Title: General Approach to Toxicology Cases

1. Scope

This procedure provides general guidelines for the receipt, analysis, and disposition of toxicological evidence for cases assigned to the Toxicology Unit (TX ; TU) within the Chemical Analysis Section (CAS) of the Division of Scientific Services' (DSS) forensic laboratory. These guidelines are based on recommendations set forth within a number of reference documents such as, but not limited to:

- DSS laboratory Quality Manual procedures
- ANSI National Accreditation Board (ANAB) AR3125 – Forensic Science Testing and Calibration Laboratories Accreditation Requirements
- Society of Forensic Toxicologists (SOFT)/American Academy of Forensic Sciences (AAFS) Forensic Toxicology Laboratory Guidelines
- American Board of Forensic Toxicology (ABFT) Laboratory Accreditation Manual
- Drug Abuse Handbook
- Poison Detection in Human Organs
- Introduction to Forensic Toxicology
- Principles of Forensic Toxicology, Handbook of Analytical Toxicology

2. Equipment/Materials/Reagents

Not applicable. Guidance for preparing reagents and the utilization of instruments/equipment may be found in specific toxicological procedures.

3. Standards and Controls

Not applicable. Guidance for preparing standards and controls (e.g., positive and negative) may be found within specific toxicological procedures.

4. Calibration

Not applicable. Guidance for calibration may be found within specific instrumental procedures.

5. Sampling

The most common types of toxicological specimens for antemortem analyses are urine and blood (sometimes plasma or serum will be submitted). For postmortem analyses blood, urine, and/or vitreous humor are often analyzed (if plasma/serum are submitted they may be treated like blood specimens and will be analyzed accordingly). 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 be removed or homogenized/broken-up (as best as possible) before sampling occurs. The determination of whether blood clots will be removed or analyzed and the process for ensuring homogeneity of clotted samples will be done on an as-needed basis and will involve a Lead Examiner or higher. Appropriate case notes will be taken for documentation of events.

Blood samples may be received in multiple tubes. When blood (or the same specimen type) has been reportedly collected at the same time interval (within 3 minutes), from the same location/person, and from the same type of test tube (i.e., grey top, lavender top, red top), 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). 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. While tubes can be further labeled to distinguish the tubes from one another, the item numbers should remain the same. Any sampling from the separate tubes will be described within applicable case note documents by the analyst(s) who handles the evidence. With an appropriate Assistant Director's (or higher) approval, if there is not enough sample within individual tubes but, collectively, samples from multiple tubes that were taken from the same person can make up a volume of sample which will allow an analysis to occur, then samples can be combined and analyzed for qualitative purposes only. Situations where it is not clear whether multiple samples of evidence should be considered one item or multiple items or whether limited samples can be combined will involve the appropriate Assistant Director (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. When combining samples due to limited volumes has been authorized and performed, then a note/remark within the report will indicate that such a practice was used for the involved item(s).

6. Procedure

6.1. Sample Collection, Receipt, and Transfer

The proper selection, collection, and submission of biological specimens for toxicological analyses is important for the scientifically sound interpretation of analytical data. There are recommended minimal volume amounts for specific types of specimens in order to adequately perform routine toxicological examinations (e.g., human performance cases: blood = 15 mL ; urine = 100 mL). 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.

When blood is analyzed for containing certain drug classes (e.g., cocaine, ethanol) it is advantageous if the specimen is mixed with chemicals so as to enhance the stability of analytes. This can be accomplished by using specimen tubes that contain preservatives and/or anticoagulants. For most toxicology cases, the preferred collection tube is a grey-top Vacutainer® which contains a mixture of sodium fluoride and potassium oxalate. 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.

Containers with specimens collected from living persons should be found labeled with appropriate information (e.g., source name, time/date of collection). Biological specimens should be submitted to the DSS laboratory in separate individual packages (e.g., DUI kit box), under proper [evidentiary] seal, with appropriate warning labels, under a single communication (i.e., Request for Analysis (RFA) form), and should be submitted in a refrigerated or frozen condition. Typically such evidence is found submitted within some sort of kit and/or paperwork (e.g., DUI kit, CT400 kit, DPS-0009-C, copy of medical records).

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.

After initially receiving a toxicology case the evidence will be inventoried and information will be entered into LIMS-Plus (JusticeTrax (JT)). The information can include, but not be limited to: type of specimen(s) received, any labeling present on the containers, the approximate specimen amounts, and any damage to or leaks from the containers. The specimen containers will be labeled with appropriate information from LIMS-Plus (e.g., item number(s) and the Laboratory/Case Number). Any problems or issues with evidence will be addressed at the time of inventory, will be documented appropriately, and can involve a Lead Examiner, Assistant Director, Deputy Director, or designee. Pictures may be taken to document the evidence and any picture should contain the lab number, the date, and the analyst's initials. Pictures will be included within appropriate case files (LIMS-Plus or hardcopy). Contributors may be contacted, if appropriate, for minor issues or discrepancies within cases, and will be contacted for major issues within cases (e.g., sample loss or sample integrity issues).

Evidence transfers will involve adequate chain-of-custody (CoC) documentation and will be documented within the laboratory information management system (LIMS) software (e.g., LIMS-Plus). If evidence is transferred to 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). Any transfer of evidence possession needs to be tracked with respect to CoC documentation to ensure that proper accountability is recorded among

analysts. If aliquoted portions of a sample are to be consumed during analysis then each portion can either be considered the same item from which it originally came (and the same item number can be used) or it can be sub-itemized (usually describing why it was used). If a different analyst will be taking control of an aliquoted portion then sub-itemization will be performed.
For example: suppose Item #001-001 blood is to be tested for volatiles by Analyst A and will then be tested for drugs by Analyst B. In this scenario Analyst A takes possession of Item #001-001 and aliquots 0.4 mL of blood into two (2) headspace vials (0.20 mL into each autosampler vial) for their own work. Those aliquots would remain Item#001-001 and they would not be sub-itemized within LIMS-plus To assist their co-worker, Analyst A then aliquots 0.5 mL of Item #001-001 blood into a test tube for future drug analysis by Analyst B. That aliquoted [0.5 mL] sample will be sub-itemized by Analyst A as Item #001-001-01 (description may be: 0.5 mL BZ/OP Quant aliquot). Analyst B comes at a later time and physically takes Item #001-001-01, appropriately updating the information within LIMS-plus as a transfer of Item #001-001-01 from the refrigerator to themselves. After Analyst B processes the 0.5 mL of Item#001-001-01 blood, if there was no more of that sub-itemed specimen then it would be considered as 'consumed' and the aliquoted Item #001-001-01 would be updated within LIMS-plus as being transferred to 'consumed in testing.'

Continuing with the example above, if Analyst A was to keep the 0.5 mL aliquoted blood sample for themselves in order to work on it that same day, then sub-itemization would not be necessary. Analyst A would transfer Item#001-001 blood from its storage location to themselves, aliquot a portion of the Item#001-001 blood into an appropriately labeled test tube, and transfer the remaining Item#001-001 blood back to storage (both physically and through LIMS-plus). As long as that entire 0.5 mL aliquot of blood got processed (i.e., consumed in testing) and didn't need to be retained, then no further recording of that aliquot in LIMS-plus would be necessary. However, if, for some reason, the aliquoted 0.5 mL blood sample wasn't used-up and needed to be put back into storage so that it could be analyzed either another day or by another analyst, then it must be sub-itemized, transferred (from the analyst to storage), and recorded within LIMS-plus. Whenever aliquots of items are to be used by another analyst then those aliquots must be sub-itemized, regardless if they are used that same day or transferred back into storage for use on another day.

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). Extracts from situations wherein biological evidence has been exhausted should be retained until directed otherwise.

6.2. Sample Storage

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 are located in the Toxicology Unit for evidence storage and shall be appropriately secured within a lockable system. Other areas, if acceptable for evidence storage, may be used to store evidence (e.g., refrigerators and freezers in other areas of the laboratory) and will have similar lockable systems. Use of tamper-evident devices will be employed (e.g., evidence tape, security tags).

6.3. Analytical Schemes for Toxicology Testing

Forensic toxicological examinations are conducted on specimens in order to detect a wide range of drugs and/or other substances. The Lead Examiner, Assistant Director, Deputy Director, or designee will be responsible for evaluating cases prior to reports being issued in order to ensure that all requests have been completed/addressed, good case management has occurred, and quality has been maintained. Refer to specific case types for more guidance. If evidence with limited volume or multiple types of evidence are received (e.g., multiple blood tube types, multiple serum tubes), a lead Examiner (or higher), possibly involving the submitting agency's representative, should be consulted so as to create an analytical scheme directing what evidence will be analyzed so as to maximize efficiency and completeness.

