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CS-PM 2 Analysis of Seized Drugs

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2.1 Guidelines for Controlled Substances Analysis

2.1.1 Analytical Tests

Categories of Tests

Analytical tests fall into three categories based upon their maximum discriminating power. The categories of tests used in the Controlled Substances Units are:

Category A. Specific, structure elucidating tests (Mass Spectrometry; Infrared Spectroscopy)

Category B. Selective tests (Gas Chromatography; microcrystalline tests; published physical pharmaceutical identifiers; Thin Layer Chromatography, Macroscopic observation (marihuana only); Microscopic observation (marihuana only))

Category C. Presumptive or screening tests (Color tests; Ultraviolet Spectroscopy; physical recognition)

NOTE: The classification of any technique may be lower if the sample, analyte, or mode of operation diminishes the discriminating power of the technique.

2.1.2 Identification Protocol

As a minimum standard for controlled substance identification, at least one specific test and at least one selective test shall be performed. A second specific test may be substituted for a selective test.

The chosen analytical scheme shall demonstrate the identity of the specific drug present.

An identification of a controlled substance must chemically exclude isomers and analogs of the substance which are not included in the status of the substance as controlled.

Relevant limitations of an analytical scheme (e.g. inability to differentiate isomers, unavailability of a reference standard, limits of detection) shall be documented in the case record and may be included in the report.

2.1.3 Identification of Marihuana

The analytical requirements for the identification of marihuana are found in the Marihuana and Marihuana Products section of the Controlled Substances Procedures Manual.

2.1.4 Documentation

Notes will be taken as a part of the analytical routine.

2.1.4.1 Evidence Descriptions

Each piece of evidence received shall be documented in the case record by means of a physical description of the packaging.

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The description shall be sufficient to enable the analyst to identify the evidence based on the description in the case record.

2.1.4.2 Discrepancies

Any significant differences between the agency's evidence description and the actual evidence (especially counts and weights) must be documented in the case record.

The employee who notices the discrepancy shall contact their supervisor or designee so at least two FSD employees are aware of the difference, with both names appearing in the case record notation.

An attempt should be made to contact the agency and resolve the discrepancy as soon as possible and before proceeding with the case analysis. Refer to LOM 4.4.3.

2.1.4.3 Enumerations and Weights

All enumerations, weights, and other measurements shall be recorded in the case record.

Evidence that is opened and analyzed shall be enumerated, weighed, or otherwise measured.

- a) Weight is an appropriate measure of powders or plant material.
- b) Volume is an appropriate measure of liquids.
- c) Number or weight is appropriate for tablets, capsules, or dosage units.

Tablets

Tablets, capsules, or dosage units that are analyzed shall be enumerated or weighed.

For non-uniform tablets (manufactured clandestinely), the weight of all tablets prior to analysis will be sufficient to establish the amount of tablets received.

Tablets, capsules, or dosage units within an opened submission container that are not analyzed and do not have inner packaging seals shall be enumerated or grossly weighed with packaging.

Weight approximation may be used in place of enumeration of uniform dosage units.

Procedure for Weight Approximation

A minimum of twenty dosage units shall be weighed to determine the average weight of one dosage unit. The average weight of one unit is calculated by dividing the total weight of selected units by the number of units weighed. For example, dividing the weight of 20 units by twenty provides the average weight of one unit.

The total weight of all uniform dosage units shall be divided by the average weight of one unit to determine the approximate number of dosage units.

Any enumeration reported which was the result of a weight approximation shall clarify that the number of dosage units reported is an approximation.

The report should include the total weight of tablets and the approximate number, for example: "543 g, approximately 2455 tablets".

Gross Weight

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Measurements of gross weights shall be clearly indicated in the case record, and packaging included in the measurement shall be:

all packaging if the evidence container was not opened

OR

only the innermost layer of packaging if the evidence container was opened

OR

specified in the case record for clarity or if neither option above applies

2.1.4.4 Personnel

The individual(s) performing each laboratory activity must be clearly reflected in the case record. The date(s) that each activity was performed must also be documented. To accomplish this one or more of the following shall be done:

Capture the initials and date of the individual responsible for each laboratory activity in the Forensic Advantage worksheet. This should be done contemporaneously by the individual performing the activity.

Create a separate worksheet for each individual to record the laboratory activities performed by that individual.

Record the initials of the individual responsible for loading and/or running GC or GCMS samples in the worksheet or in the header of the instrument data.

Responsibility for Data in the Case Record

All data files contained in the Forensic Advantage Object Repository shall be uploaded by the individual that conducted the testing activity.

For GC or GC/MS data, conducting the test means processing the data, selecting and printing peaks or spectra, or otherwise preparing instrument data to support a test result.

Data that is selected or processed by a computer is a result of an individual selecting a processing method. The individual who selected the processing method is therefore the individual who performed the test for purposes of the technical record.

Data files in the Object Repository shall be "Approved" by the individual authorizing the results (report author) prior to technical review.

Refer to LOM 2.6 and QM 7.5 for additional information.

NOTE 1: Individuals who performed laboratory activities shall be referenced on the laboratory report in a generalized statement. Refer to the Reporting Guidelines section of this manual.

NOTE 2: Personnel who review the case record are responsible for ensuring that the results, opinions and interpretations are accurate, properly qualified and supported by the technical record, and that the testing and documentation conform with the applicable management system procedures.

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Personnel conducting reviews need only be documented in the review portion of the case record.

2.1.5 Tests, Data and Results

2.1.5.1 Observations and Data

Observations made and tests or measurements performed in the examination of evidence shall be documented in the case record. This applies to data upon which the results are based as well as rejected data.

Manual calculations made shall be recorded.

