

- Type of clothing
- Distance
- Interference from body fluids

12.5 Practical Exercises

- 12.5.1 Working with your TC, as available, prepare the necessary materials (e.g., chemicals, controls, papers) for conducting distance determination evaluations/examinations.
- 12.5.2 Complete the microscopic evaluation and direct chemical processing of white fabric sample(s). Document using appropriate notes, worksheets and photographs. Explore one of the factors listed in Study Question 12.4.9.
- 12.5.3 Complete the microscopic evaluation and chemical processing using transfer techniques of dark fabric sample(s). Document using appropriate notes, worksheets and photographs.
- 12.5.4 Complete the microscopic evaluation and appropriate chemical processing of provided “complex” gunshot residue samples. (To include possible folds; angle influence; cylinder flash)
- 12.5.5 Evaluate the pellet patterns provided to you from your TC. Discuss results with your TC.
- 12.5.6 Receive a firearm, ammunition, and an unknown pattern from your TC to complete a distance determination. Conduct all appropriate visual, microscopic and chemical examinations on the unknown and generated known patterns. Complete appropriate notes/photographs, and document your final distance determination.
- 12.5.7 Complete the microscopic evaluation and appropriate chemical processing of provided “complex” gunshot residue samples. (To include possible folds; angle influence; cylinder flash)
- 12.5.7.1 Using appropriate laboratory reference firearms, produce/reproduce gunshot residue patterns similar to those in the “complex” samples (e.g., cylinder flash / top strap; folds; angles)
- 12.5.7.2 After the completion of the complex exercise, receive a firearm and ammunition from your TC and complete known patterns for comparison determining an appropriate distance with the selected gunshot residue pattern.
- 12.5.8 Complete the evaluation of a provided pellet pattern. Using the approximate 1” per 1 yard criteria, determine an approximate distance. Complete appropriate notes/worksheets.
- 12.5.9 Using provided non-porous materials, chemically process each using appropriate Modified Griess and Sodium Rhodizonate transfer techniques.

12.6 Modes of Evaluation

- 12.6.1 Practical Exercises 12.5.6, 12.5.7.1 and 12.5.8
- 12.6.2 Successful completion Practical Exam
- 12.6.3 Oral Session

12.7 References

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13 FRACTURE MATCH EXAMINATIONS

13.1 Objectives

- 13.1.1 To become knowledgeable and understand the methodologies used to identify two objects as having been at one time joined and a part of the same object (fracture or physical matching)
- 13.1.2 Learn the technique of reverse lighting

13.2 Modes of Instruction

- 13.2.1 Self-directed study through study questions and practical exercises
- 13.2.2 Specific lectures or presentations
- 13.2.2 Observations

13.3 Assignments

- 13.3.1 Completion of required reading assignments (13.6.1 – 13.6.13)
- 13.3.2 Study questions
- 13.3.3 Practical exercises

13.4 Study Questions

- 13.4.1 Explain the random processes that produce uniqueness in surface fractures.
- 13.4.2 Define fracture match.
- 13.4.3 Describe a “physical fit” examination.
- 13.4.4 Explain plastic deformation in non-brittle fractures.

13.5 Modes of Evaluation

- 13.5.1 Practical exercises
 - 13.5.1.1 You will receive 3 sets of broken objects. 1) Broken screwdriver tips 2) broken key blanks 3) a broken grip plate(s). Complete the appropriate worksheets, documenting observations with photos and/or sketches. At least a minimum, one of the 3 practical sets shall be additionally examined using opposite/reverse lighting and casting methods. Be prepared to discuss all conclusions and observations of method limitations.
 - 13.5.1.2 Tear and cut various samples of tape; document observations of cut versus torn edges, and any limitations of source conclusions.
- 13.5.2 Practical examination
- 13.5.3 Oral session

13.6 References

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- 13.6.13 Orench, J. A., "A Validation Study of Fracture Matching Metal Specimens Failed in Tension," AFTE Journal, 2005; 37(2): 142-149.

