

# Alaska Scientific Crime Detection Laboratory

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## Firearms/Toolmarks Discipline - Additional Guidelines and Procedures

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## Introduction

This document supplements the Alaska State Crime Laboratory Quality Assurance Manual. The guidelines and procedures in this manual are additional, Firearm Discipline specific information.

The numbering scheme in this document follows that of the Alaska State Crime Laboratory Quality Assurance Manual. Supplemental requirements are found in Sections 4 and 5 of this document. Additional requirements in Sections 4 and 5 are listed by the Quality Assurance Manual criteria point they address. In Sections 4 and 5, the phrase "*Nothing Additional*" means there is Nothing Additional to the requirements listed in the Laboratory Quality Assurance Manual.

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## Abbreviations

5 R L = G	5 lands and grooves, Right hand twist
L=G	lands equals grooves
LL>G	lands larger
AP	Armor piercing
Bb	Barrel
Bfm	Breach face marks
BP	Black Powder
BT	Boattail
Chem	Chemical examination or test
CMS	Case mouth seal, color identification. Also see MOUTH ANNULUS
CN	Cupro Nickel, bullet jacket
CNCS	Cupro Nickel Clad Steel, bullet jacket
Cu	Copper
CWS	Copper washed steel, case finish
DC	Dual core
DCC	Discharged cartridge case
Ejt	Ejector
Ext	Extractor
F	Function
FA	Firearms
FMC	Full metal case
FMJ	Full metal jacket, also known as FULL PATCH
FP	Firing pin
FPI	Firing pin impression
FSLC	Fired since last cleaned
G or GIMP	Groove impression
GM	Gliding metal, bullet jacket
GMCS	Gliding metal clad steel, bullet jacket
GRC	General rifling characteristics
Griess	Griess test for nitrates
GSR	Gunshot residue
HB	Heavy ball, round-nose bullet
HE	High explosive
HP	Hollow point
HPB	Heavy pointed ball, boattail bullet
HPT	High pressure test
I	Incendiary
I.D. or IDENT	Identification
IP	Inside primed
JHP	Jacketed hollow point.
JSP	Jacketed soft point

L or LIMP	Land impression
LPB	Light pointed ball – flat based bullet
LRN	Lead round nose bullet type
LS	Lacquered steel, case finish
MA	Mouth annulus, color identification. Also see CASE MOUTH SEAL
MC	Metal cased
Mfg	Manufacture
Mic or Micro	Microscopic
Na Rho	Sodium Rhodizonate test
NC	No conclusion
NCIC Code	Uniform offense codes published by the <b>National Crime Information Center</b>
NI or Nonident	Nonidentification (could not have fired the specimen)
P	Pointed
PA	Primer annulus, color identification
Pb	Lead
Prod. Code	Product code
RD	Range determination
Report	A sharp explosive sound (especially the sound of a gun firing)
RF	Rimfire
RN	Round nose
SHOTSHELL	Shotgun shell ammunition
SIMILAR	Similar or approximately equal to
SN	Soft nose
SP	Soft point
SWC	Semi-wad cutter
T	Tracer
TC	Truncated cone
Tests = Item X	Means that the evidence, item X, can be identified as having been fired in the firearm being examined
Tests = Tests	Means test cases and/or bullets can be identified as having been fired in the same firearm
TM	Toolmarks
w/	With
WC	Wad cutter
Wt	weight

## **4 Management requirements**

### **4.1 Organization**

*Nothing Additional*

### **4.2 Management System**

*Nothing Additional*

### **4.3 Document Control**

*Nothing Additional*

### **4.4 Review of requests, tenders and contracts**

*Nothing Additional*

### **4.5 Subcontracting of tests and calibrations**

*Nothing Additional*

### **4.6 Purchasing services and supplies**

4.6.1 *Nothing Additional*

4.6.2 GRIESS, RHODIZONATE and DITHIOOXAMIDE are prepared fresh when needed for casework by the examining scientist and are tested with positive and negative controls. The results are recorded on the case worksheet.

