FCS01 – SOP for Detecting Controlled Dangerous Substances

Table of Contents

1. Scope
2. Background
3. Safety
4. Materials Required
5. Standards and Controls
6. Calibration
7. Procedures
8. Sampling
9. Calculations
10. Uncertainty of Measurement
11. Limitations
12. Documentation
13. References

1. Scope

1.1. This method outlines the analytical procedure for the analysis of Controlled Dangerous Substances (CDS) in test materials. While these procedures provide general guidance and structure to the analytical process, due to the unpredictability of real-world samples, method variations may occur. In such cases, the deviations must be recorded as per Agency standards, either as a Minor or Major deviation (Defined in *DOM17 – Practices for Authorizing Deviations*).

2. Background

2.1. To establish the best practices for operations within the Forensic Chemistry Unit and to ensure conformance to the requirements of the Department of Forensic Sciences (DFS), the accreditation standards under ISO/IEC 17025:2017, and any supplemental standards.

3. Safety

3.1. The FCU follows *DOM13 – DFS Health and Safety Manual* and supplemental program guidelines.

3.2. Read Material Safety Data Sheets (SDS) to determine the safety hazards for chemicals and reagents used in the standard operating procedures.

3.2.1. Note: Do not add water to acid, only add acid to water.

3.3. Wear personal protective equipment (*e.g.*, lab coat, gloves, mask, eye protection), when carrying out standard operating procedures.

4. Materials Required

4.1. Chemical Supplies

4.1.1. Chemicals should be of sufficient quality to ensure minimal interference using a mass spectrometric (MS) technique, if applicable (i.e., GC-MS grade organic solvents).

4.1.2. Chemicals include, but are not limited to:

4.1.2.1. Helium, Nitrogen, or Hydrogen gas (99.999%, for carrier gas)

4.1.2.2. Analytical reference standards

4.1.2.3. 18MΩ Water (may be lab-generated)

4.1.2.4. Extraction solvents and chemicals such as:

4.1.2.4.1. 10% solution of hydrochloric acid (HCl, *ca*. 1.2 Molar)

4.1.2.4.2. Concentrated Sodium Hydroxide (NaOH, *ca*. 20 Molar)

4.1.2.4.3. Ammonium Hydroxide

4.1.2.4.4. Sodium Carbonate

4.1.2.4.5. Chloroform

4.1.2.4.6. Acetonitrile

4.1.2.4.7. Methanol

4.1.2.4.8. Hexanes

4.1.2.4.9. Petroleum Ether

4.2. Equipment and Instrumentation

4.2.1. Relevant laboratory equipment includes, but is not limited to:

4.2.1.1. Hydrogen generator

4.2.1.2. Water Purification System (GenPure or equivalent)

4.2.1.3. Glassware (beakers, flasks, volumetric pipettes, etc.)

4.2.1.4. Vortex

4.2.1.5. Hot Plate

4.2.1.6. Balances

4.2.1.7. Fume Hood

4.2.1.8. Small tools (spatulas, scoopulas, scissors, etc.)

4.2.2. Relevant instrumentation includes, but is not limited to:

4.2.2.1. Fourier Transform Infrared Spectrometer (FT-IR) with Attenuated Total Reflectance (ATR) crystal

4.2.2.2. Gas Chromatograph/Mass Spectrometer (GC-MS)

4.2.2.3. Gas Chromatograph/Flame Ionization Detector (GC-FID)

4.3. Consumables

4.3.1. Consumable sample preparation materials include, but is not limited to:

4.3.1.1. Culture and test tubes

4.3.1.2. Disposable pipettes

4.3.1.3. Disposable filters (glass wool or plastic syringe)

4.3.1.4. Autosampler vials and caps

4.3.1.5. 2 mL vials and caps (9mm PTFE caps, or equivalent)

4.3.1.6. Glass vial inserts

4.3.2. Consumable instrument parts include, but is not limited to:

4.3.2.1. GC Column, *e.g.,* Restek Rx5ms, HP-5, HP-35, DB-5 or equivalent.

4.3.2.2. GC liners

4.3.2.3. GC septa

4.3.2.4. GC autosampler syringes

4.3.2.5. MS Filaments

5. Standards and Controls

5.1. Standards and controls used for detecting CDS will meet criteria as outlined in *FCS02 – SOP for General Laboratory Procedures*.