14 NUMBER RESTORATION**14.1 Objectives**

- 14.1.1 To become knowledgeable in the scientific theory behind the restoration of obliterated characters
- 14.1.2 To become proficient in the different methods used to restore obliterated characters

14.2 Modes of Instruction

- 14.2.1 Self-directed study through study questions and practical exercises
- 14.2.2 Observations

14.3 Assignments

- 14.3.1 Completion of required reading assignments (14.7.1-14.7.8)
- 14.3.2 Study questions
- 14.3.3 Practical exercises

14.4 Study Questions

- 14.4.1 Define the following as they pertain to number restoration:
 - Plastic deformation
 - Elastic deformation
 - Grinding
 - Over stamping (re-stamping)
 - Gouging
 - Heating
 - Welding
 - Removal
- 14.4.2 Explain the scientific theory for the restoration of characters.
- 14.4.3 Explain the examination procedure used for the restoration of characters.
- 14.4.4 Briefly explain the chemical reactions that occur during the restoration of characters.
- 14.4.5 List and explain obliteration methods and how to recognize each. List potential effects on the subsurface and the selection of the appropriate polishing technique.
- 14.4.6 Prepare a list of chemical etchants, their contents, and the most common metals they would be used for.
- 14.4.7 Briefly explain the principle of magnetic particle inspection.
- 14.4.8 How do manufacturers impart serial numbers and what effect do these processes have on the potential restoration?

14.5 Practical Exercises

- 14.5.1 Using laboratory specimens, conduct several number restorations. At a minimum, document with appropriate notes/photographs the following: obliteration method (several methods may be evaluated), material evaluated (the student should include both ferrous and non-ferrous materials), polishing

techniques, and various etchants used/combined and any resulting effectiveness (e.g., restoration character contrast, speed of oxidation).

- 14.5.2 Using laboratory specimens, as available, conduct magnetic particle inspection restorations.
- 14.5.3 Using the appropriate bar code appendix from the firearms section procedures manual, select a firearm from the reference collection and decode the associated serial number. Take appropriate notes/photographs.
- 14.5.4 Discuss with your TC the use of the firearms reference collection and other available references in determining alphanumeric serial number combinations, font styles, and potential “secondary”/hidden serial numbers.
- 14.5.5 Discuss with your TC the safe handling and storage of all chemicals potentially used in Number Restoration.
- 14.5.6 Discuss with your TC the heat procedure that is used for restorations in plastic.
- 14.5.7 Obtain from the TC, laboratory specimens with areas of obliteration and attempt to restore them. As instructed, prepare notes and photographs to substantiate all conclusions and results.
- 14.5.8 Complete an assigned unknown bar code for serial number decryption. Take appropriate notes/photographs.
- 14.5.9 Using appropriate method(s), complete an assigned unknown serial number restoration. Take appropriate notes/photographs.

14.6 Modes of Evaluation

- 14.6.1 Practical Exercises (14.5.8 and 14.5.9)
- 14.6.2 Oral Session

14.7 References

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15 REPORT WRITING, EXPERT TESTIMONY, AND PROFESSIONALISM

15.1 Objectives

- 15.1.1 To become familiar with the Department of Forensic Science Quality Manual in regards to note taking, chain of custody and report writing.
- 15.1.2 To become familiar with the Department of Forensic Science Firearm/Toolmark Procedures Manual in regards to note taking, chain of custody and report writing.
- 15.1.3 To become familiar with the Department of Forensic Science LIMS.
- 15.1.4 To become familiar with technical and administrative review of case files.
- 15.1.5 To become proficient presenting findings in court.

15.2 Modes of Instruction

- 15.2.1 Self-directed study through study questions and practical exercises
- 15.2.2 Observations

15.3 Assignments

- 15.3.1 Completion of required reading assignments (15.7.1-15.7.26)
- 15.3.2 Study questions
- 15.3.3 Practical exercises

15.4 Study Questions

- 15.4.1 Define the following:
 - Expert witness
 - Opinion
 - Voir dire
 - Ethics
 - Bias
 - Forensic science
- 15.4.2 Discuss with your TC reasonable degree of scientific certainty, practical certainty and practical impossibility.
- 15.4.3 Discuss potential juror bias of forensic scientists and their potential effect on testimony.
- 15.4.4 What is the CSI Effect and how has it impacted forensic expert testimony?
- 15.4.5 Discuss non-verbal cues and delivery influences on expert credibility.
- 15.4.6 Discuss evidence packaging and marking criteria as listed in the Quality Manual.
- 15.4.7 Discuss the general examination documentation requirements in the Quality Manual and the Firearm/Toolmark Procedures Manual.
- 15.4.8 What is the standard for admissibility of expert testimony in Virginia and how would that differ from Federal Court?