4.6.3 *Purchasing* documents will be saved online.

4.6.4 The Firearms and Toolmark Discipline does not have any critical consumables.

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**4.7 Service to the Customer**

*Nothing Additional*

**4.8 Complaints**

*Nothing Additional*

**4.9 Control of nonconforming testing and/or calibration work**

*Nothing Additional*

**4.10 Improvement**

*Nothing Additional*

**4.11 Corrective Action**

*Nothing Additional*

**4.12 Preventive Action**

*Nothing Additional*

**4.13 Control of Records**

4.13.1.1 *Nothing Additional*

4.13.1.2 *Nothing Additional*

4.13.1.3 *Nothing Additional*

4.13.1.4 *Nothing Additional*

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#### 4.13.2.1

### **FIREARM WORKSHEETS:**

A firearm worksheet may take on many forms but should minimally contain the following information:

- Laboratory Case Number
- Caliber/Gauge
- Make
- Model
- Serial number
- Firing mechanics
- Type of action
- Safeties
- Operating condition
- Trigger pull
- Rifling characteristics
- Barrel length
- Overall length
- Documentation of test fires produced using the firearm
- Other information the examiner might find useful

### **FIRED BULLET WORKSHEET:**

A fired bullet worksheet may take on many forms but the examiner should minimally consider containing the following information:

- Laboratory Case Number
- Bullet Caliber
- Bullet Weight
- Bullet Morphology
- Bullet Rifling Characteristics
- Physical Condition of the bullet
- Other information the examiner might find useful

### **DISCHARGED CARTRIDGE CASE WORKSHEET:**

A discharged cartridge case worksheet may take on many forms. The examiner should minimally consider containing the following information:

- Laboratory Case Number
- Cartridge Case Caliber/Designation
- Head Stamp Information
- Morphology of the cartridge case
- Type of firing pin impression
- Type of breach face marking
- Detailing any extraneous marking
- Other information the examiner might find useful

## **FIREARMS RANGE OF CONCLUSIONS**

### Identification

The fired evidence in question was fired with the suspect firearm.

The fired evidence in question was fired from the same firearm, firearm not received.

### Elimination

The fired evidence in question was not fired with the suspect firearm.

The fired evidence in question was not fired from the same firearm, firearm not received.

The discipline recognizes that an elimination of a firearm by other than class characteristics is possible but that such elimination is an exceptional situation.

The discipline does not consider the routine comparison of test shots to the open case file to normally constitute an exceptional situation.

If an examiner arrives at an opinion where he/she eliminates a firearm, for any reason, the examiner must substantiate the reasons supporting his/her opinion and incorporate them into his/her work notes.

### Inconclusive

The fired evidence in question cannot be identified or eliminated as having been fired with the suspect firearm.

The fired evidence in question cannot be identified or eliminated as having been fired with the same firearm, firearm not submitted.

Inconclusive categories

Inconclusive A: Some agreement of individual characteristics and all discernible class characteristics, but insufficient for an identification.

Inconclusive B: Agreement of all discernible class characteristics without agreement or disagreement of individual characteristics due to an absence, insufficiency, or lack of reproducibility.

Inconclusive C: Agreement of all discernible class characteristics and disagreement of individual characteristics, but insufficient for an elimination.

### Unsuitable

The fired evidence in question is not suitable for comparison purposes.

### Unidentifiable

The evidence in question cannot be identified as being fired evidence.

4.13.2.1 (continued)

**TOOLMARKS RANGE OF CONCLUSIONS**

Identification

The toolmark evidence in question was made with the suspect tool.

The toolmark evidence in question was made with the same tool, tool not received.

Elimination

The toolmark evidence in question was not made with the suspect tool.

The toolmark evidence in question was not made with the same tool, tool received.

The discipline recognizes that an elimination of a toolmark by other than class characteristics is possible but that such an elimination is an exceptional situation.

Inconclusive

The toolmark evidence in question cannot be identified or eliminated as having been made with the suspect tool.

The toolmark evidence in question cannot be identified or eliminated as having been made with the same tool, tool not submitted.

