

Department of Forensic Sciences
Public Health Laboratory Division

**Forensic Chemistry Unit
Training Manual**

Forensic Chemistry Unit Training Manual

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1.0 Training Goals and Objectives

1.1 Overview of the Training Manual

1.1.1 The purpose of this manual is to provide a format for training new employees in the Forensic Chemistry Unit (FCU) of the District of Columbia, Department of Forensic Sciences (DFS). The training outline provides guidance for training on specific topics of competence for Forensic Chemist Trainees. The complete training program involves traditional instruction (e.g., modules, readings, etc.), e-learning as well as apprentice style training; working with qualified chemists. These qualified chemists will act as designated Trainers under the direction of the FCU Manager, FCU Technical Leader, DFS Training Manager and/or designee.

1.2 Format of the Training Program

1.2.1 The FCU Training Program, in its entirety, is designed for the Forensic Chemist who has minimal background or experience in the subject matter. The training program is divided into modules. Each module contains required readings, e-learning component(s), practical exercises and study questions, in addition to other duties as assigned. The topics covered in the training program should impart a fundamental understanding of the work that a chemist is expected to understand and perform in the position. The FCU Training Program is intended to be used as a *guide* for training and is not a rigid, inflexible program. Many of the modules do not have to be completed in sequence or order in which they are presented, and may be modified depending on the needs of the FCU, DFS, trainer(s), and/or facility availability. The FCU training program may consist of in-service training, training from external agencies, vendors, or a combination.

1.2.2 It is estimated that this training program can be completed, in its entirety, in approximately six (6) months; however, the program may take more or less time to complete depending on the progress of the employee and the circumstances in the FCU. The estimated timeframe for a trainee to complete the training program is dependent upon their assigned duties. It may take more or less time to get practical exposure to some of the techniques in the outline due to the nature of the cases received by FCU.

1.2.3 Satisfactory understanding of the information learned in the modules may be demonstrated through written examinations (grade \geq 80%), oral

presentations, practical examinations and/or exercises. The format of the training program is designed to provide:

- 1.2.3.1 Self-paced modules to allow for schedule flexibility,
 - 1.2.3.2 Increased time available for hands on apprentice style training,
 - 1.2.3.3 Reduced time from training inception to casework production,
 - 1.2.3.4 Consistent quality of training,
 - 1.2.3.5 Documentation and tracking of training for quality purposes
- 1.2.4 It is paramount that the Forensic Chemist Trainee understands that the ultimate objective of this training is:
- 1.2.4.1 Perform essential duties in an analytical chemistry laboratory
 - 1.2.4.2 Demonstrate competence in FCU Methods
 - 1.2.4.3 Demonstrate Competence in forensic legal laws and regulations
 - 1.2.4.4 Demonstrate competence in structural elucidation for drug compounds
 - 1.2.4.5 Demonstrate competence in presenting information to the Customer, including testimony in court as an Expert Witness

1.3 Individual Training Plans (ITPs)

- 1.3.1 Each Trainee will have their previous training, experience, education, published articles, and other credentials reviewed by the FCU Manager. Additional reviews may be performed by the DFS Training Manager/Technical Leader and/or designee. Collected data and information obtained from detailed interviews of the FCU Trainee will be utilized to establish a baseline in regard to the Trainee's technical knowledge, skills and abilities. The knowledge gaps identified will become the basis for an individual training plan tailored to the Trainee's needs. This process will be flexible, focused, and efficient approach for training individuals new to the discipline, as well as individuals that have been involved in training programs elsewhere. Demonstrated competency levels may allow a Trainee to test out of a particular module within the Training Program.
- 1.3.2 The ITP is completed by FCU management or designee, and documented on an Individual Training Plan form (Document Control Number 12823). The ITP is approved by the FCU Manager/Technical Leader, DFS Training Manager and/or designee. Once a training plan

has been established for a Trainee, they will be assigned to trainer(s) for the mentorship/supervised casework portion of training. Trainer(s) will serve as the first line verification that deliverables and milestones within the training program have been met. The progress of the Trainee will be monitored through the use of module checklists, in which successful completion of a module will be indicated by the initials of the Trainee, Trainer(s), and FCU Management.

1.4 Contractors & Previously Experienced Chemists

1.4.1 Technical Assessment Review

- 1.4.1.1 A technical assessment review of the new employee will be conducted & documented by the FCU Technical Leader and/or Unit Manager.
- 1.4.1.2 The technical assessment review will include, but not limited to, a review of the new employee's educational background, previous work experience, training & certifications.
- 1.4.1.3 Based on the results of the technical assessment review an ITP will be completed by the FCU Technical Leader and/or Unit Manager.
- 1.4.1.4 The ITP will address what additional training is needed and/or competency test requirements that must be successfully completed prior to authorization to perform technical duties.

1.5 Oral Boards

- 1.5.1 Oral boards are designed to test the Trainee's knowledge on what they have learned in the training program and can serve as a form of competency testing. The purpose of oral boards is to prepare the Trainee for court testimony by exposing them to presentation of technical material throughout the training process and breaking down technical processes into manageable learning modules.
- 1.5.2 Guidelines for Oral Boards:

- 1.5.2.1 Trainees will be provided a topic / question to address within certain modules. The Trainee shall answer the topic/question orally to a panel, without notes. Oral boards can be formatted as a discussion or presentation. Following the oral presentation by the Trainee, the panel members will ask a series of questions related to the topic, or topics previously mastered, in the training program. Two

types of responses may be expected. First, a technical response. Second, there may also be times where the Trainee will need to respond as if speaking to a jury. It will be made clear during the question which type of response is expected.

- 1.5.2.2 Each question posed by the panel will be documented.
- 1.5.2.3 The oral board panel will consist of evaluators, observers may be permitted. Three (3) evaluators are required, all evaluators being subject matter experts (i.e. FCU Manager/Technical Leader, Trainer, and qualified chemist). At least one evaluator must be a qualified FCU chemist. Permitting “observers” is at the discretion of the PHL Director and/or FCU Management. Observers can review and provide feedback to the Trainee as to performance; however, they will not be a grading evaluator.
- 1.5.2.4 Each evaluator is required to document the assessment of the Trainee’s responses using an Oral Board Scoring Sheet (Document Control Number 13203). The rubric will show what will be expected of the Trainee and used to evaluate their performance.
- 1.5.2.5 In order to pass the oral board, the Trainee must demonstrate sufficient knowledge of the subject, while presenting the information in an easy to understand method, and sufficiently answer technical questions posed by the panel.

1.6 Thirty (30) Day Progress Review

- 1.6.1 Each Trainee’s progress should be reviewed and reported every thirty days by FCU Management or designee. It is the responsibility of the Trainee to report their progress on a FCU 30-Day Progress Report form (Document Control Number 22200). The report should be submitted to FCU Management and the DFS Training Manager or designee, at the end of each month for the duration of the training. This 30-Day Progress Report serves as the basis for Trainees to later review their progress. These reports will serve as a reference in months and even years following qualification.

1.7 Training Binder

- 1.7.1 All practical work conducted by the Trainee shall be maintained in a “Training Binder”. Whether notes are maintained electronically or hard copy is up to the discretion of the Trainee. The training binder should be available for final review at the end of the training program. This binder

will serve as a reference in the months and even years following qualification, and will assist in documenting the progress during training.

1.8 Practical Examination(s)

1.8.1 Some modules will consist of a practical examination. Trainees must successfully complete the practical component, which could consist of a demonstration, completion of a relevant examination, and/or worksheet and discussion. Documentation will be reviewed by the Trainer(s) or designee.

1.9 Forensic Chemist Competency Test(s)

1.9.1 Regardless of previous experience, each Trainee will be required to pass competency test(s) for all methods/procedures for each discipline and sub-discipline for which they will be expected to perform examinations.

1.9.2 The competency test(s) will include practical components to include, but not limited to, qualitative analysis of Controlled Dangerous Substances and quantitative analysis of Heroin versus a negative control. These will be provided and administered by the FCU Manager/Technical Leader or designee.

1.10 Mock Trial

1.10.1 Upon completion of the FCU Training Program, the Trainee will participate in mock trials, where applicable. The Trainee will be expected to successfully complete, at minimum, one internal mock trial and one external mock trial. The external mock trial will be performed by attorneys external to the agency.

1.10.2 The purpose of the mock trial is to evaluate the Trainee's ability to testify as an expert witness in judicial proceedings. The mock trials will highlight the Trainee's oral presentation skills and their ability to relate complex scientific and technical information to lay persons. Sessions will be conducted in a simulated courtroom situation with the proceedings being formal and structured.

1.10.3 The mock trials may occur with a gradual succession of difficulty and may cover multiple subcategories of the work that will be performed as a Forensic Chemist. The mock trial(s) may be based on a mock case worked during the mentoring period, notes, diagram(s), and/or report(s). The Trainee will defend their work and/or conclusions reached from the review and/or work. The Trainee will be scored using the Mock Trial

Scoring Sheet (Document Control Number 7495). Results and feedback of the mock trial will be provided to the Trainee. The mock trials may also be recorded for future reference.

1.11 Completion of the Program

1.11.1 Successful completion of all of the requirements of the training program signifies that the FCU Trainee is qualified to perform as a Forensic Chemist at the DFS. The FCU Manager/Technical Leader must concur in regard to the Trainee's competency before the authorization memo is issued.

1.12 Authorization Memo

1.12.1 A Forensic Chemist Trainee will receive an authorization memo, issued by the FCU Manager/Technical Leader, prior to performing duties within the FCU, following the determination of competency. This authorization memo will clearly outline the techniques the Trainee is competent to perform, whether it is in independent casework examination, case reviews and/or use of equipment. Training in new, or additional, techniques will be appropriately documented and the FCU Trainee will be competency tested prior to assuming case related duties.

1.13 Failure to Meet the Goals of the Training Program

1.13.1 Failing twice in any single module competency or failure to successfully reach all milestones in the estimated time (with exception for situations outside of the control of the Trainee) may constitute a reason for removal from the FCU Training Program.

1.13.2 Resolution of such cases will rest with a committee consisting of FCU Management, PHL Director, and DFS Training Manager or designee.

1.13.3 Remedial training may occur within the training program to address any short coming or exercise that has not been completed to the satisfaction of the Unit Manager/Technical Leader or Trainer(s).

1.13.4 The ITP will be updated to include additional remedial training. The DFS Training Manager and/or Senior Deputy Director must be notified to assist with oversight and consistency throughout the Agency. New DFS employees may be subject to dismissal under the probationary appointment agreement.

1.14 Training Documentation

1.14.1 The following shall be maintained and serve as the technical training file:

- 1.14.1.1 Individual Training Plan
- 1.14.1.2 Written and oral tests
- 1.14.1.3 Training module checklists
- 1.14.1.4 Copies of presentations
- 1.14.1.5 Competency test(s)
- 1.14.1.6 30-Day Progress Report(s)
- 1.14.1.7 Signed and dated Authorization Memo(s)

2.0 Roles and Responsibilities

2.1 FCU Trainee

- 2.1.1 Shall be responsible for maintaining a training binder (whether hard or soft copy) which contains the records (*i.e.*, notes, worksheets, photographs, etc.) generated during the training program.
- 2.1.2 Has the ultimate responsibility for learning the materials necessary to successfully complete a competency test. The Trainee should take an active role in obtaining the information needed (reading, observation, discussing/asking questions, etc.) to do so.
- 2.1.3 Shall provide 30 Day Progress Reports to the FCU Trainer, FCU Manager and DFS Training Manager on the last business day of each month.
- 2.1.4 Shall immediately notify the FCU Management of any problems or questions that arise, if their training is not progressing, they are experiencing difficulty with the exercises, or to suggest modifications to the training program.

2.2 Trainer(s)

- 2.2.1 Shall be competency and proficiency tested in the area of instruction (where applicable) and/or have documented experience working in the subject matter of instruction.
- 2.2.2 Shall be responsible for demonstrating a particular technique and observing the trainee perform the same procedure where applicable.
- 2.2.3 Shall reinforce information gained from reading materials through detailed discussion of the technique during demonstration and/or observation, including theoretical and practical aspects.
- 2.2.4 Shall be responsible for initialing and dating training module checklists.
- 2.2.5 Shall keep FCU management and DFS Training Manager (or designee) apprised of any deficiencies or issues that may arise with a Trainee. Deficiencies may include; not understanding technical information, not performing work in a timely fashion, refusing to complete assignments, or general personnel issues.
- 2.2.6 Should participate in oral boards.

- 2.2.7 May meet with the FCU Management and/or DFS Training Manager (or designee) periodically to discuss the progress of the trainee.

2.3 FCU Technical Lead (or designee)

- 2.3.1 Shall sign off on module checklists, where applicable, and may serve in the capacity as a trainer.
- 2.3.2 Shall review each 30-Day Progress Report to monitor the progress of the Trainee.
- 2.3.3 Shall review the Trainee's training binder for completeness and accuracy at the end of the training program.
- 2.3.4 Shall issue written pass/fail feedback to the trainee at the end of the mock trials.
- 2.3.5 Shall keep management apprised of ongoing progress of each trainee.

2.4 FCU Management (or designee)

- 2.4.1 Shall complete ITPs and oversee the training plan for each trainee. Shall monitor the Trainee's progress and ensure the Trainee is adhering to the prescribed timeline for completion of milestones.
- 2.4.2 Shall review the academic transcripts and training records (as per the position description, if applicable) for newly qualified chemists and approve their qualifications prior to independent casework analysis and document such review.
- 2.4.3 Shall review each 30-Day Progress Report to monitor the progress of the Trainee.
- 2.4.4 Shall issue the Authorization Memo upon satisfactory completion of all required training.
- 2.4.5 Shall evaluate the need and assess the extent of retraining chemists.
- 2.4.6 Shall complete and approve retraining plan(s), when necessary for each chemist.
- 2.4.7 Shall periodically review the training program for relevance and update the program accordingly with the DFS Training Manager (or designee).

2.5 DFS Training Manager (or designee)

- 2.5.1 Should review each 30-Day Progress Report to monitor the progress of the Trainee.
- 2.5.2 Shall periodically review the training program for relevance and update the program accordingly with the FCU Manager/Technical Leader.
- 2.5.3 Shall maintain training documents in technical training file for each trainee.

2.6 External Instructors

- 2.6.1 Instructors that are external to the DFS will be evaluated and approved, based on their knowledge and experience of the subject matter of instruction, by the FCU Manager/Technical Leader and DFS Training Manager.

3.0 DFS Orientation and Introduction

3.1 Objectives:

- 3.1.1 Familiarize the FCU trainee with the general operation and organization of the DFS. The trainee will have an understanding of the expectations of the FCU Training Program, quality issues relevant to laboratory operations, and ethical and professional responsibilities of the position. A training plan will be developed for each FCU trainee based on a review of background and experience.
- 3.1.2 The FCU trainee should have orientation/training in the following:
 - 3.1.2.1 DCHR New Employee Orientation
 - 3.1.2.2 Attend DFS Onboarding Training
 - 3.1.2.3 Meet with Agency Director (will be set up through Management)
- 3.1.3 The Trainee should have an understanding of the overall structure of the DFS, PHL, and FCU. Topics will include but are not limited to the following:
 - 3.1.3.1 DFS Organizational Overview (Onboarding)
 - 3.1.3.2 Performance Evaluation/ Expectations (Supervisor/Manager)
 - 3.1.3.3 Overview/Tour of the Consolidated Forensic Laboratory (CFL)

3.1.4 The FCU trainee should have an understanding of the practices and procedures of the Quality Assurance Program in place at the DFS. Topics include but are not limited to the following:

3.1.4.1 Laboratory accreditation and the quality assurance system

3.1.4.2 Review and general understanding of DFS Quality Manuals to include: Quality Assurance Manual (QAM), Department Operations Manuals (DOMs), FSL Laboratory Operations Manuals (LOMs), and Standard Operating Procedures (SOPs) for FCU

3.1.4.3 Review and discussion with trainer on FCU SOPs and quality documents that relate to FCU.

3.1.5 The trainee should have an understanding of the ethical and professional responsibilities for FCU chemists to include

3.1.5.1 Professionalism

3.1.5.2 Competency and Proficiency

3.1.5.3 Clear Communications

3.2 Reading Material:

3.1.1 Quality Assurance Manual (QAM), Department Operations Manuals (DOMs), FSL Laboratory Operations Manuals (LOMs), and Standard Operating Procedures (SOPs) for FCU

3.3 Study/Discussion Questions:

3.3.1 None.

3.4 Practical Exercises/Skills:

3.4.1 The FCU Trainee should automatically receive information pertaining to Objective 3.1.2 as a new employee. If the trainee has not received the information outlined in Objective 3.1.2 **within the first two weeks** of employment, they should notify their first line supervisor.