6. Calibration

6.1. Calibration is only applicable to equipment or instruments performing quantitative measurements. Calibrations shall be performed as indicated per individual instrument or equipment SOP.

6.2. All other instrumentation and equipment used for qualitative purposes must be brought into good operating order as per individual instrument or equipment SOP.

7. Procedures

7.1. Casework Scheme

7.1.1. In general, a casework scheme shall proceed as follows:

7.1.1.1. Evidence receiving and handling (see *FCS11 – Procedure for Evidence Receiving, Handling, and Disposition*).

7.1.1.2. Open outer packaging and obtain item description.

7.1.1.3. Determine the population and sampling plan.

7.1.1.4. Obtain initial weights.

7.1.1.5. Sample preparation

7.1.1.6. Sample analysis.

7.1.1.7. Obtain final weights.

7.1.1.8. Seal evidence.

7.1.1.9. Reporting and reviewing procedures (see *FCS06 - SOP for Casework Documentation, Writing Reports, and Reviewing Reports*)

7.1.1.10. Evidence return (see *FCS11 – Procedure for Evidence Receiving, Handling, and Disposition*)

7.2. Sampling Scheme:

7.2.1. The sampling scheme is an overall approach which includes population determination, selection of the sampling plan and procedure and, when appropriate, sample reduction prior to analysis.

7.2.2. Determine the population:

7.2.2.1. The population determination shall consider all typical forms and quantities in which exhibits may appear.

7.2.2.2. A population can consist of a single unit or multiple units.

7.2.2.3. A multiple unit exhibit shall be separated into populations (items or subitems) based on the units which are similar in relevant visual characteristics.

7.2.2.4. Within any sampling scheme, if the first set of observations determines that more than one population is present, further samples from each population must be taken after sub-itemization.

7.2.3. Establish an appropriate sampling plan, as listed and defined in *FCS02 – SOP for General Laboratory Procedures*, to determine the number of units that will comprise the sample to be analyzed.

7.2.4. For multiple unit populations, the unit(s) to be analyzed shall be selected at random.

7.2.4.1. A random sample is one selected without bias. Examples of random selection include, but are not limited to, the following:

7.2.4.1.1. Computer generated random numbers or random number tables

7.2.4.1.2. "Black box" method (e.g., all units are placed in a box and the samples for testing are selected without bias).

7.2.4.2. In cases where a composite shall be made, the chemist will first test each of the selected samples (from the percent sampled population) with a screening technique prior to making a composite (Category A, B, or C).

7.2.5. For chemical analyses, a representative sample shall be removed from the selected unit(s). When sample size allows, testing should be applied on separate samplings of the material.

7.2.5.1. When a single unit, bulk population, or a composite is to be analyzed, the issue of homogeneity shall be addressed within the sampling plan.

7.2.5.2. One sample is sufficient if the bulk material is homogeneous, or if it is made so by the analyst.

7.2.5.3. If the bulk material is not homogeneous, several samples from different locations may be necessary to ensure that the test results are representative of the bulk material and to avoid false negatives.

7.2.5.4. Where practicable, a separate sample of the exhibit shall be taken for each test. For example, one sample of a bag shall be used for presumptive color spot testing, one for GC-MS or GC-FID.

7.2.6. Residue Specimens (<10mg)

7.2.6.1. Residues are samples which are either too small to be weighed accurately or that which remains. Residues can be sampled by mechanical means (e.g., shaking or scooping) or chemical means (e.g., rinsing with solvent). Case notes must reflect the method by which the sample was removed.

7.2.6.2. When possible, a sample should be removed while leaving a portion of the residue intact.

7.2.6.3. When it is not possible to redeposit and return the residue as received, the extract used in analysis will be returned to the evidence.

7.2.6.4. Residues are not regularly tested unless it is an exception under FCU policy (i.e., suspected PCP or syringe residue) or for a specific request approved by the Unit Manager.

7.2.7. Every effort should be made to avoid handling evidence repeatedly. The material should be sampled and immediately sealed. If necessary, the evidence may be closed and maintained in short term storage until the analysis is complete.

7.2.8. The number of units that were analyzed will be indicated on the Report.

7.2.9. If a statistical sampling plan is chosen, the number of specimens analyzed along with an indication of the statistical relevance of the number shall be recorded. Results shall be reported along with the corresponding proportion of positives and confidence level.

7.2.10. Sample Reduction

7.2.10.1. Sample reduction may be applied in cases where the weight or volume of the selected units is too large for laboratory analysis.

