APPENDIX B – STANDARDS & CONTROLS

I. CALIBRATION VERIFICATION METHODS

A. COMPARISON MICROSCOPE:

The microscopes require no routine calibration, however, the comparison microscopes will be cleaned and serviced periodically by a qualified technician. The comparison scopes may also be checked on a periodic basis using calibration slides that have been manufactured for that purpose. These actions will be documented on the relevant page of the instrument logbook.

Comparison Scope Calibration Check Method

1. Place calibration slides on stages and adjust lighting as necessary.
2. Begin with the lowest magnification objective.
3. Focus and align grids on each stage to hairline.
4. Compare grid gradations from side to side across the hairline. (Grids should align.)
5. Change to next highest objective and repeat steps 3 & 4.
6. Repeat step 5 until all objectives have been checked.
7. Note results on the relevant page of the instrument logbook.

B. STEREO MICROSCOPES:

The microscopes require no routine calibration, however, the stereo microscopes will be cleaned and serviced periodically by a qualified technician. These actions will be documented on the relevant page of the instrument logbook.

C. BALANCES/SCALES

1. ANNUALLY:
The balance/scale will be cleaned, serviced and certified annually by a qualified technician. This will be documented on the relevant page of the instrument calibration logbook.

2. USAGE:
The balance/scale will be checked prior to use to insure that it is functioning properly. This may be by utilizing a single check weight (in the range of normal use) that has been verified on a NIST traceable balance. This check will be documented on the case worksheet as listed in the method below.

3. METHOD FOR CALIBRATION VERIFICATION OF BALANCES:

   a. Tare the balance
   b. Place known weight on balance
   c. On the worksheet list the known value of the weight in the appropriate blank.
   d. If balance reads within 2 (two) percent of known weight, the balance is considered in compliance. List the value shown on the balance in the appropriate blank on the worksheet.
   e. Note: the values written on the worksheet must be precise enough to show that the balance was within the window of compliance; they should not be rounded or truncated.
   f. If the balance records the weight outside of the two-percent range, do not use until the balance is properly calibrated.

D. MICROMETER/CALIPER

1. ANNUALLY:
The micrometer/calipers will be standardized annually utilizing the appropriate gage blocks. These gage blocks will either be provided by the manufacturer or have a NIST traceable certificate. These actions will be documented on the relevant page of the instrument calibration logbook. The method for this verification is located in the instrument calibration logbook.

2. MICROMETER/CALIPER CALIBRATION VERIFICATION METHOD

a. Zero the micrometer or calipers
b. Measure the gage block
c. If the micrometer or calipers read within 2% of the known value, the micrometer or calipers are in compliance
d. Repeat steps a – c using each of the gage blocks.
e. If the instrument is found to be out of compliance, do not use it until it can be repaired or replaced.

3. USAGE:
The micrometer/caliper will be checked prior to use to insure that it is functioning properly. This check does not need to be documented.

E. CHATILLON TRIGGER PULL TESTER

1. ANNUALLY
The trigger pull tester will be checked using at least two different known weights. This standardization will be documented on the relevant page of the instrument calibration logbook.

Chatillon Trigger Pull Tester Calibration Verification Method

a. Zero the dial with the hook in the down position.
b. Hang a known weight
c. Read the dial
d. If the dial reads within ½ pound of the known weight, the trigger pull tester is in compliance
e. Repeat steps 1-4 at least once using a different weight each time.

2. USAGE
The trigger pull tester will be inspected before each use to insure that it is not damaged. This inspection does not need to be documented unless something is noted.

F. TRIGGER PULL ARSENAL WEIGHTS

1. ANNUALLY
The arsenal weights will be verified on a NIST traceable balance one time per year. The result will be will be documented on the relevant page of the instrument calibration logbook.

2. USAGE
The arsenal weights will be inspected before each use to ensure that the weights are not damaged. No documentation of this inspection is required unless damage is noted.

G. MEASURING BOX AND YARDSTICKS USED FOR MEASURING BARREL AND OVERALL LENGTH

1. ANNUALLY
The yard sticks will be formally checked for damage. The barrel length testing rods and the measuring box (and its components) will be formally checked for damage. The results will be documented on the relevant page of the instrument calibration logbook.

2. USAGE
The yard sticks will be inspected before each use to ensure that they are not damaged. No documentation of this inspection is required unless damage is noted. Additionally, the box and the sliding portion of the measuring box will be inspected. If damage is noted (e.g. the device is bent or the gradations are not readable), the device will be immediately removed from service and replaced.

H. CERAMIC GAGE BLOCKS

1. ANNUALLY
The gage blocks will be formally checked for damage. The result will be will be documented on the relevant page of the instrument calibration logbook.

2. USAGE
The gage blocks will be inspected before each use to ensure that they are not damaged. No documentation of this inspection is required unless damage is noted. If damage is noted (e.g. the block is chipped or broken), the gage block will be immediately removed from service and replaced.