3.4.2 The FCU Manager will conduct, or appoint a member of the staff, to meet with the FCU trainee to ensure the training outlined in Objectives 3.1.3 – 3.1.5 have been met.

3.4.3 The FCU Trainee will meet with the FCU Manager and/or DFS Training Manager to discuss prior experience and educational background.

3.5 Demonstration of Competency:

3.5.1 None.

3.6 Documentation:

- 3.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 3.0 Checklist – DFS Orientation and Introduction"

MODULE 3.0 CHECKLIST DFS Orientation and Introduction

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

READING MATERIAL

| | Trainee Initials & Date |
|-----------------------------------------------------------|----------------------------|
| Trainee has read all the required readings for Module 3.0 | |

TRAINING OVERVIEW

| | Trainee Initials & Date | Unit Manager Initials & Date |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------|
| Trainee has completed Onboarding training | | |
| Trainee has completed tour of the Consolidated Forensic Laboratory (CFL) and received introduction to disciplines within the Public Health Laboratory (PHL). | | |
| Trainee has provided emergency contact information to supervisor | | |
| Trainee has been introduced to the facility and personnel | | |
| Trainee has reviewed the organization and management structure | | |
| Trainee has reviewed the relevant job description | | |
| Trainee has received information related to Union (where applicable) | | |
| The goals of the training program have been explained | | |
| An assessment of trainee's previous training, experience and education was conducted; ITP has been completed. | | |
| Trainee has met with Agency Director | | |
| Trainee has received an overview of the Quality Assurance program | | |
| Trainee has received Qualtrax login information | | |
| Trainee has received LIMS login information and card, if applicable | | |
| Trainee has received FCU Keys and/or Iris Scan Access, if applicable | | |

DOCUMENTATION PROVIDED

| | Trainee Initials & Date | Unit Manager Initials & Date |
|---------------------------------------------------------------------------------|----------------------------|---------------------------------|
| Trainee has provided management with previous training records | | |
| Trainee has provided management with previous continuing education certificates | | |

Signatures below represent successful completion of Training Module 3.0.

Trainee Date

Trainer Date

Unit Manager Date

4.0 Quality Assurance Program

4.1 Objectives:

- 4.1.1 Quality performance, conforming to recognized standards of good practices both in the field and in the laboratory, is the most important goal within the D.C. Department of Forensic Sciences (DFS). As new and improved methods of analyses are developed to meet the expanding needs of the criminal justice and public health systems, it is essential for quality standards to progress in parallel. The DFS is committed to diligently implementing policy and procedure changes to ensure quality in all facets of DFS operations.

4.2 Reading Material

- 4.2.1 <https://www.forensicfocus.com/webinars/quality-management-system-standards-in-forensics-an-executive-overview/>
- 4.2.2 <https://what-when-how.com/forensic-sciences/qaqc/>
- 4.2.3 https://www.gossmanforensics.com/newsletter/vol01_iss03.html#:~:text=In%20the%20laboratory%2C%20quality%20assurance,is%20operating%20within%20acceptable%20limits.
- 4.2.4 https://www.researchgate.net/publication/237287165_Chapter_4_QUALITY_ASSURANCE
- 4.2.5 <https://www.testbytes.net/blog/quality-assurance-vs-quality-control/>
- 4.2.6 Open up the Qualtrax program, locate and read **DOM07** - Practices for Quality Corrective Actions (Document Control Number 1275) and **DOM08** - Procedures for Quality Preventive Actions (Document Control Number 1277).
- 4.2.7 Open up Qualtrax, find and read the **DFS Quality Policy Statement** (Document Control Number: 4864).

4.3 Study/Discussion Questions:

- 4.3.1 Define Quality Assurance.
- 4.3.2 What is a Quality Assurance Program?
- 4.3.3 Why do laboratories need a Quality Assurance Program?
- 4.3.4 What is an Audit?

4.3.5 What is the difference between Quality Assurance and Quality Control?

4.3.6 Do you need to log into Qualtrax with your user ID and password to view documents?

4.4 Practical Exercises/Skills:

4.4.1 View video on the Quality Assurance Program at DFS.

4.4.2 The trainee will receive instruction and demonstration from a member of the Quality unit in the use of Qualtrax, the quality document control system. This may be completed by a series of lectures/presentations and hands-on exercises. Trainee will record notes in training notebook.

4.4.3 Under DFS there are three (3) Divisions; navigate Qualtrax and determine the names of the Units under the Division you are assigned to.

4.5 Demonstration of Competency:

4.5.1 None

4.6 Documentation:

4.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 4.0 Checklist – Quality Assurance Program".

MODULE 4.0 CHECKLIST Quality Assurance Program

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 4.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has answered all study/discussion questions for Module 4.0, listed them in training binder, and trainer has reviewed the answers for accuracy. | | |
| PRACTICAL EXERCISES/SKILL | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 4.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |

Signatures below represent successful completion of Training Module 4.0.

_____ Date

Trainee

_____ Date

Trainer

_____ Date

Unit Manager

5.0 Chemical Safety and Evidence Handling

5.1 Objectives:

- 5.1.1 Understand importance of protecting yourself and others when handling toxic chemicals and biohazardous substances.
- 5.1.2 Become familiar with different hazards that may be encountered while in FCU.
- 5.1.3 Understand proper marking of specimens or samples received in the FCU and proper handling of FCU specimens/samples/evidence (as per Chemist program).

5.2 Reading Material:

- 5.2.1 FCU SOPs and Current Administrative practices
- 5.2.2 DFS, Safety Procedures Manual
- 5.2.3 DFS SDS Sheets for all chemicals in the FCU
- 5.2.4 DFS COA Sheets for all chemicals and controlled substances in the FCU
- 5.2.5 DC Hazardous Waste Laws: DC Hazardous Waste Management Act of 1977 (D.C. Law 2-64; D.C. Code § 8-1301 to 8-1322)

5.3 Study/Discussion Questions:

- 5.3.1 Describe the proper PPE worn while working in the FCU laboratory.
- 5.3.2 What are the additional PPE used during chemical activity?
- 5.3.3 What are the common routes of exposure to infectious diseases?
- 5.3.4 What types of infectious diseases and/or biological hazards may be encountered while working in the FCU?
- 5.3.5 When should you change gloves or PPE?
- 5.3.6 What is the laboratory policy on reporting health and safety incidents?
- 5.3.7 Discuss potential types of safety hazards you may encounter in the FCU laboratory?

- 5.3.8 What is the waste removal process for general lab, biohazard and hazardous wastes?
- 5.3.9 What are the minimum requirements for a proper seal?
- 5.3.10 Describe the procedures and practices that are used in the laboratory in order to decrease or prevent the occurrence of sample contamination.
- 5.3.11 How is evidence stored in the FCU?
- 5.3.12 How are chemicals and standards stored in the FCU? Where are they located?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module.

5.4 Practical Exercises/Skills:

- 5.4.1 Review the DFS Safety Training Program and complete Safety Level 1 and Safety Level 2.
- 5.4.2 Complete FCU Laboratory Safety walk-through, to include, but not limited to, the following:
 - 5.4.2.1 Evacuation process from the facility, including the evacuation routes and meeting place.
 - 5.4.2.2 Locations of fire extinguishers in laboratory, office area, and common areas. Discuss use of fire extinguishers.
 - 5.4.2.3 Provide phone numbers for emergency situations/show the location of phone numbers listed in the laboratory.
 - 5.4.2.4 Locations of First Aid Kits in the laboratory and office areas.
 - 5.4.2.5 Health and safety incident reporting.
 - 5.4.2.6 Location of safety equipment, i.e. safety showers, eye wash stations, PPE, fume hoods.
 - 5.4.2.7 Discuss the proper use of PPE.
 - 5.4.2.8 Location of the Safety Data Sheets (SDS) and Certificates of Analysis (COA).
 - 5.4.2.9 Waste removal process for general lab, biohazard, and hazardous wastes.
- 5.4.3 Observe qualified individuals requesting/receiving evidence from the Central Evidence Unit (CEU) and understand the procedure, chain of custody documentation/LIMS and evidence examination request forms.

Document observations in 30-Day Progress Report. Include name of individual, date, and number of transfers observed.

- 5.4.4 Read FCU SOPs to understand the standards for evidence packaging to include requirements of seals, labels, and package integrity. Discuss packaging requirements with a qualified chemist.
- 5.4.5 Observe qualified chemists examining a variety of types of evidence. Take note of the practices used to decrease the occurrence of item/sample contamination.
- 5.4.6 Understand the procedures and policies regarding storage and retention of evidence in FCU. Discuss procedures and policies regarding the consumption of evidence with a qualified chemist.
- 5.4.7 Observe qualified individuals locate QC samples from the inventory listings and understand the correct procedure for adding or removing QC inventory.
- 5.4.8 Participate in a monthly chemical inventory check. Record participation in 30-Day Progress Report.

5.5 Demonstration of Competency:

- 5.5.1 Successful completion of Safety Level 1 and 2 trainings.
- 5.5.2 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s).

5.6 Documentation:

- 5.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 5.0 Checklist – Chemical Safety and Evidence Handling".

MODULE 5.0 CHECKLIST Chemical Safety and Evidence Handling

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|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 5.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 5.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 5.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |

Signatures below represent successful completion of Training Module 5.0.

Trainee Date

Trainer Date

Unit Manager Date

6.0 Procedures Overview

6.1 Objectives:

- 6.1.1 Knowledge of the procedures applied in the collection, receipt, protection, handling, storage, analysis of samples/evidence, as well as documentation, evaluation, report writing and communication of results.
- 6.1.2 Ability to choose the best-case approach, preparation of samples and handling of evidence, implementation of analytical schemes and methodology, and reporting of results, for each individual case.
- 6.1.3 Ability to interpret and handle analytical data and related information so as to create and use respective databases.

6.2 Reading Material:

- 6.2.1 DFS DOMs, and Unit QAM and SOPs (current version)
- 6.2.2 "Basic Training Program for Forensic Drug Chemists" United States Department of Justice, Drug Enforcement Administration, Office of Forensic Sciences, if available
- 6.2.3 ASTM E2326-14 Standard Practice for Education and Training of Seized-Drug Analysts

6.3 Study/Discussion Questions:

- 6.3.1 What are the administrative, organizational and scientific/analytical aspects of laboratory work (e.g., Quality Assurance Manual, SOP's)?

6.4 Practical Exercises/Skills:

- 6.4.1 Receive instruction and demonstration of FCU Procedures by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
 - 6.4.1.1 Case approach
 - 6.4.1.2 General analytical schemes for unknown samples / powders / tablets / capsules / herbal material weighing practices
 - 6.4.1.3 Sampling practices
 - 6.4.1.4 Choice of analytical methodology
 - 6.4.1.5 Validation/verification of methods
 - 6.4.1.6 Application of techniques per substance(s)

- 6.4.1.7 Development of SOPs
 - 6.4.1.8 Equipment performance and control, preventive maintenance
 - 6.4.1.9 Quality control
 - 6.4.1.10 Interpretation and reporting of the results
 - 6.4.1.11 Documents and case records
 - 6.4.1.12 Handling/storage of samples/evidentiary material
 - 6.4.1.13 Handling and removing evidence from various containers/packaging (avoid hard-surface contact to dislodge contents)
 - 6.4.1.14 Handling/storage of information, access to databases
 - 6.4.1.15 Chain of custody
 - 6.4.1.16 Communication with clients (including communication language, establishing needs, dealing with undue pressure, etc.)
 - 6.4.1.17 Health and safety
 - 6.4.1.18 Responsibilities, duties and skills of the personnel
 - 6.4.1.19 Education and training of personnel
- 6.4.2 Observe qualified chemist(s) process at least five cases. Note the workflow and procedures taken from start to finish (chain of custody, case approach, sampling plan, instrument choice, and interpretation of results). Discuss the case approach and note how the chemist removed contents from the original container. Record the following on the 30-Day Progress report: case number, qualified chemist(s) observed, and date of observation.
- 6.4.3 Demonstrate understanding of procedural overview by developing a case approach for the following:
- 6.4.3.1 Two vials of suspected PCP liquid
 - 6.4.3.2 Three round pink pills
 - 6.4.3.3 500 rectangular pills marked "XANAX"
 - 6.4.3.4 250 blue ziplock plastic bags each containing white rock-like substance.

Note: Throughout the training program, the trainee is expected to gather case notes and reports of chemists to use as examples for learning how to take case notes and write reports of their own. Reviews and any questions regarding developing casework documentation should be discussed with trainer(s). As trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

6.5 Demonstration of Competency:

- 6.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.

6.6 Documentation:

- 6.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 6.0 Checklist – Procedures Overview."

MODULE 6.0 CHECKLIST Procedures Overview

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 6.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 6.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 6.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |

Signatures below represent successful completion of Training Module 6.0.

_____ Date

Trainee

_____ Date

Trainer

_____ Date

Unit Manager

7.0 Analytical Techniques – Balances

7.1 Objectives:

- 7.1.1 Familiarity of the operation of an analytical balance.
- 7.1.2 Familiarity of balance calibration and quality assurance practices.
- 7.1.3 Familiarity of measurement uncertainty.
 - 7.1.3.1 Random vs. Systemic error
 - 7.1.3.2 Expanded Uncertainty
 - 7.1.3.3 Sources of error in a balance, e.g., person, instrument
 - 7.1.3.4 Precision vs. Accuracy
- 7.1.4 Ability to record and report weights.
- 7.1.5 Proper handling of weights (gloves).

7.2 Reading Material:

- 7.2.1 Balance instruction manual (various vendors)
- 7.2.2 FCS02 – SOP for General Laboratory Procedures for FCU (current version)

7.3 Study/Discussion Questions:

- 7.3.1 What are balances used for in the lab?
- 7.3.2 What PPE is required to operate a balance? Why are gloves important?
- 7.3.3 What does it mean to ‘tare’ a balance?
- 7.3.4 What kind of maintenance is performed on the balances? Weekly? Monthly? Annually?
- 7.3.5 How and where are maintenance records stored?
- 7.3.6 Define uncertainty. How is uncertainty calculated in the lab? Which k value is used?
- 7.3.7 What does it mean to have a 95% confidence level vs a 99% confidence level?
- 7.3.8 What is random error vs. systemic error? Can you provide examples?
- 7.3.9 Define gross weight, package weight, and net weight.

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module.

7.4 Practical Exercises/Skills:

- 7.4.1 Receive instruction and demonstration of balance maintenance by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
 - 7.4.1.1 Weekly maintenance
 - 7.4.1.2 Monthly maintenance
 - 7.4.1.3 Annual preventative maintenance
 - 7.4.1.4 Weight calibration
 - 7.4.1.5 Uncertainty calculations for weights
- 7.4.2 Observe qualified chemist(s) perform weekly and/or monthly balance maintenance. Note the PPE used to perform maintenance. Note the procedures for handling and weighing an item of evidence. Note location of serial numbers and expiration dates of calibrated weights used for maintenance.
- 7.4.3 Demonstrate understanding of weekly maintenance by participating in maintenance with supervision. Record dates in training binder. Trainer must observe trainees perform balance maintenance at least once.
- 7.4.4 Independently perform weekly balance maintenance (at least twice). Record dates in training binder.
- 7.4.5 Demonstrate understanding of weighing evidence to a trainer by explaining how to weigh a package of drug evidence; include gross/net and post analysis weight practices.

