct supervision of the Project Coordinator and complete the appropriate documentation each time. The samples should include a combination of blood and buccal samples, as well as mixture samples requiring differential extraction. The number of runs may be increased depending on whether the trainee is experiencing difficulties.
- 3.2.4 Learn to initiate the appropriate Plexor® HY System program, to include the Stratagene Data Collection software, and the Plexor® Analysis software.
- 3.2.4.1 Observe the Project Coordinator set up the Biomek® Automation Workstation to run the Plexor® HY System program.
- 3.2.4.2 Under the direction of the Project Coordinator set up the workstation to run the Plexor® HY System program and to run the qPCR instrument. Run a sensitivity series consisting of a minimum of 6 DNA samples.
- 3.2.4.3 Set up the workstation again on a different day to run the Plexor® HY System program and to run the qPCR instrument. Run another sensitivity series consisting of a minimum of 6 DNA samples. Do the DNA quantitation, set up the deck, and run the program under the direct supervision of the Project Coordinator.
- 3.2.4.4 Under the supervision of the Project Coordinator, use the workstation and the Plexor® HY System program to quantitate DNA from a minimum of 60 casework samples in a minimum of 5 different runs and complete the appropriate documentation each time. The number of runs may be increased depending on whether the trainee is experiencing difficulties.
- 3.2.5 Learn how to clean and maintain the qPCR thermocycler.

- 3.2.6 Learn to initiate the appropriate Normalization Wizard and amplification set up programs.
- 3.2.6.1 Observe the Project Coordinator set up the Biomek<sup>®</sup> Automation Workstation to run the Normalization Wizard and amplification set up programs.
  - 3.2.6.2 Under the supervision of the Project Coordinator, use the workstation and the Normalization Wizard program to dilute the DNA and set the samples up for amplification. A minimum of 60 casework samples in a minimum of 5 different runs will be performed, completing of the appropriate documentation each time. The number of runs may be increased depending on whether the trainee is experiencing difficulties.
- 3.2.7 Learn to initiate the Biomek<sup>®</sup> Workstation calibration programs and to perform the “home all axes” function that will be conducted prior to running the instrument, and the “reframing the deck” function to be conducted every three months or as needed.
- 3.2.7.1 The procedures for performing these calibrations can be found in the Commonwealth of Virginia Department of Forensic Science Forensic Biology Section Procedure Manual, Appendix C of Section IX - Biomek<sup>®</sup> NX<sup>P</sup> Automation Workstation Procedure Manual.
- 3.2.8 Learn to initiate the 1.5 mL Tube Transfer program.
- 3.2.8.1 Observe the Project Coordinator perform the transfer of the extracted DNA from a 0.2 mL tube to a labeled 1.5 mL tube utilizing the Biomek<sup>®</sup> Workstation.
  - 3.2.8.2 Under the supervision of the Project Coordinator, use the workstation and 1.5 mL Tube Transfer program to transfer the extracted DNA from a 0.2 mL tube to a labeled 1.5 mL tube. A minimum of 5 different transfers of casework samples will be performed.
- 3.2.9 Learn to troubleshoot and perform the Recovery Program(s)
- 3.2.9.1 Observe the Project Coordinator abort a 16 sample water run and perform the Recovery Dispense Only and Recovery Methods found in the Virginia Department of Forensic Science Forensic Biology Section Procedure Manual, Appendix F of Section IX - Biomek<sup>®</sup> NX<sup>P</sup> Automation Workstation Procedure Manual.
  - 3.2.9.2 On a separate day and under the supervision of the Project Coordinator, perform the Recovery Dispense Only and Recovery Methods on an aborted 16 sample (8 blood/buccal samples, 8 blanks) run. Carry these samples through the typing steps.
- 3.3 Training Evaluation**
- 3.3.1 Evaluation of documentation skills by the Project Coordinator.
  - 3.3.2 The FLS should understand and be able to independently operate the Biomek<sup>®</sup> Workstation. This will be evaluated and monitored throughout the training.



