PHYSICAL MATCH EXAMINATION

20.1 PURPOSE:

The physical match of two items of evidence is a method to establish commonality between the two items.

20.2 RESPONSIBILITY:

Forensic Science Examiners from the Division of Scientific Services who have been trained in the discipline of physical match examination according to FB SOP-26 (Training Manual and Checklist), GL-4 (LIMS/JusticeTrax) and GL-13 (General Evidence Handling).

20.3 SAFETY

Use appropriate measures for the proper handling of biohazardous materials and hazardous chemicals according to GL-2 (Safety Manual).

20.4 DEFINITIONS:

LIMS: Laboratory Information System

20.5 PROCEDURE

20.5.1: Materials

A. Magnifying device (i.e. lens, stereomicroscope, compound microscope)

B. Digital imaging device

20.5.2 General Examination

A. Physical evidence will be examined based on the submitting agencies request, case information and condition of the evidence, as well as the examiner's knowledge, training and experience.

B. The examiner will use their training and experience to choose a suitable magnifying device (if necessary) to examine/compare the evidence submitted. If used, the stereoscope or microscope will be recorded on the appropriate Quality Record Worksheet.

C. Remove any trace material for possible further examination (if necessary) according to FB SOP-19 (Trace Evidence Collection/Hair-like Fiber Examination). Leave undisturbed any possible individualizing characteristics adhering to the item's surface (see section 20.5.3.A.2).

D. Visually examine and document the general physical characteristics (i.e. class characteristics of each item of evidence) on the appropriate Quality Record Worksheets. Capture digital images of these items including a scale.

1. General physical characteristics may include the item's color, texture, pattern and composition-type.
2. If class characteristics of two items differ, then no physical match examination will be conducted. These items may be forwarded to the Chemistry Unit of the Laboratory for further examination.

E. The examiner will determine if the items of evidence are fractured and whether or not they are in suitable condition to be physically realigned.

20.5.3 Physical Match Examination

A. Two or more items of evidence will be assessed side-by-side and in such a manner as to prevent loss or contamination.

1. If two or more evidentiary items have no discernable differences in class characteristics and can be joined with no significant differences at the fracture margin, then the two items are consistent with once having been one continuous piece.

2. If two or more evidentiary items have no discernable differences in class characteristics, can be joined with no significant differences at the fracture margin and exhibit an individualizing characteristic, then these two items were once one continuous piece.

   Individualizing characteristics extend across the fracture margin and may include, but are not limited to:

   a. Defect (such as an air bubble)
   b. Surface printing/writing (such as alphanumeric characters)
   c. Surface damage (such as scratch-type damage)
   d. Surface deposit (such as a latent print or bloodstain)

B. The physical match and individualizing characteristics (when present) will be photo-documented at the appropriate magnification including a scale.

1. This documentation may include photographs of the fractured edges/individualizing characteristics while apart, slightly apart and fitted together.
2. The physical match will be documented on the appropriate Quality Record Worksheet.
3. If used, the stereoscope/microscope will also be recorded on the appropriate Quality Record Worksheet.

C. A second qualified examiner will confirm the physical match. They may observe the actual evidence or may review the photo-documentation (i.e. during the Technical Review).

1. If this examiner concurs with the determination of the physical match, then she/he will initial the appropriate Quality Record Worksheet to indicate the agreement.
2. If this examiner does not concur with the determination of the physical match, then a third qualified examiner will be consulted.
3. A determination of physical match or no physical match will be made between the first, second and third examiners. This determination will be recorded, along with the concerns of the second examiner and the reasoning behind the final determination, on the appropriate Quality Record Worksheet. All parties will initial this documentation.

D. When a physical match is confirmed, the examiner will re-evaluate the case scenario to determine if further requested testing/examination is necessary.

20.5.4 Itemization and Disposition

A. Sub-items may be created and transferred in the LIMS system according to GL-4 (LIMS/JusticeTraxSystem), GL-5 (Ethics) and FB SOP-1.5.5., when necessary.

1. If other forensic examination is necessary, the examiner will forward some or all of the evidence to the appropriate Laboratory Unit.
2. The examiner will determine if some or all of the examined evidence should be retained at the Laboratory or returned to the Submitting Agency. Some factors used in making this determination may be the size and fragility of the evidence.

20.5.5 Report Writing

A. To complete case paperwork and write a report of examination and results see FB SOP-5 (Case Records and Reports).

B. Examples of submission descriptions are as follows:

1. Submission #1 (“portion of plastic in roadway”) consisted of a portion of green checkered, rubber-type material, measuring approximately 5” by 7”.

2. Submission #2 (“front bumper of SUV”) consisted of a black ridged, plastic-type vehicle bumper, measuring approximately 6’8” long, 28” wide and 17” deep. This submission was received with areas of damage and portions missing.

3. Submission #3 ("mud flap") consisted of a green checkered, rubber-type vehicle mud flap. This submission was received with areas of damage and portions missing.

C. Suggested report wording is as follows:

1. *Dissimilar class characteristics (no physical match examination necessary):*

   Submission #1 was found to be visually dissimilar in color, texture and pattern to submission #2, therefore no physical match examination was conducted.

2. *Similar class characteristics – Negative physical match:*
   a. Submissions #1 and #3 were found to be visually similar in color, texture and pattern. However, submissions #1 and #3 could not be physically fit to each other.
   b. Submissions #1 and #3 were forwarded to the Chemistry Unit for further analysis.

3. *Similar class characteristics – Positive physical match*:

   Submissions #1 and #3 were found to be visually similar in color, texture and pattern and could be physically fit to each other. Therefore, submissions #1 and #3 are consistent with once having been one continuous piece. (or: once part of the same item.)

4. *Similar class characteristics – Positive physical match – Individualizing characteristic*:
   a. Submissions #1 and #3 were found to be visually similar in color, texture and pattern and could be physically fit to each other.

   b. To be used as applicable:
      1. Defect:
         Defects were noted in the fractured areas of these submissions and match across the fracture margin.

      2. Surface printing/writing:
         Alphanumeric characters ("Vf872"…) were noted on the fractured area of submission #1. Alphanumeric characters (…"2pkNLqF4") were noted on the fractured area of submission #3.
         Portions of the digit "2" were noted to match across the fracture margin of these submissions.

3. Surface damage:
   Scratch-type damage was noted on the fractured areas of these submissions and match across the fracture margin.

4. Surface deposit:
   Blood-like deposits were noted on the fractured areas of these submissions and match across the fracture margin.

c. Therefore, submissions #1 and #3 were once one continuous piece. (or: once part of the same item.)

20.6 REFERENCES

A. Bell and Morris, An Introduction to Microscopy, CRC Press, 2010.
B. DeForest, Gaensslen and Lee, Forensic Science, An Introduction to Criminalistics, McGraw-Hill, 1983.
C. ASTM International, Publication Designation E 2288-03, *Standard Guide for Physical match of Paper Cuts, Tears, and Perforations in Forensic Document Examination,* 2003
D. GL-2 (Safety Manual)
E. GL-4 (LIMS/Justice Trax System)
F. GL-5 (Ethics)
G. GL-13 (General Evidence Handling)
H. Bradley, Keagy, Lowe, Rickenbach, Wright and LeBeau, *A Validation Study for Duct Tape End Matches,* FBI Laboratory Services, Forensic Science Communications, Vol.9, No.3, July, 2007.
I. Paints and Polymers SOP Manual, FBI Laboratory Chemistry Unit, Issue Date: 06/21/2006, Revision: 0, Pages 1-16.