Title: General Approach to Toxicology Cases

1. Scope

1.1. This procedure provides general guidelines for the receipt, analysis, and disposition of toxicological evidence for cases assigned to the Toxicology Unit (TX) within the the Division of Scientific Services' (DSS) forensic laboratory.

2. Procedure

2.1. Sample Collection and Evdience Receipt Requirements

2.1.1. The proper selection, collection, and submission of biological specimens for toxicological analyses is important for the scientifically sound interpretation of analytical data. However, specimens may be limited and submitting agencies may not be able to obtain recommended minimal amounts. In cases where limited sample amounts are received by the DSS laboratory, the type and amount of specimen may influence which analyses will be performed. In such situations analysts will work with Lead Examiners, and possibly the submitting agencies, to decide which analytical path will be pursued.

2.1.2. For toxicology cases, the preferred collection tube is a grey-top Vacutainer® which contains a mixture of sodium fluoride and potassium oxalate in order to enhanace the stability of the analytes. Expiration dates on such tubes are only for vacuum integrity and do not reflect on the quality of the tube or its components after samples have been captured within the container.

2.1.3. The most common types of toxicological specimens for antemortem analyses are urine and blood (sometimes plasma or serum will be submitted). Prior to sampling, containers should be inverted or swirled to ensure homogeneity. If blood samples are found to be clotted, such clots may need to behomogenized/broken-up (as best as possible) before sampling occurs. Appropriate case notes will be taken for documentation of events.

2.1.3.1. NOTE: Postmortem samples may be received however this is rare and will follow the same analytical scheme as DFC cases listed below. Consult with a lead examiner or higher prior to starting analysis.

2.1.4. All specimen labels must be compared to the information on the case requisition. Any discrepancies must be clearly documented. If a discrepancy could greatly affect the quality of results (e.g., the name of the subject on the requisition

is different from the name on the tubes), the discrepancy must be investigated before testing begins.

2.1.5. Every specimen received by the toxicology unit must be given a unique identifier in LIMS (sub-item). Specific information regarding the colored tops of multiple tube submissions, approximate volume of samples in each tube, and other information should be recorded within the 'Notes' portion of LIMS-plus for each item of evidence.

2.1.5.1. When multiple blood or urine samples are submitted, the earliest specimen will be itemized first.

2.1.5.2. Samples collected by the hospital during normal course of treatment may be received in multiple tubes. When the specimens have been reportedly collected at the same time, from the same location/person then they may be considered the same item and be given the same item number during accessioning (e.g., Item #: 001-001 – blood within three (3) tubes), if they will not be used for testing. Situations where it is not clear whether multiple samples of evidence should be considered one item or multiple items will involve the appropriate FSE2 (or higher) for a decision to be made. Any clarification or justification for non-routine actions and/or decisions will be appropriately recorded in both batch notes and case notes

2.1.6. Any specimen with an unusual or atypical condition (e.g., urine suspected to be dunked in toilet bowl) must be documented within the case record.

2.1.7. Such evidence will typically be received through the Evidence Receiving Unit of the DSS laboratory. Proper seal of evidence refers to a condition of packaging which ensures evidence is prevented from cross contamination, there is no sample loss, and any attempt at deleterious change of the evidence would be noticeable.

2.2. Chain of Custody

2.2.1. Evidence transfers will be documented within the laboratory information management system (LIMS) software (e.g., LIMS-Plus) following normal laboratory procedures.

2.2.1.1. If evidence is transferred to between multiple analysts for the purpose of aliquoting samples then evidence does not necessarily need to be under proper seal between such transfers (evidence must be free of sample loss and

free of possible contamination). If aliquoted portions of a sample are to be used at a later date, a sub-item will be created.

2.2.2. In the unusual circumstance that an extract from a specimen will be retained (e.g., all the blood evidence has been consumed and the extract needs to be saved), then the extract will be sub-itemized (e.g., Item #: 001-001-01-01) and recorded within LIMS-plus (i.e., CoC recording).

2.3. Sample Storage

2.3.1. Due to the nature of biological material, specimens will be kept refrigerated or frozen and under proper seal when not under active examination. Refrigerators and freezers for storage of active cases are located in the Toxicology Unit.Refrigerator and freezers in general areas used for long term storage of completed case material will be locked. .

2.4. Analytical Schemes for Toxicology Testing

2.4.1. Forensic toxicological examinations are conducted on specimens in order to detect a wide range of drugs and/or other substances. Pertinent case histories should be reviewed during both the accessioning process and when cases are being completed (i.e., technical reviews). For most routine DUI-related cases analysts should only need a brief understanding of the history within requests. Certain cases (e.g., sexual assaults) may require a more thorough review of case history so that adequate analytical plans are developed and followed. Professional judgment will be used to determine the sequence of tests which will be performed. The general analytical schemes within this document can be used for guidance and, in general, will be followed.