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, should be followed. Lead Examiners, the Assistant Director, and/or the Deputy Director will be consulted for guidance when necessary.

Suspected DUI Cases: 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). Biological evidence submitted from motor vehicle accident investigations will be treated the same, whether they involve injuries, are from fatalities, or where DUI is simply either suspected or needs to be ruled-out.

Blood-ethanol determinations and/or recreational/prescription drug analyses are usually requested within DUI-related submissions. Drug analyses are typically sought when ethanol is found to be low (or has not been detected at all) from breathalyzer examinations and/or drug usage has been suspected (e.g., DRE evaluations, drug

paraphernalia within vehicle found, suspect admissions). Depending on sample matrices, relevant drug-positive findings can be presumptively reported or can be confirmed (and/or quantitated). The search for and/or quantitation of drugs within blood samples will often depend on ethanol results, agency representative requests, and other factors. When breathalyzer refusals have occurred then ethanol and/or drug analyses are sought. 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 Commercial Driver's License (CDL) 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. In such situations, samples will be saved and preserved accordingly in case future drug analysis requests are received. Final decisions regarding how sample analysis schemes will be followed will rest on the appropriate Lead Examiner (or higher).

Unless sample volumes are limited, samples received from hospitals should be analyzed as if they were never previously analyzed. Data from previous examinations of submitted samples can be evaluated and can influence analytical schemes. Lead examiners (or higher) should be involved in unusual cases or when uncertainty exists in how to proceed during the scheduling of tests.

Because customers often request that ethanol results be reported as soon as possible (e.g., for Per Se hearings at the Department of Motor Vehicles (DMV)), reports containing volatile-only results (or volatile and presumptive drug results) within DUI-related cases can be issued separate from reports that contain drug confirmations and/or quantitations. While drug reports that are issued after ethanol reports are supplemental reports, it is not a requirement that they be titled as such. Tables can be found which help summarize the general analytical schemes for DUI case specimens (see figures). If non-biological evidence is submitted within a DUI investigation (e.g., liquid from a bottle seized within a vehicle), the Deputy Director, along with Lead Examiners, will determine which Unit and/or personnel will perform the examinations.

Suspected DFC cases: Other types of 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. These cases involve analyzing samples for recreational drugs, ethanol, central nervous system depressants (e.g., benzodiazepines, barbiturates), and hallucinogenic compounds. Additional information (e.g., from CT-100 sexual assault kits) may be needed. All DFC cases will involve 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. See below for a generalized analytical scheme. 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.

Postmortem cases: Specimens from deceased individuals may be received (e.g., from the Office of the Chief Medical Examiner (OCME) or another entity) and will usually be limited to homicides, motor vehicle accidents, and traumatic suicides (when deemed appropriate by the OCME). Specimens from these cases usually include blood, urine, and/or vitreous humor. If applicable, a memorandum of understanding (MOU) should be followed with regards to case management and regarding which analytes are to be qualitatively analyzed and/or quantitated. All qualitative and quantitation results not involving drugs/metabolites listed within the MOU should be vetted through an appropriate Lead Examiner (or higher) before allowing additional work to be scheduled or performed.

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

As new technology is acquired general analytical schemes may change for the different types of cases that are submitted. Some techniques may be substituted, as necessary, and presumptive and confirmatory analyses may be combined into single steps during examinations. While repetition of sample analyses should be done to ensure accuracy, such practices may not always be feasible (e.g., limited sample, time-sensitive cases). Situations where ethanol tests were not conducted or drug quantitations were not performed may be warranted, but must be documented within case files as to why such decisions were made.

6.3.1. Urine

Suspected DUI Cases: Urine samples from suspected driving under the influence (DUI) cases are usually submitted when either breathalyzer results are unavailable or when it is suspected that ethanol may not be the sole contributing factor within the investigation. The analytical scheme for urine samples from suspected DUI cases can involve qualitative/quantitative volatile analyses and qualitative-only analyses for all other drugs. However, if breathalyzer results indicate that little-to-no ethanol played a factor in certain DUI investigations, then the analysis for drugs in those cases may be the only requests that are necessary.

When a submitting agency is unclear as to what may be causing impairment of an individual, the following analytical scheme is often performed: a volatile analysis, a chromatographic/mass spectrometric (GC/MS or LC/MS) analysis, and/or a presumptive analysis (e.g., immunoassay). Given certain situations

(e.g., when ethanol is identified at blood alcohol-equivalent concentrations equal to or greater than 0.100 g%), drug analyses may not be required and ethanol-only reports may be issued. In such situations documentation within case files will explain why drug requests were not performed. Submitting agencies will have an opportunity to request further [drug] analyses by contacting the DSS laboratory. Information within incoming documents may guide analytical plans. If breathalyzer results are known and indicate that requesting agency representatives only want drug analyses to be performed, then analytical plans can be developed to exclude volatile analyses and only focus on drug analyses. In such situations adequate documentation must exist which explains why certain analyses were (or were not) performed.

If ethanol was determined to be less than 0.10 g% (or not reported at all) within a specimen and no drugs were detected during an initial examination, then further testing may need to commence before a final report is released. However, if confirmatory-type analyses were performed then no further testing may be necessary. Because of the way Connecticut statutes have been written and because other entities need ethanol results in a timely fashion (e.g., DMV Per Se hearings), reports only indicating quantitative volatile results may be issued separately from drug reports. Quantitation of drugs (other than ethanol) within urine samples will not be done unless prior approval is obtained from a Assistant Director (or higher).

Suspected Drug-Facilitated Crime (DFC) Cases: Urine is the recommended type of sample for these cases and should be obtained from the victim as soon as possible. Urine specimens in these cases will be qualitatively tested in order to detect possible past-ingestion of drugs and/or alcohol. 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). Quantitation of drugs within urine samples will not be done unless prior approval is obtained from the appropriate Assistant Director (or higher).

Postmortem Cases: Urine samples may be submitted and analyzed to supplement findings from other sample matrices (e.g., 6-monoacetylmorphine (6-MAM) for determination of heroin usage). Such samples may also be analyzed for other classes and types of drugs. Additionally in these situations, such urine specimens may be qualitatively analyzed for amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine/metabolites, fentanyl/metabolites, methadone/metabolites, opiates, oxycodone/oxymorphone, and phencyclidine (e.g., immunoassay or LC/MS).

6.3.2. Blood

Suspected DUI Cases: While not as frequent as urine, blood samples from DUI-related cases are preferred since such samples tend to give information relating to influence of chemicals at a time close to an occurrence of an incident. Based on the request and based on case history, analyses of these samples can begin with quantitative detection for volatiles. Presumptive testing for drugs-of-abuse [qualitative] can occur. Given certain situations (e.g., when ethanol is identified at concentrations equal to or greater than 0.080 g%), drug analyses may not be required and ethanol-only reports may be issued. In such situations documentation within case files will explain why drug requests were not performed. Submitting agencies will have an opportunity to request further [drug] analyses by contacting the DSS laboratory. If confirmatory-type analyses were performed then no further testing may be necessary. Because of the way Connecticut statutes have been written and because other entities need ethanol results in a timely fashion (e.g., DMV Per Se hearings), reports only indicating quantitative volatile results may be issued separately from drug reports. Typically only toxicologically significant/relevant compounds should be quantitated within blood specimens. Determination of whether compounds should be quantitated can be based on the original request and, if necessary, based on communication with the submitting agency's representative. It may be appropriate to report analytes as qualitative-only or to report them as 'greater than' a certain value (semi-quantitative). Consultation with the appropriate Lead Examiner (or higher) will be done when analysts are uncertain whether quantitations should be performed or how reports should list results.

Suspected Drug-Facilitated Crime (DFC) Cases: These cases may call for analyzing blood specimens for the presence of recreational drugs, ethanol, and/or other central nervous system depressants (e.g., benzodiazepines, barbiturates). Targeted testing for certain DFC-type drugs (e.g., GHB, flunitrazepam) may also be necessary. Relevant drugs within blood specimens are quantitated based on the original request and, if need be, based on further communication with the submitting agency's representative. Blood specimens should not be analyzed for GHB if their collection times are greater than eight (8) hours after the time of drugging/incident and ethanol should not be analyzed within specimens if their collection times are greater than twenty-four (24) hours after the incident unless approval from an appropriate Lead Examiner (or higher) has been obtained. 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). Because DFC-type cases can be unusual and non-routine, consultation with a Lead Examiner (or higher should) be considered when determining which tests be included during the development of an analytical plan or scheme.

