A. **PURPOSE**:

Employees assigned to the Controlled Substance laboratory are expected to become competent in all the analysis performed within the unit. Training will allow the Supervisor and Deputy Director to assess the ability of new employees to: follow laboratory SOPs, analyze case materials, use instrumentation, make logical assessments of findings, and write laboratory reports.

B. **RESPONSIBILITY**:

Analysts assigned to the Controlled Substance section.

C. **SAFETY**:

Proper PPE must be worn whenever handling seized drug evidence; this is a minimum of gloves and a laboratory coat. Universal safety precautions will be used.

Sources of biological threats include:

Hypodermic needles, broken glass pipes and razors which can puncture the skin

Evidence seized through body cavity searches

Sources of chemical threats include:

Drugs which absorb through the skin including PCP, LSD and Fentanyl

Chemicals used in extractions (MSDSs available for proper handling)

D. **GENERAL INFORMATION**:

1. Training needs to be addressed at two levels in this section. First, there can be new hires that have little to no practical experience in the field of Drug Chemistry as it pertains to forensic science and secondly there can be those that transfer to the section or return to the section from another forensic field. In the first case full training will be required with detailed information at all levels. In the second case purely an introduction (or reintroduction) to the specific methods of the laboratory need be concentrated on. The Deputy Director will guide the section Supervisor in the level of training required in this cases based on the individuals experience.

E. **PROCEDURE**: (New Employees)

1. General:

a. It is recognized that in the Controlled Substance section there is a wide variety of sample matrices which may be submitted for analysis. The training for this section will concentrate on the basic sample types and the most commonly used analyses. Once being deemed competent in the basic laboratory analysis, new employees will gain experience with other case materials by working with analysts trained in the specific analysis. It is expected that the general training will take approximately three months for an employee with no prior controlled substance analysis experience and less for those with experience.
   This training information is based on a new employee with no Controlled Substance analysis experience. It is the right of the Deputy Director to modify this training after assessing new employee's previous experience.

b. The section supervisor or designee will assign the employee a workspace and orientate them to the Controlled Substance section. This is to include location of instrumentation, solvents, office equipment, and other needed supplies.

c. The analyst's workspace will include a locked cabinet in which they will be issued the key.
d. The section supervisor or designee is responsible to assure that as training is performed, the Training Outline is kept up to date with the trainer, and trainee initialing and dating the specific topics as appropriate.
e. The section supervisor or designee is responsible to assure that the trainee is given adequate time to read all issued documents and reference materials; including all section SOPs.
f. The section supervisor or designee will introduce the trainee to the CT state statutes and federal controlled substances act that govern the laboratories work.
g. The supervisor or designee will familiarize the trainee with the levels of control and why drugs are placed into specific categories.
h. The section supervisor or designee will obtain a logon for the Justice Trax system for the trainee
i. The section supervisor can choose to perform all training themselves or to designate a trainer for specific methods.
j. The section Supervisor will arrange for General Laboratory training to be performed by the Quality Section

2. **Trainer Responsibilities/Supervisor**:
   i. To train the new employee using the laboratory SOPs
   ii. Document the training, turning all documentation over to the section supervisor as generated for review.

iii. Use the training outline initialing and having the trainee initial sections (topics) as appropriate.
iv. Give the trainee access to all needed references
v. To train the trainee in the proper controls and or calibrators for each discipline
vi. To keep the section supervisor appraised of trainees progress