7.5 Demonstration of Competency:

- 7.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.
- 7.5.2 The Trainee must successfully complete an oral board, addressing in detail the following: *balance maintenance, how to weigh an item of evidence, and how to calculate/interpret uncertainty.*

7.6 Documentation:

- 7.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 7.0 Checklist –Analytical Techniques – Balances."

MODULE 7.0 CHECKLIST Analytical Techniques - Balances

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 7.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 7.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 7.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 7.0. | | |

Signatures below represent successful completion of Training Module 7.0.

Trainee Date

Trainer Date

Unit Manager Date

8.0 Analytical Techniques – Sampling Plan

8.1 Objectives:

- 8.1.1 Familiarity with the concept of sampling (Administrative, Hypergeometric, Percent Based).
- 8.1.2 Familiarity with how to process residue samples.

8.2 Reading Material:

- 8.2.1 FCS02 – SOP for General Laboratory Procedures for FCU (current version)
- 8.2.2 Tzidony, Dov, and Ravreby, Mark. “A Statistical Approach to Drug Sampling: A Case Study”, Journal of Forensic Sciences, Volume 37, No.6 (November 1992), pp 1541-1549.

8.3 Study/Discussion Questions:

- 8.3.1 What is the purpose of a sampling plan?
- 8.3.2 What are the limitations of sampling plans?
- 8.3.3 What is an administrative sampling plan? Why/When is it used?
- 8.3.4 What is a hypergeometric sampling plan? Why/When is it used?
- 8.3.5 What is a percent based sampling plan? Why/When is it used?
- 8.3.6 What is a residue?
- 8.3.7 What is a composite?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee’s understanding of topics covered in this module.

8.4 Practical Exercises/Skills:

- 8.4.1 Receive instruction and demonstration of sampling plans by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
 - 8.4.1.1 Case approach for administrative sampling, hypergeometric sampling, and percent-based sampling
 - 8.4.1.2 Case approach for syringes and/or residues

- 8.4.1.3 Case approach for multiple populations and other considerations, such as weight thresholds and composites
- 8.4.2 Observe qualified chemist(s) perform sampling plans using the methods outlined in the Forensic Chemistry Unit Standard Operating Procedures (FCU SOPs) on a minimum of 5 cases. Observe and review casework note-taking and documentation. Record the following on the 30-Day Progress report: case number, qualified chemist(s) observed, date of observation, and type of sampling plan.
- 8.4.3 Demonstrate understanding of sampling plans to the trainer by developing sampling plans for the following:
 - 8.4.3.1 Develop a sampling plan for a cupcake.
 - 8.4.3.2 Develop a sampling plan for a bag of pills (same imprint).
 - 8.4.3.3 Develop a sampling plan for a bag of pills (different imprints).
 - 8.4.3.4 Develop a sampling plan for a bag of plant material.
 - 8.4.3.5 Develop a sampling plan for a box of 1,000 packages of suspected synthetic cannabinoids.
- 8.5 Demonstration of Competency:**
 - 8.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.
 - 8.5.2 The Trainee must successfully complete an oral board, addressing in detail the following: *different sampling types, their uses and how to sample/homogenize complex material (cupcakes).*
- 8.6 Documentation:**
 - 8.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 8.0 Checklist –Analytical Techniques – Sample Extraction."

MODULE 8.0 CHECKLIST Analytical Techniques – Sample Extraction

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 8.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 8.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 8.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 8.0. | | |

Signatures below represent successful completion of Training Module 8.0.

Trainee Date

Trainer Date

Unit Manager Date

9.0 Analytical Techniques – Sample Extraction

9.1 Objectives:

- 9.1.1 Knowledge of the principle / theory of separations and extractions in drug analysis:
 - 9.1.1.1 Awareness of the factors which affect separations (solubility)
 - 9.1.1.2 Knowledge of the criteria for selection of solvent systems, including safety and cost
- 9.1.2 Familiarity with extraction techniques.
- 9.1.3 Awareness of possible problems and likely causes/solutions.
- 9.1.4 Use of solubility to separate mixtures of drugs and diluents.
- 9.1.5 Definition of pKa and the Henderson-Hasselbach equation.
- 9.1.6 Basic drug extractions using aqueous/organic solvents.
- 9.1.7 Acidic drug extractions using aqueous/organic solvents.
- 9.1.8 Amphoteric drug extractions using aqueous/organic solvents.
- 9.1.9 Neutral drug extractions using aqueous/organic solvents.
- 9.1.10 Specialty (difficult) type extractions.
- 9.1.11 Knowledge of the application of Solid Phase extraction (SPE) in drug analysis.
- 9.1.12 Knowledge of chromatographic separation techniques:
 - 9.1.12.1 Use of preparative column
 - 9.1.12.2 Use of Silica and Fluorosil columns, among others
 - 9.1.12.3 Column preparation, loading and eluting

9.2 Reading Material:

- 9.2.1 FCS01 – SOP for Detecting Controlled Dangerous Substances (current version)
- 9.2.2 FCS02 – SOP for General Laboratory Procedures for FCU (current version)

- 9.2.3 FCS04 – SOP for Safe Handling and Analysis for CDS in Syringes (version)
- 9.2.4 “SWGDRUG Education and Training Outline for Forensic Drug Practitioners”, ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015

9.3 Study/Discussion Questions:

- 9.3.1 Define: solubility, diluent, pKa
- 9.3.2 What is a liquid-liquid extraction? Solid-phase extraction?
- 9.3.3 What is the Henderson-Hasselbach equation? What is this equation used for?
- 9.3.4 What is a “basic” drug? Provide an example.
- 9.3.5 What is an “acidic” drug? Provide an example.
- 9.3.6 What is an “amphoteric” drug? Provide an example.
- 9.3.7 List which solvent or extraction procedure you would use for the following substances (for GC-MS/GC-FID): Cocaine, Synthetic Cathinone, Synthetic Cannabinoid, Prescription Opioid Pill, Buprenorphine Sublingual Strip, THC plant material, LSD, Psilocybin Mushroom, Vape Cartridge, Cigarette, Cough Syrup, Gummy Candy, Amphetamine-like substance, Heroin, GHB, Unknown Liquid, Unknown White Powder.
- 9.3.8 List which solvent or extraction procedure you would use for the following (for FT-IR): Cocaine base with levamisole, cocaine base with phenacetin, cocaine hydrochloride with phenacetin, cocaine hydrochloride with mannitol

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee’s understanding of topics covered in this module.

9.4 Practical Exercises/Skills:

- 9.4.1 Receive instruction and demonstration of chemical extractions by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
 - 9.4.1.1 Basic drug extractions

- 9.4.1.2 Acidic drug extractions
- 9.4.1.3 Amphoteric drug extractions
- 9.4.1.4 Specialty (difficult) drug extractions

9.4.2 Observe qualified chemist(s) prepare the following solutions for casework: Ammoniacal Chloroform, Sodium Carbonate, 9:1 Chloroform:Methanol. Observe and review casework note-taking and documentation. Record the following on the 30-Day Progress report: case number, qualified chemist(s) observed, date of observation, and type of extraction performed.

9.4.3 Demonstrate understanding of solutions to the trainer by independent preparing the following solutions:

- 9.4.3.1 Ammoniacal Chloroform
- 9.4.3.2 Sodium Carbonate
- 9.4.3.3 9:1 Chloroform:Methanol

9.4.4 Perform extractions on a minimum of 5 training samples, representative of samples routinely encountered in casework. Use methods outlined in the FCU SOPs. Document the practice cases and extractions used on the 30-Day Progress Report form. Trainer must observe trainees perform chemical extractions at least once. Each practice case should be reviewed by the trainer

9.4.5 Observe a qualified chemist perform extractions on five separate cases. Note the type of extraction(s) used.

9.5 Demonstration of Competency:

9.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.

9.5.2 Oral Board – Analytical Techniques: The Trainee must successfully complete an oral board, addressing in detail the following: *the definition of solubility, how to isolate a controlled substance from a complex mixture, benefits/drawbacks of extraction methods, and how to decide which extraction to use for casework.*

9.6 Documentation:

- 9.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 9.0 Checklist –Analytical Techniques – Sample Extraction."

MODULE 9.0 CHECKLIST Analytical Techniques – Sample Extraction

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| Trainee: | Trainer: | Job Title: |
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| READING MATERIAL | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 9.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 9.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 9.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 9.0. | | |

Signatures below represent successful completion of Training Module 9.0.

Trainee Date

Trainer Date

Unit Manager Date

10.0 Presumptive Tests – Color (“Spot”) Tests

10.1 Objectives:

- 10.1.1 Knowledge of the principle / theory of color tests.
- 10.1.2 Familiarity with the preparation, handling and storage of the reagents.
- 10.1.3 Ability to execute color tests on drugs most commonly encountered in the illicit drug market.
- 10.1.4 Ability to interpret the results obtained.
- 10.1.5 Knowledge of the possibilities and limitations of the technique.
- 10.1.6 Knowledge of quality assurance and method validation requirements.

10.2 Reading Material:

- 10.2.1 FCS01 – SOP for Detecting Controlled Dangerous Substances (current version)
- 10.2.2 FCS02 – SOP for General Laboratory Procedures for FCU
- 10.2.3 Validation of FCU10 – Procedure for Chemical Spot Tests
- 10.2.4 Validation of Mayer’s Test Reagent (Under FCS10)
- 10.2.5 “SWGDRUG Education and Training Outline for Forensic Drug Practitioners”, ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015
- 10.2.6 "Rapid Testing Methods of Drugs of Abuse". UNODC. ST/NAR/13/Rev. I. Feb.1995
- 10.2.7 "Clarke's Analysis of Drugs and Poisons", A. C. Moffat, M. D. Osselton and B. Widdop (eds.) (2004), 3rd ed., Pharmaceutical Press, London-Chicago

10.3 Study/Discussion Questions:

- 10.3.1 What is the purpose of chemical spot tests?
- 10.3.2 What are the limitations of chemical spot tests?
- 10.3.3 What is a negative control?

- 10.3.4 What is a positive control?
- 10.3.5 What is the difference between presumptive and confirmatory analytical techniques?
- 10.3.6 Which color test reagents are currently validated in the FCU?
- 10.3.7 How do we make/test each reagent?
- 10.3.8 Please document/describe the naming scheme used for reagents made in FCU.

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

10.4 Practical Exercises/Skills:

- 10.4.1 Receive instruction and demonstration of color test reagents used in the FCU by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises.
- 10.4.2 Observe qualified chemist(s) prepare and/or re-test color test reagents used for casework. Note the procedure for making/testing the reagent and quality controls in place to document the reagent. Note the information that is recorded (lot numbers, preparer, expiration dates).
- 10.4.3 Independently prepare and/or re-test a color test reagent according to FCU SOPs with supervision. Document date of participation in training binder.
- 10.4.4 Independently perform a color test for each validated color test in FCU. Observe and note the observed color changes in your training binder.
- 10.4.5 Discuss limitations of color tests with trainer. Document examples or situations that may occur.

10.5 Demonstration of Competency:

- 10.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.

- 10.5.2 Oral Board – Presumptive Tests- Color ("Spot") Tests. The Trainee must successfully complete an oral board, addressing in detail the following: *preparation, theory of chemical process, interpretation, benefits and limitations of the color tests used in the laboratory.*

10.6 Documentation:

- 10.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 10.0 Checklist – Presumptive Tests – Color ("Spot") Tests."

MODULE 10.0 CHECKLIST Presumptive Tests – Color (“Spot”) Tests

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 10.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 10.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 10.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 10.0. | | |

Signatures below represent successful completion of Training Module 10.0.

| | |
|--------------|------|
| | |
| Trainee | Date |
| | |
| | |
| Trainer | Date |
| | |
| | |
| Unit Manager | Date |

11.0 Presumptive Tests – Physical Identification

11.1 Objectives:

- 11.1.1 Familiarity of pharmaceutical pill markings (shape, color, score, imprint).
- 11.1.2 Familiarity with identification of pharmaceutical pills/tablets.
- 11.1.3 Ability to interpret the results obtained from physical identification.
- 11.1.4 Knowledge of the possibilities and limitations of the technique.
- 11.1.5 Knowledge of quality assurance and method validation requirements.

11.2 Reading Material:

- 11.2.1 FCS01 – SOP for Detecting Controlled Dangerous Substances (current revision)
- 11.2.2 FCS02 – SOP for General Laboratory Procedures for FCU (current revision)
- 11.2.3 Drug Identification Bible (2011 edition or later)
- 11.2.4 Pillbox (pillbox.nlm.nih.gov)
- 11.2.5 Clarke's Analysis of Drugs and Poisons (Fourth edition or later)

11.3 Study/Discussion Questions:

- 11.3.1 Which resources are available for physically identifying a pill/tablet within the FCU?
- 11.3.2 How would you document a physical identification result without a photo (Worksheet, Case Report)? How would you document a physical identification that does not match your analytical results?
- 11.3.3 What is a score?
- 11.3.4 Define the following terms: capsule, tablet, extended release, soft gel, OTC

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

11.4 Practical Exercises/Skills:

- 11.4.1 Receive instruction and demonstration of how to physically identify pills through FCU approved resources by qualified chemist(s).
- 11.4.2 Observe qualified chemist(s) physically identify pills for casework. Observe and review casework note-taking and documentation. Record the following on the 30-Day Progress report: case number, qualified chemist(s) observed, date of observation, and type of extraction performed.
- 11.4.3 Document the presumptive physical identification for the following items using FCU SOP approved resources:
 - 11.4.3.1 White, Round, 512
 - 11.4.3.2 M, 30, Blue
 - 11.4.3.3 10 325, RP
 - 11.4.3.4 54, 425
 - 11.4.3.5 Orange, P, 2
 - 11.4.3.6 A, 1 6
 - 11.4.3.7 White, rectangle
 - 11.4.3.8 Pentagon, 0.5
 - 11.4.3.9 Orange, Capsule, XR
 - 11.4.3.10 93 150, 3
 - 11.4.3.11 Blue, ABG, 15
 - 11.4.3.12 DAN, 5513
 - 11.4.3.13 Red, KALI, 083
 - 11.4.3.14 M, C, 13
 - 11.4.3.15 Yellow, Round, TEVA
 - 11.4.3.16 DAM, 5620, 10, Blue, One Score, Round
- 11.4.4 Demonstrate understanding of physical identifications to the trainer by submitting at least one practice case that includes physical identification results. Document practice case packet and feedback in training binder.

11.5 Demonstration of Competency:

- 11.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s).

11.6 Documentation:

- 11.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 11.0 Checklist – Presumptive Tests – Physical Identification."

MODULE 11.0 CHECKLIST Presumptive Tests – Physical Identification

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 11.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 11.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 11.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |

Signatures below represent successful completion of Training Module 11.0.

_____ Date

Trainee

_____ Date

Trainer

_____ Date

Unit Manager

12.0 Gas Chromatography (GC) including Gas Chromatography / Mass Spectrometry (GC-MS) and coupled with Gas Chromatography / Flame Ionization Detection (GC-FID)

12.1 Objectives:

- 12.1.1 Knowledge of the principle/theory of Gas Chromatography (including GC-MS) in drug analysis:
 - 12.1.1.1 Awareness of the mechanism of separations, including support materials, stationary phases, carrier gas and operating temperature, and relevant criteria.
 - 12.1.1.2 Familiarity with the various instrumental components and their functions, including injection port, column and detectors (FID, MS).
 - 12.1.1.3 Familiarity with the MS components and their functions, including sample inlet, ionization, ion separation, ion detection and amplification, output of results.
 - 12.1.1.4 Knowledge of the theory and mechanism of GC-MS as an identification technique, fragmentation process and spectra interpretation.
 - 12.1.1.5 Knowledge of derivatization techniques, advantages and disadvantages.
 - 12.1.1.6 Knowledge of qualitative and quantitative determinations using GC.
 - 12.1.1.7 Awareness of common operational problems and causes, pitfalls and troubleshooting, preventive maintenance.
 - 12.1.1.8 Knowledge of concept of quality assurance and method validation.
- 12.1.2 Ability in the application of GC and GC-MS in drug analysis:
 - 12.1.2.1 Ability to prepare samples and avoid cross contamination
 - 12.1.2.2 Familiarity with/practice in the GC instrumentation and software.
 - 12.1.2.3 Familiarity with/practice in the GC-MS instrumentation and software.
 - 12.1.2.4 Familiarity with the operational procedures, including control of instrument.
 - 12.1.2.5 Knowledge of choice criteria and ability to determine suitable conditions and to design experiments aiming at optimum separations
 - 12.1.2.6 Practice in the application of GC and GC-MS methodology for qualitative and quantitative analysis of drugs most commonly encountered.