Postmortem Cases: When death is delayed after an incident, antemortem blood evidence is often preferred because results from these specimens can give information prior to post-hospital intervention. Typically only limited drugs/metabolites will be sought within evidence from these cases (i.e., OCME according to the MOU). Determination of whether compounds should be quantitated can be based on the MOU or communication with the submitting agency's representative. It may be appropriate to report analytes as qualitative-only or to report them as 'greater than' a certain value (semi-quantitative). Consultation with a Lead Examiner (or higher) will be done when analysts are uncertain whether quantitations should be performed or how reports should list results.

6.3.3. Vitreous Humor/Fluid:

Postmortem Cases: Vitreous fluid samples may be submitted and analyzed to supplement findings from other sample matrices. When positive ethanol findings within blood specimens occur, confirmation of ethanol will be achieved through the quantitative analyses of associated vitreous fluid specimens. When morphine is identified in a blood sample and there is no associated urine sample submitted with the case, the vitreous sample will be qualitatively analyzed for 6-acetylmorphine (aka: 6-monoacetylmorphine (6-MAM)), to indicate possible heroin use.

6.4. Analytical Schemes for Presumptive Testing

Analytical schemes can begin with the use of presumptive testing for drug class determination. These techniques can include, but are not limited to, immunoassay-type experiments. A list of analytes that can be presumptively tested within the Toxicology Unit using immunoassay instrumentation can be seen in Table 1. Additional analytes may be added, as necessary.

Table 1: Analytes which can be presumptively tested

Ethanol	Benzodiazepines	Cocaine	Oxycodone
Amphetamines	Buprenorphine	Methadone	Phencyclidine (PCP)
Barbiturates	Cannabinoids (Δ^9-THC)	Opioids	

Alternatively, structurally elucidating techniques (e.g., gas chromatography/mass spectrometry (GC/MS), liquid chromatography/mass spectrometry (LC/MS)) or similar instrumentation can be used to analyze samples for the presence of

drugs/metabolites. When agreed upon by a submitting agency, analyses may be limited to only select analytes (e.g., OCME's MOU). Table 2 lists drugs/metabolites which have been agreed, based on an MOU, to be commonly sought during the analysis of OCME samples. Even though LC/MS is a confirmatory technique certain experiments may be used within the instrument which allow it to rapidly examine specimens. When a structurally elucidating technique is used in lieu of a presumptive testing technique, and that technique contains sufficient information to qualitatively identify compound(s), analysis of a second aliquot for confirmation purposes may not required. If necessary, the appropriate Lead Examiner (or higher) will be consulted to determine whether further confirmatory testing is needed.

The purpose of presumptive techniques, especially in DUI cases, is to help rule-out the possible presence of analytes at certain detectable limits. When presumptive results are negative then it indicates that certain analytes/classes of analytes are not present within samples at toxicologically relevant amounts. When presumptive results are positive then it indicates that certain analytes/classes of analytes are present at toxicologically relevant amounts. Depending on the technique, further testing may be warranted. Presumptive testing should have minimum detection limits for analytes of interest that include therapeutic concentration ranges for drugs. The selection of the presumptive technique(s) usually depends upon the case type, the amount of available specimen, and what questions need to be answered for the submitting agency.

There are some situations wherein samples may have only been analyzed by a presumptive technique and listed within a report. If necessary, a second aliquot of sample can be analyzed using a structurally elucidating technique to ensure accuracy in the findings and a supplemental [confirmatory] report generated. Presumptive-positive drug results (e.g., from immunoassay data) within urine samples may be reported without confirmatory-type analyses being performed. In those situations a qualifying statement will be listed in the report advising the reader that such results were only presumptive.

6.5. Analytical Schemes for Confirmatory-Type Tests (see figures)

In the case of LC/MS and GC/MS, chromatography and mass spectrometry are considered two orthogonal techniques and the combination of the two techniques is considered structurally elucidating. Additionally, a different MS experiment may also be considered an orthogonal technique (e.g., full scan versus MS/MS versus selected ion monitoring (SIM)). Confirmatory-type tests for targeted analytes are more specific than presumptive tests used for initial detection. All confirmatory-type tests will include the use of positive and negative controls for the analyte(s) of interest. Qualitative positive control(s), however, need not be analyzed within the same batch/sequence as unknown samples as long as the positive control(s) are analyzed under the same analytical conditions, within the same timeframe (i.e., 2 weeks), and conform to quality control criteria found within specific experimental methods. In

general, when a presumptive technique indicates the possible presence of an analyte in a specimen then confirmation of the identity of the analyte in a second aliquot from the same specimen/item will be done. Whenever possible and practical, the use of mass spectrometry is recommended as a confirmatory technique.

Table 2: Analytes Tested Qualitatively and/or Quantitated within Postmortem Cases

11-Hydroxy Delta-9 THC	Desalkylflurazepam	Methylephedrine
6-Monoacetylmorphine$_{(free)}$	Diazepam	Midazolam
Acetone	Dihydrocodeine / Hydrocodol$_{(free)}$	Morphine$_{(free)}$
Alpha-Hydroxyalprazolam	Diphenhydramine*	Norbuprenorphine$_{(free)}$
Alprazolam	EDDP	Nordiazepam
7-Aminoclonazepam	Ephedrine/Pseudoephedrine	Norfentanyl
Amobarbital	Estazolam	Norpropoxyphene
Amphetamine	Etizolam	Oxazepam
Barbiturates	Fentanyl	Oxycodone$_{(free)}$
Benzoylecgonine	Flurazepam	Oxymorphone$_{(free)}$
Blood Alcohol Concentration $_{(BAC)}$	Hydrocodone$_{(free)}$	Pentobarbital
Buprenorphine$_{(free)}$	Hydromorphone$_{(free)}$	Phencyclidine
Butabarbital	Hydroxyethylflurazepam	Phendimetrazine
Butalbital	Hydroxytriazolam	Phenmetrazine
Cannabinoids	Isopropanol	Phenobarbital
Chlordiazepoxide	Lorazepam	Phentermine
Clobazam	MDA	Phenylpropanolamine
Clonazepam	MDMA	Propoxyphene
Cocaethylene	MDEA	Secobarbital
Cocaine	Methadone	Selegiline
Codeine$_{(free)}$	Methamphetamine	Temazepam
Delta-9 Carboxy THC	Methanol	Triazolam
Delta-9 THC	Methorphan (Dextro/Levo)*	Zolpidem

*May only be detected when using LC/MS (detection by immunoassay dependent on concentration)

When urine samples are positive for volatiles after presumptive testing is done (i.e., EMIT), then confirmatory testing for volatiles is usually performed. Depending on the situation and the amount of volatiles (e.g., ethanol) found within the specimen, further analyses for volatiles/drugs may be performed. Documentation must be present which explains decisions as to why the analysis of certain analytes was excluded.