## 4 LOADING AND RUNNING YIELD AND PRODUCT GELS

### 4.1 Goals

The FLS may be trained to load and run one or more of the different types of gels (i.e., yield or product gel) used during the DNA analysis process. As the FLS successfully demonstrates an unquestionably sound technique for loading and running each type of gel, the corresponding checklist will be completed by the Training Coordinator (i.e., the qualified examiner that conducts that specific part of the training).

- 4.1.1 To develop an understanding and working knowledge of the use of gels (for yield and product gels) used during the DNA analysis process, including the parameters used for electrophoresis and proper documentation.
- 4.1.2 To become familiar with the use of controls on the yield and product gels.
- 4.1.3 To develop an unquestionably sound technique for preventing sample contamination and sample mix up while loading gels.

### 4.2 Tasks

- 4.2.1 Read and become familiar with Chapters 3 (Yield Gels) and 6 (Product Gels) of the Commonwealth of Virginia Department of Forensic Science Forensic Biology Section Procedure Manual Section III Fluorescent Detection PCR-Based STR DNA Protocol PowerPlex® 16 BIO System Procedure Manual.
- 4.2.2 Observe the Training Coordinator load a yield and product gel.
- 4.2.3 Load and run a minimum of 5 yield and 5 product gels consisting of at least 10 training samples per gel, plus appropriate controls, under the direct supervision of the Training Coordinator or another qualified individual.
- 4.2.4 Load and run 10 competency samples (assigned by the Training Coordinator) on a yield and product gel.

### 4.3 Training Evaluation

- 4.3.1 The trainee should demonstrate an unquestionably sound technique for running consistently interpretable yield and/or product gels using proper documentation. This will be monitored by review of the documentation in the training notebook and continual observation by the training coordinator.

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## 5 LOADING AND RUNNING THE CAPILLARY ELECTROPHORESIS INSTRUMENTATION

### 5.1 Goals

The FLS may be trained to load and run the capillary electrophoresis (CE) instrument used during the DNA analysis process.

- 5.1.1 To 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.
- 5.1.2 To become familiar with the use of controls on the CE.
- 5.1.3 To develop an unquestionably sound technique for preventing sample contamination and sample mix up while loading the sample plate.
- 5.1.4 To become proficient at utilizing the software programs associated with the instrument operation and subsequent data analysis.

### 5.2 Tasks

- 5.2.1 Read and become familiar with Chapters 2 (Capillary Electrophoresis), 3 (Analysis of Capillary Electrophoresis Results Using GeneMapper™ ID), and Appendix B (Capillary Electrophoresis Maintenance) of the Commonwealth of Virginia Department of Forensic Science Forensic Biology Section Procedure Manual Section VIII Fluorescent Detection PCR-Based STR DNA Protocol PowerPlex® 16 System Procedure Manual.
- 5.2.2 Observe the Training Coordinator (or designee) load a sample plate and run the CE.
- 5.2.3 Observe the Training Coordinator (or designee) analyze data from the CE using GeneMapper™ ID.
- 5.2.4 Observe the Training Coordinator (or designee) complete the following common maintenance tasks: changing the polymer, preparation of and changing the 1x Genetic Analysis Buffer, running the water wash wizard, flushing the water trap, and defragmenting the hard drive.
- 5.2.5 Load and run a minimum of 5 sample plates consisting of at least 10 samples, plus appropriate controls, under the direct supervision of the Training Coordinator or another qualified examiner.
- 5.2.6 Complete the data analysis for the 5 sample plates using GeneMapper™ ID under supervision.
- 5.2.7 Load and run 10 competency samples (assigned by the Training Coordinator) on the CE, including data analysis using GeneMapper™ ID.
- 5.2.8 Complete the following common maintenance tasks: preparation of and changing the 1x Genetic Analysis Buffer, running the Replenish Polymer wizard, running the water wash wizard, flushing the water trap, and defragmenting the hard drive, at least three times each.

### 5.3 Training Evaluation

- 5.3.1 The trainee should demonstrate an unquestionably sound technique for running consistently interpretable CE runs using proper documentation. This will be monitored by review of the documentation in the training notebook and continual observation by the training coordinator (or designee).
- 5.3.2 After the FLS has been qualified to load and run samples on the CE, the samples that the FLS will be permitted to load and run are samples that are quality control samples. The FLS will also be permitted to set up reinjections of a plate previously loaded by an examiner. Additionally the FLS can perform the common maintenance tasks on the CE instrument.

