Sampling Approaches to Synthetic Drug Seizures

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Why are sampling plans used?

- To determine the net weight of a population
- To determine the presence of a drug in a population
- Limited resources (efficiency, cost, etc.)

To "…minimize the total number of required analytical determinations, while assuring that all relevant legal and scientific requirements are met."

SWGDRUG Recommendations Part III A

When are sampling plans used?

Processing Facility

Forensic Laboratory

Processing Facilities

What may be present?

- Powder
- Solvents
  - Acetone, alcohol
- Plant Material
  - Dosed and Undosed
- Packages
- Equipment
  - Sprayers, mixers, etc.

Laboratory Sampling

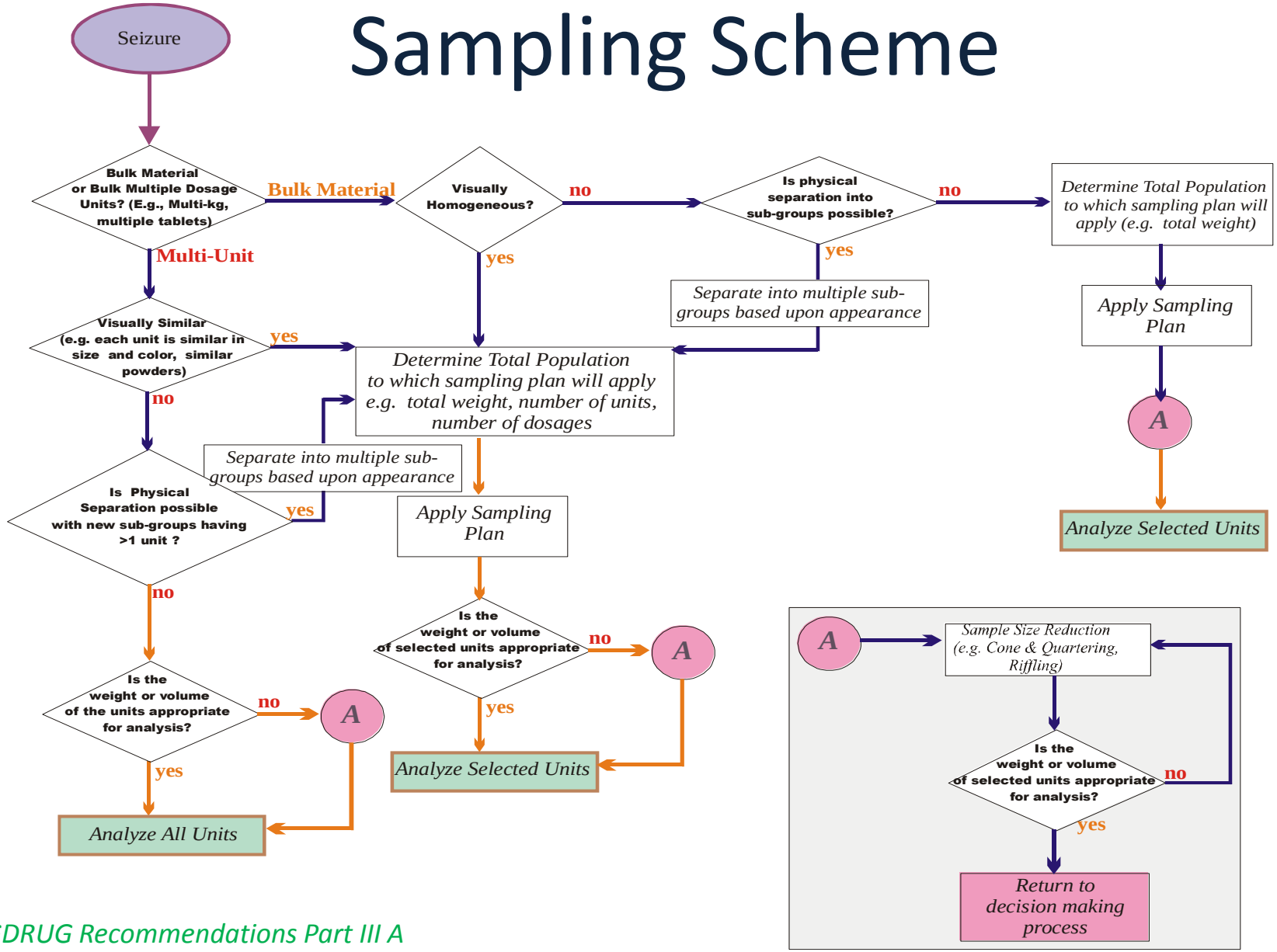
One submission may be hundreds or thousands of packets