12.1.3 Understanding the possibilities and limitations of the technique.

12.2 Reading Material:

12.2.1 FCS01 – SOP for Detecting Controlled Dangerous Substances (current version)

12.2.2 FCS02 – SOP for General Laboratory Procedures for FCU (current version)

12.2.3 FCS07 – SOP for Operating and Maintaining Analytical Balances and GC-MS (current version)

12.2.4 FCS09 – SOP for Operating and Maintaining GC-FID Instruments (current version)

12.2.5 "SWGDRUG Education and Training Outline for Forensic Drug Practitioners", ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015

12.2.6 "Clarke's Analysis of Drugs and Poisons", A. C. Moffat, M. D. Osselton and B. Widdop (eds.) (2004), 3rd ed., Pharmaceutical Press, London-Chicago

12.3 Study/Discussion Questions:

12.3.1 What is the principle of GC?

12.3.2 What is the principle of MS?

12.3.3 How are ions made in GC-MS?

12.3.4 How is fragmentation in GC-MS useful?

12.3.5 What is the principle of FID?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

12.4 Practical Exercises/Skills:

12.4.1 Receive instruction and demonstration of Gas Chromatography Mass Spectrometry and Flame Ionization Detection by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:

- 12.4.1.1 Weekly maintenance procedures
 - 12.4.1.2 Monthly maintenance procedures
 - 12.4.1.3 Annual preventative maintenance procedures/scheduling
 - 12.4.1.4 General instrument troubleshooting
 - 12.4.1.5 Principle of GC
 - 12.4.1.6 Principle of MS
 - 12.4.1.7 GCMS Ionization
 - 12.4.1.8 GC-MS Fragmentation
 - 12.4.1.9 Principle of FID
 - 12.4.1.10 Using libraries for screening compounds
 - 12.4.1.11 Basic mass spectrum interpretation
- 12.4.2 Observe qualified chemist(s) perform weekly and monthly maintenance on GC-MS and GC-FIDs. Note PPE used and steps followed to prevent contamination. Record date of observation in training binder.
- 12.4.3 Demonstrate GC-MS and GC-FID understanding by performing the following maintenance. Record instrument status in the appropriate logbooks and control charts. Trainer must observe trainee perform the weekly and monthly maintenance at least once, prior to trainee proceeding to independent exercises.
- 12.4.3.1 Weekly maintenance GC-MS
 - 12.4.3.2 Weekly maintenance GC-FID
 - 12.4.3.3 Monthly maintenance GC-MS
 - 12.4.3.4 Weekly maintenance GC-FID
- 12.4.4 Independently perform maintenance on at least two separate instruments. Use methods outlined in the FCU SOPs. Document participation in training binder.

12.5 Demonstration of Competency:

- 12.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.
- 12.5.2 Oral Board – Gas Chromatography (GC) including Gas Chromatography / Mass Spectrometry (GC-MS) and Gas Chromatography / Flame Ionization Detection (GC-FID). The trainee must successfully complete an oral board, addressing in detail the following: *the theory, instrument design, practical uses and limitations*

for GC-MS and GC-FID methods as well as chromatographic techniques and data interpretation for GC-FID and GC-MS.

12.6 Documentation:

- 12.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 12.0 Checklist – Gas Chromatography (GC) including Gas Chromatography / Mass Spectrometry (GC-MS) and coupled with Gas Chromatography / Flame Ionization Detection (GC-FID)."

MODULE 12.0 CHECKLIST
Gas Chromatography (GC) including Gas Chromatography / Mass Spectrometry (GC-MS) and coupled with Gas Chromatography / Flame Ionization Detection (GC-FID)

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 12.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 12.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 12.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 12.0. | | |

Signatures below represent successful completion of Training Module 12.0.

 Trainee Date

 Trainer Date

 Unit Manager Date

13.0 High Performance Liquid Chromatography (HPLC) including Liquid Chromatography Mass Spectrometry (LC-MS)

13.1 Objectives:

13.1.1 Knowledge of the principle/theory of HPLC and LC-MS in drug analysis:

13.1.1.1 Knowledge of the mechanism of separations, including stationary phases (columns, criteria of choice), mobile phase (types, uses, composition) and temperature.

13.1.1.2 Familiarity with the various instrumental components and their functions including injections port, column and detector (DAD, MS).

13.1.1.3 Familiarity with the MS components and their functions, including sample inlet, ionization, ion separation, ion detection and amplification, output of results.

13.1.1.4 Awareness of the mechanism of HPLC incl. LC-MS as an identification technique.

13.1.1.5 Qualitative and quantitative determinations using HPLC and LC-MS.

13.1.1.6 Awareness of common operational problems and causes, pitfalls and troubleshooting, preventive maintenance.

13.1.1.7 Knowledge of quality assurance and method validation requirements.

13.1.2 Knowledge of the application of HPLC and LC-MS in drug analysis:

13.1.2.1 Familiarity with the HPLC and LC-MS instrumentation and software.

13.1.2.2 Familiarity with the operational procedures including control of instrument.

13.1.2.3 Ability to design experiments aiming at selecting operating conditions for optimum separations.

13.1.2.4 Practice in the application of HPLC and LC-MS methodology in the qualitative and quantitative analysis of drugs most commonly encountered.

13.1.3 Capacity of interpretation of the results obtained.

13.2 Reading Material:

13.2.1 FCS01 – SOP for Detecting Controlled Dangerous Substances (current version)

13.2.2 FCS02 - SOP for General Laboratory Procedures for FCU (current version)

- 13.2.3 “SWGDRUG Education and Training Outline for Forensic Drug Practitioners”, ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015

13.3 Study/Discussion Questions:

- 13.3.1 What is the principle of LC?
- 13.3.2 What is the principle of MS?
- 13.3.3 How are ions made in LC-MS?
- 13.3.4 How is fragmentation or adduct formation in LC-MS useful?
- 13.3.5 What are typical solvents used?
- 13.3.6 How is a solvent gradient important?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee’s understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

13.4 Practical Exercises/Skills:

- 13.4.1 Receive instruction and demonstration of Gas Chromatography Mass Spectrometry and Flame Ionization Detection by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
- 13.4.1.1 Weekly maintenance procedures
 - 13.4.1.2 Monthly maintenance procedures
 - 13.4.1.3 Annual preventative maintenance procedures/scheduling
 - 13.4.1.4 General instrument troubleshooting
 - 13.4.1.5 Principle of LC
 - 13.4.1.6 Principle of MS
 - 13.4.1.7 LC-MS Ionization
 - 13.4.1.8 LC-MS Fragmentation
 - 13.4.1.9 Using libraries for screening compounds
 - 13.4.1.10 Basic mass spectrum interpretation
- 13.4.2 Observe qualified chemist(s) perform weekly and monthly maintenance on LC-MS. Note PPE used and steps followed to prevent contamination. Record date of observation in training binder.

13.4.3 Demonstrate LC-MS understanding by performing the following maintenance. Record instrument status in the appropriate logbooks and control charts. Trainer must observe trainee perform the weekly and monthly maintenance at least once, prior to trainee proceeding to independent exercises.

13.4.3.1 Weekly maintenance LC-MS

13.4.3.2 Monthly maintenance LC-MS

13.4.4 Independently perform maintenance on at least two separate instruments. Use methods outlined in the FCU SOPs. Document participation in training binder.

13.5 Demonstration of Competency:

13.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.

13.5.2 Oral Board – High Performance Liquid Chromatography (HPLC) including Liquid Chromatography Mass Spectrometry (LC-MS). The trainee must successfully complete an oral board, addressing in detail the following: *the theory, instrument design, practical uses and limitations for LC-MS as well as data interpretation.*

13.6 Documentation:

13.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 13.0 Checklist – High Performance Liquid Chromatography (HPLC) including Liquid Chromatography Mass Spectrometry (LC-MS)."

MODULE 13.0 CHECKLIST

High Performance Liquid Chromatography (HPLC) including Liquid Chromatography Mass Spectrometry (LC-MS)

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 13.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 13.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 13.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 13.0. | | |

Signatures below represent successful completion of Training Module 13.0.

Trainee Date

Trainer Date

Unit Manager Date

14.0 Infra-Red Spectroscopy (IR including FT-IR)

14.1 Objectives:

- 14.1.1 Knowledge of the principle/theory of IR (and FT-IR) in drug analysis:
 - 14.1.1.1 Knowledge of the electromagnetic spectrum.
 - 14.1.1.2 Knowledge of the theory and mechanism of absorption and of vibrational and rotational spectroscopy.
 - 14.1.1.3 The Beer-Lambert Law.
 - 14.1.1.4 Knowledge of the mechanism of IR as an identification technique, (characteristic IR group frequencies and structure/spectra correlations).
 - 14.1.1.5 Fourier transform infrared spectroscopy (FT-IR) and different techniques (KBr, ATR, etc.).
 - 14.1.1.6 Familiarity with the various instrumental components and their functions.
 - 14.1.1.7 Awareness of common operational problems and causes, troubleshooting, preventive maintenance.
 - 14.1.1.8 Knowledge of quality assurance and method validation requirements.
- 14.1.2 Knowledge of the application of IR (and FT-IR) in drug analysis:
 - 14.1.2.1 Familiarity with the IR (and FT-IR) instrumentation and software (dispersive and interferometric spectrophotometers, data processing).
 - 14.1.2.2 Familiarity with the operational procedures (sample purification and preparation, identification and interpretation of spectra).
 - 14.1.2.3 Practice in the application of IR (and FT-IR) methodology in the qualitative analysis of drugs most commonly encountered.
 - 14.1.2.4 Proper use of spectral manipulations (e.g., subtraction, baseline correction, library searching).
- 14.1.3 Ability to select operating parameters aiming at best results.
- 14.1.4 Practice in the preparation and handling of various kinds of samples.
- 14.1.5 Practice in the application of IR (and FT-IR) methodology in the analysis of drugs most commonly encountered.
- 14.1.6 Understanding the advantages and limitations of the technique.
- 14.1.7 Capacity of interpretation of the results obtained.

14.2 Reading Material:

- 14.2.1 FCS01 – SOP for Detecting Controlled Dangerous Substances (current version)
- 14.2.2 FCS02 – SOP for General Laboratory Procedures for FCU (current version)
- 14.2.3 FCS08 – SOP for Operating and Maintaining Nicolet iS50 Fourier Transform Infrared Spectroscopy (FT-IR) Instruments (current version)
- 14.2.4 FCS18 – SOP for Operating and Maintaining FTIR Spectrum 2 (current version)
- 14.2.5 “SWGDRUG Education and Training Outline for Forensic Drug Practitioners”, ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015

14.3 Study/Discussion Questions:

- 14.3.1 What is the principle of IR spectroscopy?
- 14.3.2 What is the principle of FT-IR Spectroscopy?
- 14.3.3 How is FT-IR or IR spectroscopy used to identify substances?
- 14.3.4 What are the benefits of FT-IR?
- 14.3.5 What are the limitations of FT-IR?
- 14.3.6 Where are the validations for this instrument stored?
- 14.3.7 How often is maintenance performed?
- 14.3.8 What/Where is the fingerprint region? Why is this region important to us as chemists?
- 14.3.9 What does it mean to perform a “direct” analysis of a sample by FT-IR?
- 14.3.10 How often is FT-IR maintenance performed? What is documented/recorded?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee’s understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

14.4 Practical Exercises/Skills:

- 14.4.1 Receive instruction and demonstration of FT-IR by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
 - 14.4.1.1 Electromagnetic spectrum
 - 14.4.1.2 Theory and mechanism of absorption and of vibrational and rotational spectroscopy
 - 14.4.1.3 The Beer-Lambert Law
 - 14.4.1.4 Different techniques (KBr, ATR, etc.)
 - 14.4.1.5 Common operational problems and causes
 - 14.4.1.6 Instrument troubleshooting and software familiarization
 - 14.4.1.7 Weekly, Quarterly maintenance
- 14.4.2 Observe qualified chemist(s) perform weekly and quarterly maintenance on FT-IR. Note PPE used and steps followed to prevent contamination. Record date of observation in training binder.
- 14.4.3 Demonstrate FT-IR understanding by performing the following maintenance. Record instrument status in the appropriate logbooks and control charts. Trainer must observe trainee perform the weekly and quarterly maintenance at least once, prior to trainee proceeding to independent exercises.
 - 14.4.3.1 Weekly maintenance FT-IR
 - 14.4.3.2 Quarterly maintenance FT-IR
- 14.4.4 Independently perform maintenance at least twice (or on at least two separate instruments). Use methods outlined in the FCU SOPs. Document participation in training binder.
- 14.4.5 Demonstrate understanding of FT-IR to the trainer by submitting at least two practice cases performing the identification of cocaine and its different forms. Document practice case packet and feedback in training binder.

14.5 Demonstration of Competency:

- 14.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.

- 14.5.2 Oral Board – Infra-Red Spectroscopy (IR including FT-IR). The Trainee must successfully complete an oral board, addressing in detail the following: *the theory, instrument design, practical uses and limitations for FT-IR methods as well as data interpretation for FT-IR (cocaine base v. cocaine hydrochloride).*

14.6 Documentation:

- 14.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 14.0 Checklist – Infra-Red Spectroscopy (IR including FT-IR)."

MODULE 14.0 CHECKLIST Infra-Red Spectroscopy (IR including FT-IR)

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 14.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 14.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 14.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 14.0. | | |

Signatures below represent successful completion of Training Module 14.0.

 Trainee Date

 Trainer Date

 Unit Manager Date

15.0 Testing for Cannabis and Synthetic Cannabinoids

15.1 Objectives:

- 15.1.1 Familiarity with the illicit cannabis products:
 - 15.1.1.1 Description of the cannabis plant and illicit cannabis products (names and synonyms, botany, physical appearance, morphological, microscopic and chemical characteristics, herbals, cannabis resin, liquid cannabis).
 - 15.1.1.2 Breeding of cannabis plant (outdoor/indoor/industrial production, harvesting, yield).
 - 15.1.1.3 Production of illicit cannabis products (herbal/resin/liquid cannabis).
 - 15.1.1.4 Chemical components of forensic significance of illicit cannabis products.
 - 15.1.1.5 Pharmacology of cannabis products.
 - 15.1.1.6 Legal aspects concerning cannabis including hemp for fiber.
- 15.1.2 Familiarity with Cannabis Receptor Agonists (cannabimimetic compounds, e.g. 'spice' products), including legal aspects.
- 15.1.3 Familiarity with the protocol for the analysis of illicit cannabis products (including sampling, physical examination, microscopy, extraction, presumptive (aka "color" or "spot") tests, GC, GC-MS, LC-MS, FT-IR, analytical challenges, special pitfalls).
- 15.1.4 Familiarity with additional analytical techniques for the analysis of cannabis.
- 15.1.5 Familiarity with analysis and identification of cannabimimetic compounds.

