Training Outline for Physical Match Examinations

1.0 Purpose – This document provides an outline for training in the examination of physical match evidence.

2.0 Scope – The training procedure is broken into the following two units: general physical match training and additional specialty training. In order to accept physical match cases, the analyst must complete the general physical match training unit. To accept physical match cases that involve materials such as fabrics, cordage and tape, the analyst shall also complete the additional specialty training. This training outline shall be followed by all trainees in physical match examinations, regardless of experience level.

3.0 General Physical Match Training

3.1 Introduction – This module is designed for the trainee to evaluate physical matches between rigid materials, such as metal, wood, hard plastics and glass.

3.2 Objectives – Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills to:

3.2.1 Describe the differences between class and individual characteristics.

3.2.2 Describe how a physical match may be made and why it is considered conclusive that the two objects were once joined together.

3.2.3 Document a positive physical match.

3.2.4 Write reports for positive cases, inconclusive cases, negative cases, and for negative cases where additional testing has been or will be completed.

3.3 Reading Assignments

3.3.1 Argon, N., Schecter, B. "Physical Comparisons and some Characteristics of Electrical Tape." *AFTE Journal* 18.3 (1986): 53-59.

3.3.2 ASTM Standard E2288, 2003, "Standard Guide for Physical Match of Paper Cuts, Tears, and Perforations in Forensic Document Examinations." ASTM International, West Conshohocken, PA, 2003.

3.3.3 Deforest, P.R., R.E. Gaensslen and H.C. Lee. *Forensic Science – An Introduction to Criminalistics.* New York: McGraw-Hill, 1983. (Chapter 11 – Physical Patterns).

3.3.4 Dixon, K.C. "Positive Identification of Torn Burned Matches with Emphasis on Cross Cut and Torn Fiber Comparisons." Presentation: American Academy of Questioned Documents Forensic Scientists, August, 1982.

3.3.5 Funk, J.J. "Comparison of Paper Matches." *Journal of Forensic Sciences* 13.1 (1968).

3.3.6 Katterwe, H. "Fracture Matching and Repetitive Experiments: A Contribution of Validation. *ATFE Journal* 37.3 (2005): 229-241.

3.3.7 Kirk, Paul L. *Crime Investigation*. New York: Interscience Publishers, Inc, 1953. Chapts. 20, 22: "Casts and Replicas" and "Metals."

3.3.8 Klein A., L. Nedivi and H. Silverwater. "Physical Match of Fragmented Bullets." *Journal of Forensic Sciences* 45.3 (2000): 722-727.

3.3.9 Miller, J. "Metal Fractures: Matching and Non Matching Patterns". *AFTE Journal* 38.2 (2006): 133-165.

3.3.10 Saferstein, R. *The Forensic Science Handbook.* 1st ed. Prentice-Hall Inc. 1982. (Chap. 4).

3.3.11 Shor Y., et al. "Physical Match: Insole and Shoe." *Journal of Forensic Sciences* 48.4 (2003).

3.3.12 Tsach, T., Wiesner, S., Shor, Y. "Empirical proof of physical match: Systematic research with tensile machine." *Forensic Science International*. 166 (2007): 77-83.

3.3.13 Van Hoven, H.A. and H.D. Fraysier. "The Matching of Automotive Paint Chips by Surface Striation Alignment." *Journal of Forensic Sciences* 28.2 (1983): 463-67.

3.3.14 Weimar, B. "Physical Match Examinations of Adhesive PVC – Tapes: Improvement of the Conclusiveness by Heat Treatment." *AFTE Journal* 40.3 (2008): 300-302.

3.3.15 Zugibe, F. and J. Costello. "The Jigsaw Puzzle Identification of a Hit and Run Automobile." *Journal of Forensic Sciences* 31.1 (1986):329-32.

3.4 Exercises

3.4.1 Read the literature pertaining to this module.

3.4.2 Collect rigid samples to include wood, metal, glass, plastic and automobile parts. At least one of each type shall be collected. Separate these samples into two or more pieces by cutting, tearing and/or breaking.

3.4.2.1 Attempt to physically match the pieces.

3.4.2.2 In doing the comparison, observe the class characteristics which are properties that all members of a certain class of objects or substances have in common (e.g., size, color, pattern, surface texture, dimension and composition).

3.4.2.3 Look for the presence of any individual characteristics which would identify two objects as sharing a common origin (e.g., incidental striations/scratches, irregular fracture edge, inclusions, stress fracture lines, extrusion markings, conchoidal stress lines, hackle marks, and any unique identifiers such as dirt/marker/paint/smudge/smear traversing a fracture, or a break through a design or wording imprinted in the object).

3.4.2.4 Observe how each of the above materials distorts and how that affects the ability to make a physical match.

3.4.2.5 Document the physical matches by taking detailed notes and photographs. Additional documentation (e.g., sketches) may be used to supplement the photographs.

3.4.3 Given a variety of broken training samples, attempt to physically match the pieces using the steps described above (minimum of 5).

3.4.4 Under the direct supervision of the trainer or designee, the trainee will process existing cases. The following aspects of casework will be covered:

- Initial intake and evidence handling procedures.
- Note taking, photography and other types of documentation.
- Results of analysis and report writing.

3.5 Evaluation

3.5.1 Successfully complete a written test.

3.5.2 Given two mock cases, work and document as if actual cases.

3.5.2.1 Fabric and cordage samples are provided as a part of fiber training. Fabric and cordage physical match examinations are limited to Forensic Scientists trained in fiber and physical match analysis.

3.5.2.2 Tape samples are provided as a part of tape training. Tape physical match examinations are limited to Forensic Scientists trained in tape and physical match analysis.

3.5.3 During the moot court and/or roundtable discussion, successfully present one of the mock physical match cases.

4.0 Additional Specialty Training

Some physical match cases, such as tape, cordage and fabric cases require knowledge from discipline-specific training. In order to perform specialty physical match cases, the above-listed exercises (**3.4**) and evaluations (**3.5**) shall be completed using the specialty samples in addition to the general training samples. Specialty samples include fabric, tape and cordage.

5.0 Records

- Training file
- Training checklist

6.0 Attachments – N/A

Revision History		
Effective Date	Version Number	Reason
09/17/2012	1	Original ISO Document
10/18/2013	2	Added issuing authority to header
08/29/2014	3	Updated header to Physical Evidence Section – Trace Unit, issuing authority to Physical Evidence Section Forensic Scientist Manager. Updated all references in procedure from Trace Evidence Section to Trace Unit.
03/20/2015	4	Changed wording in 2.0; changed title of 3.0; changed wording in 3.2.2; added five reading assignments to 3.3; changed wording in 3.4.2 and 3.4.3; added additional documentation such as sketches to 3.2.4.2; added "or designee" to 3.4.4; removed first bullet point from 3.4.4 and changed second bullet point to include photography and additional documentation; moved 3.5.3 to 3.5.1; changed wording in 3.5.2; changed wording in 3.5.2.1 and 3.5.2.2; changed wording in 3.5.3; and changed wording in 4.0
12/11/2015	5	Corrected Effective Date on Revision Number 4; changed wording in 2.0; added "inconclusive cases" to 3.2.4; separated 3.4.2.2 and changed wording in 3.4.2.2; changed wording in 3.4.2.3; added minimum of 5 to 3.4.3