Results of all tests shall be documented. Test results may include observations, measurements, and instrumental data.

Test results and interpretations of data may be recorded in the case record as follows:

- a) in the worksheet
- b) on the data in the Object Repository of the case record

AND/OR

- c) as required by the specific procedure used

NOTE: Comparisons to references must clearly identify the data compared, and the result when applicable.

For example, GC retention times compared must be identified by the examiner, either in the worksheet or on the data. Similarly, reference spectra compared must be identified either in the worksheet or in the data, and the results of the comparison must be evident in the case record.

All documentation to support analytical conclusions must be written such that another individual could repeat the analysis, evaluate the data, interpret the results, and reach the conclusion that was originally reached on that case.

2.1.5.2 Negative Results

While "negative" results may provide useful information for eliminating a particular drug or class of drugs, "negative" results have no independent value in the forensic identification of a drug.

Negative results will be documented and retained in the case record. When a test result is deemed negative or inconclusive, the case record should clearly state the result as such.

2.1.5.3 Rejected Data

Rejected data are data, observations, or calculations that are not considered technically valid and therefore are not usable. For example, evaporation of solvent from a vial prior to autosampler introduction would produce chromatographic data that would be rejected.

If an observation, data, or calculation is rejected, the reason, the identity of the individual taking the action, and the date shall be recorded in the case record.

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Each page of rejected data retained in the Object Repository must be clearly marked as 'Not Used' or 'Rejected' or similar to prevent confusion when reviewing paper or electronic copies of the data.

2.1.6 Notes in the Case Record

The following information shall be included in the case record as applicable:

- a) The physical description of all evidence received
- b) The weight or enumeration of analyzed evidence
- c) The gross weight or enumeration of tablets in unsealed containers within an opened item of evidence
- d) The tests performed
- e) The individual who performed each laboratory activity, and when the task was performed
- f) The unique identification of any equipment, reagent, standard, or reference material used in testing
- g) The results of the tests performed
- h) The observations made
- i) All manual calculations performed examples: sums of weights, calculation of RRt, etc.
- j) The extraction procedures performed
- k) The injection solvent used to introduce the case sample to the gas chromatograph, gas chromatograph-mass spectrometer, or DiscovIR-GC.
- l) The solvent used for the solvent blank should be the same as the injection solvent used for the case sample.

If this is not the case, both solvents used shall be recorded in the case record. For example, if methanol with internal standard was used for the solvent blank, and methanol was used for the case sample, both solvents must be recorded in the case record.
- m) All instrumental data including spectra and chromatograms
- n) Quantitative data, if obtained

2.1.7 Changes to the Case Record

Amendments made to a completed case record are tracked by Forensic Advantage.

Any technical or administrative review feedback is also documented in the case record during the review process. This includes documentation of any requested changes. Refer to LOM 2.6.3.

Amended laboratory reports are tracked by Forensic Advantage and the changes are clearly communicated to the agency by highlighting the changes made. Refer to LOM 3.3.7.

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2.1.8 Worksheet Statistics Section

The statistics section of the worksheet is used to collect information about the case.

Substances of forensic significance should be recorded in the statistics section when detected or confirmed.

The statistics collected are intended for internal informational and trend tracking purposes.

An identification recorded in the statistics section is a record of detection for statistical purposes only and may or may not represent a full identification of a substance.

Caution should be exercised if referring to information in the statistical section for purposes other than intended.

2.1.9 References

ASTM International, "Standard Practice for the Identification of Seized Drugs." ASTM E2329-14 (2014)

Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) Recommendations. Version 7.0, August 14, 2014.

ISO/IEC 17025:2017 (E), "General requirements for the competence of testing and calibration laboratories." Third edition, 2017-11.

ANAB AR 3125, "ISO/IEC 17025:2017 Forensic Science Testing & Calibration Laboratories Accreditation Requirements." June 1, 2018.

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2.2 Sampling

The purpose of sampling is to answer relevant questions about a population by examination of a portion of the population. The basis of sampling is that the composition of the sample removed for analysis represents the composition of the material from which it was taken. An appropriate sampling scheme will minimize the total number of required analyses, while ensuring that all relevant legal and scientific requirements are met.

As described in Section 2.1 of this manual, at least two tests shall be performed for each substance identified. Those tests shall be performed on a representative sample of the item being tested.

2.2.1 Selection of Items for Analysis

In order to maximize the resources of the laboratory, maintain efficiency, and eliminate redundant analyses, the items of most forensic significance will be selected for analysis. Consideration must be given to information contained in the Request for Laboratory Examination (RFLE), specific charges, items unique to a single suspect, examinations requested, and the visual inspection of the items submitted.

2.2.2 Population Determination

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

A multiple unit population consists of specimens (units) that are similar in relevant external visual characteristics such as size, color, packaging, or physical recognition.

As such, the following measures may be taken to select items for analysis:

In general, the two highest penalty items from separate populations will be selected for analysis.

In general, only one population involving a particular drug found on a person or in a particular location will be selected for analysis.

In general, the materials present in the highest quantities will be analyzed.

No further analysis is required for an intact, marked pharmaceutical preparation if, through visual examination of pharmaceutical identifiers, the product is indicated to be non-controlled. See 2.2.9 below.

Information relevant to controlled substances submission policy is found in LOM Section 4.1.5.

2.2.3 Representative Sampling

The taking of a representative sample ensures that the material sampled has characteristics representative of the entire population. The analyst shall ensure that the sampled material represents the item to be tested by making careful visual examination and considering homogeneity among drug packaging, and package contents.

If a single unit or bulk material is to be analyzed, one sample is sufficient for each test if the material appears to be homogeneous. If the material is not homogeneous, it may be necessary

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to collect samples from different areas, or steps may be taken to make the material homogenous prior to sampling.

