
Technical Procedure for Clandestine Laboratory Analysis

1.0 Purpose - To provide the Forensic Scientist with guidance on the chemical analysis of items and samples related to suspected clandestine laboratory.

2.0 Scope - This procedure applies to Forensic Scientists in the Drug Chemistry Sections of the State Crime Laboratory.

3.0 Definitions

- **Certified Responder** – A Forensic Scientist who has successfully completed a clandestine laboratory certification program and who has maintained annual recertification status.
- **Clandestine Laboratory** – an illicit operation consisting of a sufficient combination of apparatus, chemicals, and/or precursors that either has been or could be used in the manufacture, synthesis, and/or production of controlled substances.
- **Immediate precursor** – a substance which is the principal compound commonly used or produced primarily for use and which is an immediate chemical intermediary used or likely to be used in the manufacture of a controlled substance.
- **Theoretical yield** – the quantity that would be produced at any appropriate phase of production based upon the quantity of material to be used in the absence of any loss or error in actual production.

4.0 Equipment, Materials and Reagents - See Section technical procedures as needed.

5.0 Procedure

5.1 Standards and Controls - N/A

5.2 Calibrations - N/A

5.3 Sampling - See the Drug Chemistry Section [Administrative Procedure for Sampling](#) and the Drug Chemistry Section [Technical Procedure for Drug Chemistry Analysis](#).

5.4 Evidence Handling and Documentation

5.4.1 Forensic Scientists in the drug chemistry section, who are certified responders, may be called upon to assist with the processing of clandestine laboratory sites, and may include the sampling, collection, or preservation of evidence.

5.4.2 Upon return from a clandestine laboratory site, the responding Forensic Scientist will complete the [Technical Field Assistance \(TFA\)](#) form and submit it to the Evidence Control Section by the end of the next business day after his/her return to the State Crime Laboratory.

5.4.3 The TFA form serves to give the case a Laboratory Case Number and to initiate the chain of custody for any submitted evidence in the Forensic Advantage (FA) System.

5.4.4 Sample(s) from clandestine laboratory sites are submitted for drug chemistry analysis from other agencies. The item(s) shall be prelogged for submission. See the Evidence Control [Procedure for Evidence Submissions](#).

5.4.4.1 Any items collected by the Forensic Scientist shall be turned over to the agency for submission to the laboratory.

- 5.4.5 Within 48 hours of his/her return to the Laboratory, the responding Forensic Scientist shall provide a copy of his/her field notes to the SBI Site Safety Officer and the requesting officer.

5.5 Clandestine Laboratory Cases in the FA System

- 5.5.1 There shall be two different case records created in the FA System in the event response is needed by a Forensic Scientist; one for the TFA response and a separate one for the chemical analysis of the evidence. If no response is required, only the chemical analysis case record shall be included.

- 5.5.2 The TFA case record shall be completed by the responding forensic scientist and shall include:

5.5.2.1 The Technical Field Assistance form - see section files for printable version.

5.5.2.2 A copy of the responding Forensic Scientist's handwritten field notes from the clandestine laboratory site.

5.5.2.3 The TFA Report shall include the following, if applicable:

5.5.2.3.1 The TFA report shall describe the clandestine laboratory site searched, the date and time of the search, who was present at the clandestine laboratory site, and list the chemicals and equipment found at the clandestine laboratory site that are consistent with the manufacture or processing of a controlled substance.

5.5.2.3.2 A qualifying statement about each item, where applicable, shall be included along with that item's regulatory status.

5.5.2.3.3 The total grams or milligrams of (pseudo)ephedrine shall be listed after each container or unit described, based upon the total number of tablets and the strength of each tablet, if applicable.

Example:

Sudafed 12-hr Extended Release

One box (intact) containing a total of 20 tablets

Pseudoephedrine HCl, 120 mg per tablet

2.4 g (2400 mg) pseudoephedrine HCl total

5.5.2.3.4 Methamphetamine theoretical yield calculations pertaining to (pseudo)ephedrine packaging found at the scene, if applicable. See 5.7.

5.5.2.3.5 A summary statement to include the type of clandestine laboratory located at the scene, if it can be determined (i.e. manufacture, tableting, re-crystallization, extraction).

- 5.5.3 The chemical analysis FA case record shall include:

5.5.3.1 All data pertaining to the chemical analysis of items seized from the clandestine laboratory site and submitted to the Laboratory.

5.5.3.2 Copies of any administrative documents, including the signed destruction order pertaining to the submitted evidence.

5.5.3.3 Methamphetamine theoretical yield calculations from pharmaceutically marked (pseudo)ephedrine tablets collected from the scene and identified at the laboratory, if applicable.

5.6 Analysis of Clandestine Laboratory Evidence

5.6.1 Based on his/her training and experience, a Forensic Scientist shall select samples to analyze. Items should be selected based on their likelihood to contain finished product, intermediates, precursors/reagents, and reaction mixtures.

