

## Section 9 Maintenance and Calibration

### History Page

Revision #	Effective date	History
0	11/15/06	This is an original procedure this procedure has been completely reformatted and updated from the previous procedure that was adopted from the Washington State Patrol.
1	5/7/07	Procedures for handling and transport of reference weights, gage blocks and the NIST traceable ruler were added. Issuing authority added.
2	1/8/2008	Maintenance for annual cleaning and check removed.
3	9/7/2009	Added requirement for periodic checks of comparison microscope and Leads LCD Scale.
4	1/16/13	Changes made to all sections for measurement uncertainty and traceability policy updates.

## Section 9 Maintenance and Calibration

### 9.0 Scope and Background

To insure accurate data, all equipment that has a direct effect upon the comparison and measurement processes is kept in proper working order. Measurement devices and reference standards receive periodic calibration. Other equipment is examined and maintained periodically to verify safe/effective operation. Calibration / maintenance intervals may be adjusted based upon past performance, where the item has demonstrated that it will remain within specifications throughout the calibration interval.

Any equipment that appears to be damaged, out of calibration, or functioning improperly is removed from service, until the nature of the problem can be determined and corrected.

### 9.1 Procedures

#### 9.1.1 Balances

Maintenance and repairs performed on the balance will be recorded in a maintenance log.

Balances will be calibrated annually by a certified outside vendor. If the balance is taken out of service for repair or an event occurs (such as moving the balance) an intermediate check will be performed and documented. In order to pass the intermediate check the accuracy of the balance will be +/- 2%. The weights used in intermediate checks will be cleaned and calibrated annually by an outside vendor. The weights will be handled with gloves or tweezers to keep them clean. They will be transported and stored in their case. The documentation for the calibration of the weights will be kept in the front office.

#### 9.1.2 Comparison microscopes

Each microscope will have a maintenance log and any maintenance or repair will be recorded. The uniform magnification of the comparison microscope is checked by comparing two identical stage micrometers at multiple magnifications. The comparison microscope shall be checked yearly, after repairs likely to affect magnification and after moving. If the checks indicate the microscope is out of calibration calibrations shall be performed by an approved outside vendor.

#### 9.1.3 Micrometers and Calipers

Each micrometer or caliper will be annually checked against a certified gauge block or micrometer disk. These checks will be documented and the micrometer or caliper must demonstrate accuracy within .001 inches of the intended measurement.

#### **9.1.4 Rulers and other measuring devices.**

##### **9.1.4.1 NIST traceable devices**

The measuring specifications and accuracy for NIST traceable measuring devices (e.g. barrel rods, traceable ruler) are determined during certification of these devices and can be found in each laboratory's equipment/instrumentation maintenance file. The NIST traceable measuring device will be calibrated and recertified every five years. NIST traceable measuring devices will be stored so as to prevent damage such as bending or melting. The devices shall be handled with care to prevent bending, melting or damage to measuring marks.

##### **9.1.4.2 Rulers and tape measures**

Non-calibrated rulers and tape measures may be used for descriptive measurements only. Descriptive measurements using an un-calibrated measuring device may be included in the case notes but will not be included in the report.

##### **9.1.4.3 Damage or malformation**

If damage or a malformation (i.e. breakage or melting) occurs that may affect the measuring device it will be taken out of service and marked as out of service until it is repaired or replaced.

Damaged NIST certified measuring devices will be calibrated by an approved vendor before being put back into service.

#### **9.1.5 Gage blocks**

Gage blocks will be calibrated by an outside vendor every five years. Gage blocks will be handled with care to prevent bending, breaking or melting and will be transported and stored in their case.

#### **9.1.6 Trigger Pull Weights**

Trigger pull weights will be checked annually. The weights will be checked using certified balance. Tolerance for each weight is +/- 5% of the expected value. If a weight does not fall within the expected value it will be taken out of service and corrective action will be taken. Corrective action may include cleaning the weight or replacing the weight. The weight must be checked and have satisfactory results before being put back in service.

#### **9.1.7 Leeds LCD Scale**

The Leeds LCD Scale will be checked against a stage micrometer. These checks will be documented and the Leeds LCD Scale must demonstrate accuracy within .001 inches of the intended measurement. Checks will be performed annually and after changing the battery.

## 9.2 Handling and Verification of Externally Calibrated Items

### 9.2.1 Handling of Measuring Equipment

All measuring equipment will be handled and stored in the laboratory by appropriate analysts in a manner which prevents contamination, deterioration or damage and ensures proper functioning of the measurement equipment. All calibrated measurement equipment will be labeled, if possible, with the date of last calibration and date when calibration is next due.

### 9.2.2 Shipping

When a piece of equipment is sent to an approved vendor for repair, servicing or calibration it shall be packaged for shipping in such a way as to prevent damage.

### 9.2.3 Verification Upon Receipt of Externally Calibrated Item

Equipment received back shall be checked for damage and the certification documentation (*containing measuring results, including the measurement uncertainty and/or a statement of compliance with an identified metrological specification.*) will be reviewed and initialed before it is put back into service.

### 9.2.4 Review of External Calibration Documentation

Calibration Certificates for any externally calibrated item will be checked for compliance with ISO/IEC 17025:2005, Section 5.10 and initialed. All calibration certificates will be centrally stored.

## 9.3 Safety Considerations

This procedure involves hazardous materials, operations and equipment. This procedure does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Proper caution must be exercised and the use of personal protective equipment must be considered to avoid exposure to hazardous conditions.