Inconclusive categories

Inconclusive A: Some agreement of individual characteristics and all discernible class characteristics, but insufficient for an identification.

Inconclusive B: Agreement of all discernible class characteristics without agreement or disagreement of individual characteristics due to an absence, insufficiency, or lack of reproducibility.

Inconclusive C: Agreement of all discernible class characteristics and disagreement of individual characteristics, but insufficient for an elimination.

Unsuitable

The toolmark evidence in question is not suitable for comparison purposes.

Unidentifiable

The evidence in question cannot be identified as being a toolmark.

#### 4.13.2.1 (continued)

### REPORTS and CASE FILES

The final report will clearly convey to the officer and/or prosecutor exactly what was analyzed.

Reasons for inconclusive results will be conveyed on the worksheet and in the report.

Reports should be thoroughly checked by the forensic scientist after they are generated and before sending for review. All reports issued by examiners at the Scientific Crime Detection Laboratory must be subjected to a technical and an administrative review by another forensic scientist prior to issuing the report. The technical review portion must be performed by a scientist that has been competency tested in the Firearm and Toolmark discipline.

A technical review focuses on the analyst's bench notes and the chain-of-custody records. The main purpose of a technical review is to ensure that the conclusions of the examiner are fair and reasonable and based on sound scientific examinations and procedures. The technical reviewer should agree with the conclusions as based on the testing performed, and should be comfortable testifying to the results if the analyst happens to be unavailable for court.

The main purpose of the administrative review is to check for proper transcription of identification numbers, adherence to laboratory policies, proper spelling and grammar, clarity of the report, appropriateness to the agency's request, and distribution of the report to the proper agency or agencies. This last responsibility may be delegated to administrative personnel.

Note: The signature of the reviewer on the final report indicates that the reviewer has performed both an administrative and technical review.

(End of 4.13.2.1)

4.13.2.2 *Nothing Additional*

4.13.2.2.1 Start and end dates for work are noted in the analyst case notes.

4.13.2.3 *Nothing Additional*

4.13.2.3.1 *Nothing Additional*

4.13.2.3.2 *Nothing Additional*

4.13.2.4 *Nothing Additional*

4.13.2.5 *Nothing Additional*

4.13.2.5.1 Does not apply to Firearms/Toolmark

- 4.13.2.5.2 There are no instrumental analyses in the Firearms/Toolmark Discipline.
- 4.13.2.6 *Nothing Additional*
- 4.13.2.7 *Nothing Additional*
- 4.13.2.8 *Nothing Additional*
- 4.13.2.9 *Nothing Additional*
- 4.13.2.10 *Nothing Additional*
- 4.13.2.11 *Nothing Additional*
- 4.13.2.12 A verification in the Firearm/Toolmark Section indicates that a second court-qualified examiner agrees with the summary report RESULTS and the bench notes CRITERIA FOR THE CONCLUSIONS for fired bullets, discharged cartridge case, items with toolmarks, and any other comparative analysis opinion reported by the first examiner. Verifications are performed when an examiner puts forth a comparison indicating an IDENTIFICATION, an ELIMINATION, or an INCONCLUSIVE where another examiner's comparison is deemed useful. Verifications may or may not include a re-examination of the evidence. While there is no requirement for verification of comparison results, the Firearm Examiners should routinely subject their comparative conclusions to a second opinion. The frequency of these verifications may range from only a few per year to many per year.
- When a verification is to be performed, the case examiner will electronically request a verification examination in the Laboratory Information Management System (LIMS). The verifying examiner will then perform the verification and enter the results into the LIMS system, indicating the date performed.

4.13.2.13 Discipline abbreviations are listed in the Abbreviations Section of this manual.

#### **4.14 Internal Audits**

*Nothing Additional*

#### **4.15 Management Reviews**

*Nothing Additional*

## 5 Technical requirements

### 5.1 General

5.1.1 *Nothing Additional*

#### 5.1.2 MEASUREMENT OF UNCERTAINTY IN GUN BARREL LENGTH

The U.S. government as well as the State of Alaska has restricted or prohibited certain firearms on the basis of barrel length.