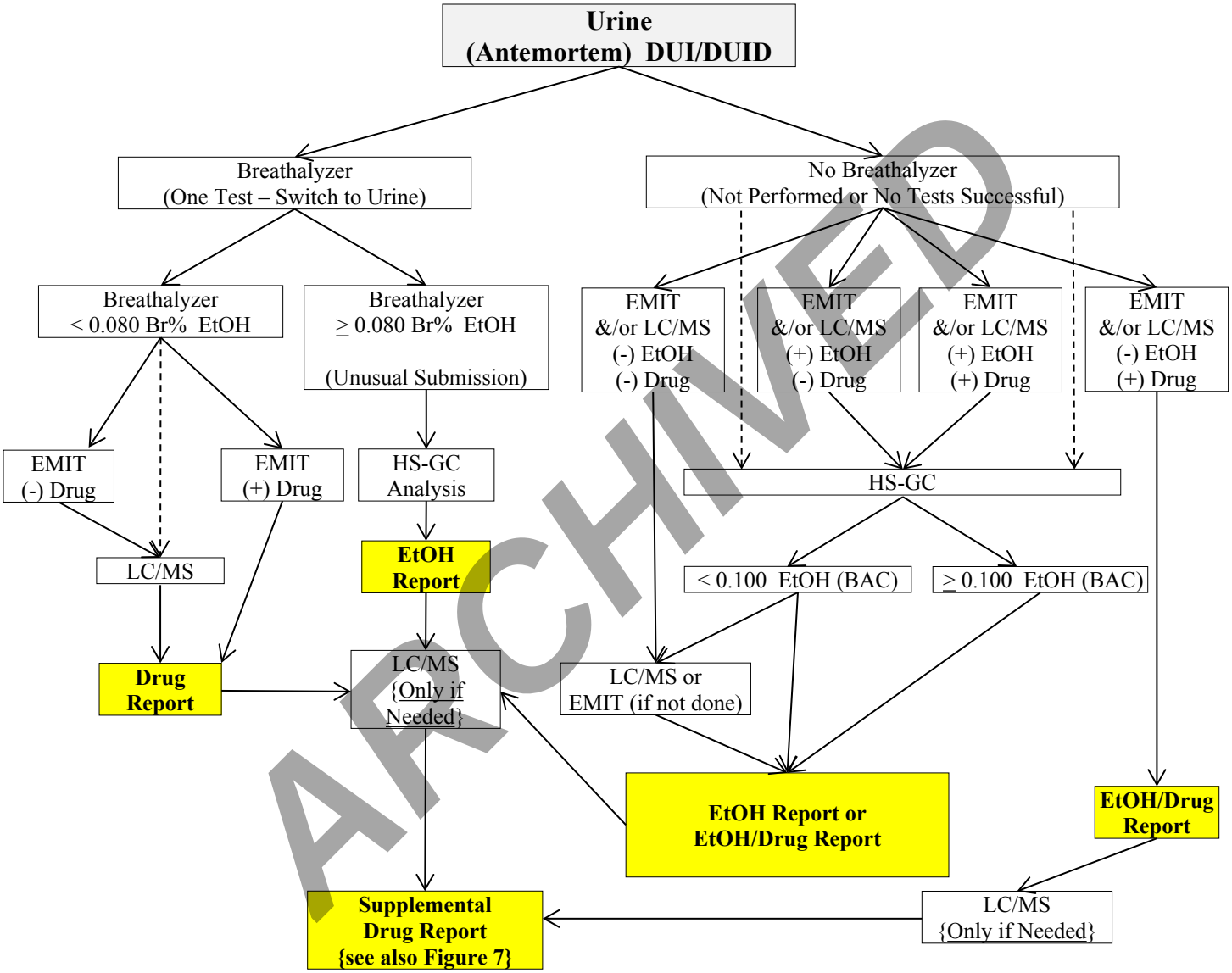
While evidence from sexual assault cases may initially be analyzed by presumptive techniques, confirmatory techniques are usually used for these cases, when applicable. In cases where the presumptive technique also provides confirmatory results (e.g., accurate mass-LC/MS) additional [confirmatory] analyses may not be required. Limited sample or other situations may influence the number of tests that will be

applied to certain evidence. Good laboratory practice and sound judgement will be used by analysts when evaluating and deciding on analytical plans. The Lead Examiner (or higher) will be notified of any unusual situations or when potential problems exist with analytical schemes.

6.6. Analytical Schemes for Quantitations (see figures)

Quantitation is performed on analytes based on importance to a case (as determined by case history, specimen volume, specimen type, and toxicological significance) and based on agreements with submitting agencies (e.g., MOU with OCME). Appropriate internal standards (e.g., deuterated) and controls (positive/negative) are used within each batch/sequence.

Figure 1: Analytical Scheme for DUI Antemortem Cases (Urine)



Note: The term HS-GC throughout this document means HS-GC/MS(FID).
Note: The EMIT portion of the above figure can involve detection of a drug panel or detection of just specific drug(s). Presumptive testing may be emitted if confirmatory-type testing is used in its place.

Figure 2: Analytical Scheme for DUI Antemortem Cases (Blood)

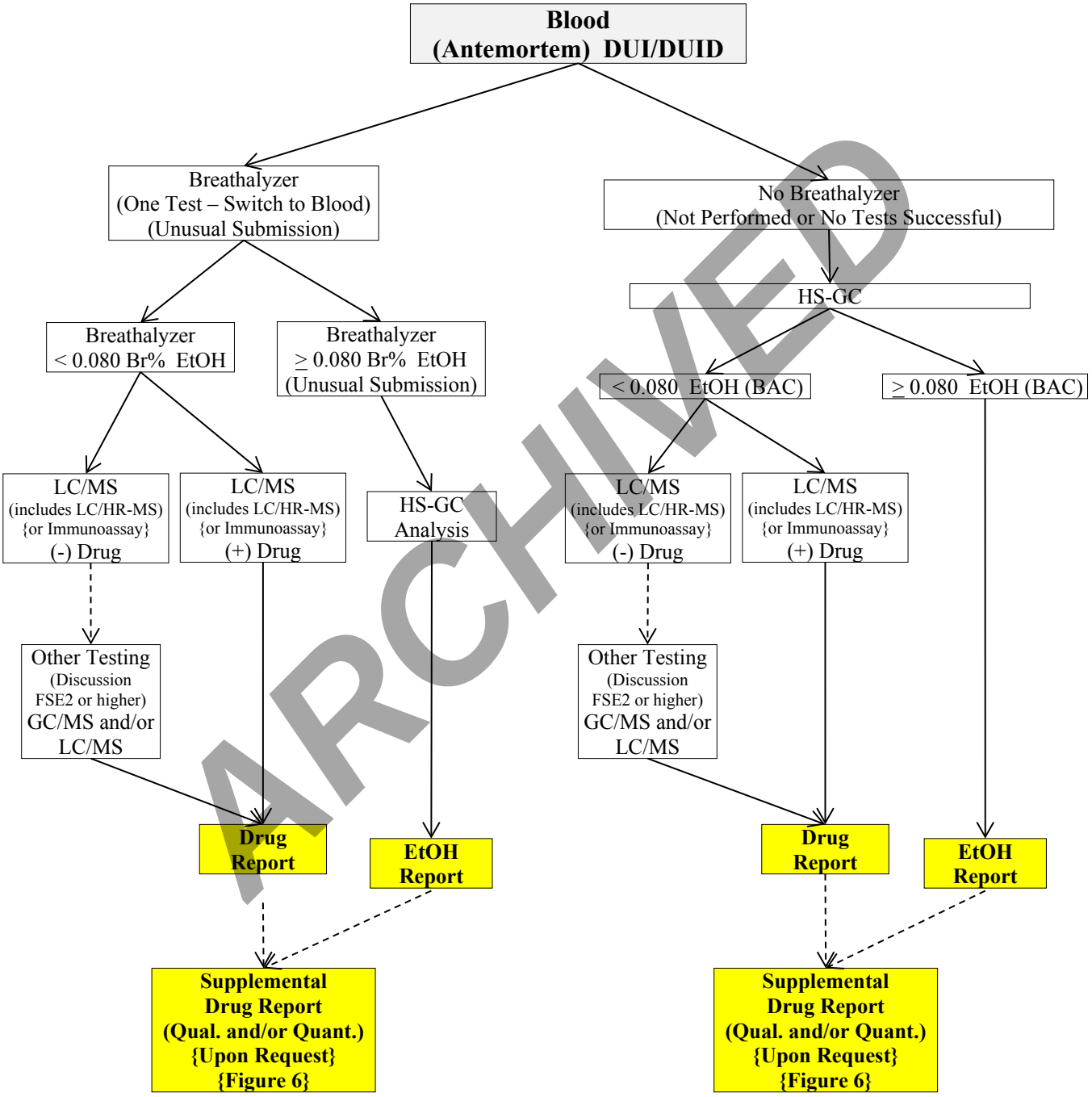
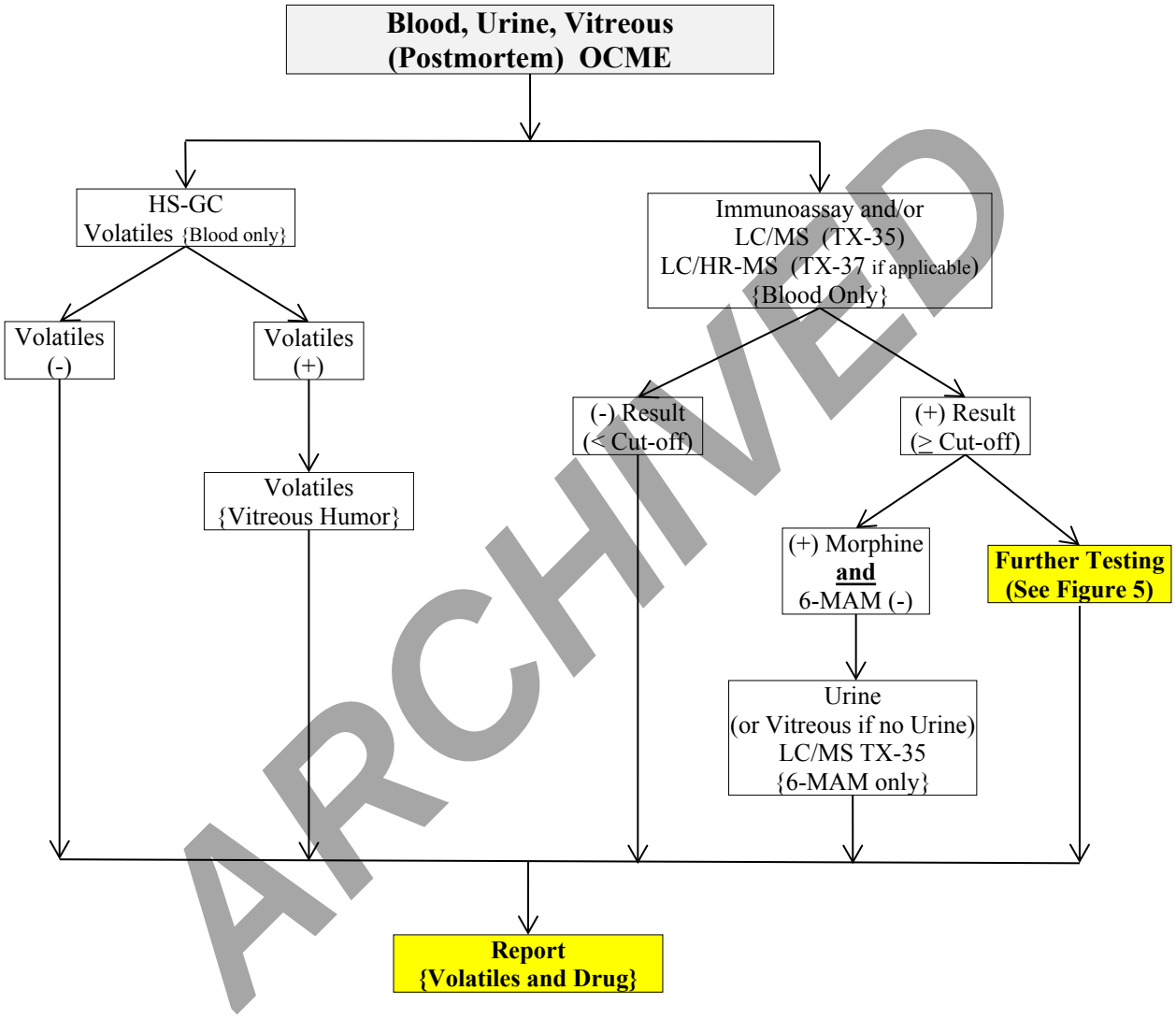


