

## **FEUQ-01- General FEU QC Guidelines**

### **Scope**

This procedure is used to establish the general guidelines for the quality control of laboratory procedures, reagents, and equipment.

### **Background**

In order to ensure that the procedures performed in the laboratory are reliable, certain quality control guidelines must be adhered to. Quality control refers to the everyday activities and techniques used to fulfill the requirements of accurate laboratory practices. These conditions are defined by laboratory accreditation bodies and additional organizations such as the American Society of Crime Laboratory Directors (ASCLD), the International Association of Identification (IAI), the Association of Firearms and Tool Mark Examiners (AFTE), and the Scientific Working Group for Firearms and Tool Marks (SWGUN).

### **Guidelines**

#### **1. Use of Controls:**

During a particular laboratory procedure various controls are used to ensure that reliable results are obtained. Negative controls, positive controls, substrate controls, reagent blanks, and known reference materials are all used to achieve this reliability.

#### **2. Quality Control of Reagents:**

Quality control testing of reagents is performed to establish that a particular lot/batch of a reagent is clean (free of contaminants) and to determine if its sensitivity is valid. To avoid unnecessary retesting of samples due to reagent failure, quality control procedures are completed prior to testing. When possible, reagents are clearly identified by the batch number, the analyst's initials and date of preparation. This information will be recorded in the appropriate Reagent Logbook. Once a reagent is prepared or received from the manufacturer it will be stored in accordance with the manufacturer recommendations.

The laboratory prepares a number of reagents for comparative analysis, gunshot residue analysis, and serial number restoration. In general, the highest quality chemicals available are used in the preparation of these reagents. All prepared reagents are clearly identified and marked with the batch number, analyst's initials, date of preparation and date of expiration. All information regarding reagent preparation is recorded on the appropriate quality control document.

Each reagent that is prepared in the Firearm Examination Unit (FEU) is given a batch number which consists of the date and the initials of the analyst who prepared that reagent. The lot number of a particular critical reagent in a batch can be tracked through the facts recorded on the appropriate worksheet maintained in a reagent logbook. The information found on the worksheet contains the reagent batch number, the chemical and manufacturer, chemical lot number, chemical amount, the date of preparation, the initials of the analyst who prepared the reagent and the expiration date for that particular batch.

Reagents prepared in the laboratory or purchased by the laboratory for use can be classified as critical or non-critical. Critical reagents are those which can cause deleterious effects to evidence if they are not functioning properly. It is essential that these reagents are tested alone and on established samples prior to use in casework. The following is a list of critical reagents prepared or purchased by and used in the FEU:

Acetone  
Acetic Acid, Glacial  
Sodium Bitartrate  
L-(+) Tartaric Acid  
Naphthol  
Hydrochloric Acid  
Methanol  
Ethyl Alcohol  
Glycerin  
Carbon Tetrachloride  
Cupric Chloride  
Ferric Chloride  
Hydrogen Peroxide  
Sodium Hydroxide  
Sodium Nitrate  
Sulfuric Acid  
Nitric Acid  
Sulfanilic Acid  
o-Phosphoric Acid

All other reagents prepared in the laboratory are classified as non-critical.

Critical reagents require quality control testing before they are released for use in the FEU to ensure they are functioning properly. Quality control of critical reagents can be performed by taking the reagents through the entire FEU analysis procedure alone (reagent blank) and with a set of established samples (e.g. known gunshot residue, reference serial number plate, etc.). The results of the quality testing should be consistent with the expected results from the reference material. If the critical reagent does not meet these requirements, then it must be discarded, and a new batch of the reagent needs to be prepared. This practice does not imply that the results of an analysis performed using a non-quality controlled reagent would necessarily be compromised. Evaluation of controls and other aspects of the analysis may establish that the results can be relied upon.

For each lot of commercial kit received, purchased kits should be inventoried and quality control tested. The date of receipt, manufacturer's lot number, kit expiration date, and lot numbers/expiration date of the kit components are recorded on the kit evaluation worksheet.

Critical reagents will be purchased from the following suppliers:

Fisher Scientific  
ThermoFisher  
VWR

Any chemical(s) received from a supplier not listed above, will be authorized by the Laboratory Unit Manager/Quality Assurance Liaison/Quality Assurance Specialist

through an issued memo.

**3. Equipment Calibration and Maintenance:**

Quality control testing of laboratory equipment (calibration and routine maintenance) is performed to ensure that the equipment being used is reliable and functioning properly. This calibration or maintenance can include but is not limited to routine cleaning, performance verification, temperature checks, etc. Only designated and accurately operating equipment should be used in casework analyses. Essential parameters of equipment operations are generally identified in validation studies and should be monitored and documented periodically to maintain successful operation. Refer to the *FSL Quality Assurance Manual (QAM01)* and the *FEU Quality Assurance Manual* for further details on instrument calibration and maintenance.

**References**

- Handbook of Firearms and Ballistics, Brian Heard
- Firearms, the Law and Forensic Ballistics, Warlow
- Color Atlas of Forensic Toolmark Identification, Nicolas Petraco
- Firearms Investigation, Identification, and Evidence, Hatcher, Jury and Weller
- Firearm Identification in the Forensic Science Laboratory, Robert M. Thompson