1 INTRODUCTION

1.1 Purpose

1.1.1 The purpose of this training manual is to familiarize the trainee with the policies and procedures of the Toxicology (TOX) Unit and to prepare the trainee to function as a Forensic Science Examiner within the unit.

1.1.1.1 The term trainee refers to an analyst (however titled) that is expected to show technical competency within their given discipline and is separate from the Connecticut Career Trainee title.

1.1.1.2 This training procedure will be used in conjunction with a personal training plan which outlines specific tasks and goals per module.

1.1.2 After a trainee's successful completion of each training module, individuals gain confidence in the high standards of testing conducted at the laboratory.

1.1.3 Modules below are not all inclusive and additional training may be required at the discretion of the FSE2 or above.

1.1.4 Not all modules may be completed and are dependent on the position of the trainee within the unit. A training plan will be established detailing the exact modules to be completed.

1.1.5 The sequence in which the training is presented in this manual shall not be considered as the mandatory order of instruction and will be dependent on the needs of the unit.

1.1.6 Exposure to legal aspects and testimony will be continuous throughout the individual's training.

1.1.7 For the purposes of this procedure, an analyst is defined as a Forensic Science Examiner, Connecticut Career Trainee, Laboratory Assistant, or other applicable position.

1.2 Training and Learning Objectives

1.2.1 TOX analysts acquire knowledge from many different mediums such as on-the-job training, seminars/lectures, workshops, scientific literature, online learning, and professional conferences.

1.2.1.1 On-the-job training: There will be various components to the training including theoretical, practical, and competency testing.

1.2.1.2 Seminars, lectures, and workshops: Material from lectures, seminars, and workshops will be made available to all TOX analysts.

1.2.1.3 Scientific literature: The analysts should keep current with advances in the field of toxicology and new procedures outlined in scientific literature. New reading materials will be made available to all TOX analysts.

1.2.1.4 Online learning: The analysts will be made aware of online opportunities for training such as webinars or online classes and are encouraged to participate.

1.2.1.5 Professional conferences: Each analyst should attempt to attend conferences related to the field of toxicology when possible.

1.3 Coordination of the Training Program

1.3.1 The training mentor will be a FSE2 or above.

1.3.2 The training mentor will be responsible for the overall training of the analyst but may delegate specific training responsibilities.

1.4 Training Documentation

1.4.1 All training records will be maintained within the unit either hardcopy or electronic.

1.4.2 At the successful conclusion of each training module, the training records (to include but not limited to training checklist, practical exam, written exam, training log and authorization documents) shall be scanned into the QMS.

1.4.3 Analysts may not perform casework on a specific module until an authorization notification has been received.

1.5 Training Period

1.5.1 It is expected that the training period (including modules 1-7) of an analyst should not exceed one year. Module 8 may be completed at any point after the analyst receives their first authorization but prior to testimony in court.

2 COMPETENCY EVALUATION

2.1 Observations of Laboratory Exercises and Activities

2.1.1 Trainees are required to observe authorized analysts, at minimum twice, completing applicable tasks.

2.1.1.1 It is preferred that the trainee observes the training mentor at least once.

2.2 Practical Competency Tests

2.2.1 Practical competency tests shall contain spiked samples (of known identity to the training mentor) and will be administered toward the end of each applicable module.

2.2.2 Practical competency tests are deemed successful when the analyte of interest is correctly identified and applicable quantitative values are within $\pm$ 20% or within the expected measurement uncertainty, whichever is greater.

2.2.2.1 For volatiles analyses, the quantitative values shall fall within $\pm$ 10%.

2.2.2.2 For qualitative assays, the achieved result shall demonstrate conformance with the expected result.

2.2.2.3 For quality control practical competency tests, the achieved result shall demonstrate conformance with the quality control acceptability criteria as stated in the unit Quality Control Manual.

2.2.2.4 For evidence accessioning practical exercises, the achieved result shall demonstrate conformance with the procedures set forth within TX-19.

2.2.3 Unsuccessful practical competency tests shall be reviewed by the training

mentor or above to determine if additional training or if a review of subject material by the trainee is warranted.

2.2.4 If the review of the practical competency tests warrants additional training, the Unit Manager(s) will be notified and additional training shall be administered. The trainee shall successfully complete another practical exercise to demonstrate their ability to perform the task.

2.2.5 If the expected result is not achieved on the second practical competency exercise, the Unit Manager(s) will be notified.