Figure 3: Analytical Scheme for Postmortem Cases (Blood, Urine, Vitreous Fluid)



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.

Figure 4: Analytical Scheme for Antemortem Cases (Confirmation – Urine)

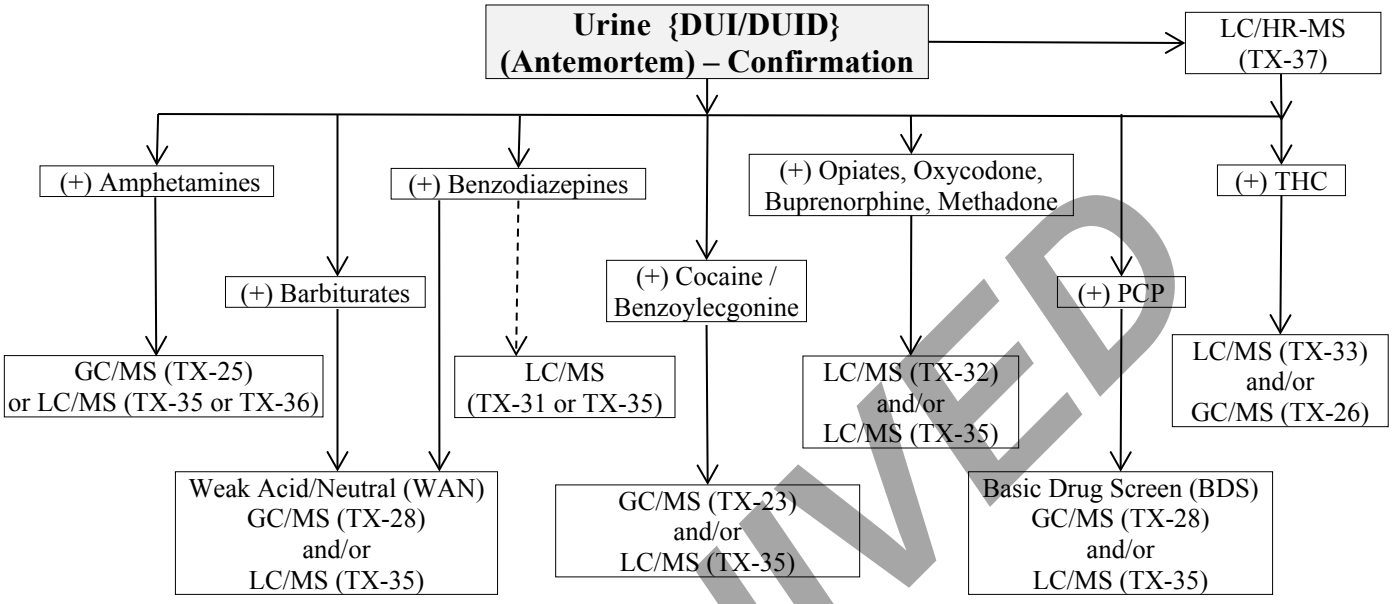


Figure 5: Analytical Scheme for Postmortem Cases (Confirmation – Blood)