3. **Demonstration of Competency**; new employees will demonstrate competency in each individual discipline prior to independently analyzing case materials. In general competency will be demonstrated by passing a written and practical examination for the individual methods.
    i. Competency examinations will be made up and administered by the Quality Manager or Laboratory Director or their designee. It is the Deputy Director's discretion to forgo a written test for a verbal interview with the analyst to assess the analyst's understanding of a specific topic. In the case of a verbal interview the interview will be documented with the Deputy Directors comments. This will include a list of topics covered and a comment indicating that the trainee did or did not have an understanding of the topic(s) covered.
        (a) Practical examinations; substances must be identified correctly using the laboratory's SOPs. Incorrect sample identification, improper application of a SOP or improper analyses are reasons for not passing a practical examination.
        (b) Written examinations; in general a score of 80% is passing with incorrect responses being reviewed with the trainee.
    ii. There are certain minor disciplines such as determination of solubility and microscopic examination in which competency will be demonstrated directly to the trainer though direct observation, no testing will be required.
    iii. Upon completion of the basic training the section supervisor will review all the training documentation and either recommends, to the Deputy Director or designee, that the trainee is competent for independent case analysis or that further training be performed.
    iv. It is the Deputy Director's or designee's discretion to complete a Certificate of Competency in Controlled Substance Analysis on an employee upon completion of all written and practical components of the Controlled Substance section training.

4. **General Laboratory Policies;** the supervisor or designee will explain general laboratory policies to the trainee. This can be an overall discussion with specific training occurring as appropriate. Topics to include:
    a. Documentation of chain of custody at all stages of case work
    b. The 2 person analyst/witness system
    c. Inventorying cases and documentation discrepancies
    d. Admittance into secured areas

e. The use of blue ink for original documents preferred (avoid black ink)
f. Not using pencils on case records (ink only)
g. Storage of case materials including whole cases and isolated case aliquots and the Two lock system for evidence storage locations

5. **Evidence receipt and handling**; although the analyst will not be assigned cases until deemed competent by the Deputy Director or designee the analyst will shadow the trainer in this function.
    i. The trainee will observe evidence transfers within the section and between evidence receiving and the CS section.

6. **Introduction to case work**:
    a. **General:** the trainee will observe the trainer as they work through cases. This is to give the trainee the overall picture of how cases flow from evidence storage to the analyst, through analysis and reporting, to the technical review, and back to evidence storage.
        i. The trainer will review the opening and sealing (closing) of case materials, daily storage of cases and the handling of portions of cases.
        ii. The use of labels, what to label and how.
            (a) A trainee will not act as a case witness until the Deputy Director or designee assesses and documents the trainees understanding of the section.

    b. **Justice Trax** (JT): The analyst will be assigned a login to the JT system and have access to test cases to become familiar with the system. Training for this will be a general explanation of the system with the trainer showing them the various functions. It is understood that the training for the Justice Trax system will be on going with the individual learning various areas of the system as they are needed for the work they are performing.
        i. Goal: To have the trainee comfortably navigating the various sections of the Justice Trax software allowing them to independently write case reports.
    c. **Writing Laboratory Notes**: Laboratory notes are taken on all cases in this section. The trainer will introduce the trainee to the proper forms to use and stress the need for these notes to be legible and for them to allow a technical reviewer to follow their path through the case.
    d. **Case Types:** As the trainer goes through case materials they will explain the various types of cases seen in the section:
        i. Rock
        ii. Powder
        iii. Botanical Material (marihuana, mushrooms, and synthetic cannabinoids)
        iv. Cigars/Cigarettes
        v. Tablets

vi. Residues – drug paraphernalia
vii. Liquids and Food stuff
viii. Blotter paper
(a) **Goal:** To have the trainee understand the evidence flow in the laboratory including chain of custody, use of Justice Trax for chain of custody and report writing, use of case notes and the general recognition of types of cases in the laboratory.

e. **Weighing Case Materials:** The trainee will read the SOP titled 'Weight Determination of Seized Evidence' SOP CS-5. Any questions will be directed to the trainer or the section supervisor. The trainer will use this SOP to train the trainee.
i. The trainer will explain;
(a) which cases get weighed and the manner of weighing the cases (direct, with packaging, calculated)
(b) the criteria weights based on Connecticut state laws
(c) the use of the balances, on/off, the tare feature, the use of significant figures and the proper forms to use for specific cases
(d) Reporting weight values
(i) Reporting weights for items analyzed and for groups of like items
(e) Calculating uncertainty, including when uncertainty must be reported
ii. Training can include
(a) use of known weights (such as varying numbers of paper clips in a bag) being weighed independently
(b) weight of trainer case materials with direct supervision
(i) Goal: To have the trainee understand the weight based criteria for case materials, to properly use analytical balances with the daily control and to properly report weights.