2.3 Written Practical Examinations

2.3.1 A written practical examination is completed as part of the competency evaluation for all modules.

2.3.2 Examinations shall be distributed at the time of evaluation and shall be completed at the laboratory.

2.3.3 Written practical examinations administered as part of TOX competency will be given in a "closed book" format, unless directed otherwise.

2.3.4 Examinations will be graded by the training mentor or above.

2.3.4.1 Written practical examinations require a grade of 80% or better to qualify as successful completion.

2.3.4.2 If 80% or better is not achieved or if there is demonstrated lack of understanding of key concepts, the trainee will be given the opportunity to expand upon their responses verbally (as documented by the training mentor) or in written form.

2.3.4.3 If the explanation or further written form does not satisfactorily resolve the deficiencies identified in the written exam, the Unit Manager(s) will be notified and additional training will be undertaken.

2.3.4.4 Upon completion of additional training, a supplemental exam will be administered.

2.3.4.5 If a score of 80% or better is not achieved on the second written exam, the Unit Manager(s) will be notified.

3 MODULE 1: INTRODUCTION

3.1 Training Objectives

3.1.1 Upon completion of this module, the trainee shall be familiar with:

3.1.1.1 The purpose of the training program including the proposed timeline of training and defined expectations

3.1.1.2 Expectations of the duties as an analyst within the TOX Unit and as an employee within the laboratory

3.1.1.3 The laboratory organization, services and personnel (e.g. Unit, Sections within Laboratory)

3.1.1.4 Other units and their functions within Division of Scientific Services

3.1.1.5 Laboratory Security, Safety and Quality Assurance Manuals, Evidence Control Unit manuals, including those applicable to LIMS

3.1.1.6 The process the laboratory undergoes to achieve/maintain accreditation

3.1.1.7 Procedures used in the TOX Unit, including TOX Protocols and TOX QC procedures

3.2 Required Readings

3.2.1 GL-3 Security Manual

3.2.2 GL-2 Safety Manual

3.2.3 GL-1 Quality Manual

3.2.4 GL-12 Evidence Receiving

3.2.5 GL-13 General Evidence Handling

3.2.6 General Laboratory – LIMS Protocol and User Manual

3.2.7 TOX Unit General SOP (TX-19)

3.2.8 TOX Unit Quality Control Manual (TX-43)

3.2.9 ANAB Guiding Principles of Professional Responsibility for Forensic Service Providers and Forensic Personnel

3.2.10 Other readings as deemed necessary by Training mentor or Quality Manager

3.3 Optional Readings

3.3.1 ISO/IEC 17025:2017 Standards

3.3.2 AR 3125 ISO/IEC 17025: 2017 Forensic Testing and Calibration Laboratories Accreditation Requirements

4 MODULE 2: HISTORICAL OVERVIEW/UNIT OVERVIEW

4.1 Training Objectives

4.1.1 Upon completion of this module, a trainee shall:

4.1.1.1 Know the evolution of modern Forensic Science

- This shall include an introduction to general forensic science through a web-based module, assigned reading, or a presentation by a supervisor.

NOTE: This training is to be provided if the trainee has not previously received this introduction during his/her undergraduate or graduate curriculum.

4.1.1.2 Understand the role of the analyst in a criminal case or investigation

4.1.1.3 Be introduced to the application of ethical practices in forensic science and criminal, civil law and testimony

4.1.1.4 Be able to describe the functions and responsibilities of the TOX Unit within the Laboratory

4.1.1.5 Be familiar with the Evidence Receiving Unit (ERU) Policies and Procedures and the role of ERU within the laboratory

4.1.1.6 Be familiar with literature references available to the TOX Unit

5 MODULE 3: QUALITY CONTROL / EVIDENCE HANDLING

5.1 Training Objectives

5.1.1 Upon completion of this module, the trainee shall be familiar with:

5.1.1.1 Inventory and ordering Supplies

5.1.1.2 Refrigerators and freezers (temperature logs)

5.1.1.3 Balances and pipettes

5.1.1.4 Accessioning cases

5.1.1.5 Case destruction

5.1.1.6 Reference standards

5.1.1.7 Preparation and verification of calibrators, controls and reagents

5.1.1.8 Levey-Jennings charts

5.1.1.9 Measurement uncertainty

6 MODULE 4: HEADSPACE GC–FID ANALYSIS

6.1 Training Objectives

6.1.1 Upon completion of this module, a trainee shall:

6.1.1.1 Understand the fundamentals of headspace GC-FID volatile analysis on toxicology case specimens related to OUI and non-OUI related cases