I. CHECK WEIGHTS (SECONDARY STANDARD)

1. ANNUALLY
The check weights will be formally checked against the laboratory's ultraclass weights (primary standard). The procedure for this is located in the QM 5.6. The result will be documented on the proper laboratory form, which will be located in the instrument calibration logbook.

2. USAGE
The weights will be inspected before each use to ensure that they are not damaged. No documentation of this inspection is required unless damage is noted. If damage is noted (e.g. the weight is dented, broken or corroded), the gage block will be immediately removed from service and replaced.

II. NIST TRACEABLE STANDARDS

As required by QM 5.6 the following is a list of NIST traceable measurement standards used in the Firearms Section:

1) Balance Check Weights (considered a secondary standard). Each examiner has a NIST traceable check weight.
   a) Handling – Check weights will be handled with gloves, tweezers or tongs to avoid contact with skin.
   b) Transport – Check weights will be transported in their original box/container when taken out of the examiner's office for any reason.
   c) Storage – Check weights will be stored in their original box/container near the examiner's balance.
   d) Use – See relevant sections above.
2) There are two NIST traceable yardsticks used for measuring barrel and overall length. One is in the measuring box. The other is stored in its case in the main room of the Firearms Section.
   a) Handling – Yardsticks will be handled with care to avoid bending, damaging or damage to the ruling gradations.
   b) Transport – Yardsticks will be transported with care and in the original container when possible
   c) Storage – Yardsticks will be stored in their original container when possible. One will remain in the firearm measuring box.
   d) Use – See relevant sections above.
3) There is a set of ceramic gage blocks used for verifying calibrations of calipers and micrometers.
   a) Handling – Gage blocks will be handled with care to avoid damage.
   b) Transport – Gage blocks will be transported in their containers/boxes.
   c) Storage – Gage blocks are stored in the section supervisor's desk.
   d) Use – See relevant sections above.

III. REAGENTS

The preparation of stock solutions of reagents is logged, dated and initialed. Reagents are prepared from analytical grade solvents and chemicals and laboratory deionized water.

Stock solutions of test reagents are tested when prepared, where applicable, with appropriate controls. Analysts will check the stock solution with similar controls when removing portions for individual casework.

Personnel in the Firearms Section have noted no breakdown of reagents over time under conditions of normal laboratory storage. Nevertheless, no powder pattern reagents stock solutions should be used after one year of shelf life. Serial number restoration reagents need only be remade when their stored condition becomes unsightly or hazardous.

IV. WORKSHEETS

A copy of each of the analytical worksheets in use by the Firearm & Toolmark Identification Section is found in the appropriate folder on the department's resource drive in a subfolder with the Standard Operating Procedures. Other administrative forms used by the laboratory or CMPD may be found in the section that pertains to laboratory's Quality Assurance Manual. Examiners may choose to create and use worksheets of their own for other nonanalytical purposes.

REVISION HISTORY FOR ALL APPENDIXES (A-D)

Issue Date	History
03/31/00	Original Issue
03/19/01	Changed Report Writing Process Map, Added Gene to the History Page.
01/31/02	Added calibration verification for comparison scope, refined calibration verifications for balances (monthly) and micrometers/calipers (annual).
1/30/04	Updated methods for comparisons scope, balances, micrometer/calipers. Updated Gene's position. Updated report procedures process map. Fixed typos.
1/27/05	Updated worksheets for CALEA accreditation and revised Appendix B to require new or revised forms to fit CMPD format and a copy be forwarded to RP&A. Added Carrie to signature page.
3/28/08	Revised balance calibration method, revised location of section worksheets
9/13/10	Added Measurement Uncertainty as Appendix C. Made the process maps Appendix D.
3/8/11	Updated trigger pull weight verification, added method for verification of yard sticks and added list of NIST traceable standards
6/17/11	Changed footnotes for ISO17025 and retired process maps.
9/8/11	Revised uncertainty estimation due to different divisor in equation in Appendix C. Updated Appendix A to follow ASCLD/LAB-International requirement.
12/5/12	Updated Appendix B to more reasonable requirements for yard sticks and ceramic gage blocks.
10/25/13	Added Jennifer Pohlheber's Instruments to Appendix D.
12/11/13	Updated calibrations/inspections to include the gun measuring box and rods, did a major revision to Appendix C to follow ASCLD/LAB Annex C and to include new examiner in uncertainty study.
12/26/13	Updated Appendix B to included policies for handling, storage, transportation and use of NIST traceable reference standards. Added check weights to calibration procedures.

Approval

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Matthew C. Mathis

Issuance

Chief Criminalist _____ Date:
Todd J. Nordhoff

Criminalist _____ Date:
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Criminalist _____ Date:
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