1.0 Purpose

This procedure describes the sampling, sampling plan and sample selection process for the laboratory.

2.0 Discussion

Sampling evidence is the most important initial step in forensic drug analysis since what is sampled must truly represent the total population. The analyst takes into consideration the homogeneity (or lack thereof) among drug packaging (bags, packets, capsules, etc.) and its contents. Careful visual inspection and personal experience are essential in determining the proper sampling procedure.

For items containing multiple specimens, statistically-based sampling models (e.g., hypergeometric distribution) allow the analyst to analyze a portion of the specimens and subsequently make statistical inferences about the population. Alternatively, a fixed number of specimens within a population analyzed with the purpose in mind of meeting the requirements of a particular criminal charge (e.g., simple possession, distribution) is allowed. In these instances, an inference to the entire population is not drawn and the number of specimens analyzed is indicated on the report.

3.0 Definitions

3.1 Sampling: Taking a part of a substance, material or product for testing in order to reach a conclusion, make an inference about, and report on the whole.

3.2 Sampling Plan: For an item that consist of a multi-unit population (e.g. tablets, baggies, bindles), a sampling plan is a statistically valid approach to determine the number of sub-items that must be tested in order to make an inference about the whole population.

3.3 Sampling Procedure: A defined procedure used to collect a sample or samples form the larger whole, to ensure that the value obtained in the analysis is representative of the whole. The sampling procedure may include details about the size and number of sample(s) to be collected, locations from which to collect the sample(s), and a method to ensure the homogeneity of the larger whole (or to make it so).

3.4 Sample Selection: A practice of selecting items to test, or portions of items to test, based on training, experience and competence. In sample selection, there is no assumption about homogeneity.

4.0 Procedure

4.1 Every effort is made to avoid handling evidence repeatedly. The material is sampled and immediately sealed. If necessary, the evidence is sealed and stored in short term storage until the analysis is complete. Evidence generally will not remain in short term storage for longer than 30 days.

4.2 In order to minimize detailed labeling on small items such as very small metal foil packets, plastic bags or plastic bag corners, they may be secured in a bandolier of tape, which is labeled. If needed, items may be placed in an additional plastic bag which can be sealed, fully labeled and properly documented in the case notes.

4.3 For chemical analyses, a representative sample is removed from the specimen. When sample size allows, testing is applied on separate samplings of the material. Taking a small amount of material for use in a color test prior to taking a separate sampling for additional tests is an appropriate method. For suspected marijuana, performing the microscopic examination on a larger population prior to taking a representative sample for the Duquenois-Levine test is sufficient. For pharmaceutical tablets and capsules, the use of pharmaceutical identifiers as a screening test prior to taking a representative sample for confirmatory testing is sufficient.

4.4 Administrative Sampling (Sample Selection)

4.4.1 Simple possession, Possession with intent (PWISMD)

4.4.1.1 One specimen is randomly selected and fully analyzed.

4.4.1.2 All remaining specimens are left intact in case further analysis is required.

4.4.2 Cases with weight thresholds

4.4.2.1 In instances where statutory or state sentencing guidelines have weight thresholds, enough specimens are weighed and analyzed, separately and fully, to exceed the threshold or to make statistical inference about the whole population.

4.4.2.2 The remaining specimens are left intact in case further analysis is required.

4.4.3 Pharmaceutical preparations

4.4.3.1 Due to unique physical identifiers present in pharmaceutical preparations, a consistent sample population is easily determined. The thoroughness represented by the sampling scheme used for street drugs is not required for pharmaceutical preparations which are clearly visually consistent with each other.

4.4.3.1.1 At least one representative sample must be analyzed fully.

4.4.3.1.2 If there is only one sample or specimen submitted, the extract used in analysis is returned to evidence. Case notes indicate how the extract is stored and that it is being returned with the original evidence packaging.

4.4.3.1.2.1 Procedure: Evaporate the solvent from the extract in the autosampler vial used in analysis. Seal the autosampler vial (ASV) into a ziplock bag or by other appropriate means. Label the ziplock bag with the Lab #, Department Case #, Item #, initials and a statement similar to "vial and bag added at lab." Record the date in the case notes that the ASV was placed in the evidence.

4.4.3.1.3 If the evidence is resubmitted for further analysis, resample and analyze using either the administrative sampling plan or the hypergeometric sampling scheme depending on the legal requirements.

4.5 Hypergeometric Sampling Plan

Hypergeometric sampling is a statistically-based model involving a defined confidence level with an associated probability of finding failures in a population. The hypergeometric model is used for specimens with no significant markings or labels (e.g., the contents of plastic bags and bag corners, vials, and glassine packets.)

4.5.1 This plan is used when additional analysis is requested for successful prosecution.

4.5.2 The appropriate number of specimen within the population is randomly selected to give a 95% confidence level that at least 90% of the population contains the analyte of question. (See Appendix A for guidance.)

4.5.3 Record the number of specimens indicated by the Hypergeometric table found in Appendix A, along with an indication of the statistical relevance of the number in the case notes.