15.2 Reading Material:

- 15.2.1 All technical SOPs (current version)
- 15.2.2 "SWGDRUG Education and Training Outline for Forensic Drug Practitioners", ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015
- 15.2.3 "Recommended methods for the identification and analysis of cannabis and cannabis products". UNODC. ST/NAR/40. September 2009

- 15.2.4 "Rapid Testing Methods of Drugs of Abuse". UNODC. ST/NAR/13/Rev. I. Feb.1995
- 15.2.5 "Clarke's Analysis of Drugs and Poisons", A. C. Moffat, M. D. Osselton and B. Widdop (eds.) (2004), 3rd ed., Pharmaceutical Press, London-Chicago
- 15.2.6 Marijuana Analysis for Forensic Chemists (Presentation, DEA, 2018)
- 15.2.7 Cannabis (DEA Supplemental reading, 2018)

15.3 Study/Discussion Questions:

- 15.3.1 Describe the criteria necessary to identify each of the following:
 - 15.3.1.1 Marijuana
 - 15.3.1.2 Marijuana resin (hashish)
 - 15.3.1.3 Hash oil
- 15.3.2 What Schedule is marijuana and why?
- 15.3.3 What is the principal psychoactive ingredient in marijuana?
- 15.3.4 List 3 tests used to identify marijuana and the expected results.
- 15.3.5 Why do you run a blank with Duquenois?
- 15.3.6 Name 4 cannabinoids.
- 15.3.7 List the taxonomy of marijuana.
- 15.3.8 What is sinsemilla?
- 15.3.9 What is the difference between hashish and hash oil?
- 15.3.10 Are the seeds of the marijuana plant controlled? Stalk? Explain.
- 15.3.11 What is the role of the hydrochloric acid during the Duquenois color test reaction?
- 15.3.12 Are there any substances that will give a positive Duquenois test (characteristic violet chloroform layer) other than THC and other cannabinoids?
- 15.3.13 Using monoterpenoid nomenclature, which two isomers of THC are present in marijuana?

- 15.3.14 At what rate does Δ^9 -THC convert to cannabinol upon prolonged storage? What factors contribute to the conversion?
- 15.3.15 Are there any other plants that have cystolithic hairs?
- 15.3.16 What is the difference between the Duquenois test, the Duquenois-Levine test, the Rapid Duquenois Levine test, and the Modified Duquenois test?
- 15.3.17 Name the gross physical and microscopic characteristics of the Cannabis Sativa L. plant.
- 15.3.17.1 Does the male plant produce flowers?
- 15.3.17.2 Are cystolithic hairs glandular or non-glandular?
- 15.3.17.3 What are the typical dimensions of marijuana seeds?
- 15.3.17.4 Which characteristics will effervesce with the appropriate reagent?
- 15.3.18 Draw the structures of delta-9-tetrahydrocannabinol, cannabinol, and cannabidiol.
- 15.3.19 How is cannabinol formed?
- 15.3.20 Complete the chart below by specifying whether each test is presumptive or conclusive and what a positive result (consistent with marijuana) indicates.

| Test | Presumptive or Conclusive | What does the test indicate? |
|-------------------------|---------------------------|------------------------------|
| Macroscopic/Microscopic | | |
| Duquenois-Levine | | |
| GC-MS | | |
| GC-FID | | |

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

15.4 Practical Exercises/Skills:

- 15.4.1 Receive instruction and demonstration of analyzing plant-material by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises.

- 15.4.2 Observe qualified chemist(s) perform presumptive and confirmatory tests for the identification of Marijuana and Delta-9-Tetrahydrocannabinol using the methods outlined in the FCU SOPs on a minimum of five cases. Observe and review casework note-taking and documentation. On the 30-Day Progress Report form, record the following: case number, qualified analyst(s) observed, date of observation, type of exam and number of items.
- 15.4.3 Demonstrate the techniques to the trainer by performing the following experiments. Record results on worksheets as appropriate and take notes according to laboratory protocol. Trainer must observe trainee perform the presumptive and confirmatory tests at least once, prior to trainee proceeding to independent exercises.
- 15.4.3.1 Microscopic Evaluation
- 15.4.3.1.1 View plant material provided by the trainer (examples: marijuana, nutmeg, oregano, tea, hops, parsley, damiana, basil, dill) under the appropriate magnification and note appearance similarities and differences. Identify and label cystolithic and non-cystolithic hairs, if present.
- 15.4.3.2 Color Test
- 15.4.3.2.1 Perform the Duquenois-Levine color test on plant material provided by the trainer (examples: marijuana, nutmeg, oregano, tea, hops, parsley, damiana, basil, dill) and document observed color changes.
- 15.4.3.3 GC-MS
- 15.4.3.3.1 Perform an extraction on plant material (marijuana) provided by the trainer and document results. Perform structural identification and confirm the presence of controlled dangerous substances, if applicable.
- 15.4.3.4 GC-FID
- 15.4.3.4.1 Perform an extraction on plant material (marijuana) provided by the trainer and document results. Confirm the presence of controlled dangerous substances, if applicable.

- 15.4.4 Perform marijuana examination (microscopy, color test, and GC-MS) on a minimum of 5-15 training samples, representative of samples routinely encountered in casework. Use methods outlined in the laboratory FCU SOPs. Document on the 30-Day Progress Report form. Trainer must observe trainee perform marijuana examinations at least once, prior to trainee proceeding to independent exercises. Each practice case should be reviewed and approved by trainer.

15.5 Demonstration of Competency:

- 15.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.
- 15.5.2 Practical Exam: Successful analysis of a cannabis or synthetic cannabinoid product using FCU Standard Operating Procedures.
- 15.5.3 Oral Board - Testing for Cannabis and Synthetic Cannabinoids. Trainee must successfully complete an oral board, addressing in detail the following: *cannabis plant, breeding of cannabis, cannabis products (hashish, hash oil), pharmacology and receptors, legal aspects (local vs. federal), FCU testing policy and procedures.*

15.6 Documentation:

- 15.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 15.0 Checklist – Testing for Cannabis and Synthetic Cannabinoids."

MODULE 15.0 CHECKLIST Testing for Cannabis and Synthetic Cannabinoids

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 15.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 15.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 15.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| PRACTICAL EXAM | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully passed practical exam by correctly identifying the presence of a cannabinoid or synthetic cannabinoid versus a negative control. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 15.0. | | |

Signatures below represent successful completion of Training Module 15.0.

Trainee Date

Trainer Date

Unit Manager Date

16.0 Testing for Opium Alkaloids, Opium Derivatives and Synthetic Opioids

16.1 Objectives:

- 16.1.1 Familiarity with the opium, opium alkaloids and opium derivatives (heroin) including semisynthetic opioids (oxycodone, hydrocodone, fentanyl, etc.):
 - 16.1.1.1 Description/recognition of illicit opium products (botany, physical appearance, morphological and chemical characteristics, opium preparations).
 - 16.1.1.2 Production of illicit opium products (isolation of morphine from opium, manufacture of heroin from morphine).
 - 16.1.1.3 Chemical constituents of forensic significance of illicit opium products and derivatives, including by-products, adulterants and diluents, comparative analysis / establishing links between samples.
 - 16.1.1.4 Structures and pharmacology of constituents of opium, opium derivatives (heroin), semi-synthetic opioids and synthetic opioids.
 - 16.1.1.5 Legal aspects concerning opium, opioid derivatives (heroin), semi-synthetic and synthetic opioids.
- 16.1.2 Familiarity with the protocol for the analysis of illicit opium, opium products, opium derivatives (heroin) and semi-synthetic opioids (including sampling, physical examination, microscopy, extraction, presumptive (color/spot) tests, GC, GC-MS, LC-MS, FT-IR, analytical challenges, and special pitfalls.
- 16.1.3 Familiarity with additional analytical techniques for the analysis of illicit opium, opium products, opium derivatives (heroin) and semi-synthetic opioids.

16.2 Reading Material:

- 16.2.1 All technical SOPs (current version)
- 16.2.2 "SWGDRUG Education and Training Outline for Forensic Drug Practitioners", ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015
- 16.2.3 "Recommended Methods for Testing Opium, Morphine and Heroin", UNODC, ST/NAR/29/Rev.1, June 1998
- 16.2.4 "Rapid Testing Methods of Drugs of Abuse". UNODC. ST/NAR/13/Rev. I. Feb.1995

- 16.2.5 "Clarke's Analysis of Drugs and Poisons", A. C. Moffat, M. D. Osselton and B. Widdop (eds.) (2004), 3rd ed., Pharmaceutical Press, London-Chicago

16.3 Study/Discussion Questions:

- 16.3.1 What is the term "Alkaloid" used to describe?
- 16.3.2 What is the difference between a naturally occurring opioid, semi-synthetic opioid, and synthetic opioid? Name three examples of each.
- 16.3.3 What is the main medical use of opioids?
- 16.3.4 What are the principle psychoactive ingredients in the poppy plant?
- 16.3.5 What process gives rise to 6-Monoacetylmorphine?
- 16.3.6 What class of opium alkaloids is most addictive?
- 16.3.7 Draw the structures of Heroin and Fentanyl.
- 16.3.8 What color would you perform on a suspected heroin sample?
- 16.3.9 Describe the criteria/process to identify each of the following:
- 16.3.9.1 Morphine
 - 16.3.9.2 Codeine
 - 16.3.9.3 Heroin
 - 16.3.9.4 Fentanyl
- 16.3.10 What schedule is Heroin and why?
- 16.3.11 What schedule is Oxycodone and why?
- 16.3.12 What schedule is Fentanyl and why?
- 16.3.13 What schedule is Codeine and why?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

16.4 Practical Exercises/Skills:

- 16.4.1 Receive instruction and demonstration of analyzing opioids by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises.

- 16.4.2 Observe qualified chemist(s) perform presumptive and confirmatory tests for the identification of opioids using the methods outlined in the FCU SOPs on a minimum of five cases. Observe and review casework note-taking and documentation. On the 30-Day Progress Report form, record the following: case number, qualified analyst(s) observed, date of observation, type of exam and number of items.

- 16.4.3 Demonstrate the techniques to the trainer by performing the following experiments. Record results on worksheets as appropriate and take notes according to laboratory protocol. Trainer must observe trainee perform the presumptive and confirmatory test at least once, prior to trainee proceeding to independent exercises.
 - 16.4.3.1 Physical Identification
 - 16.4.3.1.1 Perform physical identification using approved resources to presumptively identify a pharmaceutical opioid pill or tablet provided by the trainer. Document imprint and resource used.

 - 16.4.3.2 Color Test
 - 16.4.3.2.1 Perform the Marquis color test on a suspected opioid sample provided by the trainer (examples: heroin, oxycodone, hydrocodone) and document observed color changes. Discuss possible limitations of this method with the trainer.

 - 16.4.3.3 GC-MS
 - 16.4.3.3.1 Perform an extraction on a suspected opioid sample provided by the trainer and document results. Perform structural identification and confirm the presence of controlled dangerous substances, if applicable. Discuss possible limitations of this method with the trainer.

 - 16.4.3.4 GC-FID
 - 16.4.3.4.1 Perform an extraction on a suspected opioid sample provided by the trainer and document the results. Confirm the presence of controlled dangerous substances, if applicable. Discuss possible limitations of this method with the trainer.

- 16.4.4 Identify the presence of opioids (physical identification, color test, GC-MS, GC-FID) on a minimum of 5-15 training samples, representative of samples routinely encountered in casework. Use methods outlined in the laboratory FCU SOPs. Document on the 30-Day Progress Report form. Trainer must observe trainee perform an opioid confirmation at least once, prior to trainee proceeding to independent exercises. Each practice case should be reviewed by trainer.

16.5 Demonstration of Competency:

- 16.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.
- 16.5.2 Practical Exam: Successful analysis of illicit opium, opium products, opium derivatives (heroin), semi-synthetic opioids and synthetic opioids using FCU Standard Operating Procedures.
- 16.5.3 Oral Board - Testing for Opium Alkaloids, Opium Derivatives and Synthetic Opioids. Trainee must successfully complete an oral board, addressing in detail the following: *macroscopic plant information, genus/species information, geography of plant, traditional medicinal uses, timeline, types of opioids (natural, semi-synthetic, synthetic), how to detect opioids in the FCU, and detection challenges.*

16.6 Documentation:

- 16.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 16.0 Checklist – Testing for Opium Alkaloids, Opium Derivatives and Synthetic Opioids."

MODULE 16.0 CHECKLIST

Testing for Opium Alkaloids, Opium Derivatives and Synthetic Opioids

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 16.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 16.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 16.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| PRACTICAL EXAM | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully passed practical exam by correctly identifying the presence of an opium alkaloid, opium derivative or synthetic opioid versus a negative control. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 16.0. | | |

Signatures below represent successful completion of Training Module 16.0.

Trainee Date

Trainer Date

Unit Manager Date

17.0 Quantitative Testing for Heroin by GC-FID

17.1 Objectives:

- 17.1.1 Familiarity with the protocol for running calibration and QC checks of heroin standards on GC-FID.
- 17.1.2 Familiarity with the forms and calculations for quantitation of heroin samples.
- 17.1.3 Familiarity with the sample preparation for a heroin casework sample.
- 17.1.4 Familiarity with the acceptance criteria and reporting procedure for quantitated samples.

17.2 Reading Material:

- 17.2.1 FCS15 – SOP for Quantitation of Heroin using GC-FID (current version).
- 17.2.2 FCS21 – Procedure for Uncertainty in Measurement (current version).
- 17.2.3 "SWGDRUG Education and Training Outline for Forensic Drug Practitioners", ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015
- 17.2.4 "Terminology and Information on Drugs". UNODC. E 03.XI14 ISBN 92-1-148163-5, Sept. 2003"Recommended Methods for Testing Lysergide (LSD)", UNODC, ST/NAR/17, January 1989
- 17.2.5 "Rapid Testing Methods of Drugs of Abuse". UNODC. ST/NAR/13/Rev. I. Feb.1995
- 17.2.6 "Clarke's Analysis of Drugs and Poisons", A. C. Moffat, M. D. Osselton and B. Widdop (eds.) (2004), 3rd ed., Pharmaceutical Press, London-Chicago

17.3 Study/Discussion Questions:

- 17.3.1 Why is quantitative analysis different than qualitative analysis?
- 17.3.2 Why is heroin quant analysis performed in DC?
- 17.3.3 What is the process to quantitate a heroin sample?
- 17.3.4 How much sample is necessary to perform heroin quant analysis?

- 17.3.5 How much sample is weighed for each quant sample prepared?
- 17.3.6 Which balances in the laboratory are available for quantitative analysis?
- 17.3.7 How much volume of quant solution is necessary for each quant sample prepared?
- 17.3.8 How is the quant solution made? Where is it recorded?
- 17.3.9 Which instruments are validated to perform quant analysis of heroin?
- 17.3.10 What software does the FID use?
- 17.3.11 What should you do if the calibrant auto-prints to a value below 100?
- 17.3.12 How would you locate/know the uncertainty values for the method?
- 17.3.13 How often is the uncertainty recalculated?
- 17.3.14 How often is the method (curve) re-calibrated?
- 17.3.15 Where are the quant control charts located? Where are the sequence print-outs saved?
- 17.3.16 What is the process to make the QC Low and QC High? How often do these need to be made/expire?
- 17.3.17 What is the process to make the calibrant? How often does this need to be made/expire?
- 17.3.18 Where is the QC lot information recorded?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

17.4 Practical Exercises/Skills:

- 17.4.1 Receive instruction and demonstration of quantitatively analyze heroin by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
 - 17.4.1.1 Preparing QC solutions (QC Low, QC High, Calibrant)
 - 17.4.1.2 Preparing Quant Solution
 - 17.4.1.3 Uncertainty calculations

- 17.4.1.4 Annual re-calibration
- 17.4.1.5 Interpretation of results and quantitative calculations
- 17.4.1.6 Reporting quantitative results
- 17.4.2 Observe qualified chemist(s) perform quantitative analysis of heroin samples using the methods outlined in the FCU SOPs on a minimum of five cases. Observe and review casework note-taking and documentation. On the 30-Day Progress Report form, record the following: case number, qualified analyst(s) observed, date of observation, type of exam and number of items.
- 17.4.3 Demonstrate the techniques to the trainer by performing the following experiments. Record results on worksheets as appropriate and take notes according to laboratory protocol. Trainer must observe trainee perform testing at least once, prior to proceeding to independent exercises.
 - 17.4.3.1 QC Low and QC High
 - 17.4.3.1.1 Make QC Low and QC High for quant analysis following methods outlined in FCU SOPs. Run sample(s) as a quality check on validated instruments and review the results with trainer.
 - 17.4.3.2 Calibrant
 - 17.4.3.2.1 Make Calibrant for quant analysis following methods outlined in FCU SOPs. Run sample(s) as a quality check on validated instruments and review the results with trainer.
 - 17.4.3.3 Quant Solution
 - 17.4.3.3.1 Make Quant Solution following methods outlined in FCU SOPs. Run sample(s) as a quality check on validated instruments and review the results with trainer.
- 17.4.4 Perform quantitative analysis of heroin on a minimum of 5-15 training samples, representative of samples routinely encountered in casework. Use methods outlined in the laboratory FCU SOPs. Document on the 30-Day Progress Report form. Trainer must observe trainee perform marijuana examinations at least once, prior to trainee proceeding to independent exercises. Each practice case should be reviewed and approved by trainer.