For bricks or bales of compressed material, the brick or bale should be broken or cored to obtain a representative sample. It may be necessary to collect samples from different areas to provide a representative sampling of the material.

The actions by which a representative sample was obtained from inhomogeneous or compressed materials should be documented in the case record.

2.2.4 Individual Chemical Tests

When possible, analyses should be performed on separate samples of the material being tested.

For suspected marijuana, performing the macroscopic and microscopic examinations on a larger population and then taking a representative sample for a test for cannabinoids is sufficient.

For pharmaceutical products, the use of pharmaceutical identifiers for a larger population and then taking a representative sample for confirmatory testing is sufficient.

2.2.5 Non-Statistical Sampling

The non-statistical sampling procedure is appropriate for use in most cases and is applied to determine if a controlled substance is present in a number of units of a population, such as required by a particular criminal charge. If the analysis of more specimens than are listed in the non-statistical sampling procedure is required for investigation of a specific case, additional samples may be selected by the statistical sampling plan upon agreement of the requesting prosecutor.

2.2.5.1 Non-Statistical Sampling Procedure

A sufficient number of units (bags, packets, tablets, plants, etc.) shall be analyzed, separately and fully, such that the net weight or total count of units analyzed will meet or exceed the needs of the investigation or the legal requirements applicable to the case. For most cases, analysis of one unit is sufficient.

2.2.5.2 Weight-Based Penalty Thresholds

Michigan law provides for sentencing to be based on the total weight of certain drugs or the number of marijuana plants, termed "weight threshold" in this manual.

In instances where statutory or state sentencing guidelines have weight thresholds, enough units will be weighed or counted, and analyzed, separately and fully to exceed the weight threshold. The remaining units or items will be left intact.

Refer to MCL 333.7401, 333.7403, and 333.26424 for specific weight-based penalty thresholds.

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2.2.5.3 Pharmaceutical Preparations of Schedule 2 Narcotics

Each container of uniform schedule 2 narcotic pharmaceutical products is to be considered an aggregate mixture and one tablet or capsule will be analyzed.

The aggregate weight of a multi-unit population of schedule 2 narcotic pharmaceutical products should be included in the case record.

If the aggregate weight of the uniform tablets or capsules in the mixture surpasses a weight threshold, the aggregate weight shall be included in the laboratory report.

The report shall indicate that one of the tablets or capsules was analyzed.

2.2.5.4 Federal Cases

Federal courts also have sentencing guidelines (Title 21 USC Chapter 13, Subchapter I Part D).

In these cases, the total weight of the substance contained in multiple packages along with an analysis of the contents of one package is sufficient.

2.2.6 Statistical (Hypergeometric) Sampling Plan

In any population of drug items, the number of positives and negatives is unknown unless each unit of the whole seizure is analyzed. Statistical sampling involves testing a statistically based subset of a multi-unit population in order to reach a conclusion or inference about the whole population. If some uncertainty is allowed, the hypergeometric distribution can be used to calculate a sample size (n units) that must be analyzed so that at least a certain number of units (k) are positive at a given confidence level. The hypergeometric sampling plan is a statistically based model.

Hypergeometric sampling may be used, upon agreement of the requesting prosecutor, if analysis of more items than specified in the non-statistical sampling procedure are requested for investigation or prosecution.

If a hypergeometric sampling plan is used:

- a) The units of the population must appear homogeneous.
- b) The appropriate number of units within the population will be randomly selected.
- c) The number of units to test will be determined by the hypergeometric table (2.2.13) to give 95% confidence that at least 90% of the population contains controlled substances (or "is positive").
- d) Each unit sampled will be tested separately and fully.
- e) The number of units to test indicated by the hypergeometric table, along with the statistical relationship to the population and confidence level, will be recorded in the case record.
- f) The hypergeometric table shall not be used if one or two negatives are expected in the population, nor shall it be used if a different confidence level or minimum positive fraction is required. Contact the Technical Leader in these circumstances.

The Hypergeometric Table is found in 2.2.13.

The statistical sampling plan should not be used in place of full analysis of a sufficient number of units to meet or exceed any weight -based penalty thresholds applicable to the case.

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2.2.7 Analysis of Multiple-Unit Populations

The number of units that were fully analyzed shall be clearly stated on the laboratory report.

At any point in analysis, if it is discovered that more than one population is present, the sampling procedure or plan shall be applied to the new populations.

2.2.8 Negative Results in Multi-Unit Populations

Non-controlled Pharmaceuticals

No further analysis is required for a population of intact, marked pharmaceutical preparations if, through visual examination of pharmaceutical identifiers, the population is indicated to be non-controlled.

The results should be reported as "Markings on tablet(s) indicated non-controlled substance(s); no chemical analysis was performed." An equivalent statement is acceptable if clearly stated in the report.

In this context, an intact pharmaceutical preparation demonstrates no appearance or suspicion of tampering or adulteration.

Candy, Vitamins, and Other Products

For populations that are clearly non-controlled, such as mints or vitamins, analysis of one representative sample is usually sufficient.

Negative Results in Other Items

If initial tests show that no controlled substances are present in one or more units originally selected for analysis, one of the following options may be used to determine how to complete the case:

Select additional units to analyze, separately and fully, according to the non-statistical sampling procedure to meet the legal requirements of the case.

OR

Report the number of units tested, the weight associated with each (if applicable), and the results of the initial analysis of each.

OR

Prepare and analyze a mixture composed of material sampled and homogenized from the remaining untested units. The composition of this mixture should reflect the total composition of the units in question, and the method used to prepare the mixture shall be clearly described in the case record. Note: this method provides a result for the mixture. A positive test result for the mixture cannot be attributed to a specific unit of the population without additional unit-specific testing. This method should not be used if its use would preclude future unit-specific testing.