1.1 **Federal** guidelines: Shotguns have barrels as short as 18 inches (46 cm), the minimum shotgun barrel length allowed by law in the United States without special permits; most manufactures use a minimum length of 18.5 inches, to give leeway in the case of a measuring dispute). Barrel lengths of less than 18 inches (46 cm) as measured from the breechface to the muzzle when the weapon is in battery with its action closed and ready to fire, or have an overall length of less than 26 inches (66 cm) are classified as short barreled shotguns under the 1934 [National Firearms Act](#) and are heavily regulated.

1.2 **Alaska** statute 11.61.200, Prohibited Weapon: rifle with a barrel length of less than 16 inches, shotgun with a barrel length of less than 18 inches, or firearm made from a rifle or shotgun which, as modified, has an overall length of less than 26 inches.

For the State of Alaska Scientific Crime Detection Laboratory; measurements such as the barrel length of a sawed off shotgun are important measurements because legal rulings can be based on these measurements. These are “measurements that matter” that necessitate an analysis of the estimation of uncertainty of measurements.

The following study was conducted in 2009 by a mentorship student under the guidance of the laboratory’s Quality Assurance Manager. It was conducted in two parts:

- A. Comparison of variability in multiple gun barrel measurement by two examiners.
- B. Comparison of variability in repeated measurements of one item by two examiners.

The measuring technique for gun barrel length is a method devised by Forensic Scientist Robert Shem that he uses for his work in the Alaska Scientific Crime Detection Laboratory. He uses a long wooden dowel that has a modified 2 mL plastic microcentrifuge tube positioned to slide along the length of the dowel. The rod slides down the length of the gun barrel and the plastic tube slides down the dowel until it contacts the tip of the barrel. Once the length of the barrel is demarcated on the dowel rod with the plastic tube, the rod is laid on a NIST traceable ruler. The process is repeated as a check on the measurer’s accuracy. If the 2<sup>nd</sup> barrel length measurement is the same as the 1<sup>st</sup>, there is assurance of the barrel length, but if the two measurements differ, the process will be repeated until a consistent result is obtained.

5.1.2 (continued)

Forensic Scientists Robert Shem and Debra Gillis each used this technique to measure the barrel length of the fifteen guns listed in the table below.

Make, Model and Serial Number	Bob	Deb	Difference
Mossberg model 500A 12 Gage #R867055	18.6 in.	18.6 in.	0 in.
Remington Model 870 12 Gage #B241233M	27.8 in.	27.8 in.	0 in.
Remington Model 788 22 250 Rifle #136155149	24.1 in.	24.1 in.	0 in.
Mossberg model 500A 12 gage #J833572	28.0 in.	28.0 in.	0 in.
Remington model 870 20 gage #C130317V	21.1 in.	21.0 in.	0.1 in.
Remington model 700 256 caliber #B6304467	24.0 in.	24.0 in.	0 in.
Remington model 700 243 caliber #C6528199	22.0 in.	22.0 in.	0 in.
Harrington & Richardson model 098 20 gage #HE221194	25.6 in.	25.6 in.	0 in.
Ruger Ranch Rifle 223 caliber #187-61383	18.5 in.	18.5 in.	0 in.
Winchester model 1400 MK II #403909	29.9 in.	29.9 in.	0 in.
American Arms model SM 64 #058157	19.2 in.	19.2 in.	0 in.
Winchester model 9422 22 caliber #F220320	20.3 in.	20.3 in.	0 in.
Remington model 522 #3085912	7.4 in.	7.4 in.	0 in.
Mossberg model 500A 12 gage #J880934	15.4 in.	15.4 in.	0 in.
Browning model suite 16 16 gage #5860	27.6 in.	27.6 in.	0 in.