17.5 Demonstration of Competency:

- 17.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.
- 17.5.2 Practical Exam: Successful quantitative analysis of a heroin sample using FCU Standard Operating Procedures.
- 17.5.3 Oral Board Exam - Quantitative Testing for Heroin by GC-FID. Trainee must successfully complete an oral board, addressing in detail the following: *preparing QCs, calibrant, and quant solutions; amount of sample necessary to perform quant analysis, how to interpret and report purity results, and frequency of re-calibration.*

17.6 Documentation:

- 17.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 17.0 Checklist – Quantitative Testing for Heroin by GC-FID."

MODULE 17.0 CHECKLIST Quantitative Testing for Heroin by GC-FID

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 17.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 17.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 17.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| PRACTICAL EXAM | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully passed practical exam by correctly identifying the purity of submitted heroin sample by GC-FID versus a negative control. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 17.0. | | |

Signatures below represent successful completion of Training Module 17.0.

Trainee Date

Trainer Date

Unit Manager Date

18.0 Testing for Cocaine

18.1 Objectives:

- 18.1.1 Familiarity with the coca plant and illicit materials containing cocaine:
 - 18.1.1.1 Description/recognition of coca plant and illicit materials containing cocaine (botany, physical appearance, morphological and chemical characteristics).
 - 18.1.1.2 Production of illicit materials containing cocaine (isolation of cocaine from coca leaf, production of coca paste, cocaine base, "crack") and manufacture of cocaine.
 - 18.1.1.3 Chemical constituents of forensic significance of coca plant and illicit materials containing cocaine, including by-products, adulterants and diluents, comparative analysis / establishing links between cocaine samples.
 - 18.1.1.4 Structures, physical data and pharmacology of constituents of illicit materials containing cocaine.
 - 18.1.1.5 Legal aspects concerning coca plant and illicit materials containing cocaine.
- 18.1.2 Familiarity with the protocol for the analysis of illicit materials containing cocaine (including sampling, physical identification, extraction, presumptive (color/microcrystal) tests, GC, GC-MS, LC-MS, FT-IR, analytical challenges, special pitfalls).
- 18.1.3 Familiarity with additional analytical techniques for the analysis of cocaine.

18.2 Reading Material:

- 18.2.1 All technical SOPs (current version)
- 18.2.2 "SWGDRUG Education and Training Outline for Forensic Drug Practitioners", ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015
- 18.2.3 "Recommended Methods for Testing Cocaine". UNODC ST/NAR/7 Feb.1986
- 18.2.4 "Rapid Testing Methods of Drugs of Abuse". UNODC. ST/NAR/13/Rev. I. Feb.1995
- 18.2.5 "Clarke's Analysis of Drugs and Poisons", A. C. Moffat, M. D. Osselton and B. Widdop (eds.) (2004), 3rd ed., Pharmaceutical Press, London-Chicago

18.3 Study/Discussion Questions:

- 18.3.1 What schedule is cocaine base?
- 18.3.2 What schedule is cocaine hydrochloride?
- 18.3.3 What kind of drug class/category does cocaine fall within?
- 18.3.4 What are the three basic groups of alkaloids present in cocaine?
- 18.3.5 What are four properties (chemical and physiological) of cocaine base (aka smokable cocaine) that have contributed to its popularity?
- 18.3.6 Why is baking soda commonly recovered during cocaine seizures?
- 18.3.7 What are some other common cutting agents or diluents seen with cocaine in the District?
- 18.3.8 What is Levamisole? What is it used for?
- 18.3.9 What schedule is Procaine? What is it used for?
- 18.3.10 What is Mannitol?
- 18.3.11 Draw the structural difference between cocaine hydrochloride and cocaine base. How would this influence the FT-IR spectra?
- 18.3.12 How would you analyze a sample containing cocaine base and levamisole by FT-IR? Note solvents that may be required for adequate separation. Discuss the limitations of identifying mixtures with trainer.
- 18.3.13 How would you analyze a sample containing cocaine base and phenacetin by FT-IR? Note solvents that may be required for adequate separation.
- 18.3.14 How would you analyze a sample containing cocaine hydrochloride and phenacetin by FT-IR? Note solvents that may be required for adequate separation.
- 18.3.15 Since the cocaine molecule contains two carbonyl groups, would you expect the IR of the carbonyl region to have one or two absorption peaks? Why?
- 18.3.16 Complete the chart below by specifying whether each test is presumptive or conclusive and what a positive result (consistent with cocaine) indicates.

| Test | Presumptive or Confirmatory? | What does the test indicate? |
|------------|------------------------------|------------------------------|
| Color Test | | |
| GC-MS | | |
| FT-IR | | |

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

18.4 Practical Exercises/Skills:

18.4.1 Receive instruction and demonstration of analyzing cocaine samples by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:

- 18.4.1.1 Coca plant genus/species
- 18.4.1.2 Production of illicit materials containing cocaine (isolation of cocaine from coca leaf, production of coca paste, cocaine base, "crack") and manufacture of cocaine
- 18.4.1.3 Structures, physical data and pharmacology of constituents of illicit materials containing cocaine
- 18.4.1.4 Legal aspects concerning coca plant and illicit materials containing cocaine

18.4.2 Observe qualified chemist(s) perform presumptive and confirmatory tests for the identification of cocaine base and/or cocaine hydrochloride using the methods outlined in the FCU SOPs on a minimum of five cases. Observe and review casework note-taking and documentation. On the 30-Day Progress Report form, record the following: case, qualified analyst(s) observed, date of observation, type of exam and number of items.

18.4.3 Demonstrate the techniques to the trainer by performing the following experiments. Record results on the worksheet as appropriate and take notes according to laboratory protocol. Trainer must observe trainee perform the presumptive and confirmatory tests at least once, prior to trainee proceeding to independent exercises.

- 18.4.3.1 Color Test
 - 18.4.3.1.1 Perform the Cobalt Thiocyanate color test on the following substances provided by the trainer: cocaine base, cocaine hydrochloride, procaine, lidocaine, mannitol,

caffeine, and acetaminophen. Document any observed color changes.

18.4.3.2 GC-MS

18.4.3.2.1 Perform an extraction on suspected cocaine and/or procaine provided by the trainer and document results. Perform structural identification and confirm the presence of controlled dangerous substances, if applicable.

18.4.3.3 FT-IR

18.4.3.3.1 Perform a direct analysis of the following substances provided by the trainer: cocaine base, cocaine hydrochloride, and procaine and/or caffeine. Confirm the presence of controlled dangerous substances, if applicable. Review FT-IR validations and discuss limitations of FT-IR analysis with trainer.

18.4.4 Identify the presence of cocaine (color test, GC-MS, FT-IR) on a minimum of 5-15 training samples, representative of samples routinely encountered in casework. Use methods outlined in the laboratory FCU SOPs. Document on the 30-Day Progress Report form. Trainer must observe trainee perform a cocaine confirmation at least once, prior to trainee proceeding to independent exercises. Each practice case should be reviewed by trainer.

18.5 Demonstration of Competency:

18.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.

18.5.2 Practical Exam: Successful analysis of cocaine using FCU Standard Operating Procedures.

18.5.3 Oral Board Exam – Testing for Cocaine. Trainee must successfully complete an oral board, addressing in detail the following: macroscopic plant information, genus/species information, geography of plant,

traditional medicinal uses, timeline, types/forms of cocaine submitted as evidence, how to detect cocaine in the FCU, and detection challenges.

18.6 Documentation:

- 18.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 18.0 Checklist – Testing for Cocaine."

MODULE 18.0 CHECKLIST Testing for Cocaine

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 18.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 18.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 18.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| PRACTICAL EXAM | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully passed practical exam by correctly identifying the presence of cocaine base and/or cocaine hydrochloride versus a negative control. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 18.0. | | |

Signatures below represent successful completion of Training Module 18.0.

Trainee Date

Trainer Date

Unit Manager Date

19.0 Testing for Amphetamine Type Stimulants (ATS)

19.1 Objectives:

- 19.1.1 Familiarity with the Amphetamine Type Stimulants:
 - 19.1.1.1 Non-ring substituted amphetamines (e.g., amphetamine, methamphetamine, cathine, cathinone)
 - 19.1.1.2 Methylenedioxy substituted amphetamines (e.g., MDA, MDMA)
 - 19.1.1.3 Other ring substituted amphetamines (also in section "Hallucinogens")
 - 19.1.1.4 2,4,5-Ring substituted phenethylamines
 - 19.1.1.5 2,4,5-Ring substituted amphetamines
 - 19.1.1.6 Other ring substitution patterns (phenethylamines and amphetamines) (e.g., Mescaline, PMA, PMMA, DMA, TMA, 4-MTA)
 - 19.1.1.7 Classification and respective definitions
 - 19.1.1.8 Description of compounds, physical and chemical characteristics, stereochemistry
 - 19.1.1.9 Illicit ATS manufacture, including synthesis of amphetamine, methamphetamine and ring-substituted ATS (XTC-group, etc.)
 - 19.1.1.10 Pharmacology of Amphetamine Type Stimulants
 - 19.1.1.11 Legal aspects
- 19.1.2 Familiarity with the protocol for the analysis of Amphetamine Type Stimulants (including sampling, physical description, extraction, presumptive color tests, GC, GC-MS, LC-MS, FT-IR, analytical challenges, special pitfalls).
- 19.1.3 Familiarity with additional analytical techniques for the analysis of Amphetamine Type Stimulants.

19.2 Reading Material:

- 19.2.1 All technical SOPs (current version)
- 19.2.2 "SWGDRUG Education and Training Outline for Forensic Drug Practitioners", ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015
- 19.2.3 "Terminology and Information on Drugs". UNODC. E 03.XI14 ISBN 92-1-148163-5, Sept. 2003

- 19.2.4 "Recommended Methods for the Identification and Analysis of Amphetamine Methamphetamine and their Ring-substituted Analogues in Seized Materials". UNO DC. ST/NAR/34. Jan. 2006
- 19.2.5 "Rapid Testing Methods of Drugs of Abuse". UNODC. ST/NAR/13/Rev. I. Feb.1995
- 19.2.6 "Clarke's Analysis of Drugs and Poisons", A. C. Moffat, M. D. Osselton and B. Widdop (eds.) (2004), 3rd ed., Pharmaceutical Press, London-Chicago

19.3 Study/Discussion Questions:

- 19.3.1 What is the process to analyze amphetamine type stimulants?
- 19.3.2 What is the structure of Amphetamine? Methamphetamine?
- 19.3.3 What is the structure of Cathinone?
- 19.3.4 What color test is used to presumptively identify Amphetamine and Methamphetamine? What would a positive reaction look like?
- 19.3.5 What are some limitations or challenges of detecting methamphetamine and amphetamine by GCMS?
- 19.3.6 What are some limitations or challenges of detecting synthetic cathinones by GCMS?
- 19.3.7 What molecular structure gives rise to the m/z 58 ion in the mass spectrum of methamphetamine?
- 19.3.8 What gives rise to the m/z ion in amphetamine?
- 19.3.9 What are two slang terms for MDMA?
- 19.3.10 Name four drugs besides MDMA which are used at "rave" clubs.
- 19.3.11 When and why was MDMA first introduced?
- 19.3.12 What is SAFEDC?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

19.4 Practical Exercises/Skills:

- 19.4.1 Receive instruction and demonstration of quantitatively analyze heroin by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
 - 19.4.1.1 Drug classification/category
 - 19.4.1.2 Short and long term effects of ATS
 - 19.4.1.3 Structural similarities and differences of ATS, such as:
 - 19.4.1.3.1 Methylenedioxy substituted amphetamines (e.g., MDA, MDMA)
 - 19.4.1.3.2 Other ring substituted amphetamines (also in section "Hallucinogens")
 - 19.4.1.3.3 2,4,5-Ring substituted phenethylamines
 - 19.4.1.3.4 2,4,5-Ring substituted amphetamines
 - 19.4.1.3.5 Other ring substitution patterns (phenethylamines and amphetamines) (e.g., Mescaline, PMA, PMMA, DMA, TMA, 4-MTA)
 - 19.4.1.3.6 Description of compounds, physical and chemical characteristics, stereochemistry
 - 19.4.1.3.7 Illicit ATS manufacture, including synthesis of amphetamine, methamphetamine and ring-substituted ATS (XTC-group, etc.)
 - 19.4.1.4 Pharmacology of Amphetamine Type Stimulants
 - 19.4.1.5 Legal aspects
- 19.4.2 Observe qualified chemist(s) perform quantitative analysis of ATS samples using the methods outlined in the FCU SOPs on a minimum of five cases. Observe and review casework note-taking and documentation. On the 30-Day Progress Report form, record the following: case number, qualified analyst(s) observed, date of observation, type of exam and number of items.
- 19.4.3 Demonstrate the techniques to the trainer by performing the following experiments. Record results on worksheets as appropriate and take notes according to laboratory protocol. Trainer must observe trainee perform testing at least once, prior to proceeding to independent exercises.
 - 19.4.3.1 Color Test
 - 19.4.3.1.1 Perform the Marquis color test on a suspected amphetamine type stimulant provided by the trainer. Document observed

- color changes. Discuss possible limitations of this method with the trainer.
- 19.4.3.1.2 Perform the Cobalt Thiocyanate color test on a suspected amphetamine type stimulant provided by the trainer. Document observed color changes. Discuss possible limitations of this method with the trainer.
- 19.4.3.2 GC-MS
- 19.4.3.2.1 Perform a methanol extraction on a suspected amphetamine type stimulant sample provided by the trainer and document the results. Perform structural identification and confirm the presence of controlled dangerous substances, if applicable. Note peak shape. Discuss results with trainer.
 - 19.4.3.2.2 Perform a chloroform (or 9:1 chloroform:methanol) extraction on a suspected amphetamine type stimulant sample provided by the trainer and document the results. Perform structural identification and confirm the presence of controlled dangerous substances, if applicable. Note peak shape. Discuss results with trainer.
 - 19.4.3.2.3 Perform a basic extraction (ammoniacal chloroform) on a suspected amphetamine type stimulant sample or standard provided by the trainer and document the results. Perform structural identification and confirm the presence of controlled dangerous substances, if applicable. Note peak shape. Discuss results with trainer.
- 19.4.3.3 GC-FID
- 19.4.3.3.1 Perform a methanol extraction on a suspected amphetamine type stimulant sample provided by the trainer and document the results. Confirm the presence of controlled dangerous substances, if applicable. Note peak shape. Discuss results with trainer.
 - 19.4.3.3.2 Perform a chloroform (or 9:1 chloroform:methanol) extraction on a

suspected amphetamine type stimulant sample provided by the trainer and document the results. Confirm the presence of controlled dangerous substances, if applicable. Note peak shape. Discuss results with trainer.

19.4.3.3.3

Perform a basic extraction (ammoniacal chloroform) on a suspected amphetamine type stimulant sample or standard provided by the trainer and document the results. Confirm the presence of controlled dangerous substances, if applicable. Note peak shape. Discuss results with trainer.