OR

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Contact the investigating agency to determine the necessary or appropriate level of analytical support for the given investigation. Continue analysis as appropriate based upon that determination.

OR

Perform a screening test on a statistically determined number of units by using the hypergeometric sampling plan.

OR

Any combination of two or more of the above.

2.2.9 Evidence Consumed During Analysis

When possible, samples should be removed for testing so as to leave a portion of the material intact. However, it may be necessary to sample an entire unit, such as a low-dose tablet.

If a discernible dosage unit (tablet, capsule, etc.) or all of an item (residue, etc.) is consumed during analysis, the laboratory report shall state that the item was consumed in analysis.

When less than a whole dosage unit was consumed in analysis, an approximation of how much was used shall be included in the case record.

In instances in which a dosage unit is sampled by the scraping of material such that the shape (round, oblong, biconvex, etc.) of the dosage unit is materially unchanged, the approximation of the evidence consumed may be satisfied by notation in the case record that the dosage unit was scraped to obtain material for analysis.

2.2.10 Reporting

Sampling information shall be included in the laboratory report.

If a discernible dosage unit (tablet, capsule, etc.) or all of an item (residue, etc.) is consumed during analysis, the laboratory report shall state that the item was consumed in analysis.

2.2.10.1 Non-Statistical Sampling Reports

For non-statistically selected samples, it must be clear that the results of analysis apply only to the tested units.

For single unit populations, no additional statements are necessary.

For multiple unit populations, the number of units that were fully analyzed shall be clearly stated.

2.2.10.2 Statistical Sampling Reports

For statistically selected samples, the following shall be clearly stated in the report:

- a) The number of units that were analyzed
- b) The results are based on a hypergeometric sampling plan.
- c) The level of confidence and inference made.

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The following statement should be used as a guide:

“Using a hypergeometric sampling plan, twenty-nine tablets were analyzed separately, and each was found to contain caffeine. Based on these results, there is a 95% level of confidence that at least 90% of the tablets contain caffeine.”

2.2.11 Currency

Currency shall not be analyzed for the presence of drug substances unless a visible residue on the currency is present.

Generally, no determination as to source or time of exposure to drug substances can be made with respect to currency.

2.2.12 Hazardous Items

Syringes are to be analyzed only in accordance with all provisions of Section 4.1 of the Forensic Science Division Health and Safety Manual.

The contents of any pressurized tank shall not be examined. This does not include pressurized cans.

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2.2.13 Hypergeometric Table

This table will be used to determine the required sample size (n) to guarantee with 95% confidence that at least 90% of the population (N) contains controlled substances. To use this table, it must be expected at the outset that all sampled units will be positive. If one or two negatives are expected, a separate table must be used.

This table is derived from European Network of Forensic Science Institutes Drug Working Group (ENFSI DWG) "Calculator for Qualitative Sampling of seized drugs (2012)", issued 12/17/2012.

Number of Units in Population	Number of Units to Test (95% C.L. that at least 90% of population contains analyte)
1 – 10	ALL
11	9
12	9
13	10
14	11
15	12
16	12
17	13
18	14
19	15
20	12
21	13
22	14
23	14
24	15
25	16
26	16
27	17
28	18
29	18
30	15
31	16
32	17
33	17

Number of Units in Population	Number of Units to Test (95% C.L. that at least 90% of population contains analyte)
34	18
35	18
36	19
37	19
38	20
39	20
40	18
41	18
42	18
43	19
44	19
45	20
46	20
47	21
48	21
49	22
50-69	23
70-79	24
80-109	25
110-169	26
170-200	27
201-1,000	28
1,001-10,000	29

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2.2.14 References

ASCLD/LAB Policy on Sampling, Sampling Plans, and Sample Selection In the Drug Chemistry Discipline, AL-PD-1018-Ver 2.0, (2012).

ASTM International, "Standard Practice for the Identification of Seized Drugs." ASTM E2329-14 (2014)

ASTM International, "Standard Guide for Sampling Seized Drugs for Qualitative and Quantitative Analysis." ASTM E2548-11 (2011)

European Network of Forensic Science Institutes Drug Working Group (ENFSI DWG) "Guidelines on Representative Drug Sampling." Version 1-1 (2003).

European Network of Forensic Science Institutes Drug Working Group (ENFSI DWG) "Hypergeometric Sampling Tool (version 2012) Background of Calculation and Validation", DWG-SGL-002, issued December 17, 2012.

European Network of Forensic Science Institutes Drug Working Group (ENFSI DWG) "Validation of the "Guidelines on Representative Sampling_DWG-SGL-001-vers002", issued December 17, 2012.

IUPAC. Compendium of Chemical Terminology, 2nd ed. (the "Gold Book"). Compiled by A. D. McNaught and A. Wilkinson. Blackwell Scientific Publications, Oxford (1997). XML on-line corrected version: <http://goldbook.iupac.org> (2006-) created by M. Nic, J. Jirat, B. Kosata; updates compiled by A. Jenkins.

Michigan Compiled Laws MCL 333.7401, MCL 333.7403, and MCL 333.26424

Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) Recommendations. Version 7.0, August 14, 2014.

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2.3 Terminology for Reports and Testimony

2.3.1 Scope

This quality assurance document describes definitions and bases for terminology that may be used in Forensic Science Division seized-drug laboratory reports or testimony. This document applies to Forensic Science Division analysts who are authorized to prepare laboratory reports and offer expert witness testimony regarding the results of seized drug examinations.