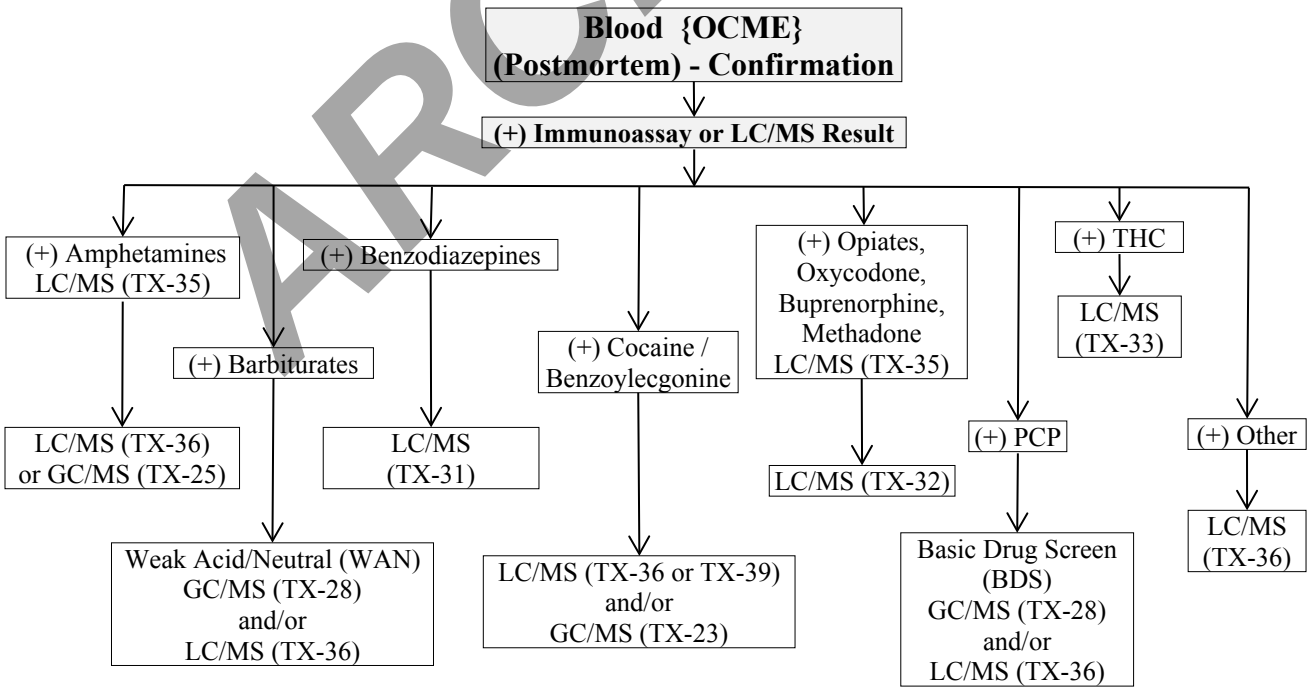
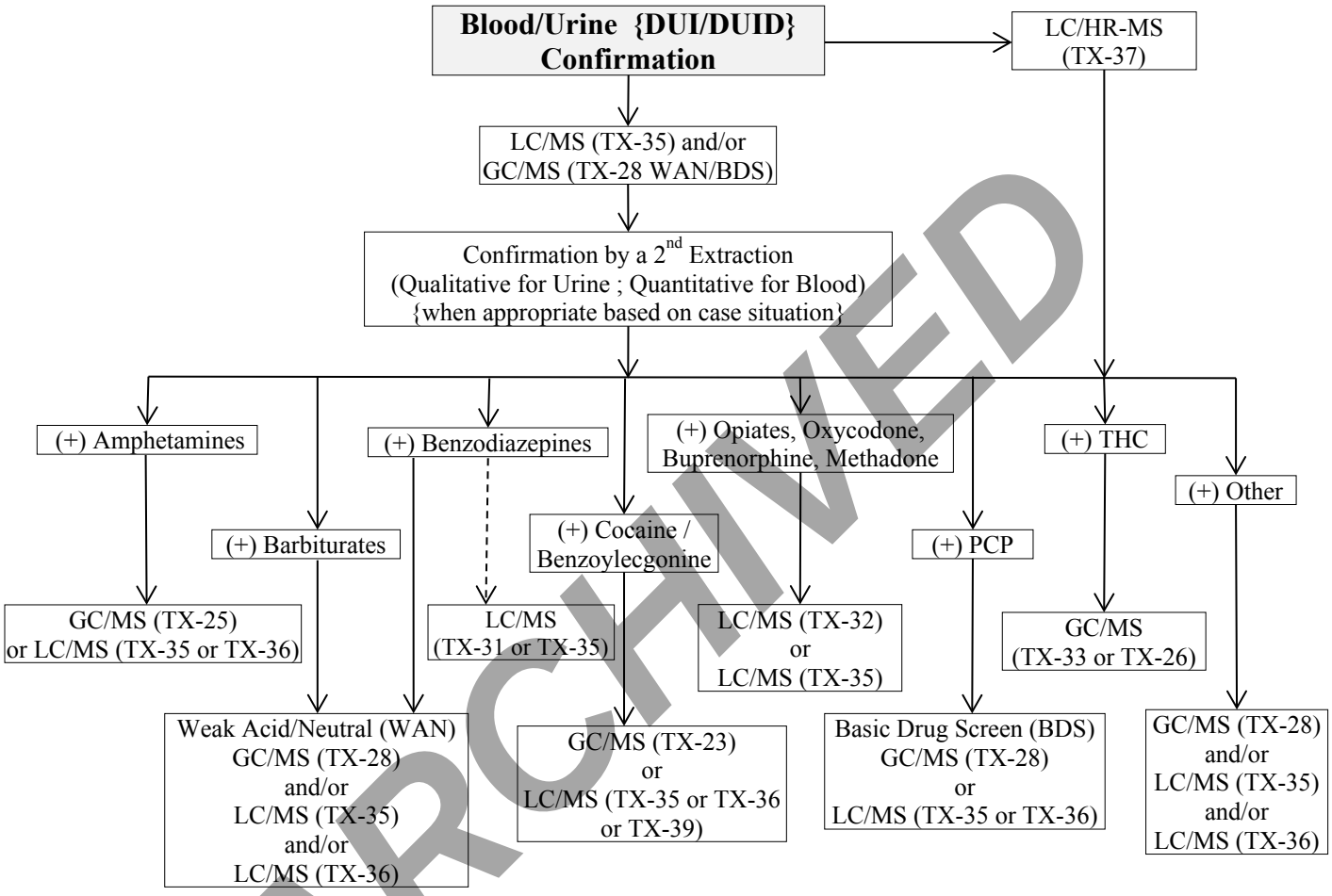


Figure 6: Analytical Scheme for DUI Antemortem Cases (Confirmation – Blood/Urine)



7. Determining if the Calibration is Acceptable (Batch Acceptance)

Acceptable results of a calibration may vary. However, the following general guidelines should be considered when determining its acceptability:

Note: Guidance for batch acceptance within this procedure will be used, however decision criteria within separate procedures may override this guidance.

7.1. Chromatographic peak integration is reviewed to verify that peaks in calibrators, controls and unknowns are being similarly integrated. Automated integration

processes available in instrumental software packages are used whenever possible. However, occasionally it is necessary to manually integrate a peak. When manual integration is performed this will be made apparent to the reviewer of the data either by automated markings applied by the software package or by a note on the data printout.

7.2. A multi-point calibration graph is generated based on concentrations and chromatographic area ratios between analytes of interest and internal standard analytes. Best-fit graphs (linear or non-linear) are generated and should have coefficient of determination (R^2) values of at least 0.990. Concentrations of the lowest and highest calibrator solutions will bracket any reported concentration(s) of case specimen(s).

7.3. The equation of the calibration graph is used to determine the 'measured amount' of analyte within case specimens. When the desired coefficient of determination (R^2 value) cannot be reached and it is suspected that certain calibrator solution data are the cause, then empirical concentrations of calibrator solutions can be compared to their theoretical values to determine whether those calibrator solution data can be discarded. If a suspect calibrator solution's empirical concentration differs by ±20 % of its theoretical concentration, then that calibrator solution may be dropped as long as the following exists:

7.3.1.1. At least four (4) non-zero calibrators remain within the calibration set

7.3.1.2. The case sample(s) to be reported and positive control sample(s) are still bracketed by the remaining calibration graph points.

7.3.1.3. An Assistant Director (or higher) has approved the dropping of the calibration solution point(s) and such approval has been documented within both the batch paperwork and the affected case file paperwork.

7.4. For a quantitative result to be reportable, the associated batch must contain an appropriate positive control with an empirical concentration that falls within +/-20% of its theoretical concentration value. Because batches often contain multiple analytes associated with multiple case samples, if a specific positive control solution within a batch is not within the acceptable expected value then the appropriate Lead Examiner (or higher) will be consulted to determine what specific sample quantitations may be reported and/or when a batch, as a whole, can be deemed acceptable. All such consultations and their reasons/outcomes will be clearly documented (e.g., within the batch summary sheet and within affected case file documents).

7.5. If all positive control solutions in a batch are not within the +/-20 % expected range then the batch will be rejected for quantitation purposes but may still be used for qualitative evaluation. In general, any consistently failed positive control solutions will be brought to the attention of the appropriate Lead Examiner (or higher) for determination of quality control activities and batch/case impact.

7.6. Calibration and control results may be reviewed as a batch. A batch summary will be provided to a technical reviewer along with all calibration and control data from that set. The technical reviewer will be an analyst who did not participate in the analysis of the batch (non-analysis activities such as starting an instrument sequence or correcting simple instrumental operations are not considered participation in a batch). The technical reviewer will ensure that the batch meets all applicable quality control guidelines. The batch summary sheet, the instrument method printout, the sequence printout, all corresponding calibrator and control data printouts, and any other pertinent records will be stored with batches. A copy of the signed batch summary sheet will be included in applicable case records so cross reference to batch documents is possible.

7.7. Internal standard recovery of batches will be monitored by taking the average of the internal standard areas for the calibrators (or the calibrators and controls). Internal standard recoveries for individual unknown samples should fall within 50% and 200% of the calculated average of the calibrators (or calibrators and controls). If the internal standard recovery is outside of this range then the reason for this will be investigated and quantitative results will not be reported until a valid reason is identified. All reasons should be documented in appropriate case files or batch documents.