7.3. Weighing Evidence

7.3.1. Analytical, top-loading or high-capacity electronic balances are acceptable for routine casework. The balance used will be recorded in the case notes and reported with the corresponding uncertainty.

7.3.2. If the estimated uncertainty is equal or larger than the weight, a more accurate balance shall be used or the substance shall be reported as a residue, whichever is appropriate.

7.3.3. When multiple balances are used to record net weights of units within one case item, the weight recorded with each balance shall be noted separately.

7.3.4. Weight Types

7.3.4.1. Gross Weights

7.3.4.1.1. Any weight that includes packaging is a gross weight, unless otherwise noted.

7.3.4.2. Package Weights

7.3.4.2.1. A package weight is the weight of the empty innermost container(s).

7.3.4.3. Net Weights

7.3.4.3.1. Any weight that does not include any packaging is a net weight, unless otherwise noted.

7.3.4.3.2. Weights of capsules, cigars, and cigarettes with or without filter tips are considered net weights.

7.3.4.3.3. Residues will be considered a net weight and are reported as such. Residues are defined as substances that weigh less than 10mg.

7.3.5. Weighing Procedures

7.3.5.1. Weights for all evidence will be taken prior to sampling, except when impracticable (i.e., residues).

7.3.5.1.1. If a weight is not obtained for any other reason, “Not Obtained” will be indicated as the net weight.

7.3.5.2. The net weight of each unit analyzed will be obtained and recorded as such in the case notes.

7.3.5.2.1. For multiple units analyzed within an item for either a composite or hypergeometric sampling, the net weight of each unit will be recorded individually in the case notes. The calculated total net weight will be reported. Measuring and recording the net weight of multiple specimens at the same time shall be avoided whenever it is possible to do so.

7.3.5.3. The total gross weight of all unanalyzed units, including innermost packaging when applicable, will be obtained and recorded as such in the case notes and reported.

7.3.5.4. Net weights shall be obtained and reported when practicable (i.e., to avoid contamination from loose powders) by subtracting the weight of empty packaging from the gross weight (including packaging). The procedure shall be as follows:

7.3.5.4.1. Record the weight of the innermost container(s) with contents of exhibit.

7.3.5.4.2. Remove the exhibit from the container(s) as much as practicable. Record the package weight.

7.3.5.4.3. Calculate the net weight by subtracting the package weight from the gross weight.

7.3.5.5. Weights will be recorded in the analytical notes as they are displayed on the balance.

7.3.5.6. Samples without packaging (besides the heat-sealed evidence bag) shall be recorded as net weight.

7.3.5.7. In cases where the container weight is clearly much greater than the sample weight, the net weight (without packaging) of the material may be obtained and reported accordingly.

7.3.5.8. For resubmissions, only the weights of the additional samples tested will be obtained and reported.

7.4. Reporting Volumes

7.4.1. Volumes of liquids may be reported during the process of casework as an approximate value and will be treated as general as a description. Note – weights of liquids shall still be recorded as outlined in section 7.3.

7.4.2. In situations where an accurate volume is necessary, e.g., as per customer request, an uncertainty of the measurement device and serial number of the device will be recorded in the case notes.

7.4.3. Glassware used for quantitative measurements shall be Class A and calibrated with traceability to the International System of Units (SI). Serial numbers and/or identifiers will be recorded in the case notes. Recalibration of Class A glassware is not necessary.

7.5. Categorization of Analytical Techniques

7.5.1. Techniques for the analysis of drug samples are classified into three categories (see Table 1), based on their maximum potential discriminating power. However, the classification of a technique may be lower if the sample, analyte, or mode of operation diminishes its discriminating power.

7.5.2. Examples of diminished discriminating power may include:

7.5.2.1. An infrared spectroscopy technique applied to a mixture which produces a combined spectrum, or

7.5.2.2. A mass spectrometry technique which only produces molecular weight information.

Category A	Category B	Category C
Infrared Spectroscopy	Capillary Electrophoresis	Color Tests
Mass Spectrometry	Gas Chromatography	Fluorescence Spectroscopy
Nuclear Magnetic Resonance Spectroscopy	Ion Mobility Spectrometry	Immunoassay
Raman Spectroscopy	Liquid Chromatography	Melting Point
X-ray Diffractometry	Microcrystalline Tests	Pharmaceutical Identifiers
	Ultraviolet/Visible Spectroscopy	
	Thin Layer Chromatography	
	Supercritical Fluid Chromatography	
	Macroscopic Examination (Cannabis only)	
	Microscopic Examination (Cannabis only)	

Table 1. SWGDRUG Categories of Analytical Techniques

7.5.3. Identification Criteria

7.5.3.1. Herein are the minimum standards for the forensic identification of commonly seized drugs. It is recognized that the correct identification of a drug or chemical depends on the use of an analytical scheme based on validated methods and the competence of the analyst. The FCU requires the use of multiple uncorrelated techniques.