2.3.2 Application to Casework

The results of seized drug analysis are expressed in the form of a laboratory report and testimony. Seized drug analysts are expected to prepare reports and provide testimony consistent with the directives of this document and the Reporting Guidelines section of this manual.

This document does not, and cannot, address every contingency that may occur. For example, an analyst may not have an opportunity to fully comply with this document during a testimonial presentation due to circumstances beyond his or her control. In addition, this document does not prohibit conclusions in reports and testimony that fall outside of the stated scope.

2.3.3 Conclusions Regarding Seized Drug Examinations

The following conclusions may be offered regarding the examination of seized drug evidence:

- a) Identification (i.e. Identified)
- b) Possible Presence
- c) Not Detected
- d) Inconclusive

2.3.3.1 Identification

“Identification” is an analyst’s conclusion that the scientific data support the presence of an analyte or class of analytes in a questioned sample.

The basis for an ‘identification’ conclusion is an analyst’s determination that:

1) a specific analyte or class of analytes was detected in a questioned sample using orthogonal techniques, at least one of which provides chemical structure information about the analyte or class of analytes;

2) predefined decision criteria set forth in the relevant procedures were satisfied for each technique;

and

3) the techniques included the use of positive and negative controls (where applicable); or, if positive controls are unavailable, the results were compared to a reliable reference material or database, or to peer reviewed literature.

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2.3.3.2 Possible Presence

“Possible Presence” is an analyst’s conclusion that the scientific data support the presence of an analyte or class of analytes in a questioned sample, but the analytical process was stopped prior to completing all orthogonal techniques required for an identification.

The basis for a ‘possible presence’ conclusion is an analyst’s determination that a specific analyte or class of analytes was detected in a questioned sample using one or more validated techniques, but the combination of techniques used does not meet the requirements for an Identification.

2.3.3.3 Not Detected

“Not detected” is an analyst’s conclusion that the scientific data supports the determination that an analyte or class of analytes is not present in a questioned sample or not present at a detectable level.

The basis for a conclusion that an analyte or class of analytes is ‘not detected’ in a questioned sample is an analyst’s determination that the result(s) of the technique(s) used is (are) negative for the analyte or class of analytes, or do not meet the decision criteria specified in the relevant procedure.

2.3.3.4 Inconclusive

“Inconclusive” is an analyst’s conclusion that the scientific data supports the decision that no determination can be made regarding the questioned sample or the comparisons to reference materials.

The basis for an ‘inconclusive’ conclusion is an analyst’s decision that the result(s) of the technique(s) used is (are) insufficient to determine the nature of a questioned sample.

2.3.4 Conclusions regarding Control Status

The following conclusions may be offered regarding control status of seized drug evidence:

- a) Controlled
- b) Not Controlled
- c) Not Determined (no control status reported)

NOTE: These conclusions are not considered to be statements of conformity since there is no specification, mandate, or technical standard which is to be satisfied by the item being tested.

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2.3.4.1 Controlled

“Controlled” is an analyst’s conclusion that the detected analyte or class of analytes is listed or otherwise included in Schedule 1-5 of the relevant statute or rule pertaining to the case.

The basis for a ‘controlled’ conclusion is an analyst’s determination that the analyte or class of analytes is listed by name or structure or otherwise qualifies as a controlled substance under the relevant law(s). The factors on which this conclusion is made may be necessary to explain in the case record. It may also be necessary to qualify the conclusion by referencing federal or state law if the substance is only controlled under one and not the other. Refer to the Reporting Guidelines section of this manual.

2.3.4.2 Not Controlled

“Not Controlled” is an analyst’s conclusion that the detected analyte or class of analytes is not listed or included in Schedule 1-5 of the relevant statute or rule pertaining to the case.

The basis for a “not controlled” conclusion is an analyst’s determination that the analyte or class of analytes is neither listed nor qualifies as a controlled substance under relevant law or rule.

2.3.4.3 Not Determined (no control status reported)

“Not Determined” is an analyst’s conclusion that control status of the analyte or class of analytes could not be clearly determined.

The basis for a “not determined” conclusion is an analyst’s determination that the circumstances of the case or nature of the analyte do not permit either a “controlled” or “not controlled” conclusion. The reasons for this conclusion may be necessary to explain in the case record or laboratory report.

2.3.5 Limitations to Conclusions

- a) If an analyte or class of analytes is identified in a questioned sample, an analyst shall not assert how that analyte or class of analytes was transferred to the questioned sample or how long that analyte or class of analytes has been present in the questioned sample.
- b) When analyzing a portion of a population, an analyst shall not assert that his or her conclusion applies to the entirety of the population (or a percentage of the population), unless a statistically based sampling plan is used.
- c) A seized drug analyst shall not assert that seized drug examinations are infallible or have a zero error rate.

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- d) A seized drug analyst should not use words such as “scientific certainty” or “reasonable degree of scientific certainty”, unless required by jurisdictional regulations.
- e) A seized drug analyst shall not provide a conclusion that includes a statistic or numerical degree of probability except when based on relevant and appropriate data.
- f) Seized drug analysts may not provide conclusions or opinions outside the scope of their specific expertise.

2.3.6 References

ASTM E602 – Standard Practice for Reporting Opinions of Scientific or Technical Experts
 SWGDRUG Guidelines, ver 8.0, June 13, 2019
 US Department of Justice Uniform Language for Testimony and Reports, March 13, 2019

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2.4 Reporting Guidelines

2.4.1 Evidence Descriptions

Every opened container shall have an adequate description of the appearance of the item and packaging. The description shall be detailed enough so that the Forensic Scientist could identify the evidence based on their notes.

Seals that the agency used in interior packaging shall be in this descriptor.

