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UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF WASHINGTON

UNITED STATES OF AMERICA,
Plaintiff,
vs.
KEVIN WILLIAM HARPHAM,
Defendant.

NO. CR-11-0042-JLQ

ORDER DENYING MOTION TO
EXCLUDE TOOL MARK EVIDENCE

I. INTRODUCTION

BEFORE THE COURT is Defendant’s Motion to Exclude Toolmark Evidence (ECF No. 113). This motion concerns the admissibility of non-firearm tool mark forensics and an opinion concerning a single pair of *Klein* pliers. This court has performed its gatekeeping role as directed by *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). Defendant seeks to preclude the introduction of tool mark testimony, specifically the opinion of FBI Forensic Examiner Brett Mills that a pair of pliers allegedly connected to the Defendant, or his family or neighbors, were used to crimp component parts of the destructive device at issue in this case.

A *Daubert* hearing was held on August 4, 2011. See ECF No. 144. Mr. Mills testified as a witness for the Government. The defense presented no contravening testimony during the hearing (because their consulting “academic” witness was apparently not available). Defense counsel vigorously cross-examined Mr. Mills, raising issues that could cause the

1 jury to closely examine the basis for the opinion of Mr. Mills. Following the hearing, the
2 court allowed the parties to file supplemental briefing and additional literature.

3 After considering the evidentiary record, the testimony, and the parties' arguments, the
4 court finds that the method and application of tool mark identification utilized by Mr. Mills
5 at the FBI Laboratory in this case is sufficient to pass the *Daubert* test, leaving the weight
6 to be given to Mr. Mills' testimony for the jury after cross-examination and any controverting
7 testimony. While there is subjectivity involved, it is the subjective judgment of a trained
8 professional experienced in analyzing and comparing tool mark parts. Accordingly,
9 Defendant's motion is denied.

10 **II. BACKGROUND**

11 Brett Mills has been employed by the FBI Laboratory since 1989, which is a laboratory
12 accredited by the American Society of Crime Laboratory Directors (ASCLD). He has a
13 bachelors degree in biology. From December 1989 through May 1990, and January 1996
14 through 1998, he completed FBI training programs in the Firearms/Toolmarks Unit.
15 Though his training did not specifically involve specific training in plier marks, it did include
16 touring tool manufacturing facilities to learn how tools are made. Mr. Mills testified that he
17 has worked numerous projects involving crimpers or pliers, estimating that perhaps 10% of
18 his cases have involved such non-firearm tools. Mr. Mills could not recall ever testifying in
19 a *Daubert* hearing or about plier marks specifically. However, Mr. Mills has testified
20 approximately 40 times in the field of firearms and tool marks. Mr. Mills is not individually
21 certified by the Association of Firearm and Tool Mark Examiners (AFTE).

22 On January 20, 2011, the FBI laboratory where Mr. Mills works first received from
23 law enforcement the component parts of the alleged destructive device at issue in this case.
24 Mr. Mills was asked to examine them for tool marks. According to his report, he knew the
25 origin of the items he examined were "recovered...after a suspicious backpack was
26 discovered in downtown Spokane along the route of a Martin Luther King Jr March." Mr.

1 Mills examined the parts received January 20, 2011 and noticed that some of the components
2 had impression and striation tool marks, which he determined appeared to have been left by
3 the same crimping-type of tool.

4 On March 25 and March 30, 2011 the FBI laboratory received a number of items
5 seized by law enforcement in this case, including various tool specimens (given 16 different
6 item numbers) consisting of tools labeled wire cutters, crimpers, wire strippers, "assorted
7 cutting tools", and a single pair of pliers-- Item No. K67. Though Mr. Mills' report does not
8 identify which model or type of pliers K67 was, Mr. Mills testified that he recalled it was
9 manufactured by Klein Tools. In addition to the various tools, on March 30, the lab received
10 additional specimens discovered and seized from the search of a gravel pit.

11 Knowing both the suspect tool marks and the tools provided to him were potentially
12 linked to a crime, Mr. Mills testified he then eliminated all but the one pair of pliers he was
13 provided based upon each tools' class characteristics. After determining that the pliers could
14 have potentially produced the marks present on the component parts, he testified he then
15 created ten to twenty test impressions in similar media with the pliers in order to make a
16 visual comparison using photomicrography. He then examined the "striated marks present
17 in the two toolmarks to determine if patterns of similarity exist[ed]."