7.5.3.2. When a validated Category A technique is incorporated into an analytical scheme, at least one other technique (from either Category A, B or C) shall be used.

7.5.3.3. When a Category A technique is not used, at least three different validated techniques shall be employed. Two of the three techniques shall be based on uncorrelated techniques from Category B.

7.5.3.4. For the use of any method to be considered of value, test results shall be considered "positive" (i.e., it must meet the acceptance criteria defined in the method validation and operating protocol). When possible, data from a test result should be compared to data generated from a reference material which has been analyzed under the same analytical conditions.

7.5.3.5. When "negative" (i.e., does not meet acceptance criteria defined in the method validation and operating protocol) or "inconclusive" test results are achieved, an additional test of similar or higher discriminating category may be used in order to identify the presence of a substance. While "negative" test results provide useful information for ruling out the presence of a particular drug or drug class, these results have no value toward establishing the forensic identification of a drug.

7.5.3.5.1. Note: An "inconclusive" test result is defined as a determination by an analyst that there is neither sufficient agreement to render a positive result nor sufficient disagreement to render a negative result.

7.5.3.6. In cases where tandem techniques are used, e.g., gas chromatography-mass spectrometry, liquid chromatography-diode array ultraviolet spectroscopy, they will be considered as separate techniques provided that the results from each are used and utilize two separate samplings.

7.5.3.7. The chosen analytical scheme shall demonstrate the identity of the specific drug present and shall minimize false positive and false negative identifications. Where a scheme has limitations, this shall be reflected in the final interpretation.

7.5.3.8. A definitive structural identification technique, such as MS, will be used on all substances where the identities will be reported, whenever practicable.

7.5.3.9. This analysis scheme may be applied to the identification of non-controlled substances, if requested. The applicability of

the method to the analysis of the chemical of interest will be evaluated prior to use, and identification based the same criteria used for controlled substance analysis.

7.6. Color Tests

7.6.1. Color tests will be performed on select materials as a presumptive test and cannot be used to report conclusions without subsequent confirmatory analysis.

7.6.2. Each color test performed will have a simultaneously run negative control (blank). When running multiple tests with the same color reagent at once, only one blank for the set is necessary.

7.6.3. The color(s) which appear(s) must be documented on the examination worksheet.

7.6.4. Refer to *FCS10-Procedure for Chemical Spot Tests* for specific color test procedures.

7.7. Pharmaceutical (Rx) Identification

7.7.1. Pharmaceutical (Rx) identification will be performed on pharmaceutical preparations whenever possible.

7.7.2. Pharmaceutical identification is an examination of the evidence and comparison to a known credible reference standard.

7.7.3. Sources that may be used for this purpose are one of the following:

7.7.3.1. Drug Identification Bible

7.7.3.2. Physician’s Desk Reference

7.7.3.3. Manufacturer’s Reference

7.7.3.4. Poison Control Center (Web Poison Control)

7.7.3.5. Drugs.com

7.7.4. A secondary reference can be used to provide pictures but must be accompanied by an acceptable source. Photos are preferred, but are not critical for positive identification, as long as all physical characteristics (i.e., imprint(s), color, and shape) are a match.

7.7.5. If items which may be pharmaceutically identified are submitted, and the sampling plan would indicate that they would not be tested, the items that would not be tested will instead be pharmaceutically identified.

7.7.6. Partial pill fragments may be pharmaceutically identified if they are mixed with intact pills and their physical characteristics are consistent with the intact pills.

7.8. Extractions Guidance

7.8.1. The following listed procedures are examples of commonly used extractions but is not an exhaustive list.

7.8.2. Simple organic solvent extraction

7.8.2.1. Homogenize exhibit, as appropriate.

7.8.2.2. Obtain a representative sample of test material and add to a glass container or test tube.

7.8.2.3. Add appropriate amount of organic solvent (*e.g.,* acetonitrile, methanol, chloroform, hexane, *etc.*) to the sample and vortex.

