1. Purpose

This procedure provides general guidelines for the examination of cases within the Chemistry Unit (CU) of the Chemical Analysis Section (CAS) within the Division of Scientific Services (DSS) forensic laboratory. Within this document such things as types of cases, requests, sampling plans, and generalized workflows will be discussed.

2. Scope

This procedure describes general guidelines and information about evidence, case analysis requests, and reports related to items submitted to the CU of the DSS. These descriptions are based on the DSS general laboratory (GL) procedures and summarize the overall approach to analytical practices within the Unit. Separate and detailed standard operating procedures (SOPs) exist that cover specific areas within each discipline.

3. Responsibilities

This document applies to personnel who perform examinations, assist with examinations, or function in any capacity within the CU.

4. Specimens

Types of evidence typically submitted to the CU for analysis involve items from fire investigations and shootings. Fire investigation cases usually involve evidence from fire scenes which are typically submitted within metal cans due to the volatility and residual nature of possible ignitable liquids. Factory sealed liquid products may not necessarily need to be submitted in metal cans. Comparison samples may be submitted. For crimes possibly involving firearms and the need to detect residues from ammunition primers, evidence may include SEM stubs, GSR collection kits, clothing, and other items.

5. Procedure

Provided below are procedures for the general operational flow and casework analysis within the CU.

5.1 Case Generation and Evidence Handling

5.1.1 Cases are usually created and requests are generated within LIMS by the Evidence Receiving Unit (ERU).

5.1.2 Evidence will be transferred to analysts according to GL practices and is normally done through the ERU.

5.1.3 Analysts should retrieve and inventory evidence as soon as possible.

5.1.4 Analysts will ensure that evidence is under proper seal before acceptance and/or when transferring.

5.1.5 If evidence is found to not be under proper seal during transfer then analysts may assist with such proper sealing prior to their acceptance of the evidence. Such activities will be recorded within LIMS and/or casenotes.

5.1.6 If evidence does not lend itself to being under proper seal (e.g., too bulky), then evidence may still be accepted by analysts, but proper steps need to be taken to ensure evidence preservation and integrity. The appropriate manager, or their designee, will be notified when evidence can't be placed under proper seal or when other unusual activities arise.

5.1.7 All evidence shall be stored in an appropriate, locked, cabinet or designated evidence room and shall be stored under proper seal when not under active examination. A proper seal is defined as one which prevents evidentiary loss, cross-contamination, and deleterious change. Active examination is defined as a time period wherein an item of evidence is being examined during a limited time period (i.e., (1) working day).

5.1.8 Even during active examination, whenever there is a possibility that evidence could be lost, contaminated, or unknowingly tampered with, such evidence should be placed under proper seal. Examples of proper seal include, but are not limited to, using evidence tape with inked initials across tape edges or heat-seals with inked initials over seals.

5.1.9 For evidence which cannot fit into an appropriate evidence locker or evidence room, an appropriate manager, or their designee, will be notified and one, or more, of the following will occur:

5.1.9.1 An alternative evidence storage location will be selected (appropriate authorization needs to have been obtained if using locations associated with other sections).

5.1.9.2 Evidence may be left outside an evidence storage location provided that the evidence is under proper seal and the environment where it is placed has limited access and is acceptable to store such evidence.

5.1.9.3 Evidence not able to be placed under proper seal may be stored in a room/area for limited duration, but signs should be placed on all entrances to the room/area indicating unsealed evidence is being stored (e.g., 'No Entrance – Examination in Progress'). Further steps should be taken to limit the access (e.g., temporarily changing proximity card reader authorization) so that only authorized employees are allowed in that area for that time period.

5.1.10 The transfer of evidence must be done using a chain of custody system.

5.1.11 Upon starting examinations, analysts should attempt to preserve the original evidence seals or photograph such seals prior to alteration. Accessioning areas, examination areas, and areas where evidence is re-sealed will be clean and in locations where no contamination will occur.

5.1.12 While under examination, and in a secure environment (e.g., restricted access laboratory/instrument room), evidence does not have to be under proper seal.

5.1.13 Instances where evidence will be consumed during analysis and unavailable for future re-testing should be conveyed to appropriate customers prior to such analysis. Evidence which will be preserved, but which may be in another state/form (e.g., extracts from fire debris evidence), and which will be sent back to the submitting agency should be treated as evidence (i.e., labeled, placed under proper seal, and tracked appropriately) according to laboratory/section policy.

5.1.14 After performing all requested examinations and analyses, evidence will be placed under proper seal. If new packaging is needed then old packaging can be isolated and labeled as 'original packaging material.' Containers housing items will be marked so that items and other relevant case information can be easily identified.

5.1.15 Evidence is stored in appropriate secured evidence storage areas until returned to the ERU or transferred to another analyst.

Note: Evidence within an instrument or other equipment (e.g., oven) need not be under proper seal.

5.2 LIMS and Case Documentation

5.2.1 Evidence is tracked, casework documentation is maintained, and specific requests for disciplines are created through the use of LIMS.

