Forensic Chemistry Section

Fire Debris Analysis Quality Assurance Policy

1. Scope

This document details quality assurance policies governing fire debris evidence examinations.

2. Evidence Processing and Handling

2.1 Fire debris evidence is submitted in metal cans and mason jars.

2.2 The laboratory does not typically process fire debris evidence bags, however the laboratory will not refuse to accept them. Fire debris bags will only be accepted for clothing items or items too large to fit into a paint can.

2.3 The benchtop will be cleaned and lined with a Kimwipe or equivalent. Appropriate cleaning solutions include non-petroleum based products such as bleach or dish soap. Methanol, Ethanol, or Isopropanol may be used as long as the examiner allows sufficient time for the alcohol to evaporate.

2.4 Due to the nature of fire debris evidence, only the outer container will be marked.

2.5 The extracts will be returned with the other items of evidence.

2.6 When handling heat sealed bags, if the original seal must be removed to access the evidence, that portion of the bag will be attached to the exterior of the package.

2.7 Containers that are not conducive to examination, such as compromised containers or ones that are too tightly packed will be returned to the investigating agency for repackaging. If an examiner should need to replace a container, both original and new containers will be returned to the submitting agency. The new container will become a sub-item of the original container.

2.8 Fire debris evidence from incidents resulting in injury or death may contain biohazards.

2.9 Fire debris evidence processing includes macroscopic examination of debris, extraction, and instrumental analysis using a Gas Chromatograph / Mass Spectrometer.

2.10 The examiner will be aware of the deleterious effects of each extraction procedure to the debris.

2.11 All solid / fire debris samples will be analyzed according to the laboratory's extraction scheme.

2.12 All liquid samples will be tested for flammability and miscibility.

2.13 A comparison to a known library reference sample will be conducted in any case resulting in identification. The data for the known reference sample will be included in the case folder.

2.14 System blanks will be processed simultaneously with the evidence. Only one system blank needs to be run with evidence samples.

2.15 Case related samples will be placed in amber vials only. Non-case related samples such as system blanks, solvent blanks, resolution check mix, and ignitable liquid library samples will be placed in clear vials only. Only clear vials may be discarded in the Sharps® container.

2.16 Only data from evidence items and library standards will be placed in the case folder. Solvent blanks, system blanks and resolution check mix data will be stored electronically. The examiner will note if the quality control data is acceptable in the case notes.

3. General Laboratory Quality Assurance

3.1 The Isotemp oven will be cleaned regularly.

3.2 Paper clips, beakers, and other utensils used must be clean.

3.3 Disposable gloves and lab coats will be worn while handling samples. Gloves will be changed between each sample.

3.4 Activated charcoal strips from new lots will be analyzed to ensure a lack of contamination. One strip will be directly washed with Dichloromethane and a second extracted as a system blank. Both strips will be analyzed on the GC\MS.

3.5 All solvents shall be analyzed on the GC\MS to determine solvent purity. This will be carried out for each new lot number. A neat sample and an evaporated sample will be analyzed for each solvent.

3.5.1 For pentane, an evaporated sample is one in which 500mL of the solvent has been evaporated to a maximum volume of 2 mL. A pesticide grade (99+% pure) pentane or equivalent will be used.

3.5.2 For Dichloromethane, an evaporated sample is one in which 4 mL of the solvent has been evaporated to a maximum volume of 1 mL or an equivalent evaporation ratio. An HPLC grade (≥99.9% pure) Dichloromethane or equivalent will be used.

3.5.3 Data from the solvent purity will be analyzed for possible impurities. The solvent will be considered to be unacceptable if identified impurities are those which would be found in common ignitable liquids such as toluene, xylene(s), substituted benzenes, normal alkanes, etc. Additionally, if the impurities are at such a level as to potentially mask ignitable liquid residues in casework, the solvent would be considered unacceptable.

3.5.4 If a solvent is considered unacceptable, the solvent will not be used in casework or validations. The solvent can either be returned to the vendor, disposed of, or can be used for solvent washes for laboratory equipment.

3.6 Ultra High Purity Helium (grade 5 or 99.999%) or better will be used as the carrier gas for the GC/MS.

4. Fire Debris Case Files

4.1 A Total Ion Chromatogram (TIC) will be printed for each case sample. The following information will be included on the TIC; sample name, operator's name, date acquired, file name, vial number, and miscellaneous information.

4.2 Summed Ion Profiles for Alkanes (ions - 43, 57, 71, 85), Aromatics (ions - 91, 105, 119), Cycloparaffin/Alkenes (ions - 55, 69, 83) and Naphthalenes (ions - 128, 142, 156) will be printed out after each sample.

4.3 System blanks, solvent blanks and resolution check mix data will be stored electronically in the data file folder associated with the date that the samples were run on the instrument.

4.4 The technical reviewer will check the electronic data to ensure that the data is acceptable.

4.5 The date of the autotune will be noted in the case folder, however a copy of autotune data does not need to be included.

5. Ignitable Liquids Reference Library

5.1 The laboratory will maintain a library of ignitable liquids obtained from commercial sources.

5.2 The library may include a variety of reductions of the samples.

5.3 Each library sample will be labeled with a unique number, which is tracked by a spreadsheet maintained on the laboratory network. The library number will also indicate if the sample is reduced.

5.4 Aliquots of library samples will be stored in the Fire Debris Refrigerator. The large parent containers will be securely stored in a flammable materials cabinet in the laboratory garage.