$n = 15$  degrees of freedom = 14 average difference = 0.006667

variance = 0.006667 standard deviation = 0.02582 standard error = 0.006667

This data was analyzed using a two-tailed paired sample  $t$  test to look at the differences between the measurements for each gun. The original hypothesis was that there was no difference between the gun measurements. The  $t$  value for  $t_{0.05(2), 14}$  equals 2.145. If the calculated  $t$  value is greater than 2.145 the original hypothesis will be rejected. The calculated  $t$  value for the first round of gun barrel measurements was 1 and therefore we accepted our original hypothesis.

As the results show, there is little variability between Forensic Scientist Shem's measurements and Forensic Scientist Gillis' measurements, and it can be concluded that their measuring technique provides consistent, accurate data and has a low rate of variability between the two examiners.

5.1.2 (continued)

Forensic Scientists Robert Shem and Debra Gillis each used the same technique to perform repeated gun barrel measurements of the same gun. The firearm selected for this experiment was a Mossberg model 500A 12 gauge shotgun, serial number J833572. Each examiner measured the barrel fifteen times:

Mosberg Model 500A 12 Gage Serial #J833572			
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0
bob	28.0	deb	28.0

n=30  
 DF (v) =29  
 Average =28  
 Sum of Squares 0  
 Variance = 0  
 Standard Deviation = 0  
 Coefficient of Variation = 0  
 Plus or minus 0 Sixteenths

As the results show, there was no variability in the recorded repeated measurement of Forensic Scientist Shem and Forensic Scientist Gillis. The standard deviation is zero, and the method does not demonstrate variability.

(End of 5.1.2)

5.1.3 GRIESS, RHODIZONATE and DITHIOOXAMIDE are prepared fresh when needed for casework by the examining scientist and are tested with positive and negative controls.

5.1.3.1 GRIESS, RHODIZONATE and DITHIOOXAMIDE results are recorded on the case worksheet.

**5.2 Personnel**

*Nothing Additional*

**5.3 Accommodation and environmental conditions**

*Nothing Additional*

## **5.4 Test and calibration methods and method validation**

5.4.1 Processing used for a case evidence is left to analyst discretion. Processing guidelines are listed in the Firearm/Toolmark Work Instructions Manual.

5.4.2 *Nothing Additional*

5.4.3 *Nothing Additional*

5.4.4 *Nothing Additional*

### **5.4.5 Validation of Methods**

5.4.5.1 *Nothing Additional*

5.4.5.2 Validation records are stored in the Validations folder in the Discipline Share folder.

5.4.5.3 *Nothing Additional*

5.4.5.4 Performance Check records are stored in the Performance Checks folder in the Discipline Share folder.

### **5.4.6 Estimation of uncertainty of measurement**

5.4.6.1 *Nothing Additional*

5.4.6.2 Measurement of uncertainty - See section 5.1.2 of this manual.

5.4.6.3 Measurement of uncertainty - See section 5.1.2 of this manual.

### **5.4.7 Control of data**

5.4.7.1 *Nothing Additional*

5.4.7.2 *Nothing Additional*

5.4.7.2.1 *Nothing Additional*

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## 5.5 Equipment

5.5.1 Equipment used in the Firearm/Toolmark Discipline consists of:

- Comparison Microscopes
- Stereo Microscopes
- Balances
- Trigger pull Devices (Arsenal or Postal Weights)
- Micrometer/Caliper
- Rulers
- Fume Hoods
- Infrared Cameras

### 5.5.2 CALIBRATION STANDARDS and INSTRUMENTATION MAINTENANCE

#### COMPARISON MICROSCOPES

The State of Alaska Scientific Crime Detection Laboratory utilizes two Leeds LCF Firearms Comparison Microscopes, installed March 1, 2010 and May 30, 2012. These microscopes replaced a Reichert Comparison Scope, serial #2. The Operations Manual and validation certification for the Leeds microscopes are maintained on the laboratory's computer network and in the laboratory's LIMS.

The comparison microscope will be cleaned and serviced by a factory certified technician as needed.

USAGE: The comparison microscope will be checked prior to use to insure that it is functioning properly.

This check will be performed by placing two similar items on each stage (test to test) and observing the agreement between these items.

This performance check of the comparison microscope will be documented in the case file.