15.5 Practical Exercises

- 15.5.1 Discuss with your TC the standards regarding note taking, chain of custody and report writing as they relate to the Department of Forensic Science Quality Manual and the Firearm/Toolmark Procedures Manual.
- 15.5.2 Discuss with your TC the standards regarding file maintenance and location and courtroom testimony monitoring as they relate to the Department of Forensic Science Quality Manual.
- 15.5.3 Read through copies of reports generated by examiners to familiarize yourself with report formats and phraseology.
- 15.5.4 Discuss with your TC the operation of local, state and federal law enforcement agencies and court systems.
- 15.5.5 When possible, observe examiners testifying; discuss with your TC their demeanor and professionalism.
- 15.5.6 Confer with other examiners regarding personal hints and recommendations in regards to courtroom testimony.
- 15.5.7 Using current ASCLD/LAB criteria and the Department's Quality Manual and Section Procedures manual, discuss with your TC how the laboratory meets the accreditation standards.
- 15.5.8 Prepare a list of "qualification questions" which can be used by the prosecutor to qualify you as an expert witness. Discuss with your TC.
- 15.5.9 Discuss with the TC the laboratory policy regarding the reexamination of evidence.
- 15.5.10 Discuss with the TC the laboratory policies regarding the following:
- Providing verbal results prior to issuance of a final laboratory report
 - Inquiries from the press and other media
 - Providing a laboratory report to other agencies and Medical Examiner
 - The Department's subpoena policy (to include, civil, federal, and state courts)
 - The Department's policies on case file check out; SDT for notes; FOIA requests; taking cases to court; providing copies of notes to attorneys; deposition requests
- 15.5.11 Discuss with the TC the Department of Forensic Science's proficiency testing program as it relates to the firearm and toolmark section and be able to discuss this topic.
- 15.5.12 Demonstrate a working ability to describe the uncertainty of measurement in a courtroom testimony situation.
- 15.5.13 The trainee should document the review of at least five case files using the appropriate Technical Review Form. Case files should be generated by multiple examiners, if possible. The potential findings of the reviews shall be discussed with the TC. Technical Review forms generated in this capacity shall be marked as Training and retained in their Training File. The case files shall be technically reviewed by an authorized examiner pursuant to QM 17 prior to release.
- 15.5.14 Complete an ASCLD/LAB-*International* Audit Trail Worksheet on at least one case.
- 15.5.15 Complete at least one mock case in the stage database of LIMS.

15.6 Modes of Evaluation

- 15.6.1 Practical Exercises
- 15.6.2 Oral Session

15.7 References

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- 15.7.24 Firearms and Toolmarks Procedure Manual Sections, referring to Examination Documentation
- 15.7.25 DFS Document 100-F111 Technical Review Form
- 15.7.26 ASCLD/LAB-*International* Supplemental Requirements for Accreditation of Forensic Science Testing Laboratories (2011)
- 15.7.27 ISO/IEC 17025:2005 – accessible through DFS Intranet

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Appendix A - Individual Training Plan (ITP) Template

For each section listed below include the following information:

- List previous documented training received
- Provide detailed plan, including assignments, exercises, exams and presentations to be completed with dates, for each section.

The objectives listed in the Firearm/Toolmark Training Manual should be used as a guide for questions during the assessment to determine the individual's knowledge level.

Quality Manual / Firearms Safety

Instrumentation

Machining Processes

Introduction to Toolmark Identification

Toolmark Examinations and Comparisons

Firearm and Toolmark Evidence Admissibility Criteria and Defense

History of Firearms Identification

Ammunition

Firearms

Bullet and Shotshell Component Examinations and Comparisons

Cartridge and Shotshell Case Examinations and Comparisons

Gunshot Residue and Distance Determination

Fracture Match Examinations

Number Restoration

Report Writing, Expert Testimony and Professionalism

Uncertainty of Measurement

Evidence Handling

Cognitive Factors in Comparative Analysis

The expected completion date of this training plan is _____.