## 6 OTHER DUTIES

### 6.1 Tasks

The FLS may be trained to conduct one or more of the tasks outlined in this section. As the FLS completes each of these duties, the corresponding checklist will be completed by the training coordinator (i.e., the qualified examiner that conducts that specific part of the training). The original checklist initialed and dated by the training coordinator will be forwarded by the supervisor to the Laboratory Director or their designee in accordance with the Department Quality Manual. These tasks, performed on an-ongoing and as-needed basis, may include but are not limited to:

- 6.1.1 Learn to assist an examiner in the location of stains on bedding and other items of evidence using the alternate light source (ALS).
- 6.1.2 Learn to assist an examiner in the recovery of hairs/fibers from items of evidence being examined.
- 6.1.3 Learn to make the reagents for the detection/identification of physiological fluids and DNA analysis. Refer to the Forensic Biology Section Procedure Manual, Section II, Presumptive and Confirmatory Tests for Biological Substances and Section VIII, Fluorescent Detection PCR-Based DNA Protocol: PowerPlex® 16 System.
- 6.1.4 Learn to perform routine quality control testing on reagents and laboratory equipment as set forth in the Forensic Biology Section Procedure Manual, Section II - Presumptive and Confirmatory Tests for Biological Substances, Section III - Fluorescent Detection PCR-Based STR DNA Protocol: PowerPlex® 16 BIO System, and Section VI - Quality Assurance Program DNA Typing of Biological Materials . The quality control testing may include, but is not limited to:
  - AmpliTaq™ Gold DNA Polymerase
  - Antisera and normal sera for human and animal protein
  - Autoclave
  - Balances
  - Centrifuges
  - DNA concentrator/evaporator
  - Heat blocks
  - Incubators/ovens
  - Internal Lane Standard
  - Microscopes
  - OneStep® ABA p30 cards
  - PCR-based system kits
  - Pipettes
  - Refrigerators/freezers
  - Standard Reference Material (SRM) 2391 Kit or NIST Traceable samples
  - Thermal cyclers
  - Thermometers
  - Type I H<sub>2</sub>O system
- 6.1.5 Learn to fix and stain smears for sperm searches using the Christmas tree stain (Kernechtrot-Picroindigocarmin stain). Refer to the Forensic Biology Section Procedure Manual, Section II, Presumptive and Confirmatory Tests for Biological Substances.
- 6.1.6 Learn to perform sperm searches (on stained smears only).
- 6.1.7 Learn to prepare agarose gels (1% yield and 3% product gels) and record the chemical lot numbers.
  - 6.1.7.1 Learn to properly wrap and store gels.

6.1.8 Learn to photograph yield and product gels, and photograph photographs of yield and product gels. DO NOT DISCARD the gels until the examiner has approved the scan or the photograph.

6.1.9 Learn to take the necessary precautions in order to prevent sample contamination and/or mishandling.

6.1.10 Learn how to properly dry down DNA extracts and prepare them for agency return.

6.1.11 Learn to perform the manual Plexor<sup>®</sup> HY System procedure. NOTE: This training will not be conducted prior to the FLS becoming qualified to perform the automated Plexor<sup>®</sup> HY System procedure using the BioMek<sup>®</sup> Automation Workstation. Prior to performing this task independently, the FLS will undergo a competency test.

## 6.2 Evaluation and Qualification

Completion of the appropriate portion(s) of the checklist by the training coordinator.

## 6.3 Miscellaneous Duties

When assigned duties have been completed, the following additional duties can be done (if applicable). No corresponding checklist will be maintained for these duties. The duties may include, but are not limited to:

- Empty and prepare biohazard trash for pick up
- Shred contents of shred boxes
- Stock commonly used supplies
- Clean hoods as necessary
- Wipe down common countertops
- Clean and autoclave glassware
- Inventory and order supplies
- Clean examiner pipettes
- Copy case file documentation for Discovery Orders, etc.

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