2.4.2. Suspected DUI Cases

2.4.2.1. Many examinations within the Unit involve antemortem specimens from driving under the influence (DUI) investigations wherein volatiles and/or impaired-driving drugs are suspected to be present. Submitting agency representatives often request that ethanol/drugs be detected, identified, and possibly quantitated. Such analytes within blood samples may be quantitated, but quantitation within urine specimens will be limited to volatile compounds (e.g., ethanol, methanol, acetone, isopropanol).

2.4.2.2. With the exception of fatalities, in submissions where ethanol findings from samples are high (i.e., equal to or over 0.080 g% blood alcohol content (BAC) for adult drivers, equal to or over 0.040 g% BAC for drivers operating commercial vehicles, equal to or over 0.020 g% BAC for drivers under 21

years old), analyses for drugs may be omitted from analytical schemes unless specifically requested. Drug and alcohol analysis shall be performed on all surviving operator samples in fatality cases.

2.4.2.3. Lead examiners (or higher) should be involved in unusual cases or when uncertainty exists in how to proceed during the scheduling of tests.

2.4.2.4. Due to time requirements for state Per Se hearings related to DUI cases, volatile reports are generally issued prior to full drug reports. While drug reports that are issued after ethanol reports are supplemental reports, it is not a requirement that they be titled as such. When DUI samples are collected at the request of the officer (not drawn during normal course of hospital treatment), duplicate testing will be performed on blood and/or urine samples.

2.4.3. **Suspected DFC cases**

2.4.3.1 Cases within the Toxicology Unit may involve biological evidence from suspected drug facilitated crime-type investigations (DFC ; formerly known as drug facilitated sexual assaults (DFSA)). Evidence from these cases will often involve the submission of both urine (recommended) and blood samples. All DFC cases will include confirmatory analytical techniques in addition to any presumptive techniques which may be used. Reports involving presumptive testing-only should not be issued for DFC-type cases. Toxicological analyses will begin within sixty (60) days of the request date for all DFC-type cases in order to conform to statutes related to sexual assault evidence. All DFC-type cases will receive testing for alcohol and/or drugs unless outside acceptable times ranges.

2.4.3.1.1 For gamma- hydroxybutyric acid (GHB), blood collection times must be less than eight (8) hours after the time of drugging/incident. Ethanol should not be analyzed within blood specimens if their collection times are greater than twenty-four (24) hours. Blood samples that have been collected after two (2) days of the alleged incident will not be analyzed. Upon approval of the appropriate Assistant Director (or above), blood may be tested regardless of the interval between the time of incident and the collection time in order to be able to better interpret the significance of positive urine findings (or if target drugs are known to have longer half-lives).

2.4.3.1.2 For gamma-hydroxybutyric acid (GHB), urine collection times must be less than twelve (12) hours from the suspected drugging/incident. Ethanol should not be analyzed within urine specimens if urine specimen collection times are greater than twenty-four (24) hours after the incident. Samples that have been collected five (5) days

(120 hours) after the alleged incident will not be analyzed without prior approval from the appropriate Assistant Director (or higher).