8. Uncertainty

Procedural uncertainty is reported with all quantitative results and should be evaluated periodically. The overall uncertainties can be calculated based on an evaluation of control performance (variance) and calculations related to uncertainty that are maintained in a spreadsheet format according to Section procedure. Included in this spreadsheet is information related to reference materials and/or equipment utilized in procedures that could affect the quantitative accuracy of the result. For analytes where there has been no historical data available to determine uncertainty and where such analytes do not fall into a class of drugs where uncertainty can been established, uncertainty values can be reported based on the response of batch control information. Other possible solutions to this uncertainty value reporting can be employed upon approval from the appropriate Assistant Director (or higher) and with appropriate documentation explaining the decision within case file documents.

9. Reagent/Solvent/Reference Materials

Before a new batch (or lot) of a solvent, reagent, reference material, or similar material is used for analyzing casework it will be appropriately validated using established methods/procedures. 'Appropriately validated' means that the solvent/reagent/reference material will be analyzed contemporaneously with previously validated materials and is shown to be appropriate for use with casework. A material is considered validated and acceptable for use when that material produced results which proved that it had worked as

expected within the designated procedure – that blanks/negative controls were shown to not have contained analytes of interest (nor contaminants that would have interfered with the overall findings) and that positive controls produced correct data. Documentation for the acceptability will be appropriately retained (e.g., within batch documentation, logbook). This documentation should include recording validations within batch run sheets and having the batches reviewed. Completing the Reagent Logbook (or equivalent) will minimally include the name of the new reagent/solution/material, the lot number, the creation date, the person(s) that created the material, lot numbers of components (when available), and the validation completion date. If created in-house, then the lot number should include information related to the date it was made and the preparer's initials (e.g., MPR07212016). If the same solution was made using different reagents or at different times during the same day, lot numbers can be differentiated using hyphenated letters (e.g., JLG07042016-a, JLG07042016-b). Solutions will be marked with a colored sticker (e.g., green) to indicate that a solution/material has been validated for use, the date it was validated, and the analyst's initials who ensured that the validation was complete. If there is not enough room on a solution's/material's container to record all information then such information can be located within a logbook. The procedures used to ensure solutions/materials were valid for use shall be such that if the results demonstrate acceptability within comparable methods then those validated materials can be considered acceptable for use across such procedures. For example, if a new batch of methanol was validated to be acceptable for use by liquid chromatographic/mass spectrometric (LC/MS) methods, then the methanol shall be deemed acceptable for use with gas chromatographic/mass spectrometric (GC/MS) methods. Certified reference materials may be exempt from validations and Analysts should consult the appropriate Unit Lead (or higher) when seeking to not validate such materials prior to casework.

9.1. Validation

9.1.1. Solvent, reagents, reference materials, or similar materials will be appropriately validated prior to use in casework.

9.1.2. If a material does not initially meet acceptance criteria then the performance verification process may be repeated. If the solution still can't be validated then the Assistant Director (or above) will be notified to determine whether to replace the material, purchase new material, or to further troubleshoot the situation.

9.1.3. Differentiation between validated materials and non-validated materials should be readily distinguishable so that Analysts know which can be used for casework and which still need further validation. This can be done using stickers, the letter 'V,' the words 'verified,' 'unverified,' or similar verbiage.

9.1.4. A log of validated materials will be maintained so that results of said materials (i.e., pass or fail) will be recorded. This can be in a book (e.g., Solution QC log book) or done electronically.

9.2. Storage

9.2.1. Even though evidence shall be transferred to and stored within storage areas under proper seal (i.e., free from sample loss, contamination, and deleterious change), evidence should be kept in such storage areas (e.g., refrigerators, freezers) separate from non-evidentiary materials (i.e., reference standards).

9.2.2. All materials (e.g., reagents, standards) are stored according to their manufacturer's specifications (i.e., at room temperature, at refrigerator temperature, or at freezer temperature). Materials prepared in-house will be stored according to instructions within individual procedures. When uncertain how to store a material refer to a Lead Examiner (or above).

9.3. Other Quality Controls

9.3.1. When analyzing samples (including calibrator and control solutions), materials used within such batches should not vary in lot number. For example, a batch of 30 samples being analyzed using solid phase extraction (SPE) should utilize SPE cartridges all having the same lot number.

9.3.2. Materials used in casework should be of high-quality grade, where applicable. More information regarding solvent and reagent purity grades can be found within individual procedures.

9.3.3. Expired materials (with exception of solvents) will not be used within casework. Expiration dates with just a month and a year will be considered expired on the last day of that month.

9.3.4. Assigned expiration dates for in-house prepared materials will not extend past any expiration date for the materials that make up that material. For example, an in-house prepared drug solution made on 05/01/2022 from a reference standard with an expiration date of 07/04/2022 and a solvent with an expiration date of 12/25/2022 can't have an expiration date greater than 07/04/2022.

9.3.5. When performing quantitations, calibrator and control solutions should be prepared from separate manufacturers. If that is not feasible then the same manufacturer of solutions can be used but the calibrator solutions and control solutions should be from different lots. Also, when feasible, the calibrator and control solutions should be prepared by different analysts.

9.4. Materials for Qualitative Analyses

9.4.1. Positive control solutions must be validated using a previously validated solution as a comparison. This can be done by analyzing the un-validated

solution within a validated batch and comparing resulting data (chromatographic and mass spectral evaluations will follow the same decision processes as for reporting unknown analytes). Alternate ways to validate such solutions may be acceptable upon approval of the Assistant Director (or higher).

9.4.2. A preparation worksheet (or equivalent) must be completed that documents lot numbers, expiration dates, pipettes used during the preparation, and any relevant information (e.g., deviations) that may be necessary for quality purposes. Any deviations must be approved prior to being implemented.

9.5. Materials for Quantitative Analyses

9.5.1. An in-house prepared calibrator solution must be validated using a previously validated control solution. This will be done by creating calibrator solutions and analyzing them alongside a validated batch or alongside validated control solutions separately (chromatographic and mass spectral evaluations will follow the same decision processes as for reporting unknown analytes). Alternate ways to validate calibrator solutions may be acceptable upon approval of the Assistant Director (or higher).

9.5.2. An in-house prepared positive control solution must be validated using a previously validated calibrator solutions. This will be done by creating a control solution and analyzing it alongside a validated batch or alongside validated calibrator solutions separately. Alternate ways to validate calibrator solutions may be acceptable upon approval of the Assistant Director (or higher).

9.5.3. A preparation worksheet (or equivalent) must be completed that documents lot numbers, expiration dates, pipettes used during the preparation, and any relevant information (e.g., deviations) that may be necessary for quality purposes. Any deviations must be approved prior to being implemented.

9.5.4. Each new positive control or calibrator solution must be within +/-15% of its expected value. If an analyte is outside of the +/-15% expected range, then consult with the appropriate Lead Examiner (or higher) for resolution.

9.5.5. In the event that no validated solutions exist for either an in-house prepared calibrator solution or an in-house prepared control solution, un-validated solutions of both can be compared to one another provided that different analysts have prepared each type of solution (i.e., one Analyst prepared the positive control solution and another Analyst prepared the calibration direct dilution solutions). Calculated concentration values will be within ±15% of expected values. This situation should typically only be seen when a new assay is developed or if previously verified solutions were inadvertently consumed or destroyed.

9.6. Internal Standard Solutions

9.6.1. Newly prepared internal standard (IS) solutions (i.e., deuterated reference materials) can be validated by qualitatively analyzing them against previously validated IS solutions. The comparison between newly prepared and validated IS solutions can be either in the form of extracted or un-extracted samples. Resulting data will not contain non-deuterated analytes (if applicable) nor extraneous peaks which would cause issues with using for casework.

9.6.2. Internal standard solutions containing different lot numbers will not be used within a single batch.

9.7. Immunoassay Cutoff and Control Solutions

9.7.1. An non-validated immunoassay cutoff solution (i.e., lot/batch of such solutions) can be validated by analyzing it with, and comparing its results to those from, validated positive and negative controls. The immunoassay results from the control solution samples must demonstrate acceptable results (i.e., positive control gives a positive result, negative control gives a negative result).

9.7.2. Non-validated immunoassay positive/negative control solutions (i.e., lot/batch of such solutions) can be validated by analyzing them with, and comparing their results to those from, a validated cutoff solution. The immunoassay results from the control solution samples must demonstrate acceptable results (i.e., positive control gives a positive result, negative control gives a negative result).

9.7.3. In the event that there are no currently validated solutions for either cutoff nor control solutions, non-validated cutoff and non-validated controls may be analyzed together and compared provided that different Analysts are involved with preparing the solutions for analysis (i.e., one preparing the control solutions and another preparing the cutoff solution) and the Lead Examiner (or higher) approves.