5.6.1.1 In addition to controlled substance(s), precursor(s) shall be identified when possible.

5.6.2 Solid Materials and Powders

5.6.2.1 Solid materials and powders shall be sampled and analyzed according to the Drug Chemistry Section procedures.

5.6.2.2 Solids and powders that are likely inorganic in composition (example: iodine and phosphorus) shall be submitted to the Trace Evidence Section of the Laboratory for identification. Note: some inorganic materials may not be able to be identified.

5.6.2.2.1 In cases where the item of evidence is from a suspected red phosphorus/iodine methamphetamine lab and the substance appears to be reaction material, the Forensic Scientist shall analyze a portion of the material to determine if methamphetamine and/or (pseudo)ephedrine are also present and send a subsequent untested portion of the material to the Trace Evidence Section for elemental analysis, when sample size allows.

- A sub-item shall be created and labeled appropriately for the portion of the material being transferred to the Trace Evidence Section for analysis and all evidence transfers shall be recorded in the FA System.

5.6.2.2.2 In cases where phosphorus is identified in an item of evidence, the Forensic Scientist shall document the color of the item in the FA worksheet.

5.6.3 Liquid Samples

5.6.3.1 Liquids shall be sampled and analyzed according to the Drug Chemistry Section procedures.

5.6.3.2 If the total volume of liquid was seized and submitted for analysis, the net weight shall be determined prior to analysis and reported with applicable measurement assurance.

5.6.3.3 If the total volume of liquid was not seized at the site, the density of analyzed liquid samples shall be determined in order to calculate the total weight of liquid present at

the clandestine laboratory site. **The total volume of liquid found at the clandestine laboratory site shall be provided by the submitting agency.** Measurement assurance data is not required since reported weights are truncated to the whole number.

5.6.3.3.1 The following statement shall be included in the results:

“Based on the total volume of the original liquid reported on the Request for Examination of Physical Evidence Form, Item X contained XX grams(s) of liquid containing XX.”

Example: Total volume of liquid at the clandestine laboratory site = 250 mL. A 3.0 mL sample of the liquid was placed on the balance, resulting in a mass of 2.60 grams. The chemical analysis of the liquid revealed “compound Z”. What is the total weight of the liquid containing “compound Z” found at the site?

$$\begin{aligned}\text{Density} &= \text{mass/volume} \\ &= 2.60 \text{ g}/3.0 \text{ mL} \\ &= 0.866 \text{ g/mL}\end{aligned}$$

Therefore:

$$0.866 \text{ g/mL} \times 250 \text{ mL} = 216 \text{ g of liquid containing “compound Z”}.$$

- 5.6.3.4** Prior to chemical analysis, the solubility of liquid samples shall be determined using either water or a water insoluble solvent such as chloroform or hexane and recorded in the FA worksheet.
- 5.6.3.5** Prior to chemical analysis, the pH of liquid samples shall be recorded in the FA worksheet.
- 5.6.3.6** If bi-layered or multi-layered liquids are present, each layer will be sampled and analyzed separately. The Forensic Scientist shall thoroughly document the physical appearance of each layer as well as the location of each layer relative to others.

5.7 Theoretical Yield Calculations Involving (Pseudo)Ephedrine

- 5.7.1** For methamphetamine manufacture cases involving (pseudo)ephedrine packaging: The total grams of (pseudo)ephedrine present at the clandestine laboratory site shall be listed along with the total grams of methamphetamine that could be produced based on a theoretical yield (see Section Files for Printable versions).
- 5.7.2** The Forensic Scientist shall clearly differentiate when calculating theoretical yield between items involving pseudoephedrine HCl versus pseudoephedrine sulfate.
 - 5.7.2.1** Theoretical yield calculation for methamphetamine (meth) HCl from (pseudo)ephedrine(PSE) HCl

$$\begin{aligned}\text{Molecular weight of (pseudo)ephedrine HCl} &= 201.7 \text{ g/mol} \\ \text{Molecular weight of methamphetamine HCl} &= 185.7 \text{ g/mol} \\ 1 \text{ mol PSE HCl} &= 1 \text{ mol meth HCl}\end{aligned}$$

$$\frac{201.7 \text{ g/mol PSE HCl}}{\# \text{ g PSE HCl at Site}} = \frac{185.7 \text{ g/mol methamphetamine HCl}}{X \text{ g of methamphetamine HCl}}$$

$$X \text{ g of meth HCl} = \frac{(\# \text{g PSE HCl at site})(185.7 \text{ g/mol meth HCl})}{201.7 \text{ g/mol PSE HCl}}$$