Sampling Approach Design

Consider:

- ✓ Laws
- ✓ Jurisdictional requirements
- ✓ Purpose of the investigation
- ✓ Customer requests
- ✓ Current laboratory policies
- ✓ Accreditation requirements

Sampling Scheme



SWGDRUG Recommendations Part III A

Sampling Plans

Statistical	Non-Statistical
Inferences can be made about the entire population ▪ Hypergeometric ▪ Bayesian	No inferences are made about the population ▪ All/One ▪ Square root ▪ Judicial Requirements

Example 1

You open a box containing multiple packets of the same brand of suspected cannabimimetics

Example 1

Are there multiple units?

Yes

Are they visually similar?

Yes

Determine total population

1000

Apply Sampling Plan

Hypergeometric

- Commonly used in controlled substance analysis cases
- “The probability that a sample of size n contains X positives (units containing illegal drugs), given that the population of size N contains N_1 positives…”

Guidelines on Representative Drug Sampling, ENFSI

Example 1

Population	95% confidence			99% confidence		
	K=0.5	K=0.7	K=0.9	K=0.5	K=0.7	K=0.9
800	5	9	28	7	13	42
900	5	9	28	7	13	43
1000	5	9	28	7	13	43
5000	5	9	29	7	13	44

Where k=ratio of positives guaranteed in the population

Consider laws, jurisdictional requirements, lab policy, and the purpose of the investigation

Analyzing 28 items will guarantee with 95% confidence that at least 90% of the packages contain that drug.

Example 2

You open a box containing multiple packets of many different brands of suspected cannabimimetics

Example 2

Are there multiple units?

Yes

Are they visually similar?

No

Is physical separation possible?

Yes

Separate and determine total population

31 brands, 125 units

Is the weight of the units appropriate for analysis

Yes

Apply Sampling Plan

Example 2

Population	95% confidence			99% confidence		
	K=0.5	K=0.7	K=0.9	K=0.5	K=0.7	K=0.9
1-9	All	All	All	All	All	All
10	3	5	8	4	6	9
20	4	6	12	5	9	15
⇩	⇩	⇩	⇩	⇩	⇩	⇩
100	5	8	23	7	12	33
200	5	9	26	7	13	38

If the same approach is taken as in Example 1,
all 125 units would be analyzed

Threshold

- Non-statistical sampling plan
- Analyze samples to meet an established threshold

Example:
3000 vials of suspected cocaine base
Threshold is 50g
*Analyze up to 50g of the sample

What are the threshold limits for cannabimimetics and cathinones?

Laboratory Sampling

There is known variability between packets of different brands and even within the same brand

BUT

we can use the knowledge of the dosing process to assist in developing a sampling span

Other Non-Statistical Approaches

Variable results may be due to:

- Small sampled portions which can give hot spots or false negatives
- Multiple components present from contamination in sprayers, cement mixers, etc.

When choosing a plan…

- ✓ Evaluate statistical and non-statistical plans
- ✓ Evaluate the legislative need
- ✓ Address SWGDRUG recommendations
- ✓ Address accreditation requirements

Document "…the sampling plan and procedures used by the laboratory or other bodies where these are relevant to the validity or application of the results"

ASCLD-Lab ISO/IEC 17025:2005(E)

Best plan…

DOCUMENTATION

Reports should be clear regarding what has been tested and NEVER state more than you actually know.

Resources

SWGDRUG
www.swgdrug.org

European Network of Forensic Science Institutes, Guidelines on Representative Drug Sampling
www.enfsi.eu

American Society for Testing Materials
www.astm.org

Thank you!

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