19.5 Demonstration of Competency:

- 19.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.
- 19.5.2 Practical Exam: Successful analysis of an ATS product using FCU Standard Operating Procedures.
- 19.5.3 Oral Board - Testing for Amphetamine Type Stimulants (ATS). Trainee must successfully completed an oral board, addressing in detail the following: *ATS drug classification, pharmacology, short/long term effects, plant based stimulants, synthetic stimulants, legal aspects, how to detect ATS in FCU, and any limitations and detection difficulties.*

19.6 Documentation:

- 19.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 19.0 Checklist – Testing for Amphetamine Type Stimulants (ATS)."

MODULE 19.0 CHECKLIST Testing for Amphetamine Type Stimulants (ATS)

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 19.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 19.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 19.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| PRACTICAL EXAM | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully passed practical exam by correctly identifying the presence of an amphetamine type stimulant (ATS) versus a negative control. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 19.0. | | |

Signatures below represent successful completion of Training Module 19.0.

Trainee Date

Trainer Date

Unit Manager Date

20.0 Testing for LSD and Hallucinogens (Mescaline, Psilocybin/Psilocin, Phencyclidine)

20.1 Objectives:

- 20.1.1 Familiarity with the products containing LSD, Psilocybin/Psilocin (Psilocybe Mushrooms) and other substituted tryptamines, Mescaline (Peyote Cactus - Mescal Buttons), as well as other hallucinogenic phenethylamines (2-CB, STP, DOB, TMA, etc., also referred to in section "ATS").
- 20.1.2 Description/recognition of illicit products containing LSD, Psilocybin/Psilocin (Psilocybe Mushrooms) and other substituted tryptamines, Mescaline (Peyote Cactus - Mescal Buttons), as well as other hallucinogenic phenethylamines (2-CB, STP, DOB, TMA, etc.).
- 20.1.3 Illicit production/manufacture of LSD, Psilocybin/Psilocin (Psilocybe Mushrooms) and other substituted tryptamines, Mescaline (Peyote Cactus – Mescal Buttons), as well as other hallucinogenic phenethylamines (2-CB, STP, DOB, TMA, etc.).
- 20.1.4 Chemical compounds, structures and pharmacology of LSD products. Chemical constituents of forensic interest in and pharmacology of Peyote Cactus, Mescal Buttons and Psilocybe Mushrooms, as well as other substituted tryptamines and other hallucinogenic phenethylamines.
- 20.1.5 Legal aspects concerning LSD, Psilocybin/Psilocin (Psilocybe Mushrooms) and other substituted tryptamines, Mescaline (peyote Cactus - Mescal Buttons), as well as other hallucinogenic phenethylamines (2-CB, STP, DOB, TMA, etc.).
- 20.1.6 Familiarity with the protocol for the analysis of LSD products (including physical identification, sampling, extraction, presumptive tests - Color, GC, GC-MS, HPLC, FT-IR, analytical challenges)^(SFP).
- 20.1.7 Familiarity with the protocol for the analysis of Psilocybin/Psilocin (Psilocybe Mushrooms) and other substituted tryptamines (including physical - macroscopic and microscopic characteristics - identification, sampling, extraction, presumptive color tests, TLC, GC, GC-MS, FT-IR, special pitfalls)^(SFP).
- 20.1.8 Familiarity with the protocol for the analysis of Mescaline (peyote Cactus - Mescal Buttons), as well as other hallucinogenic phenethylamines (2-CB, STP, DOB, TMA, etc.) (including physical -

macroscopic and microscopic characteristics - identification, sampling, extraction, presumptive color tests, TLC, GC, GC-MS, FT-IR, special pitfalls)^(L)_{SEP}.

20.2 Reading Material:

- 20.2.1 All technical SOPs (current version)
- 20.2.2 "SWGDRUG Education and Training Outline for Forensic Drug Practitioners", ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015
- 20.2.3 "Terminology and Information on Drugs". UNODC. E 03.XI14 ISBN 92-1-148163-5, Sept. 2003"Recommended Methods for Testing Lysergide (LSD)", UNODC, ST/NAR/17, January 1989
- 20.2.4 "Recommended Methods for Testing Peyote Cactus (Mescal Buttons)/Mescaline and Psilocybe Mushrooms / Psilocybin" UNODC, ST/NAR/19, December 1989
- 20.2.5 "Rapid Testing Methods of Drugs of Abuse". UNODC. ST/NAR/13/Rev. I. Feb.1995
- 20.2.6 "Clarke's Analysis of Drugs and Poisons", A. C. Moffat, M. D. Osselton and B. Widdop (eds.) (2004), 3rd ed., Pharmaceutical Press, London-Chicago

20.3 Study/Discussion Questions:

- 20.3.1 What does PCP stand for?
- 20.3.2 What schedule is PCP?
- 20.3.3 In what form or forms is PCP usually sold?
- 20.3.4 What is the process to analyze PCP liquid? PCP cigarette?
- 20.3.5 What does LSD stand for?
- 20.3.6 Name two ergot alkaloids.
- 20.3.7 What is the common name and the taxonomical name (genus and species) for the mold found on wheat/rye and used to make LSD?
- 20.3.8 What is the starting material for the synthesis of LSD?

- 20.3.9 What does prolonged exposure to UV light do to LSD?
- 20.3.10 What is the process to analyze LSD?
- 20.3.11 In what form is LSD usually sold?
- 20.3.12 What are some challenges or difficulties when analyzing LSD?
- 20.3.13 What schedule is LSD?
- 20.3.14 What is the process to analyze Psilocybin mushrooms?
- 20.3.15 What are some challenges or difficulties when analyzing mushrooms?
- 20.3.16 Do Psilocybin mushrooms have any distinct features?
- 20.3.17 Where can Psilocybin mushrooms be found naturally?
- 20.3.18 What schedule is Psilocybin? What schedule is Psilocin?
- 20.3.19 What is the principal active ingredient of peyote?
- 20.3.20 What is peyote? Describe its physical appearance.
- 20.3.21 Are peyote cacti available legally in the US? Are there exceptions?
- 20.3.22 Define the term indole. Name some common indole hallucinogens.
- 20.3.23 Define the term catechol. Name some common catechol hallucinogens.
- 20.3.24 Where can DMT be found?
- 20.3.25 What is sage/diviner's sage?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

20.4 Practical Exercises/Skills:

- 20.4.1 Receive instruction and demonstration of analyzing hallucinogens by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
 - 20.4.1.1 Description/recognition of illicit products containing LSD, Psilocybin/Psilocin (Psilocybe Mushrooms) and other

- substituted tryptamines, Mescaline (Peyote Cactus - Mescal Buttons), as well as other hallucinogenic phenethylamines (2-CB, STP, DOB, TMA, etc.)
- 20.4.1.2 Illicit production/manufacture of LSD, Psilocybin/Psilocin (Psilocybe Mushrooms) and other substituted tryptamines, Mescaline (Peyote Cactus – Mescal Buttons), as well as other hallucinogenic phenethylamines (2-CB, STP, DOB, TMA, etc.)
- 20.4.1.3 Chemical compounds, structures and pharmacology of LSD products. Chemical constituents of forensic interest in and pharmacology of Peyote Cactus, Mescal Buttons and Psilocybe Mushrooms, as well as other substituted tryptamines and other hallucinogenic phenethylamines
- 20.4.1.4 Legal aspects concerning LSD, Psilocybin/Psilocin (Psilocybe Mushrooms) and other substituted tryptamines, Mescaline (peyote Cactus - Mescal Buttons), as well as other hallucinogenic phenethylamines (2-CB, STP, DOB, TMA, etc.)
- 20.4.2 Observe qualified chemist(s) perform qualitative analysis of hallucinogens using the methods outlined in the FCU SOPs on a minimum of five cases. Observe and review casework note-taking and documentation. On the 30-Day Progress Report form, record the following: case number, qualified analyst(s) observed, date of observation, type of exam and number of items.
- 20.4.3 Demonstrate the techniques to the trainer by performing the following experiments. Record results on worksheets as appropriate and take notes according to laboratory protocol. Trainer must observe trainee perform testing at least once, prior to proceeding to independent exercises.
 - 20.4.3.1 Color Test
 - 20.4.3.1.1 Perform the Mayer's color test on a suspected PCP sample provided by the trainer. Document observed color changes.
 - 20.4.3.1.2 Perform the Cobalt Thiocyanate color test on a suspected PCP sample provided by the trainer. Document observed color changes.
 - 20.4.3.2 GC-MS

20.4.3.2.1 Perform an extraction on a suspected hallucinogen sample provided by the trainer and document results. Perform structural identification on confirm the presence of controlled dangerous substances, if applicable.

20.4.3.3 GC-FID

20.4.3.3.1 Perform an extraction on a suspected hallucinogen sample provided by the trainer and document results. Confirm the presence of controlled dangerous substances, if applicable.

20.4.4 Perform analysis of 5-15 hallucinogen training samples or standards, representative of samples routinely encountered in casework. Use methods outlined in the laboratory FCU SOPs. Document on the 30-Day Progress Report form. Trainer must observe trainee perform marijuana examinations at least once, prior to trainee proceeding to independent exercises. Each practice case should be reviewed and approved by trainer.

20.5 Demonstration of Competency:

20.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.

20.5.2 Practical Exam: Successful analysis of an LSD or Hallucinogens product using FCU Standard Operating Procedures.

20.5.3 Oral Board - Testing for LSD and Hallucinogens (Mescaline, Psilocybin/Psilocin). Trainee must successfully complete an oral board, addressing in detail the following:

20.6 Documentation:

20.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 20.0 Checklist – Testing for LSD and Hallucinogens (Mescaline, Psilocybin/Psilocin)."

MODULE 20.0 CHECKLIST

Testing for LSD and Hallucinogens (Mescaline, Psilocybin/Psilocin, Phencyclidine)

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 20.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 20.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 20.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| PRACTICAL EXAM | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully passed practical exam by correctly identifying the presence of LSD or other hallucinogen versus a negative control. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 20.0. | | |

Signatures below represent successful completion of Training Module 20.0.

Trainee Date

Trainer Date

Unit Manager Date

21.0 Testing for GHB, Benzodiazepines, Barbiturates, and Other Unknown Substances

21.1 Objectives:

- 21.1.1 Familiarity with GHB and pro-drugs (butanediol and GBL)
 - 21.1.1.1 Description/recognition of suspected GHB products
 - 21.1.1.2 Production and use of GHB
 - 21.1.1.3 Methods for confirming the presence of GHB
 - 21.1.1.4 Structures and pharmacology of GHB and GBL
 - 21.1.1.5 Legal aspects concerning GHB and GBL
- 21.1.2 Familiarity with Benzodiazepines
 - 21.1.2.1 Description/recognition of suspected benzodiazepines
 - 21.1.2.2 Trade name information and physical identification of pharmaceutically made benzodiazepines
 - 21.1.2.3 Medical uses and legal aspects concerning benzodiazepines
 - 21.1.2.4 Structures and pharmacology of benzodiazepines
 - 21.1.2.5 Designer benzodiazepines (Etizolam, Flualprazolam, etc.)
- 21.1.3 Familiarity with Barbiturates
 - 21.1.3.1 Description/recognition of suspected barbiturates
 - 21.1.3.2 Trade name information and physical identification of pharmaceutically made barbiturates
 - 21.1.3.3 Medical uses and legal aspects concerning barbiturates
 - 21.1.3.4 Structures and pharmacology of barbiturates
- 21.1.4 Familiarity with Other Unknown Substances
 - 21.1.4.1 GC-MS methods available; Column length, Separation techniques
 - 21.1.4.2 Early vs. late eluting compounds
 - 21.1.4.3 Trouble-shooting and external identification resources/available libraries

21.2 Reading Material:

- 21.2.1 All technical SOPs (current version)
- 21.2.2 FCS20 – Procedure for the Derivatization of GHB (current version)

21.2.3 “SWGDRUG Education and Training Outline for Forensic Drug Practitioners”, ENFSI Drugs Working Group, Ref. Code: DWG-GDL-003, Issue no. 003, October 2015

21.2.4 “Clarke’s Analysis of Drugs and Poisons”, A. C. Moffat, M. D. Osselton and B Widdop (eds.) (2004), 3rd ed., Pharmaceutical Press, London-Chicago

21.3 Study/Discussion Questions:

21.3.1 What was the original medical use of GHB?

21.3.2 Name two analogs of GHB?

21.3.3 GBL and butanediol are known as prodrugs. What does this mean?

21.3.4 Can IR be used to distinguish GHB from GBL?

21.3.5 What is the process to analyze GHB in FCU?

21.3.6 Why is derivatization necessary for the confirmation of GHB by GC-MS

21.3.7 Barbiturates are derived from what compound?

21.3.8 How are barbiturates categorized? What are the categories?

21.3.9 Name three barbiturates.

21.3.10 What are the trade names of the following substances: Diazepam, Flurazepam, Lorazepam, Alprazolam?

21.3.11 List three medical uses of benzodiazepines.

21.3.12 What is the process to analyze benzodiazepines?

21.3.13 Which validated method should be used for identifying steroids or other late eluting compounds?

21.3.14 What are some online resources that can assist with the identification of new or unknown controlled dangerous substances that do not currently exist in a library?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee’s understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

21.4 Practical Exercises/Skills:

- 21.4.1 Receive instruction and demonstration of analyzing GHB, Benzodiazepines, Barbiturates or another unknown substance by qualified chemist(s). This may be completed by a series of lectures/presentations and hands-on exercises.
- 21.4.2 Observe qualified chemist(s) perform qualitative analysis of GHB, Benzodiazepines, Barbiturates, or other unknown substances using the methods outlined in the FCU SOPs on a minimum of five cases. Observe and review casework note-taking and documentation. On the 30-Day Progress Report form, record the following: case number, qualified analyst(s) observed, date of observation, type of exam and number of items.
- 21.4.3 Demonstrate the techniques to the trainer by performing the following experiments. Record results on worksheets as appropriate and take notes according to laboratory protocol. Trainer must observe trainee perform testing at least once, prior to proceeding to independent exercises.
 - 21.4.3.1 Physical Identification
 - 21.4.3.1.1 Perform physical identification using approved resources to presumptively identify a pharmaceutical imprint provided by the trainer. Document imprint and resource used.
 - 21.4.3.2 Color Test
 - 21.4.3.2.1 Perform the Marquis color test on a suspected Benzodiazepine (or unknown powder) sample provided by the trainer. Document observed color changes.
 - 21.4.3.2.2 Perform the Cobalt Thiocyanate color test on a suspected Benzodiazepine (or unknown powder) sample provided by the trainer. Document observed color changes.
 - 21.4.3.3 GC-MS
 - 21.4.3.3.1 Perform an extraction on a suspected benzodiazepine (or unknown powder) sample provided by the trainer and document results. Perform structural identification on confirm the presence of

controlled dangerous substances, if applicable.

21.4.3.4 GC-FID

21.4.3.4.1 Perform an extraction on a suspected benzodiazepine (or unknown powder) sample provided by the trainer and document results. Confirm the presence of controlled dangerous substances, if applicable.

21.4.4 Perform analysis of 5-15 training samples or standards (GHB, benzodiazepines, barbiturates, or other unknown substance), representative of samples routinely encountered in casework. Use methods outlined in the laboratory FCU SOPs. Document on the 30-Day Progress Report form. Trainer must observe trainee perform marijuana examinations at least once, prior to trainee proceeding to independent exercises. Each practice case should be reviewed and approved by trainer.

21.5 Demonstration of Competency:

21.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.

21.5.2 Practical Exam: Successful quantitative analysis of a heroin sample using FCU Standard Operating Procedures.

21.5.3 Oral Board Exam – Testing for GHB, Benzodiazepines, Barbiturates, and Other Unknown Substances. Trainee must successfully complete an oral board, addressing in detail the following: drug classification, drug schedule, effects (short and long term), and testing methods for GHB, Benzodiazepines, Barbiturates, and Other Unknown Substances. Oral Board shall include FCU specific trends for each of the mentioned substances in addition to an overview of how to use available resources to identify controlled substances new to FCU.