f. **Sample Collection and Preparation**: For this training, the analyst will first read through the SOPs titled 'General Case Handling' SOP CS-1 and 'Analysis by Sample Matrices' SOP CS-4. Any questions will be directed to the trainer or the section supervisor.
i. Goal: To have the trainee recognize case types and understand the appropriate sampling for the sample type while also being able to prepare samples for analysis as needed.
ii. The trainer will discuss case types, sampling plan and sampling procedures (note as other sample types arise with new analysts, they will be trained on those separately).
(a) Plant material- extraction
(b) Tablets –collection and possible need for extraction
(c) Rock/Powder-collection
(d) Residues –rinse and collection

(e) Cigars/Cigarettes – rinse and collection

g. **Microscopic Examination:** Performed on plant material expected to be marihuana. The trainer will show the trainee how to utilize the MiScope to look for cystolithic hairs on the plant material and to print the associated pictures form the device. The trainer will explain the significance of this anatomical feature to the trainee.
   i. To show understanding and competence of this, the trainee will demonstrate to the trainer that they can use the MiScope and identify cystolithic hairs and print the associated pictures. The trainer will view all pictures after the trainee, until they are comfortable that they are able to correctly identify this feature. If possible the trainer should select positive and negative samples for the trainee to observe and differentiate.

h. **Solubility in Water:** Performed on suspected cocaine samples to distinguish the two forms (salt from free base). The trainer will explain that free base analytes are not soluble in water and that salt forms are. They will also discuss what it means when samples are partially soluble.
   i. The trainee will perform the test on the trainer's case materials. The trainee will verbally report the result to the trainer who will visually confirm this.

7. **Confirmatory Tests**: In this section GC/MS and FTIR are the confirmatory methods used the majority of the time.
   a. **GC/MS**: It is recognized that an analyst can have various levels of expertise on this instrument. Initially the trainee will be given the theory behind the instrument, how to manipulate the software to run samples, and finally how to analyze the data. This basic level of training will allow the analyst to analyze case materials and to represent the findings in court.
      i. Goal: To have the trainee become competent to perform the daily instrument set-up, prepare samples for qualitative and quantitative analysis, set-up sequences, run appropriate controls and/or calibrators, print out reports and interpret data independently; also allowing the analyst to testify in court on the findings and the instrumentation used.
      ii. It is expected that an analyst, using this instrument, will become competent in the upkeep and maintenance of the instrument. This will occur over time, with on the job training. Eventual proficiency will allow for the manipulation of different parameters for specific case needs.
      iii. The trainee will read SOP 'Gas Chromatography/Mass Spectrometry' SOP CS-7 and 'Quantitation of Controlled Substances and Other Drugs' SOP CS-12. Any questions should be directed to the trainer or the section supervisor.
      iv. The trainer will introduce the trainee to:

(a) Instrument theory with a stress on using the instrument tutorial as a guide
(b) the instrument soft ware
(c) explain temperature programs – specifically the differences in those used by the laboratory
(d) daily instrument setup, determining acceptability for use
(e) sample sequences
(f) sample preparation
(g) SCAN mode v. SIM mode
(h) Qualitative v. Quantitative
(i) Laboratory quantitative methods
(j) Data retrieval, understanding retention and relative times, and spectral fragmentation

b. Training exercises can include:
   i. reviewing data files and printing reports based on their understanding of the peaks of importance
   ii. the trainee can be issued fake case samples to prepare, build a sequence for, run and interpret the data
   iii. as the trainer is confident in the trainee's abilities, they can allow the trainee to set-up case samples under direct supervision
   iv. The trainee can repeat quant runs previously analyzed by the trainer
      (a) Competency in this instrumentation method will be demonstrated as listed above and with the approval of the Deputy Director.
   v. References (additional)

