DISTRICT COURT, CITY & COUNTY OF DENVER, COLORADO Court Address: 520 West Colfax Ave Denver, Colorado 80204	DATE FILED: April 6, 2023 9:59 AM CASE NUMBER: 2022CR4185
Plaintiff: THE PEOPLE OF THE STATE OF COLORADO v. Defendant: MICHAEL A. GARROR	▲ **COURT USE ONLY** ▲ **Case Number: 22CR4185** **Courtroom: 5G**

ORDER DENYING DEFENDANT'S MOTION TO PRECLUDE OR LIMIT EXPERT OPINION REGARDING FIREARM TOOLMARK ANALYSIS

THIS MATTER comes before the Court on the Defendant, Michael Garror's, Motion to Preclude or Limit Expert Opinion Regarding Firearm Toolmark Analysis. A hearing was held on April 3, 2023 after the Court's determination that it lacked sufficient information to make specific findings about the reliability of the scientific principles involved, the helpfulness to the jury, and potential prejudice. After considering the record received at hearing, the court record in its entirety and relevant authority, the Court enters the following findings and orders.

I. Background

1. The defendant is charged with two counts:

   COUNT 1: ASSAULT IN THE SECOND DEGREE, C.R.S. 18-3-203(1)(b) (F4); and COUNT 2: ILLEGAL DISCHARGE OF A FIREARM, C.R.S. 18-12-107.5 (F5).

2. Peter Neubauer (hereinafter "victim") claims that the defendant, his neighbor, shot at him using a firearm following an interaction on their respective balconies.

3. The bullets penetrated the exterior wall of the victim's apartment, one of which struck the victim causing injuries.

4. After investigation, the police recovered multiple bullets and shell casings on the scene and located a handgun in the defendant's apartment.

5. Detective Daniel Wade submitted the handgun, bullets and shell casings retrieved from the scene to the Denver Crime Laboratory's Firearms/Toolmark Unit. Mr. Nathan Von Rentzell completed forensic toolmark analysis, firearm identification and firearm functionality related to those submissions.

6. Mr. Von Rentzell was endorsed as an expert in "Forensic Toolmark Analysis, Firearm Identification and Functionality" in this case and completed an expert report.

7. Mr. Von Rentzell will testify that the toolmarks that he observed on the casing found at the scene were consistent with the toolmarks that he observed on the known comparison casings and that the same handgun made the mark on both casings. He will further testify that Forensic Scientist Supervisor of the Firearms Unit and firearm/toolmark examiner, Charles Reno, then repeated this process. The second comparison yielded the same results.

8. Defendant does not contest Mr. Von Rentzell's qualifications as an expert to perform such an inquiry nor the helpfulness of such testimony to the jury Instead, the defendant contends that the science informing the standards of forensic toolmark analysis, firearm identification and functionality are unreliable and thus any expert opinion should be excluded or limited.

9. At hearing, the People offered testimony by Mr. Zach Kotas.

10. Mr. Kotas is a forensic scientist with the Denver Crime Laboratory Firearms and Toolmark Unit. Mr. Kotas regularly performs forensic toolmark analysis, firearm identification and firearm functionality as part of his professional duties. Based upon his education and professional experience, Mr. Kotas was certified as an expert in this area without objection. Further, Mr. Kotas is aware of the standard protocols and procedures used by the Denver Crime Laboratory for all similar analysis for this purpose as derived from the guidelines provided by the Association of Firearm and Toolmark Examiners ("AFTE")

11. The Defense submitted three exhibits questioning the validity of the scientific principles underlying firearm toolmark analysis. They were: (1) the National Research Council, Strengthening Forensic Science in the United States: A Path Forward (2009) ("NRC report"); (2) the President's Council of Advisors on Science and Technology, Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods (2016) ("PCAST report"), and (3) the 2017 Addendum to the PCAST report.

II. Legal Standards

C.R.E. 702 provides that "[i]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise." In determining the admissibility of scientific or other expert testimony, a trial court is to employ an analysis under C.R.E. 702 and C.R.E. 403, which is referred to as a *Shreck* analysis. *People v. Shreck,* 22 P.3d 68 (Colo. 2001). A *Shreck* analysis requires the court to consider whether: (1) the scientific principles underlying the testimony are reasonably reliable; (2) the expert is qualified to opine on such matters; (3) the expert testimony will be helpful to the jury; and (4) the evidence satisfies C.R.E. 403. *People v. Rector*, 248 P.3d 1196, 1200 (Colo. 2011) (citing *Shreck*, 22 P.3d at 77–79). When the trial court makes this determination of relevance and reliability under C.R.E. 702 and C.R.E. 403, it is required to issue specific findings regarding its analysis. *Shreck*, 22 P.3d at 70, 79.