A description of any containers not tested or opened shall be included in the inventory of the evidence received.

2.4.2 Enumerations and Weights

Each piece of evidence received shall be documented in the report by means of a physical description of the packaging.

Evidence that is opened and analyzed shall either be enumerated or weighed per policy defined in this manual.

Weights will be reported according to the section on Weight Measurement in the Controlled Substances Procedures Manual or as specified in a particular procedure.

2.4.3 Reporting of Identification and Control Status

2.4.3.1 Schedule

Controlled substances are to be reported with wording consistent with Michigan Public Health Code and the Administrative Rules of the Michigan Board of Pharmacy, or federal law when applicable.

The identity and schedule will be reported when clearly known. Modification is permissible for clarity and/or to maintain accuracy in reporting.

Unless specifically controlled or listed separately, enantiopure formulations may be reported under the generic drug name. Example: dexmethylphenidate may be reported as methylphenidate, Schedule 2.

2.4.3.2 Law Changes

If a substance name or schedule has changed after the seizure of the item and before the issuance of the laboratory report, the identification and schedule reported will be consistent with the relevant law at the time of seizure

2.4.3.3 Federally Controlled Substances

For Federal cases, report the substance as scheduled under federal law.

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Under Michigan law, if a substance is designated, rescheduled, or deleted as a controlled substance under federal law and notice of that designation, rescheduling, or deletion is given to the administrator of the Michigan Public Health Code, the substance shall be similarly scheduled under MCL 333.7201 unless the administrator holds a board meeting within the expiration of 91 days after notice of federal control is received.

For simplicity, if an identified substance is controlled federally but is not known to be similarly controlled in Michigan, the report will state that the identified substance is controlled federally and will specify the relevant section of the public health code for determination of control status under state law.

The following statement may be used:

_____ is a federally controlled substance, Schedule ____, effective ____ (date) ____.
Refer to MCL 333.7204 to determine the control status of this substance under state law.

It is generally not advisable to report that a federally controlled substance is unequivocally *not controlled* in Michigan if there is ambiguity or uncertainty as to if any action was taken by the Board of Pharmacy.

Exceptions may occur and will be handled on a case by case basis upon consultation with the Unit Supervisor.

2.4.3.4 Controlled by Structure

If a substance is controlled by structure (e.g. synthetic cannabinoids, synthetic cathinones, phenethylamines), the report should state the section of the law under which the identified substance is controlled.

For example, "MDPV is controlled under MCL 333.7212 §1(x)(iii), Schedule 1."

2.4.3.5 Possible Analog or Possible Control by Receptor Activity

If a substance is not specifically controlled by name or structure but could be controlled as an analog or by pharmacological activity, leave the schedule blank and use a statement such as "_____ is not specifically controlled in Michigan."

It is generally not advised to report substances with possible control status as "not controlled" without additional qualification.

2.4.3.6 Control under more than one Schedule

If a substance is listed under more than one schedule it is appropriate to either state the relevant sections under which it is named OR assign the schedule under which the substance was most recently controlled.

For example:

"Phencyclidine (PCP) is controlled in Michigan under both MCL 333.7216 (Schedule 3) and Board of Pharmacy Rule R338.3119 (Schedule 2)."

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OR

“Hydrocodone, Schedule 2”

2.4.3.7 Definition, Regulation and Control under more than one Section of MCL

If a substance is defined or regulated under more than one section of MCL, the report shall be issued according to the section of MCL under which the request for analysis is made. If no section of MCL is specified in the request, the report shall specify the applicable section(s) of MCL under which analysis was made, and/or results were authorized.

For example:

“Item #1 was identified as Marihuana, a schedule 1 controlled substance as defined by the Michigan Public Health Code of 1978, sections 333.7106 and 333.7212.”

2.4.4 Limitations

Relevant limitations of an analytical scheme related to the identification of a substance should be reported. Modification is permissible for clarity and/or to maintain accuracy in reporting.

2.4.4.1 Isomers, not distinguished

Substances with known isomers not analytically distinguished shall be reported following this example: “25I-NBOMe or one of its positional isomers. 25I-NBOMe and its isomers are controlled under R338.3113 (oo), Schedule 1.”

Enantiopure formulations may be reported according to CS-PM 2.3.3.1. If specific optical isomers are listed or controlled separately then this clause (2.3.4.1) also applies.

2.4.5 Additional Report Statements

For consistency in reporting, the following statements shall be used as applicable. Modification is permissible for clarity and/or to maintain accuracy in reporting. It is often appropriate to use more than one statement.

2.4.5.1 No controlled substances detected

For reporting of an item in which no compounds that are of forensic significance were found, use “No controlled substances detected.”

2.4.5.2 Insufficient

For reporting of an item with too little specimen available for complete identification, use “Insufficient material was available for full analysis.”

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If there was insufficient material available to test for marihuana but enough material for other identifications to be made, use “Insufficient material was available for a full analysis for marihuana.”

If enough specimen is available, but insufficient concentration of analyte is present, use an “Inconclusive Results” statement.

2.4.5.3 Tablet Markings Inconsistent with Identification

For tablets and capsules with markings consistent with a controlled substance but which have analytical results different from the manufacturer’s specification as to content, use one of these examples:

“Observations of the physical characteristics and markings on the tablets are consistent with a pharmaceutical preparation containing hydrocodone. However, chemical analysis of 5 tablets did not show the presence of any controlled substance.”

“Observations of the physical characteristics and markings on the tablets are consistent with a pharmaceutical preparation containing tramadol. However, chemical analysis of one tablet confirmed the presence of hydrocodone.”