18 Mr. Mills determined, based upon his experience, that his test impression of K67 had
19 sufficient agreement with the tool marks left on fourteen of the component parts he was
20 provided. The challenged testimony consists of the following conclusions included in Mr.
21 Mills' report: Tool marks on fourteen suspect components "were identified as having been
22 produced by the K67 crimping/cutting tool." These were the only so-called "identifications"
23 made by Mr. Mills. The remainder of his results were "inconclusive." Tool marks on five
24 suspect components beared marks "consistent with having been produced by a tool
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1 employing a crimping action like specimen K67," though an exact match could not be made
2 due to there being no "toolmarks of value for comparison purposes". Five additional
3 components also bore "insufficient microscopic toolmarks of value for comparison
4 purposes," though Mr. Mills determined that their marks were not produced by other
5 specimen tools submitted to him due to the tools' class characteristics. Twelve additional
6 specimens did not have tool marks "of value for comparison purposes."

7 According to FBI laboratory procedures, if the examiner believes there is sufficient
8 agreement to make an identification, the items are sent back into the evidence control room
9 where it is then sent to a second examiner who repeats the comparison in order to verify (or
10 not) the results before a final report is written. Mr. Mills' fourteen positive identifications
11 were reviewed and verified by another examiner in his lab. His inconclusive results were not
12 reviewed.

13 Upon cross-examination, Mr. Mills testified that in conducting his examination he did
14 not research the manufacture of this type of Klein pliers, nor did he test any other pair of
15 pliers. Mr. Mills testified that K67 was worn, slightly rusted, and still had some
16 manufacturer marks, which provided him "more than enough for an identification."

17 **III. ANALYSIS**

18 **A. Legal Standard for Admissibility**

19 Federal Rules of Evidence 702 allows for the admission of "scientific, technical, or
20 other specialized knowledge" when "(1) the testimony is based upon sufficient facts or data,
21 (2) the testimony is the product of reliable principles and methods, and (3) the witness has
22 applied the principles and methods reliably to the facts of the case." A district court may rely
23 on various factors in evaluating such evidence, including (1) whether the theory can be or has
24 been tested; (2) whether the theory has been subjected to peer review; (3) whether the error
25 rate is known and standards exist to control the operation of the technique; and (4) whether
26 the theory has gained general acceptance. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S.

1 579, 593-94 (1993). A district court is not required to “mechanically apply the Daubert
2 factors” and has “broad discretion when discharging [its] gatekeeping function.” *United*
3 *States v. Hankey*, 203 F.3d 1160, 1168 (9th Cir. 2000)(noting that “the *Daubert*
4 factors...simply are not applicable to...testimony, whose reliability depends heavily on the
5 knowledge and experience of the expert, rather than the methodology or theory behind it.”).

6 **B. The Record**

7 In addition to Mr. Mills’ report, his qualifications, and the court’s own legal research,
8 the court has reviewed the voluminous literature items submitted by the parties. This record
9 includes the following sources submitted by the Government:

- 10 • SWGGUN Survey Summary (ECF No. 123, Ex. E)
- 11 • Brundage, David J., *The Identification of Consecutively Rifled Gun Barrels*, 30 AFTE
12 Journal 438 (1998) (ECF No. 123, Ex. F)
- 13 • DeFrance, Charles S. And Michael D. Van Arsdale, *Validation Study of*
14 *Eletrochemical Rifling*, 35 AFTE Journal (2003)(ECF No. 123, Ex. F)
- 15 • Brunch, Stephen and Douglas P. Murphy, *A Comprehensive Study for the Forensic*
16 *Examination of Cartridge Cases*, 35 AFTE Journal 201 (2003)(ECF No. 123, Ex. F)
- 17 • Thompson, Evan and Rick Wyant, *Knife Identification Project (KIP)*, 35 AFTE
18 Journal 366 (2003)(ECF No. 123, Ex. F)
- 19 • Orench, Jose A., *A Validation Study of Fracture Matching Metal Specimens Failed in*
20 *Tension*, 37 AFTE Journal 142 (2005)(ECF No. 123, Ex. F)
- 21 • Chumbley, Scott L., et al., *Validation of Tool Mark Comparisons Obtained Using a*
22 *Quantitative, Comparative, Statistical Algorithm*, 55 J. Forensic 953 (2010) (ECfNo.
23 123, Ex. G)
- 24 • Grzybowski, Richard, et al., *Firearm/Toolmark Identification: Passing the Reliability*
25 *Test Under Federal and State Evidentiary Standards* 35 AFTE J. 209 (2003). (ECF
26 No. 123, Ex. H)