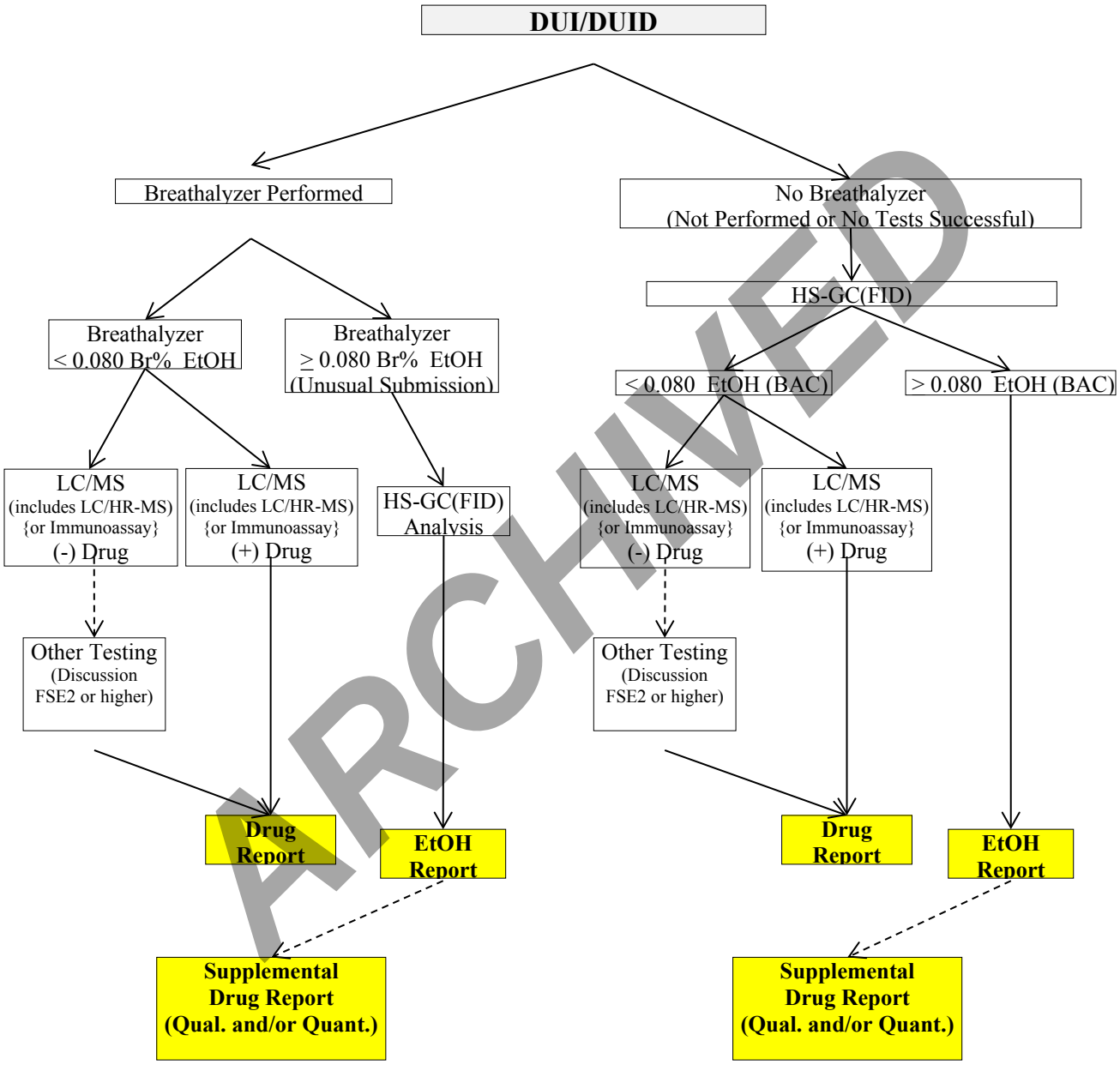
2.4.3.1.3

Since DFC-type cases can be unusual and non-routine, the lead examiner (or higher) should be consulted to determine the analytical plan based on the circumstances of the specific case.

2.4.4. Other Cases

2.4.4.1. While the majority of submissions within the DSS laboratory's Toxicology Unit will be from suspected DUI or suspected DFC this procedure doesn't preclude other types of cases involving human biological materials to be examined within the Unit (e.g., special events testing, serum-conversions, proficiency tests).

Figure 1: Analytical Scheme for DUI Antemortem Cases (Non-Fatal)



Note: LC/MS include screening and confirmation/quantation.
Note: Variations in this (and other) schemes are allowed depending on sample volume, customer requests, and other reasons deemed toxicologically applicable. Such variations will be approved by the appropriate Lead Examiner (or higher) and recorded in appropriate case file and/or batch paperwork

3. Abbreviations

The following abbreviations may be found in the procedures and case notes within the Toxicology Unit:

ACN	Acetonitrile
BZ	Benzodiazepine
CAL	Calibrator
CTRL	Control
DUI	Driving Under the Influence
DOC	Department of Corrections
DFC	Drug Facilitated Crime
DFSA	Drug Facilitated Sexual Assault
EtOH	Ethanol
MeOH	Methanol
IPA	Isopropanol
RT	Retention time
HS-GCMS(FID)	Head Space-Gas Chromatography Mass Spectrometry (Flame Ionization Detector)
HS-GC(FID)	Head Space-Gas Chromatrograhy (Flame Ionization Detector)
FID	Flame Ionization Detector
EMIT	Enzyme Multiplied Immunoassay Technique
LC MS	Liquid Chromatography Mass Spectroscopy
TX	Toxicology
BL	Blood
UR	Urine
SER	Serum
ND	None Detected (not detected)
DI H2O	De ionized Water
Neg	Negative
POS	Positive
SA	Sexual Assault
Coc	Cocaine
BE	Benzoylecgonine
Op	Opioids
THC	Delta-9-Tetrahydrocannabinol
COOH-THC	Carboxy-delta-9-tetrahydrocannabinol
THC-OH	11-Hydroxy-delta-9-tetrahydrocannabinol (11-OH-THC, OH-THC)
SMA	Sympathomimetic Amines
GHB	Gamma-hydroxybutyrate or gamma-hydroxybutyric acid
OCME	Office of the Chief Medical Examiner
MOU	Memorandum of Understanding
Volatiles	Methanol, Ethanol, Acetone, Isopropanol

4. References

DSS Quality Manual

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