4.5.4 Each specimen sample is analyzed separately and fully.

4.6 Multiple Specimens

4.6.1 If all specimens are not analyzed, the number of those that are fully analyzed will be recorded in the case notes.

4.6.2 Within any sampling scheme, Administrative or Hypergeometric, if the first set of observations determines that more than one population is present, further samples from each population must be taken.

4.6.3 If presumptive testing indicates that no controlled substances are present in the samples chosen, screening tests are done using the hypergeometric sampling scheme.

4.6.3.1 For items consisting of specimens, which are obviously non-controlled such as gum, candy or vitamins, a single representative sample may be screened.

4.7 Bulk Materials

Bulk materials (e.g., bricks of compressed powder, bales of plant material) are broken or cored to obtain a representative sample. Depending on the size of the material, samples from several locations may be required to obtain a representative sample. The examiner records the locations from which the samples were obtained in the case notes.

4.8 Residue Samples

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

4.8.1 When possible, a sample is removed while leaving a portion of the residue intact.

4.8.2 When it is not possible to redeposit and return the residue as received, the extract used in analysis is returned to the evidence. Case notes indicate how the extract is stored and that it is being return with the original evidence packaging.

4.8.2.1 Procedure: Evaporate the solvent from the extract in the autosampler vial used in analysis. Seal the autosampler vial (ASV) into a ziplock bag or by other appropriate means. Label the ziplock bag with the Lab #, Department Case #, Item #, initials and a statement similar to "vial and bag added at lab." Record the date in the case notes that the ASV was placed in the evidence.

4.9 Reporting

4.9.1 When a sampling plan is used, information about the sampling plan is documented in the case notes and on the report or as an attachment to the report and includes confidence levels and corresponding inferences of the population (e.g. 95% confidence that at least 90% of the baggies contain cocaine).

4.9.2 When sampling plan is used for a single homogenous item, the report states the result for the item.

4.9.3 When sample selection is used, the report or case notes as an attachment to the report states what was received and what was tested. The result pertains only to that which was tested. The weight of the entire item is reported in addition to the weight of the sub-items that are actually tested. (e.g., "100 baggies of white powder with a total gross weight of 212.2 grams were received in item 1. Contents of six baggies were tested and found to contain cocaine. The net weight of the contents of the six tested baggies was 13.6 grams").

5.0 Health and Safety

Personnel should follow health and safety practices when sampling controlled substances. Personal protective equipment such as lab coat, gloves, safety glasses and N-95 masks are used, as needed.

6.0 Records Management

The analyst performing the sampling procedure is responsible to record the sampling process used in the case record. The Quality Manager is responsible to ensure the proper storage, backup and retention of laboratory records.

7.0 References

7.1 ASCLD/LAB Policy on Sampling, Sampling Plans and Sample Selection, Version 2.0, Effective date, March 1, 2012.
7.2 ASCLD/LAB Guidance Document on Sampling, Sampling Plans and Sample Selection in the Drug Chemistry Discipline, Version 2.0, Effective date, March 1, 2012.
7.3 Virginia Division of Forensic Sciences, Controlled Substances Procedures Manual, Revision 5, Issue Date, 13-DEC-2010
7.4 Shark, Robert E. "Sampling Your Drugs: A User's Guide", Commonwealth of Virginia, Bureau of Forensic Science, Technical Brief, c. 1986.
7.5 European Network of Forensic Science Institutes Drugs Working Group. "Guidelines on Representative Sampling" 2002-2003.

8.0 Appendices

A. Hypergeometric Sampling Table

9.0 Revision Table

Revision #	Effective date	Revised by	Description of Revisions
Original Issue	11/19/2012	B. Pridgen	
#1	06/05/2014	B. Pridgen	Combined simple possession and PWI criteria. Added statement 4.8.2.1 to 4.4.3.1.2

Hypergeometric Sampling Table

This hypergeometric sampling table gives the appropriate number of specimens within the population to be randomly selected to give a 95% confidence level that at least 90% of the population contains the analyte of question.

Population (N)	Failure%= 10%; Confidence Level=95%	Population (N)	Failure%= 10%; Confidence Level=95%
1-10	ALL	40	21
11	9	41	18
12	9	42	17
13	10	43	19
14	11	44	19
15	12	45	20
16	12	46	20
17	13	47	21
18	14	48	21
19	15	49	22
20	16	50	22
21	11	60	23
22	14	70	24
23	14	80	24
24	15	90	25
25	16	100	25
26	16	200	27
27	17	300	28
28	18	400	28
29	18	500	28
30	16	600	28
31	16	700	28
32	17	800	28
33	17	1000	29
34	18		
35	18		
36	19		
37	19		
38	20		
39	20		

This table is to be used as a guide for analysts. The sample size should be adjusted if the failure rate is higher than 10%.

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Authorization

This Standard Operating Procedure, Revision Issue #1, has been approved and authorized by:

Bethany P. Pridgen, MFS Forensic Lab Manager	Date
Ralph M. Evangelous Chief of Police	Date