6.1.1.2 Provide an understanding of the effects of volatile substances in the body

6.2 Required Readings

6.2.1 Assay-specific Protocol

6.2.2 Ethanol; Principles of Forensic Toxicology, ed. Barry Levine, Fourth Edition, Chapter 13.

7 MODULE 5: SERUM CONVERSIONS

7.1 Training Objectives

7.1.1 Upon completion of this module, a trainee shall understand:

7.1.1.1 The theory behind the equation used for the conversion of a serum ethanol value to a blood ethanol value

7.2 Required Readings

7.2.1 Assay-specific Protocol

7.2.2 M.T. Barnhill, Jr., D. Herbert, D.J. Wells, Journal of Analytical Toxicology, Vol. 31, January/February, 2007

7.2.3 P.M. Rainey, Relation Between Serum and Whole-Blood Ethanol Concentrations, Clin. Chem., 39/11, 2288-2292, 1993

7.2.4 R.C. Charlebois, M.R. Corbett, J.G. Wigmore, Comparison of Ethanol Concentrations in Blood, Serum, and Blood Cells for Forensic Application, J. of Anal. Toxicology, Vol. 20, May/June, 1996.

8 MODULE 6: LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY/MASS SPECTROMETRY (LC-MS/MS) to include High Resolution Accurate Mass.

8.1 Training Objectives

8.1.1 Upon completion of this module, the trainee shall be familiar with:

8.1.1.1 Types of LC-MS/MS used in the TOX unit and how they are used

8.1.1.2 Make and Model of the instrumentation used in the TOX unit

8.1.1.3 Use and operation of the instrumentation that is used in the TOX unit

8.1.2 Upon completion of this module the trainee shall understand:

8.1.2.1 The theory and operation of the LC-MS/MS

8.1.2.2 The components of the LC and the function of each, including:

- Injection Site
- Pump Components
- Mobile Phase
- Columns (Biphenyl, poroshell, C18)

8.1.2.3 Chromatography type (normal phase and reverse phase)

8.1.2.4 The components of the MS/MS and the function and theory of each, including:

- Interfaces
- Ionization methods
- Mass analyzers

- Detector
- Vacuum systems
- Data system

8.1.2.5 The difference between LC/MS/MS and HRAM LC/MS

8.1.2.6 The QA/QC procedures and when they should be performed

8.1.2.7 How to and be able to perform QC

8.1.2.8 Basic maintenance/troubleshooting

- Trainee shall also observe routine maintenance whenever possible

8.2 Optional Readings

8.2.1 Instrument operating manuals

8.2.2 Chromatography; Principles of Forensic Toxicology, ed. Barry Levine, Fourth Edition, Chapter 9.

8.2.3 Mass Spectrometry; Principles of Forensic Toxicology, ed. Barry Levine, Fourth Edition, Chapter 11.

9 MODULE 7: BREATH ANALYSIS

9.1 Training Objectives

9.1.1 Upon completion of this module, a trainee shall understand:

9.1.1.1 The fundamentals of the Breath Analysis Unit (BAU) including the operation and theory of the Draeger 9510 instrument

9.1.2 Upon completion of training, an analyst shall:

9.1.2.1 Assist in the presentation and training of new Draeger 9510 instructors

9.2 Required Readings

9.2.1 Assay-specific Protocol

9.2.2 State of Connecticut Alcotest 9510 Supervisor's Manual

9.2.3 *Commonwealth v. Evando Ananias, Christian Figueroa, and Others*

9.2.4 *Fernschild v. Commissioner of Motor Vehicles*

9.2.5 *Pajonas v. Commissioner of Motor Vehicles*

9.2.6 *Piel v. Commissioner of Motor Vehicles*

9.2.7 *State v. Barone*

9.2.8 *State v. Pilotti*

10 MODULE 8: MOOT COURT

10.1 Training Objectives

10.1.1 Analysts will train to provide testimony and will understand the standard of care when expressing and conveying opinions and conclusions.

10.1.2 To understand the role of the expert witness if court testimony is needed.

10.1.3 When possible, the analyst will observe a unit analyst during courtroom testimony.

10.2 Case Testimony

10.2.1 Provide moot-court experience, using a TOX case to prepare for case testimony.

10.2.2 Laboratory personnel may serve as both prosecution and defense attorneys.

10.2.3 Experience may include voir dire, direct testimony, cross, re-direct and re-cross.

10.2.4 Review and documentation of outcome by Unit Section Supervisor with analyst.

11 MODULE 9: EXAMPLE TRAINING PLAN

11.1 See TX 44.1