7.8.2.4. Filter (using syringe or glass wool filter) into a GC-MS vial, or use centrifuge if needed, obtaining only the supernatant.

7.8.2.5. Note: For purification, multiple organic solvents (or water) may be needed. Extracts will be discarded or retained in each step as necessary, based on solubility of the targeted analyte.

7.8.2.6. If solid is needed, extract may be dried down on a watch glass by air or heat evaporation.

7.8.3. Base extraction

7.8.3.1. Homogenize exhibit, as appropriate.

7.8.3.2. Obtain a representative sample of test material and add to a glass container or test tube.

7.8.3.3. In a separate glass container or test tube, add appropriate amount of chloroform (may be chloroform/methanol mixture).

7.8.3.4. Add sufficient amount of base (e.g., ammonium hydroxide, sodium carbonate, etc.) to the chloroform and vortex until pH reaches approximately 8-10.

7.8.3.5. Obtain chloroform layer (bottom), add to the sample, then vortex.

7.8.3.6. Filter into a GC-MS vial (using syringe or glass wool filter).

7.8.4. Derivatization

7.8.4.1. In some cases, it may be decided to derivatize the test compound to enhance sensitivity. If this is performed, the analyst must record a description of the derivatization process chosen within the case packet.

7.9. Gas Chromatographer/Mass Spectrometer (GC-MS)

7.9.1. GC-MS is two tests in tandem and is a full confirmatory test. (Scientific Working Group for the Analysis of Seized Drugs, "SWGDRUG," Category A + B tests; ASTM E2329-17 Standard Practice for Identification of Seized Drugs, Table 1)

7.9.2. Samples are dissolved in an appropriate organic solvent, filtered, and injected on the GC-MS using a validated method.

7.9.3. Each substance confirmed using this technique must be compared to a reference standard, meeting confirmation criteria and quality control procedures as listed in *FCS09 – Operating and Maintaining GC-MS and GC-FID Instruments*.

7.9.4. Controlled substances that are confirmed with a reference standard will be reported as "*substance name* detected".

7.9.5. Substances found that are not controlled or confirmed with a standard but meet all other acceptance criteria will be reported as "*substance name* noted".

7.9.5.1. Note: Controlled substances that are known to be precursors or byproducts of another substance that is "detected" in the sample may be "noted" without a standard if it is present as a non-major component. A non-major component in regards to this event is defined as a peak that is less than approximately half of the abundance of the "detected" parent substance.

7.9.6. Substances found that are not controlled but are confirmed with a standard and meet acceptance criteria will be reported as "*substance name* noted" and indication of standard comparison will be recorded in the case notes.

7.9.7. Substances that are found but do not meet analytical acceptance criteria will be reported as "*substance name* possible" and cannot be used for conclusions.

7.9.8. If no controlled substances are found, the result will be reported as "No Controlled Dangerous Substances detected." If controlled substances are found but do not meet the acceptance criteria, the result will be reported as "Unable to Confirm the Presence of Controlled Dangerous Substances."

7.9.9. Analogue and Structure Class Determination

7.9.9.1. Classification as a controlled substance analogue involves the evaluation of the similarity of structure of a chemical compound to a known controlled substance.

7.9.9.2. Structural determinations are evaluated on:

7.9.9.2.1. The interpretation of mass spectra for an unknown versus known drug compound, or

7.9.9.2.2. The interpretation of mass spectra for an unknown versus literature-reported chemical structure if no current standard exists

7.9.9.3. Documentation shall be kept on the evaluation of similarities between chemical compounds, including a discussion of how the compounds are similar and how they are different. Evaluation of similarity is a subjective matter and opinions may differ. A consultation among experts may be necessary.

7.9.9.4. Structural comparisons in a forensic laboratory may be limited to the structural class and functional group, ring or chain substitutions. As examples, isomers, homologues, salt forms, atomic substitutions, esters, and ethers may be considered. The scope of comparison conducted should be made clear in the report.

7.10. Gas Chromatography Flame Ionization Detector (GC-FID)

7.10.1. GC-FID is a single test and is not considered confirmatory as a standalone examination. (SWGDRUG Category B test, ASTM E2329-17). For confirmation of substances, this technique shall be used in conjunction with a SWGDRUG Category A test, ASTM E2329-17, of which results shall be in agreement.

7.10.2. Samples are dissolved in an appropriate organic solvent, filtered, and injected on the GC-FID using a validated method.