“Observations of the markings on the tablets are consistent with a pharmaceutical preparation containing alprazolam. However, physical characteristics of the tablets are not consistent with known pharmaceutical preparations of alprazolam. Chemical analysis of one tablet indicated the presence of zapizolam. Zapizolam is not controlled.

2.4.5.4 Drug or Preparation Specific Results

If consideration of non-controlled active ingredients or specific dosage form or specific combinations of ingredients is relevant, use the following example:

“Item 1 was found to contain butalbital, acetaminophen, and caffeine. Reference(s) indicated Item 1 is consistent with an exempt (non-controlled) preparation.”

2.4.5.5 Inconclusive Results

For reporting of an item in which a controlled substance can neither be confirmed nor excluded, the reason will be clearly stated in the report. Some possible reasons for an inconclusive result may include insufficient concentration, degradation, nature of the analyte, or absence of reference materials.

Example statements:

“No identification of controlled substances could be made due to _____ (*insert reason*).”

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“No conclusion can be drawn as to the presence or absence of a controlled substance because _____ (insert reason).”

2.4.5.6 Possible Presence of a Substance Reported without a Full Analytical Scheme

If a detected or indicated substance is named in the report without conducting at least two uncorrelated techniques, the report shall clearly state that full analysis (identification) was not performed. This conclusion reports the possible presence of an analyte and is not intended for reporting an inconclusive result.

Example statements:

“Initial testing of Item 1 by gas chromatography-mass spectrometry indicated the possible presence of 25C-NBF. Full analysis for identification of 25C-NBF was not performed.”

“Initial testing of Item 1 by gas-chromatography-mass spectrometry indicated the possible presence of 25C-NBF but no identification was made due to the unavailability of a reference material.”

“Physical identification of the tablets indicated acetaminophen, a non-controlled substance. No confirmatory tests were performed.”

“Initial testing of Item 1 by gas chromatography-mass spectrometry detected the possible presence of acetaminophen. Full analysis for identification of acetaminophen was not performed. Acetaminophen is not controlled in Michigan.”

2.4.5.7 Additional Personnel Involved in Processing

If additional personnel, other than the author of the report, were involved in processing the evidence the following statement is to be used. Include the names of the laboratories where work was performed:

“In addition to the reporting analyst, other personnel at the MSP [insert lab name] Forensic Laboratory have processed evidence associated with this report.”

For purposes of this section, use this statement if other personnel opened, inventoried, measured, sampled, extracted, or performed testing on the case. Often, all personnel involved will work at the same laboratory but include the laboratory in all cases to ensure clarity.

Evidence transfer or direct supervision of a trainee is not subject to this requirement.

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2.4.6 Incomplete or No Analysis Reports

If no results are to be reported, such as in the event of the adjudication of a case in progress, the case will be reported following LOM 3.3.4.7.

Example statements:

“Notification was received from (the Prosecutor’s office) on (date) that the request for analysis has been cancelled and is no longer necessary.”

“Per (agency) on (date), no further analysis of Item 1 is needed.”

2.4.7 Latent Print Examination Request not honored due to Presence of High Hazard Material

If a latent print examination was requested and a high hazard material was detected or identified, the evidence will not be transferred to the latent print unit and the latent print examination will not be conducted per LOM 4.1.2 and CSPM 1.2. To inform the customer of the status of the Latent Print examination request, the Controlled Substances laboratory report shall contain the following statement. Modification is permitted for accuracy and clarity.

“Per Forensic Science Division policy, the packaging of the item(s) submitted will not be forwarded for Latent Print examinations due to the presence of the substances detected and/or identified. This completes the testing to be performed on the item(s) listed above.”

2.4.8 Examination Request not honored due to Not Meeting Test or Submission Requirements

If an item received for seized drug analysis is not tested due to not meeting the submission policy or requirements for testing, it is appropriate to briefly explain why the item is being returned without analysis.

Example statements:

Item 1 was not analyzed as it does not meet the requirements for testing.

Item 1 was not analyzed as it does not meet the submission policy for seized drug analysis.

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2.5 Review Guidelines

The following criteria shall be checked when administering a case review:

2.5.1 General

2.5.1.1 Results Connect to the Item Tested

The results and data which support the identification must be clearly connected to the item tested.

- a) Correct laboratory number and Item number(s) are on instrumental data for items tested.
- b) For reference material data, the reference data may be connected to the item tested by:

Labeling the reference material data pages with the item number.

OR

Relating the reference material and results to the item tested in the applicable section(s) in the worksheet. For clarity, the reference material should be referred to by its unique standard number on the data and in the results table when applicable.

OR

Both of the above.

Evidence transfers to and from the analyst's personal custody are acknowledged, at the time of transfer, in the chain of custody record.

The chain of custody shows the evidence was in analyst's personal custody at the time of measurement, physical examination, observation-based testing, and sampling.

Observations are recorded at the time they are made.

The identified controlled substance and schedule are listed correctly on the worksheet and the report.

The statistics portion of the worksheet is filled.

2.5.1.2 Record Contains All Notes and Data

The case record includes all analytical results for all items analyzed.

Dates are recorded on data to indicate when work was performed.

All changes, alterations, additional notations, and interlineations in hand-written notes are initialed.

2.5.2 Color Tests/Microcrystal Tests

Reagent bottle designation and verification date(s) are recorded in case record.

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Color reaction and/or crystal results are recorded in worksheet.

2.5.3 Sampling, Extractions & Solvents

Approximate portion of tablet consumed in analysis is stated in case record.

When entire sample is consumed this is clearly stated in case report.

When multiple samples are submitted the portions and/or samples that are analyzed are clearly stated in case report.

The minimum protocol for identification was met and the tests performed are documented in the case record for each item identified on the laboratory report.

When extractions are conducted, the type of any acids, bases and/or solvents used shall be documented.