Use of the stage micrometer for critical measurements of evidence will be preceded by verification with a NIST Micrometer Calibrator. This verification will be documented on the firearm worksheet.

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## 5.5.2 (continued)

### STEREOMICROSCOPE

The Firearm & Toolmark unit of the laboratory utilizes Leica™ stereomicroscopes, models MZ6 and Wild M3Z.

The comparison microscope will be cleaned and serviced by a factory certified technician as needed.

USAGE: Each stereomicroscope will be checked prior to use to insure that it is functioning properly.

This check will be performed by observing an item under the microscope and utilizing past experience in determining if the instrument appears to be giving a true and accurate representation of the evidence.

### BALANCES

The balances will be cleaned, calibrated, and certified annually by an accredited external vendor. Documentation of this action is kept with the laboratory's quality assurance records.

Verification of balances with NIST traceable standard weights will be performed monthly and the verification documented in the Firearm Balance Logbook. Reference weights must not be touched with bare hands (tweezers or gloves are used).

### TRIGGER PULL DEVICES (ARSENAL or POSTAL WEIGHTS)

Performance checks of the three trigger pull weights (0.5 lb, 1 lb, and 2 lbs) will be conducted when purchased and annually thereafter. Each weight must not exceed  $\pm 2.0$  grams when performance checked, or the weight will not be used. The performance checks will be conducted utilizing an externally calibrated in-house balance.

Documentation of yearly performance checks of the trigger pull weights and trigger pull (hook) device will be made and the records maintained in the Firearm **Balances & Weights** Logbook and in the Quality Assurance files maintained by the Quality Assurance Manager.

Conversions: 0.5 lb. = 226.80 grams

1.0 lb. = 453.59 grams

1.5 lbs. = 680.39 grams

2.0 lbs. = 907.18 grams

USAGE: The arsenal weights and "hook device" will be inspected before each use to insure that the weights are not damaged. This inspection does not need to be documented unless something is noted.

## 5.5.2 (continued)

### MICROMETER/CALIPER

USAGE: The micrometer/caliper will be checked prior to use to insure that it is functioning properly using a NIST-certified gauge block. The Certificate of Accuracy will be maintained on the laboratory's network and in the LIMS. Any checks will be documented on the appropriate laboratory worksheet for the item being measured. The gauge block will be replaced every two years.

### RULERS

USAGE: Because the overall and barrel lengths of rifles or shotguns are factors in the legal ownership of a firearm, an accurate measurement of both is necessary, particularly when either measurement appears to be very close to the legal minimums.

NIST-traceable rulers will be utilized. The Certificates of Calibration for the NIST-traceable rulers will be maintained in the LIMS and on the laboratory's computer network. The rulers will be replaced every two years.

The overall and barrel lengths, when it is necessary to record them, will be documented to the nearest tenth of an inch on the appropriate Firearm Worksheet.

### FUME HOOD

The fume hood will be serviced and certified annually by a reputable outside agency. These preventative maintenance actions will be documented and that documentation kept with the laboratory Quality Assurance records.

### INFRARED CAMERAS

The State of Alaska Scientific Crime Detection Laboratory utilizes a Sony NightShot digital camera. This camera is utilized primarily for documentation photography and for visualizing gunshot residue. One additional IR camera, a Canon EOS 5D Mark II digital SLR, has been validated for use in the Firearm unit of the laboratory.

The Operation Manuals for these cameras are kept in the Firearm/Toolmark laboratory. Information on the cameras is also kept on the laboratory computer network:

I:\Discipline Shares\Firearm and Toolmark\Instrumentation & Equipment\Infrared Cameras

(End of 5.5.2)

- 5.5.3 Equipment manuals are stored in the Discipline Share folder.
- 5.5.4 *Nothing Additional*
- 5.5.5 Equipment records are stored in Discipline Share folder.
- 5.5.6 Performance checks - See Section 5.5.2 of this manual.
- 5.5.7 *Nothing Additional*
- 5.5.8 Equipment Calibration documentation - See Section 5.5.2 of this manual.
- 5.5.9 *Nothing Additional*
- 5.5.10 *Nothing Additional*
- 5.5.11 *Nothing Additional*
- 5.5.12 *Nothing Additional*

## **5.6 Measurement traceability**

### **5.6.1 General**

- 5.6.1.1 Calibration Checks - See Section 5.5.2 of this manual.
- 5.6.2 Specific Requirements
  - 5.6.2.2.1 NIST traceability- See Section 5.5.2 of this manual.
  - 5.6.2.2.2 SI units - See Section 5.5.2 of this manual.