21.6 Documentation:

- 21.6.1 Completion of the tasks in this module will be documented on the checklist titled “Module 21.0 Checklist – Testing for GHB, Benzodiazepines, Barbiturates, and Other Unknown Substances.”

MODULE 21.0 CHECKLIST

Testing for GHB, Benzodiazepines, Barbiturates, and Other Unknown Substances

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 21.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 21.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 21.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |
| PRACTICAL EXAM | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully passed practical exam by correctly identifying the presence of GHB, Benzodiazepine, Barbiturate, or Other Unknown Substance. | | |
| ORAL BOARD | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the oral board for Module 21.0. | | |

Signatures below represent successful completion of Training Module 21.0.

Trainee Date

Trainer Date

Unit Manager Date

22.0 Case Documentation

22.1 Objectives:

- 22.1.1 Familiarity with CDS Worksheet.
- 22.1.2 Familiarity with FCU Report Template.
- 22.1.3 Familiarity with LIMS Procedures (current software).
- 22.1.4 Familiarity with Chain of Custody.

22.2 Reading Material:

- 22.2.1 FCU Technical SOPs (current revisions)

22.3 Study/Discussion Questions:

- 22.3.1 What documentation goes in a completed case report?
- 22.3.2 What is the order of documentation?
- 22.3.3 How do you sign an electronic case report?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

22.4 Practical Exercises/Skills:

- 22.4.1 Understand general casework documentation, organization and content by observing qualified chemist(s) take notes during casework. Types of cases should include qualitative and quantitative analysis. Obtain copies of worksheets to study and refer to if necessary.
- 22.4.2 Understand general reporting format by observing qualified chemist(s) complete a case report packet. Types of cases should include qualitative and quantitative analysis. Obtain copies of completed case packets to study and refer to if necessary.
- 22.4.3 Submit at least ten completed practice case packets to trainer for review and approval. Each packet should include all relevant documentation and organized according to FCU procedures.

22.5 Demonstration of Competency:

- 22.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training

binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s). The trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the trainee.

22.6 Documentation:

- 22.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 22.0 Checklist – Case Documentation."

MODULE 22.0 CHECKLIST Case Documentation

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 22.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 22.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 22.0, noted the results in their training binder and results were reviewed by the trainer for accuracy. | | |

Signatures below represent successful completion of Training Module 22.0.

_____ Date

Trainee

_____ Date

Trainer

_____ Date

Unit Manager

23.0 Technical/Administrative Review

23.1 Objectives:

- 23.1.1 Develop and demonstrate an understanding of how to properly conduct technical and/or administrative reviews in accordance with the requirements of the Forensic Chemistry Unit Quality Assurance Manual and Standard Operating Procedures.

23.2 Reading Material:

- 23.2.1 FCU Quality Assurance Manual (QAM)
- 23.2.2 FCS06 – Reviewing Reports (current revision)
- 23.2.3 FCF02 – FORM FCU PACKET REVIEW (current revision)

23.3 Study/Discussion Questions:

- 23.3.1 Define technical review.
- 23.3.2 Who is authorized to conduct a technical review?
- 23.3.3 Define administrative review.
- 23.3.4 Who is authorized to conduct an administrative review?
- 23.3.5 What documentation must be completed for both technical and administrative reviews?

Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the trainee's understanding of topics covered in this module. It is the discretion of the trainee to answer questions for their training binder.

23.4 Practical Exercises/Skills:

- 23.4.1 Receive instruction and demonstration from qualified personnel in the administrative and/or technical review process of casework reports and documents in accordance with laboratory policy. This may be completed by a series of lectures/presentations and hands-on exercises. Trainee will record notes in training binder.
- 23.4.2 Observe qualified chemist(s) perform technical and administrative review process on at least five case reports. Observe procedure and note the forms (technical and administrative checklists) used during the process. On the 30-Day Progress Report form, record the following:

case number, qualified chemist(s) observed, date of observation, type of exam and number of items.

- 23.4.3 As applicable, trainee must conduct five supervised administrative reviews on case files and documents consisting of various types and complexities routinely performed by the FCU. Reviews will be documented on the "Supervised Technical/Administrative Review Worksheet" (Document Control Number 13202).
- 23.4.4 As applicable, trainee must conduct 5 - 10 supervised technical reviews on case files consisting of various types and complexities routinely performed by FCU. Reviews will be documented on the "Supervised Technical/Administrative Review Worksheet" (Document Control Number # 13202).

Note: Throughout the training program, the Trainee is expected to gather case notes and reports of qualified individuals to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As the Trainee progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

23.5 Demonstration of Competency:

- 23.5.1 Practical exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 23.5.2 The Trainee must successfully complete an unsupervised administrative review competency test prior to approval to perform independent administrative reviews.
- 23.5.3 The Trainee must successfully complete an unsupervised technical review competency test prior to approval to perform independent technical reviews.

23.6 Documentation:

- 23.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 23.0 Checklist – Technical/Administrative Review".

MODULE 23.0 CHECKLIST Technical/Administrative Review

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 23.0. | | |
| STUDY/DISCUSSION QUESTIONS | | |
| | Trainee Initials & Date | |
| Trainee has the ability to answer study/discussion questions for Module 23.0. | | |
| PRACTICAL EXERCISES/SKILLS | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises for administrative review in Module 23.0, noted the results in their training binder, and results were reviewed by the trainer for accuracy. | | |
| COMPETENCY TEST | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the administrative review competency test for Module 23.0. | | |
| Trainee has successfully completed the technical review competency test for Module 23.0. | | |

Signatures below represent successful completion of Training Module 23.0.

_____ Date

Trainee

_____ Date

Trainer

_____ Date

Unit Manager

24.0 Legal Overview/Expert Testimony/Mock Trial

24.1 Objectives:

- 24.1.1 To gain familiarity with courtroom etiquette and to gain experience in presenting scientific results in accurate but non-technical terms in a court of law.
- 24.1.2 The trainee should have an understanding of the principles of courtroom etiquette and presentation of evidence, which may include but are not limited to the following:
 - 24.1.2.1 Courtroom demeanor and attire
 - 24.1.2.2 Courtroom procedures and rules
 - 24.1.2.3 Rules of evidence packaging and handling in the courtroom setting
 - 24.1.2.4 Chemist qualifications
 - 24.1.2.5 Technical testimony
 - 24.1.2.6 Discovery issues
 - 24.1.2.7 General guidelines and Frye and Daubert hearing procedures
 - 24.1.2.8 Ethical responsibilities of the expert witness
 - 24.1.2.9 Appropriate public speaking etiquette
 - 24.1.2.10 Significance of accreditation

24.2 Reading Material:

- 24.2.1 Current DFS and PHL administrative policies including DOMs and FSL LOMs regarding court testimony and monitoring.
- 24.2.2 Legal Accountability
 - 24.2.2.1 Bullcoming vs. New Mexico (US S. Ct. 2011)
 - 24.2.2.2 Melindez-Diaz vs. Massachusetts (US S. Ct. 2009)
 - 24.2.2.3 Crawford v. Washington (US S. Ct. 36 2004)
 - 24.2.2.4 Brady vs. Maryland (US S Ct. 1963)
 - 24.2.2.5 Giglio vs. United States (US S. Ct. 1972)
 - 24.2.2.6 Jencks Act (18 USC §3500)
 - 24.2.2.7 Confrontation Clause (6th Amendment, US Constitution)
- 24.2.3 Legal Obligations: Federal Rules of Criminal Procedure
 - 24.2.3.1 Rule 16: Discovery and Inspection
 - 24.2.3.2 Rule 17: Subpoena (ad Testificandum vs. Duces Tecum)
- 24.2.4 Evidence Admissibility

- 24.2.4.1 Fry vs. United States (DC Cir. 1972)
- 24.2.4.2 Fry Standard-General acceptance and be scientifically sound
- 24.2.4.3 Daubert vs. Merrell Dow Pharmaceuticals (US S. Ct. 1993)
- 24.2.4.4 Daubert Standard: Relevance and Reliability
- 24.2.4.5 Prongs of Daubert (Method Criteria for Acceptance):
- 24.2.4.6 Federal Rules of Evidence: 403, 701, 702, 703, 704, 705, 706
- 24.2.4.7 Legal Codes
- 24.2.4.8 Scheduling by Synthetics Abatement and Full Enforcement Drug Control Act of 2015 (“SAFE DC”)
- 24.2.4.9 Title 21 United States Code (USC) Controlled Substances Act
- 24.2.4.10 DC Special Order: Legalization of Possession of Minimal Amounts of Marijuana for Personal Use Initiative of 2015 (D.C. Act 20-565), “Initiative 71”

24.2.5 Organizations

- 24.2.5.1 Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG)
- 24.2.5.2 OSAC Seized Drugs Subcommittee:
<https://www.nist.gov/topics/forensic-science/seized-drugs-subcommittee>
- 24.2.5.3 OSAC Registry: <https://www.nist.gov/topics/forensic-science/organization-scientific-area-committees-osac/osac-registry/osac-approved>

24.3 Study/Discussion Questions:

24.3.1 Complete brief summaries for the following:

- 24.3.1.1 Bullcoming vs. New Mexico (US S. Ct. 2011)
- 24.3.1.2 Melendez-Diaz vs. Massachusetts (US S. Ct. 2009)
- 24.3.1.3 Crawford v. Washington (US S. Ct. 36 2004)
- 24.3.1.4 Brady vs. Maryland (US S Ct. 1963)
- 24.3.1.5 Giglio vs. United States (US S. Ct. 1972)
- 24.3.1.6 Jencks Act (18 USC §3500)
- 24.3.1.7 Confrontation Clause (6th Amendment, US Constitution)
- 24.3.1.8 Grand Jury - True Bill vs. No Bill
- 24.3.1.9 Rule 16: Discovery and Inspection
- 24.3.1.10 Rule 17: Subpoena (ad Testificandum vs. Duces Tecum)
- 24.3.1.11 Fry vs. United States (DC Cir. 1972)
- 24.3.1.12 Daubert vs. Merrell Dow Pharmaceuticals (US S. Ct. 1993)

24.3.1.13 Scheduling by Synthetics Abatement and Full Enforcement Drug Control Act of 2015 (“SAFE DC”)

24.3.1.14 Title 21 United States Code (USC) Controlled Substances Act

24.4 Practical Exercises/Skills:

24.4.1 Observe multiple qualified forensic analyst(s)/technician(s) (as available) testify in court and take notes as to courtroom attire, courtroom procedure (e.g., swearing in, direct, cross, and re-direct and/or re-cross questioning, etc.), evidence handling (if applicable), qualifying questions, technical testimony, and any other pertinent observations. On the FCU 30 Day Progress Report form (Document Control Number: 12397), record the following: case number, qualified analyst(s)/technician(s) observed, date of observation. Prior to testimony observation, perform the following tasks:

24.4.1.1 Review theoretical and practical aspects of the techniques performed during evidence testing for the particular case at hand.

24.4.1.2 Discuss with qualified analyst(s)/technician(s) some potential questions to be asked during qualifications, direct examination, and cross-examination.

24.4.1.3 After the court proceedings, review the testimony with the analyst/technician.

Note: Due to the nature of sporadic opportunities to witness FCU members testifying, the Trainee is encouraged to observe as many testimonies as possible during their training period and document accordingly.

24.4.2 Courtroom testimony question and answer training session with trainer, General Counsel, or designee including but not limited to, the following topics:

24.4.2.1 Qualifying/*Voir dire* questions

24.4.2.2 Direct examination

24.4.2.3 Cross examination

24.4.2.4 Explanation of analytical processes and SOPs

24.4.3 Participate in a comprehensive mock trial(s) to prepare and evaluate the trainee as an expert witness in the field of Forensic Chemistry.

24.4.4 Guidelines for Mock Trial

24.4.4.1 The atmosphere of the trial should be formal. It should be conducted in the same manner as a real courtroom

situation. This includes conduct, protocol, and all other aspects.

24.4.4.2 Harassment of the expert witness by the defense counsel or prosecutor should be kept to the minimum necessary to achieve the desired goal. Questioning by both the prosecutor and defense attorney should be relevant and realistic.

24.4.4.3 The participants can include a judge, prosecutor, and defense. Mock Trials require five (5) evaluators, with four (4) evaluators being subject matter experts and one (1) evaluator being a member of the Training Unit. Each evaluator is required to score the witness using the Mock Trial Scoring Sheet (Document Control Number 7495). Scores will be tallied by each evaluator and combined for a final score. Passing score for a final mock trial is a combined score of 80% or greater.

24.4.4.4 The "attorneys" must be qualified scientists(s), lawyer(s), or suitable individual(s) designated by the FCU Unit Manager/Technical Leader, and/or DFS Training Manager. It is desirable that this person has knowledge in the area in which the trainee will be testifying. PHL Management reserves the right to use attorneys from stakeholder agencies as participants, evaluators, and/or observers to the mock trials.

24.4.4.5 Permitting "observers" is at the discretion of the PHL Director and/or FCU Management. Observers can review and provide feedback to the trainee as to performance; however, they will not be a grading evaluator.

24.4.4.6 Mock Trials may be videotaped and provided to the trainee as a feedback mechanism.

24.4.4.7 Evaluators will orally provide feedback on performance with the trainee immediately following the mock trial. The FCU Unit Manager/Technical Leader will provide feedback in writing of any deficiencies and pass/fail status.

24.4.5 Successfully complete at least one external mock trial.

24.5 Demonstration of Competency:

24.5.1 Successful passing of at least one external mock trial, with a maximum of two mock trials provided.

24.6 Documentation:

- 24.6.1 Completion of the tasks in this module will be documented where applicable on the checklist titled "Module 24.0 Checklist Legal Overview/Expert Testimony/Mock Trial", the Mock Trial Scoring sheet and formal documentation of pass/fail from FCU Unit Manager/Technical Leader.

MODULE 24.0 CHECKLIST Legal Overview/Expert Testimony/Mock Trial

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| READING MATERIAL | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has read all the required readings for Module 24.0. | | |
| PRACTICAL EXERCISES/SKILL | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the practical exercises in Module 24.0, noted the results in their training binder, and results were reviewed by the trainer for accuracy. | | |
| MOCK TRIAL | | |
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the mock trial. | | |

Signatures below represent successful completion of Training Module 24.0.

_____ Date

_____ Date

_____ Date

25.0 Competency Tests

25.1 Objectives:

- 25.1.1 To successfully complete and pass a **qualitative** competency assessment by confirming the presence of a Controlled Dangerous Substance versus a negative control and/or Non-Controlled Substance using FCU Standard Operating Procedures, Methods, and Instrumentation.
- 25.1.2 To successfully complete and pass a **quantitative** competency assessment by determining the purity (%) of Heroin in a submitted sample using FCU Standard Operating Procedures, Methods, and Instrumentation.

25.2 Reading Material:

- 25.2.1 N/A

25.3 Study/Discussion Questions:

- 25.3.1 N/A

25.4 Practical Exercises/Skills:

- 25.4.1 N/A

25.5 Demonstration of Competency:

- 25.5.1 Competency Exam: Successful **qualitative** analysis of a Controlled Dangerous Substance versus a negative control and/or Non-Controlled Substance using standard methods.
- 25.5.2 Competency Exam: Successful **quantitative** analysis of a Heroin sample using standard methods.

25.6 Documentation:

- 25.6.1 Completion of the tasks in this module will be documented where applicable on the checklist titled "Module 25.0 Competency Tests" and formal documentation of pass/fail from FCU Technical Lead (or designee).

MODULE 25.0 CHECKLIST Competency Tests

| | | |
|----------|----------|------------|
| Trainee: | Trainer: | Job Title: |
|----------|----------|------------|

| COMPETENCY TEST | | |
|---------------------------------------------------------------------------------------------|----------------------------|----------------------------|
| | Trainee Initials & Date | Trainer Initials & Date |
| Trainee has successfully completed the qualitative competency test for Module 25.0. | | |
| Trainee has successfully completed the quantitative competency test for Module 25.0. | | |

Signatures below represent successful completion of Training Module 25.0.

Trainee Date

Trainer Date

Technical Lead Date

Unit Manager Date