5.2.2 Members of the Unit will work with the ERU and the Case Management Unit (CMU), as well as other laboratory staff, in order to coordinate evidence transfers, update information about cases, issue reports, and update other relevant aspects regarding cases (e.g., testimony, subpoenas).

5.2.3 The inventorying/accessioning of evidence, taking of case notes, and generation of other documentation will be the responsibility of the assigned analyst and will normally be captured within the case file. The term 'case file' is a combination of hardcopy documents within case file folder(s) and electronic data within LIMS.

5.2.4 All case documentation will be according to laboratory policy and relevant Unit SOPs.

5.2.5 Labels put on evidence and/or paperwork need only be accurate regarding laboratory case number, evidence item identification number, and general description. Evidence descriptions within LIMS may change slightly based on the needs of the DSS or other sections. Printing/placing new labels is not necessary if such changes do not impact the use of the label in question.

5.2.6 All relevant communications, especially those with outside entities, must be captured within case files. All relevant e-mails should be uploaded/placed into case files. Other communications can be logged within the case synopsis in LIMS.

5.3 Case Analyses

5.3.1 The analysis of evidence will be performed according to applicable SOPs within the Unit. Any minor deviations (i.e., those that don't affect the overall quality of analyses) will be documented. Major deviations (i.e., those that may affect the overall quality of analyses) will be preapproved according to laboratory policy prior to occurrence.

5.3.2 All appropriate documention should be incorporated, where feasible, into LIMS. Supplemental documentation can be kept within hardcopy case file folders. Laboratory document control policies will be followed and all appropriate initials/dates will accompany relevant paperwork.

5.3.3 Once cases and requests are established within LIMS they are can be assigned to appropriate analysts.

5.3.4 Evidence is transferred, analyzed, and results are obtained. All documentation, including photographs, will be maintained according to DSS policy. Instrumental data will be retained and stored according to both DSS and Section policies.

5.4 Results and Reports

5.4.1 Analysts will summarize their results and include them within LIMS to produce a draft laboratory report.

5.4.2 Technical review (TR) and administrative review (AR) milestones will be captured within LIMS.

5.4.3 External technical reviewers with experience within the applicable discipline may be utilized. External reviewers will be provided with copies of any necessary SOPs, documents, and casenotes required to perform their technical review. All external technical reviews will be peformed according to the policies and proceedures of the DSS, Section, and Unit.

5.4.4 Reports will be appropriately reviewed and if any corrections to the draft report are required, then the reason for the correction will be recorded within LIMS and a new draft report generated.

5.4.5 Reports will be appropriately released and distributed to submitting agency representatives. Tracking of reports will be done within LIMS as sub-itemized pieces of evidence.

5.4.6 All appropriate case documentation can be found either in physical case file folders or within LIMS. Analytical data must support the results/conclusions within reports and a another competent analyst should be able to arrive at the same result/conclusion based on documents retained within case files.

5.4.7 Reports will be in a format complying with DSS policy.

5.4.8 All items that were received and analyzed will be listed within reports along with any appropriate comments/results associated with each item.

5.4.9 Supplemental reports are those which contain additional information to previous reports. Such reports must be able to be linked to previous reports for clarity of information.

5.4.10 Amended, or revised, reports are those which contain corrections to previous reports. Such reports must also be able to be linked to applicable previous reports for clarity.

5.5 Validations will occur for procedures prior to their use with casework. Documentation will be kept in appropriate validation binders and approval for use will follow GL and Section policies.

6. Decision Criteria, Calculations, Measurement Uncertainty

Not applicable.

7. Abbreviations

Below are some abbreviations which may be found within documents related to the Chemistry Unit. More abbreviations may be found within specific unit procedures:

7.1 GC/MS: gas chromatography/mass spectrometry

7.2 GC: gas chromatograph or gas chromatography

7.3 MS: mass spectrometer or mass spectrometry

7.4 MSD: mass selective detector

7.5 TIC: total ion chromatogram

7.6 EIC: extracted ion chromatogram

7.7 EIP: extracted ion profile

7.8 SIM: selected ion monitoring

7.9 PIEI: positive ion electron impact

7.10 Char tube: charcoal tube

7.11 JT: JusticeTrax

7.12 FTIR: Fourier-transform infrared spectrophotometer

7.13 ATR: attenuated total reflectance

7.14 LPD: light petroleum distillate

7.15 MPD: medium petroleum distillate

7.16 HPD: heavy petroleum distillate

7.17 SEM: scanning electron microscopy

7.18 EDS: energy dispersive X-ray spectroscopy

7.19 GSR: gunshot residue (synonymous with pGSR)

7.20 pGSR: primer gunshot reside (synonymous with GSR)

7.21 AA: Atomic Absorption

7.22 keV: kilo-electron volt

7.23 3-comp/com: (3) three component

7.24 2-comp/com: (2) two component

7.25 1-comp/com: (1) one component

7.26 cm^{-1}: reciprocal centimeters (wavenumber)

8. Limitations

Limitations should be described within each report along with any other information which may be deemed relevant to the submitting agency or reader of the report.

9. Safety

Not applicable.

10. References

DSS laboratory GL procedures

CAS and CU procedures

ASTM standards (e.g., E1588, E1618, E2451, E3309, etc.)