- 1 • Bachrach, Benjamin, Anurag Jain, Sung Jung & Robert D. Koons, *A Statistical*
2 *Validation of the Individuality and Repeatability of Striated Toolmarks: Screwdrivers*
3 *and Tongue and Groove Pliers*, 55(2) J. Forens. Sci 348 (2010)
- 4 • Bacharach, Benjamin, *Statistical Validation on the Individuality of Tool Marks Due*
5 *to the Effect of Wear, Environment Exposure and Partial Evidence* 1-77 (2006-2009)
- 6 • Eckerman, Stephanie J., *A Study on Consecutively Manufactured Chisels* 34(4) Ass'n
7 Firearms & Tool Mark Examiners J. 379, 380 (2002)
- 8 • AFTE Committee for the Advancement of the Science of Firearm and Tool Mark
9 Identification, *The Response of the Association of Firearm and Tool Mark Examiners*
10 *to the February 2009 National Academy of Science Report (“Strengthening Forensic*
11 *Science in the United States: A Path Forward.”* (2009)
- 12 • AFTE Committee for the Advancement of the Science of Firearm and Tool Mark
13 Identification, *The Response of the Association of Firearm and Tool Mark Examiners*
14 *to the National Academy of Sciences 2008 Report Assessing the Feasibility, Accuracy,*
15 *and Technical Capability of a National Ballistics Database* (2008)
- 16 • Rolph, John E. Affidavit, *U.S. v. Kevin Edwards* (D.C.)
- 17 The defense has primarily relied upon *The Committee on Identifying the Needs of the*
18 *Forensic Science Community, National Research Council of the National Academies,*
19 *Strengthening Science in the United States: A Path Forward* (2009)(“NAS 2009 Report”).
20 In addition, the defense has requested a continuance of the *Daubert* hearing in order to allow
21 it to call rebuttal “academic” expert, Professor Adina Schwartz (who is not a tool mark
22 examiner and cannot express expert opinions regarding the actual identifications done by Mr.
23 Mills). The defense has supplied a law review article she authored criticizing the scientific
24 foundations of tool mark identification, Schwartz, Adina “*A Systematic Challenge to the*
25 *Reliability and Admissibility of Firearms and Toolmark Identification*, 6 Colum. Sci. & Tech.
26 L. Rev. 2 (2005).

1 Professor Schwartz's opinions have been proffered in numerous other cases in support
2 of evidentiary challenges. They have also been criticized by many, including by Ronald
3 Nichols, whose article "*The Scientific Foundations of Firearms and Tool Mark Identification*
4 *- A Response to Recent Challenges*" was attached to the Government's supplemental brief.
5 The court does not find it necessary to delay the ruling on this motion, or the trial, to permit
6 Ms. Schwartz to testify in person on this motion.

7 Though the field of literature on the broader area of tool mark identification (including
8 firearms) is extensive, the court is not tasked to write a primer on the quality of its current
9 forensic science. Tool mark identification, like other "match" evidence such as shoe prints
10 and handwriting, is not a novel scientific technique and has long been used an effective
11 investigative tool. In the field of firearms, tool mark identification has been widely accepted
12 by courts as a reliable process passing muster under *Daubert*. It is a discipline which has
13 been extensively reviewed by scientists, academics, and courts, including the undersigned
14 judge who has had experience as a prosecutor, defense attorney, and judge in the context of
15 ballistics, though never before plier marks.