### **5.6.3 Reference Standards and Reference Materials**

- 5.6.3.1 *Nothing Additional*
- 5.6.3.2 *Nothing Additional*
- 5.6.3.2.1 Firearms Reference and Ammunition Reference Collections are addressed in the Firearms/Toolmark Work Instruction Manual.
- 5.6.3.3 Firearms reference collection is inventoried at least once per calendar year.
- 5.6.3.4 *Nothing Additional*

## **5.7 Sampling**

*Nothing Additional*

## **5.8 Handling of test and calibration items**

*Nothing Additional*

## **5.9 Assuring the quality of test and calibration results**

5.9.1 *Nothing Additional*

5.9.1.1 Control testing is covered under criteria point 5.1.3 in this manual and in the Firearms/Toolmarks Work Instruction Manual.

5.9.2 If a control test is negative, the Discipline supervisor will be notified. The Discipline supervisor or a designee will take any necessary corrective action.

5.9.3 *Nothing Additional*

5.9.3.1 *Nothing Additional*

5.9.3.2 *Nothing Additional*

5.9.3.3 Each Firearms/Toolmark analyst takes a CTS General Firearms proficiency test yearly.

5.9.3.3.1 *Nothing Additional*

5.9.3.3.2 *Nothing Additional*

5.9.3.4 Each Firearms/Toolmark analyst takes a CTS General Firearms proficiency test yearly.

5.9.3.5 *Nothing Additional*

5.9.3.6 *Nothing Additional*

5.9.4 *Nothing Additional*

5.9.4.1 See 4.13.2.1 in this manual

5.9.4.2 *Nothing Additional*

5.9.4.3 *Nothing Additional*

5.9.5 *Nothing Additional*

5.9.5.1 *Nothing Additional*

5.9.6 *Nothing Additional*

5.9.7 *Nothing Additional*

## **5.10 Reporting the results**

5.10.1 *Nothing Additional*

5.10.2 *Nothing Additional*

**5.10.3 Test Results**

5.10.3.1 *Nothing Additional*

5.10.3.2 *Nothing Additional*

5.10.3.3 *Nothing Additional*

5.10.3.4 *Nothing Additional*

5.10.3.5 Results and report wordings are covered under criteria point 4.13.2.1 in this manual.

5.10.3.6 Exclusions and report wordings are covered under criteria point 4.13.2.1 in this manual.

5.10.3.7 Inconclusive results and report wordings are covered under criteria point 4.13.2.1 in this manual.

5.10.4 *Nothing Additional*

5.10.5 *Nothing Additional*

5.10.6 *Nothing Additional*

5.10.7 *Nothing Additional*

5.10.8 *Nothing Additional*

5.10.9 *Nothing Additional*

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## REVISION HISTORY

<b>Changes from FTM2013R0 to FTM2013R1</b> Change effective 09/14/2012
New manual written in Laboratory Quality Assurance Manual criteria point format.
Inserted information from previous Firearms/Toolmark Manual (LP2013R0) to write manual.
Information for the new manual taken from the following LP2013R0 appendices. Appendix 1 - Range of Conclusions Appendix 3 - Calibration Standards and Instrumentation Maintenance Appendix 4 – Worksheets Appendix 5 - Reports and Case Files Appendix 7 – Verifications Appendix 8 – Abbreviations Appendix 10 - Uncertainty of Measurement in Gun Barrel Length
Added 5.6.3.3 Firearms reference collection is inventoried at least once per calendar year.

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