9.8. In-house Prepared Reagents/Buffers and Mobile Phases

9.8.1. Non-validated reagents can be validated by utilizing them as would be done for casework along with validated controls (i.e., positive, negative) using appropriate procedures. The analytical results from the control solution samples must demonstrate acceptable results (i.e., positive control gives a positive result, negative control gives a negative result).

9.8.2. Non-validated mobile phases can be validated together (e.g., Mobile Phases A and B) by utilizing them within the instrument performance check and analyzing a validated performance solution along with a validated solvent blank. The analytical results from the performance solution sample must

demonstrate acceptable results (i.e., all analytes detected at appropriate chromatographic peak area counts and producing appropriate mass spectra).

9.9. Solid Phase Extraction (SPE) Columns/Cartridges

9.9.1. Non-validated SPE columns can be validated by utilizing them as would be done for casework along with validated controls (i.e., positive, negative) using appropriate procedures. The analytical results from the control solution samples must demonstrate acceptable results (i.e., positive control gives a positive result, negative control gives a negative result).

9.9.2. If multiple expiration dates of a newly purchased lot/batch of columns is received, a column from each expiration date lot must be verified independently.

9.9.3. At least one (1) column from each lot/batch needs be validated per extraction type (e.g., Basic Drug Extraction (BDS), Weak Acid/Neutral (WAN), Cannabinoids, General Drug Screen (GDS)). Use at least one (1) validated column with the same samples that are to be used for the non-validated columns. Perform extractions per appropriate procedures and analyze sample extracts on multiple instruments to ensure validation data is evaluated appropriately (i.e., same extracts analyzed on low resolution and high-resolution mass spectrometers).

9.9.4. If no previously validated columns are available for comparison then notify the Lead Examiner (or higher). Either acceptance will be granted based on the fact that validated control samples are to be used or the use of a full set of calibration samples may be warranted for the column validation.

9.10. Validation Data Storage and Retention

9.10.1. The data supporting validations is stored in designated locations (e.g., a Quality Control (QC) filing cabinet or electronically).

9.10.2. The data may be archived once a given lot is removed from service.

For materials that are purchased in multi-bottle lots, once one bottle from the lot is found to be acceptable for a particular use, all the bottles in the lot can also be marked as validated for that use (or related use, as appropriate). Bottles with working solutions will be labeled with appropriate information (e.g., solution name, lot number (if generated in-house will include date and initials of preparer), expiration date (if applicable and if different than the standard one year from date of validation), initials (if different from in-house lot number), colored label (e.g., green) with validation information, and any applicable safety information. If feasible, quality control solutions (e.g., controls. calibrators) should be

purchased. If solutions need to be made in-house then good quality assurance (QA) practices will be employed (e.g., recording trend data, validating reagent/solutions)

10. Negative Control/Blank Matrices

10.1. A new lot/batch of negative control matrix must be appropriately validated prior to use with casework samples. Aliquoted samples from a matrix lot/batch will be analyzed along with a validated positive control according to appropriate procedures (e.g., BDS, GDS, WAN, Cannabinoid) and shown to be analyte-free and appropriate for use as a negative control. The new lot of blank matrix should be run along with the old lot of blank matrix. Analyte-free refers to analytes of interest and such materials may contain analytes which would not diminish quality from its use (e.g., containing nicotine, caffeine).

10.2. If a matrix is negative for all relevant analytes then its information is documented in the appropriate log and marked accordingly on its container as being acceptable for routine use.

10.3. If a matrix is positive for a reportable drug (e.g., diphenhydramine) then it must be documented in the appropriate log and marked accordingly as such (i.e., "Contains diphenhydramine). This matrix may not be used for assays targeting the analytes that it contains.

11. Abbreviations

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

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
EMIT	Enzyme Multiplied Immunoassay Technique
GC MS	Gas Chromatography Mass Spectroscopy
IR	Infrared
UV	Ultraviolet
LC MS	Liquid Chromatography Mass Spectroscopy
TX	Toxicology
CS	Controlled Substances
WAN	Weak Acid Neutral

BDS	Basic Drug Screen
BL	Blood
UR	Urine
CHEP	Cyproheptadine
DI H2O	De ionized Water
Neg	Negative
NDD	No Drugs Detected
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)
Benzo	Benzodiazepine
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

12. References

DSS Quality Manual

SOFT/AAFS Forensic Toxicology Laboratory Guidelines. Society of Forensic Toxicologists, Inc. and the American Academy of Forensic Sciences, Toxicology Section. 2006.

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Handbook of Analytical Toxicology, Cravey, R. and Baselt, R. Eds., Biochemical Publications: Davis, CA, 1981

Poison Detection in Human Organs, 4th Ed., Curry, A., Ed., Charles C., Thomas: Springfield, IL, 1988

Principle of Forensic Toxicology, 2nd ed., Levine, B. Ed, American Association of Clinical Chemistry, Washington, DC, 2003.

Rev. #	History
3	Updated verbiage and formatting within the entire document. Inserted figures and tables to summarize schemes. Inserted information about OCME samples. Removed unnecessary verbiage throughout document. Added schematic figures to summarize methodology. Added History section.
4	Updated verbiage, grammar, and formatting within the entire document. Added 'Assistant Director' throughout document. Updated to allow for either LC/MS Screening or Immunoassay techniques as an initial screening tool. Clarified that the use of LC/MS as a screening tool may not require further analysis. Updated flow charts to include LC/MS Screen and other LC/MS Quantitative methods. Removed bias from consideration of Uncertainty. Added limitation statement within Table 2. Updated section 6.5 and the figures.
5	General unknown drug screen of comprehensive drug screen added. Discussion about postmortem cases added. Wording added to allow the extraction process and instrumentation analysis to be performed by separate analysts. Added abbreviations PM and OCME. Definition for work product expanded. Definitions for basic drugs of abuse screen and comprehensive drug screen added. Updated verbiage and formatting within the entire document. Inserted figures and tables to summarize schemes. Inserted information about OCME samples. Removed unnecessary verbiage throughout document. Added schematic figures to summarize methodology.
6	Fixed grammar and spelling errors throughout document. Assistant Director position added throughout document. Added statement about LC/MS analyses in paragraph 1 of section 6.3.1. Changed wording in paragraph 1 of section 6.3.1. Added "other than ethanol" to statement in last sentence of paragraph 1 of section 6.3.1. Changed "customer" to "submitting agency's representative" in paragraph 2 of section 6.3.2. Updated postmortem cases section under suction 6.3.2. Updated Section 6.4 and added paragraph about situations in which urine samples may only be analyzed by a screening technique. Added a brief statement under Table 2 in Section 6.5. Added LC/MS to Figures 1, 2, and 3. Updated Figure 4 to combine immunoassay and LC/MS screen. Added LC/MS to figures 5 and 6. Changed THC confirmations within figures 5 and 6. Updated Figure 7 to include LC/MS. Updated format and added MOU abbreviation in section 9.

7	Updated itemization numbers to reflect new format change. Updated analytical plans for DUI cases. Updated wording and other material within sections 5 and 6.1. Information regarding expiration dates added in section 6.1. Changed JT to LIMS-Plus throughout document. Updated wording in Section 6.1 for clarity. Added use of tamper-evident devices within section 6.2. Moved paragraph about case history from section about postmortem cases in section 6.3 and moved to section 6.3. Added information under suspected DUI cases in sections 6.3, 6.3.1, and 6.3.2. Updated sections 6.3 and 6.4 regarding minimum detection limits for analytes of interest, including therapeutic ranges. Added statement about documentation to section 6.5 and added the ability to use older calibration data for quantitations. Updated figures throughout document.
8	Updated Figure 2 ('+ Drug' corrections in flow chart). Updated title. Made changes to Figures 5, 6, & 7.
9	Added section describing batch acceptance criteria (Section 7).
10	Removed numbering from 'Notes' throughout document. General formatting changes throughout document. Replaced DFSA with DFC. Updated Sections 5 and 6.1, 6.3, 6.3.1, 6.3.2, 7.1., 7.3, and 7.4. Updated figure numbering (there was no Figure 3 listed) , updated figure descriptions, and updated some figure schemes. Included TX-39 in Figures 5 and 6. Updated Sections 9 and 10 significantly with descriptions of validating materials used as controls, reagents, mobile phases, and matrix blanks. Replaced the term 'screen' and 'screening' throughout document with other terms to make descriptions less ambiguous.