16 Due to the obvious and important distinctions between firearms and pliers, the court,
17 during the *Daubert* hearing and thereafter, has attempted to focus the discussion on the
18 precise issue before the court: the admissibility of the non-firearm (plier) striated pattern
19 matching conclusions of Brett Mills.

20 **C. Discussion**

21 Mr. Mills testified that pattern matching methodology, whether examining cartridge
22 cases, a knife, hammer, or pliers is the same. The literature, as well as the testimony of Mr.
23 Mills, reflects that the basic premise for tool mark analysis is that tools (a hard object) used
24 either to cut or to clamp softer materials may leave a specific type of mark on that material.
25 The softer material, both from the submitted material and from lab impressions created with
26 the suspected tool imprinted on similar media, is examined under a microscope that

1 magnifies the marks. An experienced tool mark examiner then compares the two markings
2 under a microscope to determine whether the marks are in sufficient agreement to determine
3 they were made by a specific tool. There is no numerical standard for declaring a match.

4 Defendant's primary challenge is that the pattern-based methodology, even if followed
5 by a qualified examiner, is not sufficiently reliable in this case due to the subjective nature
6 of the decision and its lack of objective standards - especially as to pliers. This court's
7 research has not revealed a single prior federal case ruling on the admissibility of plier
8 identification. Nonetheless, Defendant's arguments against admission of the tool mark
9 evidence in this case are not novel and have been submitted, both successfully and
10 unsuccessfully, in other tool mark contexts. *See e.g., United States v. Monteiro*, 407
11 F.Supp.2d 351, 364 (D.Mass. 2006) ("[O]ne critical problem with the AFTE Theory [of
12 toolmark identification] is the lack of objective standards.... [T]here is no generally accepted
13 standard for distinguishing between class, subclass, and individual characteristics."); *United*
14 *States v. Green*, 405 F.Supp.2d 104, 114 (D.Mass. 2005) ("In effect, there are no national
15 standards to be applied to evaluate how many marks must match."); *United States v. Glynn*,
16 578 F.Supp.2d 567, 572 (S.D.N.Y. 2008) ("[B]allistics opinions are significantly subjective.
17 Moreover, the standard defining when an examiner should declare a match-namely
18 "sufficient agreement"-is inherently vague.").

19 Mr. Mills' underlying premise is that no two tools make exactly the same mark on
20 softer material either because of the manufacturing process or because of the subsequent use
21 or misuse of the tool. Scientific studies of non-firearm tool marks and specifically plier
22 marks, though very limited compared to the much larger body of the study of firearm tool
23 marks, have suggested viability of this principle. Dr. Benjamin Bachrach's 2010 study
24 supports the use of pattern matching techniques for plier marks, though it only involved a
25 comparison of 10 pliers made by one manufacturer. The study concludes that "[s]triated
26 toolmarks produced by screwdrivers and tongue and groove pliers are both repeatable and

1 specific enough to allow for reliable identification of the producing tool when they are
2 created on the same medium and under the same conditions (for the media and tools used in
3 this evaluation.” Other admittedly very limited studies of consecutively manufactured tools
4 such as crimpers, pliers, bolt cutters, and chisels, have revealed the presence of unique
5 features amongst such tools.

6 However, as counsel for the Defendant state in their supplemental brief, whether tools
7 can create unique tool marks is not the real issue here and indeed, there is no evidence
8 challenging it. Instead, the question is whether a method that relies upon the individual
9 examiner’s training and experience (the “I know it when I see it approach” as the defense
10 refers to it) is fatal to the reliability of the technique, particularly where no other pliers from
11 the same manufacturing batch were tested. While the subjective nature of an opinion can
12 raise questions of reliability, as Senior District Court Judge Louis Pollak has also noted, even
13 in the post-*Daubert* era,

14 [t]here are many situations in which an expert's manifestly subjective opinion...is
15 regarded as admissible evidence in an American courtroom: a forensic engineer's
16 testimony that a bottom-fire nailer's defective design caused an unintended
17 “double-fire,” resulting in injury to the plaintiff, *Lauzon v. Senco Products*, 270 F.3d
18 681 (8th Cir. 2001); an electrical engineer's testimony that fire in a clothes drier was
caused by a thermostat malfunction, *Maryland Casualty Co. v. Therm-O-Disc*, 137
F.3d 780 (4th Cir. 1998); a marketing researcher's testimony as to consumer
interpretations of advertising claims, the testimony being based on a market survey of
consumers. *Southland Sod Farms v. Stover Seed Co.*, 108 F.3d 1134 (9th Cir. 1997).