Clark's Isolation and Identification of Drugs in pharmaceuticals, body fluids, and post mortem materials; The Pharmaceutical Society of Great Britain, specifically chapters on GC/MS

Instrumental Data for Drug Analysis; 2nd edition volumes 1-4, Terry Mills III and J. Conrad Roberson

GC/MS Tutorial Discs
The Drug Identification Bible

8. **FTIR:** The FTIR is a confirmatory instrument used primarily to distinguish Cocaine free base from Cocaine salt form. This instrument may non-routinely be used for other analysis such as Nitrous oxide detection. This training will be dedicated to the cocaine free base determination.
   a. Goal; to have the trainee competent in the overall workings of the FTIR including set up, running samples, and theory. This will allow the analyst to independently operate the instrument, report findings, and testify in court on the findings and instrumentation used.
   b. The trainee must read the SOPs titled 'Fourier Transfer Infrared Spectrophotometer: Use and Maintenance' SOP CS-8. Any questions are to be directed to the trainer or the section supervisor.

c. The trainer will introduce the trainee to:
   i. Instrument theory
   ii. Sample preparation
   iii. Instrument set-up including monthly validation and daily control
   iv. Instrument soft ware
   v. Running samples under the spectrum program
   vi. Differentiation of Cocaine salt form from free base
   vii. Interpreting data
   viii. Training exercises can include
      (a) the trainee running portions of previously analyzed case materials independently to gain familiarity with the software and reports
      (b) running blind samples including blanks

d. Competency in this instrumentation method will be demonstrated as listed above and with the approval of the Deputy Director.

e. References; Operating the Perkin-Elmer Spectrum 1000 FT-IR Spectrophotometer, operators' manual.

   i. Spectrum BX FT-IR User's Guide; Perkin-Elmer, 1998
   ii. Spectrum BX FT-IR Help Topics; Instrument Validation.
   iii. Spectrum BX FT-IR Help Topics; Performing an instrument validation
   iv. Clark's Isolation and Identification of Drugs in pharmaceuticals, body fluids, and post-mortem materials, The Pharmaceutical Society of Great Britain. Specifically chapters on Infra red spectroscopy

9. **Retrieving Standards and Standard Validation**: The trainee will read the SOP titled 'Storage and Use or Controlled Substance Standards' SOP CS-11 and 'Reagents and Standards' SOP CS-3. Any questions will be directed to the trainer or section supervisor.
   a. The trainer will introduce the trainee to:
      i. The standard safe and refrigerator and how to retrieve standards
      ii. The paperwork which is maintained for the standards
      iii. The non-controlled standards storage area
      iv. Preparing standards
      v. The validation of qualitative standards by GC/MS
      vi. The validation of quantitative standards by UV and GC/MS
      vii. The use of the validation system
      viii. The Deputy Director or designee will determine when full access (i.e. the combination to the safe) will be given to the trainee.

10. **UV Spectrophotometer:** This instrument is primarily used to validate quantitative standards. The trainee will read the SOP titled 'Ultraviolet Spectrometer' SOP CS-9. any questions are to be directed to the trainer or section supervisor. Note: The use of this instrument is rare and the training on this will not necessarily be performed with the initial training.
    a. The trainer will introduce the trainee to;
    b. The sample preparation
    c. The extinction coefficient and how to find these in Clark's
    d. Instrument set-up
    e. Running the instrument
    f. Interpretation of data, calculation of quantitative value
    g. **References;**
        i. Shimadzu UV-2450/2550 Instruction Manual
        ii. Shimadzu Instruction Manual UV 2401PC/2501PC User's System Guide
        iii. Clark's Isolation and Identification of Drugs in pharmaceuticals, body fluids, and post-mortem materials, The Pharmaceutical Society of Great Britain.