5.7.2.2 Theoretical yield calculation for methamphetamine (meth) HCl from (pseudo)ephedrine (PSE) sulfate

Molecular weight of (pseudo)ephedrine sulfate = 428.5 g/mol

Molecular weight of methamphetamine HCl = 185.7 g/mol

1 mol PSE SO₄ = 2 mol meth HCl

$$X \text{ g of meth HCl} = \frac{(\# \text{g (pseudo)SO}_4 \text{ at site}) \left(\frac{2 \text{ mol meth HCl}}{1 \text{ mol (PSE SO}_4)} \right) \left(\frac{185.7 \text{ g}}{1 \text{ mol meth HCl}} \right)}{\left(\frac{428.5 \text{ g (pseudo)ephedrine SO}_4}{1 \text{ mol}} \right)}$$

5.8 Return and/or Destruction of Clandestine Laboratory Evidence

5.8.1 Solids and powders (with the exception of reaction material, red phosphorus, and iodine crystals) shall be returned to the submitting agency.

5.8.2 Liquid and sludge samples shall be retained unless another disposition is indicated by a court order.

5.8.2.1 Evidence shall be destroyed by the Forensic Scientist performing chemical analysis of the evidence, or designee, according to the State Crime Laboratory Hazardous Waste Management Program as outlined in the [State Crime Laboratory Safety Manual](#). The Forensic Scientist Manager or designee shall ensure that items are destroyed in a timely manner.

5.8.2.2 The Forensic Scientist shall document destruction of the evidence in FA in accordance with the [Administrative Policy for the Drug Chemistry Section](#). The case record shall then be republished.

5.8.3 Technical Field Assistance items in FA shall be “Transferred Out” in the FA System with a comment stating that the TFA is a report only and has no evidence associated with it.

5.8.4 In cases where evidence is to be returned to the agency, a copy of the TFA report shall be included with a copy of the Laboratory Report from the Chemical Analysis case record, to be returned to the Evidence Control Section and subsequently the submitting agency.

5.9 Calculations – See 5.7.

5.10 Uncertainty of Measurement – See the [Procedure for Measurement Assurance](#) and [Drug Chemistry Technical Procedure for Balances](#).

6.0 Limitations

- 6.1 For calculation of methamphetamine theoretical yield: these calculations are based upon the amount of known chemical, the stoichiometry of the reaction, and the product. The product of the calculation is generally not achievable in practice.
- 6.2 In the instance a Pharmaceutical Identifier cannot be located for a (pseudo)ephedrine preparation, a methamphetamine theoretical yield cannot be calculated.

7.0 **Safety** - See the [State Crime Laboratory Safety Manual](#).

- 7.1 Evidence storage locations shall be properly ventilated.
- 7.2 Care shall be taken when working with acids, bases, or other chemicals.

8.0 **References**

ASTM Standard E2882-19. "Standard Guide for Analysis of Clandestine Drug Laboratory Evidence." ASTM International: West Conshohocken, PA, 2019, www.astm.org.

9.0 **Records**

- FA System Case files
- Technical Field Assistance form
- Forensic Scientist Field Notes, if applicable
- Yield Calculations Methamphetamine HCl from (Pseudo)ephedrine HCl
- Yield Calculations Methamphetamine HCl from (Pseudo)ephedrine Sulfate

10.0 **Attachments** – N/A

Effective Date	Version Number	Reason
01/03/2023	10	<p>3.0 – add definitions for certified responder, immediate precursor, and theoretical yield.</p> <p>5.4 – rename to remove “Paperwork” add “Documentation”; reorganized to include parts from old 5.7.</p> <p>5.5 - reorganized to include parts from old 5.7; reworded & clarified terminology</p> <p>5.5.3 – added “chemical”.</p> <p>5.5.3.1 – added “chemical” and “submitted to the Laboratory”.</p> <p>5.5.3.2 – added “signed”.</p> <p>5.5.3.3 – “added “Methamphetamine” and clarified pharm tablets.</p> <p>5.6.1 – reworded.</p> <p>5.6.1.1 – reworded; added “shall”.</p> <p>5.6.2.1 – generalized with “procedures”.</p> <p>5.6.2.2 – direct submission to Trace Evidence; added note.</p> <p>5.6.2.2.1 – added “labeled appropriately”.</p> <p>5.6.3.1 – new; then reorganized/reworded remaining 5.6.3.</p> <p>5.6.3.3.1 – removed “methamphetamine”, generalized with “Compound Z”.</p> <p>5.7 – Renamed; reorganized to include parts from old 5.7.</p>

	<p>5.8.2.1 & 5.8.2.2 – reworded; updated to include reference to DC Admin Policy. Added 6.1 & 6.2. Added 7.1 & 7.2 8.0 - Added ASTM Reference E2882-19. 9.0 - Added TFA form and Field Notes. Remove all reference to samples being brought back by FS.</p>
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