When a sample is used direct/heat it is clearly stated in the case record.

When a case sample is introduced to a gas chromatograph, gas chromatograph-mass spectrometer, or DiscovIR-GC, the injection solvent shall be documented. The solvent used as a solvent blank shall be recorded if it is different than the injection solvent used for the case sample.

2.5.4 Balances, Weights, and Volumes

The balance used for weight measurement is identified in the case record.

Balance verification data is included for samples exceeding a weight-based penalty threshold. Refer to the section on Balances and Weight Measurement in the Controlled Substances Procedures Manual.

The graduated cylinder or pipette used for volume measurement is identified in the case record if the case is subject to a volume-based penalty threshold.

Uncertainty of measurement is reported according to the section on Uncertainty of Measurement in the Controlled Substances Procedures Manual, or at the request of the investigating agency.

2.5.5 Tablets

Physical identification of appropriate references of tablet markings are recorded in case record.

Case report identifies that no chemical tests were conducted on tablets/capsules when markings indicate that the tablets/capsules contain non controlled substances.

Weight of Schedule 2 narcotic tablets is stated on the laboratory report if more than 50 grams.

2.5.6 Instrumental

Instrument model and operating parameters are included in the case record.

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Acceptable reference standard spectra are included for all GC-MS, FTIR and GC-IR identifications in object repository or the case record identifies shared library spectra from section object repository. Reference literature spectra are labeled with title, edition and volume information.

Unique standard designation is included in the case record when a drug standard is used.

Corresponding sample and standard spectra GC-MS, FTIR and LC-MS have acceptable correlation.

Identified substance is represented in the data in the case record.

Appropriate blanks are included in the case record.

The retention times and/or relative retention times are identified in the case record on standards and samples when gas chromatography is used in the analytical scheme.

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2.6 Seized Drug Testimony Guidelines

2.6.1 Scope

This quality assurance document describes guidelines for forensic seized drug analysis opinions and testimony. This document applies to Forensic Science Division analysts who are authorized to prepare laboratory reports or offer testimony regarding seized drug examinations.

2.6.2 Application to Casework

The results of seized drug analysis may be expressed in the form of a laboratory report, written or verbal opinion, and testimony. Seized drug analysts are expected to offer opinions and provide testimony consistent with this document.

By the nature of their work, forensic seized drug analysts may express reasons for conclusions and offer opinions related to the testing performed. Under no circumstances may forensic seized drug analysts provide expert opinions outside the scope of their specific expertise.

This document does not, and cannot, address every contingency that may occur. For example, an analyst may not have an opportunity to fully comply with its directives during a testimonial presentation due to circumstances beyond his or her control. In addition, this document does not prohibit the provision of opinions and testimony that fall outside of its stated scope.

Analysts are prohibited from testifying as an expert witness on behalf of a private individual unless otherwise authorized.

Requests for expert testimony unrelated to the analysis of evidence, testing methods, or testing results will be considered on a case-by-case basis in consultation with the laboratory director, technical leader, and an Assistant Division Commander.

2.6.3 Seized Drug Witnesses

Personnel may be asked to testify as a fact or expert witness.

- a) Fact witnesses typically testify to the work performed in the laboratory that includes scientific principles, test methods, instrumentation, quality assurance procedures, and chain of custody.
- b) Expert witnesses typically testify to their own interpretation of results and express an expert opinion.

2.6.4 Written and Oral Opinions

Seized drug analytical reports will state the results of analytical testing. Opinions on, and interpretation of analytical findings may be offered in reports or testimony.

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Elements of the expert's opinion which will make the report understandable to the intended recipient should be reported.

The scope of opinions and conclusions reported or testified to shall not go beyond the knowledge, training and experience of the analyst.

All opinions are rendered based upon facts, information, and observations available at the time. Seized drug analysts should be prepared to reconsider and, if necessary, change their conclusions, opinions, or testimony in light of new information or developments.

2.6.4.1 Expert Opinions

An *expert opinion* is a coherent, scientifically sound statement or statements regarding the meaning of analytical findings in a forensic case. The statement is formulated from consideration of analytical data, measurements, and other relevant information.

An expert opinion should:

- a) Be expressed in a clear, coherent manner;
- b) Be based on established scientific principles and foundations;
- c) Be based on the totality of the information available;
- d) Have references that support the opinion;
- e) Clearly state any assumptions made;
- f) Clearly state any known limitations of the result or opinion.

2.6.5 Limitations to Testimony and Opinions by a Seized Drug Analyst

- a) A seized drug analyst shall not assert that seized drug examinations are infallible or have a "zero error rate".
- b) A seized drug analyst shall not cite the number of seized drug examinations performed in his or her career as a direct measure for the accuracy of a proffered conclusion. An analyst may cite the number of seized drug examinations performed in his or her career for the purpose of establishing, defending, or describing his or her qualifications or experience.
- c) A seized drug analyst should not offer an opinion as to the absolute drug content of an exhibit or item of evidence without analytical data supporting the opinion.
- d) A seized drug analyst should not use words such as "scientific certainty" or "reasonable degree of scientific certainty", unless required by jurisdictional regulations.
- e) If pharmacological activity is a requirement for control status, the seized drug analyst should not provide such testimony in the absence of specific training and experience in pharmacology (or related fields).

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	<i>Document Manager: Elizabeth Gormley</i>	<i>Approved By: Ryan Larrison</i>

2.6.6 References

- ASTM E602 – Standard Practice for Reporting Opinions of Scientific or Technical Experts
- SWGDRUG Guidelines, ver 8.0, June 13, 2019
- US Department of Justice Uniform Language for Testimony and Reports, March 13, 2019