11. **Case Reporting**: Reports are generated on all cases handled in the laboratory.
    a. Goal, to have the trainee independently write and generate case reports through the Justice Trax system
    b. The trainer will introduce the trainee to the Justice Trax system
    c. The trainer will familiarize the trainee with the items which must be included in the report by state statute, evidence description, methods performed, analytical findings including weights and items analyzed.
    d. Training can include
        i. The trainee can work on test cases entering descriptions, results and reviewing reports
        ii. The trainee can review old case files to see how varying cases are reported

12. **Mock Case**: Upon completion of training the trainee will be given a minimum of one mock case prepared by the section Supervisor or designee with guidance from the Deputy Director. The case(s) must represent typical section cases. The case(s) may be made of standard reference materials, previously analyzed proficiency materials or other materials as is deemed fit to the purpose (see CS-13.3).

    a. The trainee will independently analyze the case with any questions being directed only to the section supervisor. The case will be handled as though a real case from beginning to end. The trainee should consult any section SOPs to assure that the methods are being followed. When complete the trainee will turn the case materials, evidence and file back to the section supervisor for review.

b. Grading of the case will be pass/fail with the review being performed by the section supervisor, Deputy Director, or their designee.
   i. Non-fatal errors may include, but are not limited to typographical errors, math errors (that are typographical in nature), or forgetting to initial a single case page.
      (a) Note: Since attention to detail is essential, more than 3 "non-fatal" errors may be defined as fatal. This decision will be made by the Deputy Director in conjunction with the trainer.
   ii. Fatal errors may include, but are not limited to, not following SOPs, incorrect or illogical conclusions, incorrect reporting, improper case labeling or math errors that are due to incorrect or illogical pathways.
   iii. If successfully completed, the trainee will then have moot court based on the mock case.
   iv. If not successfully completed the section supervisor and Deputy Director will implement further training in the areas found to be weak in the mock case. When this additional training is completed a new mock case will be issued to the trainee.

c. The final decision of competency will be at the discretion of the Deputy Director. It is possible to have an individual pass a mock case challenge however the Deputy Director or designee may determine that further experience is needed prior to independent case analysis.

13. **Court Room Training**: This training should include the Deputy Director, , section supervisor and other designed employees as needed.
   a. Goal: The goal of this training is to give the trainee confidence to represent the work performed in a manner which is truthful and helpful to the courts.
   b. As appropriate the trainee will go to court with a trained analyst and observe the proceedings
   c. A general list of typical questions will be given to the analyst. They will review these and answer them verbally with the section supervisor or Deputy Director. The topics covered and results of training will be documented in a memo for the training file.
   d. A moot court will be held to challenge the trainee and prepare them for what they might face in court. This will include all aspects such as proper dress, to preparing a case file, and testimony.
   e. The trainee will include:
      i. General courtroom etiquette
      ii. Only answer questions truthfully
      iii. Being non-bias
      iv. Do not answer questions outside of their expertise
      v. Do not guess at answers "I don't know" can be acceptable

vi. Dress appropriately, males in a coat and tie and females in professional business attire. Not to wear items with affiliations including professional affiliations.
vii. To remove their badge before appearing at court
viii. Supplying the prosecution and defense attorneys with court review forms

f. All new employees will have an observer review their first court appearance. This will be done by the section supervisor, the Laboratory Directors, or other competent analyst designated by the Deputy Director.

14. **Competency**:
The trainee will be given a certificate of competency upon successful completion of the mock case(s) and the mock trial at the discretion of the Deputy Director. Upon receipt of this certificate the analyst is deemed capable of performing case analyses and reporting results independently in the analysis included in the training.

15. **Training Records**:
The section Supervisor is responsible to maintain original training documents including the training checklist, training exercises and mock case results. The section supervisor is responsible to forward documentation of the trainee's competency to the Quality Section (such a copy of the training checklist and the Deputy Directors approval). The Quality section will obtain a letter of authorization for the trainee from the Director. Copies will be supplied to the Deputy Director, the trainee, and the trainee's personnel file.

Training records will be maintained for the length of the trainee's employment plus 30 years (per state record retention guidelines).