19 *U.S. v. Llera Plaza*, 188 F.Supp.2d 549 (E.D.Pa. 2002). The lack of universal standards or
20 data banks of plier marks does not disqualify this evidence, but may raise questions on cross-
21 examination as to the weight the jury gives to such evidence. *Daubert* does not stand for the
22 proposition that an opinion must necessarily have a quantifiable basis in order to be
23 submitted to the jury for its consideration. Mr. Mills candidly testified that “nothing in our
24 field is absolute...We know that we can’t look at every single tool that’s ever been
25 manufactured in the world.” But, he asserts his opinions are to a “practical certainty” and that
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1 in his opinion, it is virtually impossible for another tool to have produced the marks allegedly
2 connected to the destructive device.

3 Despite the limitations of the methodology and evidence of some lack of scientific
4 consensus as outlined by the defense, the Government has produced adequate evidence of
5 the reliability of the technique of pattern-matching generally to allow the testimony of Mr.
6 Mills to be presented to the jury which may give that testimony such weight, if any, as it
7 thinks it deserves. There is no evidence suggesting that the procedures used by Mr. Mills in
8 this case depart from practices generally used within the field. Mr. Mills has over twenty
9 years of training and experience. His testimony evidenced his familiarity with the literature
10 in the field. He testified that he has performed examinations of thousands of pieces (400-
11 500 cases) involving IED components. He further estimated that 10% of his caseload and
12 experience has involved non-firearm toolmarks including crimpers, pliers, and screwdrivers.

13 The documentation, including photographs of the comparisons made, the procedure
14 and process of peer review followed by Mr. Mills and the FBI lab, and the alleged unique
15 characteristics of the pliers in this case, cause this court to find that the opinions of Mr. Mills
16 resulting from his examination *in this instance* are sufficiently reliable to be admissible. That
17 finding, of course, does not suggest what weight, if any, the jury should give to those
18 opinions. These circumstances distinguish this case from those cited by the defense, for
19 example, *United States v. Smallwood*, 2010 WL 4168823 (W.D. KY 2010)(precluding expert
20 testimony due to the examiner's lack of training with knife marks and the unavailability of
21 photographs of the comparison).

22 That Mr. Mills did not take the time or find it necessary to compare or blind test *any*
23 other plier marks or other pliers and the fact that there are no databases of pliers, does not
24 render Mr. Mills' evaluation inherently unreliable. Instead, any lack of certainty goes to the
25 weight of the evidence which is for the jury after what will certainly be strong cross-
26 examination and any controverting evidence offered by the defense.

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D. Conclusion

The defense evidence of a lack of consensus amongst scientists and the undisputed notion that there is room for improvement in the area of tool mark identification, does not mean that such evidence cannot minimally satisfy *Daubert*. Almost all science is constantly evolving. *Daubert* does not require absolute certainty.

This court has vigilantly exercised its gatekeeper role. However, that role is not intended as a replacement for the adversary system. The legitimate limitations of tool mark analysis in this case recounted by the defense -- e.g. the potential for bias, the impossibility of calculating error rates, the subjective nature of the findings, the failure to examine other pliers, the extent of the witness's expertise, or lack thereof, with Klein pliers -- are all matters easily capable of being exposed through "the crucible of cross-examination" by the experienced defense attorneys. *Crawford v. Washington*, 541 U.S. 36, 61 (2004). As *Daubert* instructs, "[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence." *Daubert*, 509 U.S. at 596.

IV. Order

For the foregoing reasons, IT IS HEREBY ORDERED that Defendant's Motion to Exclude Toolmark Evidence (ECF No. 113) is **DENIED**.

The Clerk is hereby directed to enter this Order and furnish copies to Plaintiff and counsel.

DATED this 26th day of August, 2011.

s/ Justin L. Quackenbush
JUSTIN L. QUACKENBUSH
SENIOR UNITED STATES DISTRICT JUDGE