7.10.3. Each substance that is to be confirmed using this technique must be compared to a reference standard, meeting confirmation criteria and quality control procedures as listed in *FCS09 – Operating and Maintaining GC-MS and GC-FID Instruments*.

7.10.4. Controlled substances that are confirmed using this technique will be reported as "*substance name* detected", if also confirmed with a SWGDRUG Category A test, ASTM E2329-17. Non-controlled substances that are confirmed using this technique will be reported as "*substance name* noted."

7.10.5. If a GC-FID run is performed, but no substances are matched against it, the run will be reported as "No matching peaks detected". If only "possible" substances are matched (i.e., peaks that match a standard retention time but are too small to confirm), the run will be reported as "Unable to confirm presence of Controlled Dangerous Substances".

7.11. Fourier Transform Infrared Spectroscopy (FT-IR)

7.11.1. FT-IR is a confirmatory test when coupled to a Category B or lower test, of which results are in agreement (SWGDRUG Category A test, ASTM E2329-17).

7.11.2. Solid or non-aqueous liquid samples are directly placed on the ATR portion of the FT-IR.

7.11.3. Aqueous samples must be evaporated and dried before they are analyzed using FT-IR.

7.11.4. Each substance that is to be confirmed using this technique must meet the confirmation criteria and quality control procedures as listed in *FCS08 - SOP for Operating and Maintaining Fourier Transform Infrared Spectroscopy (FT-IR) Instruments.*

7.11.4.1. Substances that are confirmed using this technique will be reported as "*substance name* detected", if also confirmed with another SWGDRUG A, B, or C test, ASTM E2329-17, of which results shall be in agreement.

7.11.4.2. If only "possible" substances are matched (i.e., substances that do not meet analytical acceptance criteria or substances for which the method is not validated), the run will be reported

as "*substance name* possible" and cannot be used for conclusions.

7.12. Quality Control

7.12.1. The laboratory shall employ quality assurance measures to ensure the results correspond to the exhibit. Example measures are:

7.12.1.1. The use of two separate samplings,

7.12.1.2. Sample identification procedures, such as barcoding and witness checks,

7.12.1.3. Good laboratory practices (e.g., positive and negative controls, one sample opened at a time, procedural blanks).

7.12.2. Work practices shall be established to prevent contamination of evidence during analysis.

7.12.3. Deficiency of Analysis

7.12.3.1. In the course of examining seized drug samples and related materials, the FCU may encounter some operations or results that are deficient in some manner. For these situations, the FCU shall follow DOM07 – Practices for Quality Corrective Action to address deficiencies or unapproved deviations from established policy or procedures in an analysis.

8. Sampling

8.1. Refer to section 7.2 for sampling procedures.

9. Calculations

9.1. All calculations will be recorded in the case notes with appropriate uncertainty provided.

10. Uncertainty of Measurement

10.1. All recorded quantitative measurements (e.g. weights, purity determinations), except for those indicated as "approximate", shall include the corresponding determined uncertainty.

10.2. When quantitative results are obtained, and the significance of the value may impact the report, the uncertainty of measurement must be determined. See *FCS21 – Procedure for Uncertainty in Measurement*.

10.3. If a full uncertainty study has not yet been performed and calculated, the vendor provided uncertainty in measurement shall be provided, pending an on-site validation.

11. Limitations

11.1. See specific method validations or SOPs for limitations on analytical processes.

11.2. Limitations must be clearly conveyed within the laboratory report.

11.3. Note: To avoid potential bias, all data obtained from unknown samples shall be reviewed for unique characteristics by the analyst prior to comparing to reference material for interpretation.

12. Documentation

12.1. FCU Examination Worksheets

12.2. FCU Laboratory Report

13. References

13.1. Forensic Science Laboratory Quality Assurance Manual, (Current revision).

13.2. DFS Departmental Operations Manuals, (Current revision).

13.3. FCU Standard Operating Procedures, (Current revisions).

13.4. Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG), Recommendations, (Current revision).

13.5. Controlled Substances Procedures Manual, Department of Forensic Sciences, Virginia (DFS Document 221-D100, Rev. 18).

13.6. Diamond, F. Identification of Synthetic Cannabinoids in Herbal Incense Blends by GC/MS (NMS Labs, written for Agilent, Application Compendium, 2012).

13.7. ASTM E2329-17, Standard Practice for Identification of Seized Drugs.