A trial court's reliability inquiry under C.R.E. 702 should be broad in nature and consider the totality of the circumstances of each specific case. *Id.* at 70, 77. Thus, the trial court may, but is not required, to consider a wide range of factors pertinent to the case at bar. *Id.* When an expert's opinions are based not on scientific principles, but rather specialized knowledge derived from experience, the opinions are still subject to an inquiry regarding validity and reliability. *Brooks v. People*, 975 P.2d 1105, 1114 (Colo. 1999). Furthermore, to ensure that evidence is both relevant and reliable, the question of whether the expert's testimony will assist the trier of fact may determine who qualifies as an expert, and the scope of the testimony allowed. C.R.E. 702; *Shreck*, 22 P.3d at 68. An expert opinion is helpful if it relates to a relevant matter outside the understanding of the typical factfinder. *Huntoon v. TCI Cablevision of Colo., Inc.*, 969 P.2d 681, 690 (Colo. 1998). The "helpful" prong of Rule 702 relates largely to whether an "untrained layperson would be qualified to determine intelligently and to the best possible degree the particular issue without enlightenment from those having a specialized understanding of the subject involved." *Id.* (internal quotation and citation omitted). A trial court may admit expert testimony if it will assist the trier of fact to understand the evidence or to determine a fact in issue. CRE 702; *People v. Williams,* 790 P.2d 796 (Colo.1990). In exercising its discretion under CRE 702, the trial court should consider numerous factors, including the nature and extent of evidence in the case, the expertise of the proposed witness, the sufficiency and extent of the fundamental evidence upon which the expert witness' ultimate opinion is to be based, and the scope and content of the opinion itself. , as cited by, *People v. Lesslie*, 939 P.2d 443, 450 (Colo. App. 1996) (citing *Lanari v. People,* 827 P.2d 495 (Colo. 1992)).

The determination of whether a witness is qualified to testify as an expert is committed to the discretion of the trial court. *Tatum v. Basin Resources, Inc.*, 141 P.3d 863, 868 (Colo. App. 2005). An expert's qualification is given broad consideration under C.R.E. 702 in light of his

knowledge, skill, experience, training, or education. *Durkee v. Oliver*, 714 P.2d 1330 (Colo. App. 1986).

Expert testimony permissible under C.R.E. 702 must still be screened under C.R.E. 403. A trial court is required to apply its discretionary authority under C.R.E. 403 to ensure that the probative value of the scientific or other evidence is not substantially outweighed by unfair prejudice, confusion of the issues, undue delay, waste of time, or needless presentation of cumulative evidence. *Shreck*, 22 P.3d at 78–79. In conducting this analysis a court must issue specific findings of its consideration under C.R.E. 403 as to whether the probative value of the evidence is substantially outweighed by its prejudicial effect." *Id.* at 78. C.R.E. 403 contemplates the consideration of such factors as the importance of the fact of consequence for which the evidence is offered, the strength and length of the chain of inferences necessary to establish the fact of consequence, the availability of alternative means of proof, whether the fact of consequence for which the evidence is offered is being disputed, and, if appropriate, the potential effectiveness of a limiting instruction in the event of admission. *Vialpando v. People*, 727 P.2d 1090, 1096 (Colo. 1986). In reviewing a trial court's decision to admit the evidence, appellate courts will "assume the maximum probative value that a reasonable jury might give the evidence and the minimum unfairness reasonably expected from the evidence." *People v. Lowe,* 660 P.2d 1261 (Colo. 1983).

Finally, a trial court is not required to conduct an evidentiary hearing under *Shreck* provided it has before it sufficient information to make specific findings about the reliability of the scientific principles involved, the expert's qualification to testify to such matters, the helpfulness to the jury, and potential prejudice. *Rector*, 248 P.3d at 1201.

III. Analysis

As already explained, a *Shreck* analysis requires the court to consider whether: (1) the scientific principles underlying the testimony are reasonably reliable; (2) the expert is qualified to opine on such matters; (3) the expert testimony will be helpful to the jury; and (4) the evidence satisfies C.R.E. 403. The Court will consider each in turn.

A. Reliability of Scientific Principles

i. Firearms Toolmark Analysis Theory and Background[1]

The Court finds the analysis provided in *United States v. Otero*, 849 F. Supp. 2d 425 (D.N.J. 2012), *aff'd*, 557 F. App'x 146 (3d Cir. 2014) describing the underlying theory of toolmark

[1] The hearing and order were conducted under significantly compressed timeframes, close to the advent of trial. The Court has not received a completed transcript for the *Shreck* hearing and therefore does not cite to specific portions of the transcript herein.

analysis informative. This analysis is consistent with the testimony received at the *Shreck* hearing regarding the underlying scientific principles.

Toolmark identification is based on the theory that tools used in the manufacture of a firearm leave distinct marks on various firearm components, such as the barrel, breech face or firing pin. The theory further posits that the marks are individualized to a particular firearm through changes the tool undergoes each time it cuts and scrapes metal to create an item in the production of the weapon. Toolmark identification thus rests on the premise that any two manufactured products, even those produced consecutively off the same production line, will bear microscopically different marks. With regard to firearms, these toolmarks are transferred to the surface of a bullet or shell casing in the process of firearm discharge. Depending on the tool and the type of impact it makes on the bullet or casing, these surface marks consist of either contour scratch lines, known as striations (or striae), or impressions. For example, rifling (spiraled indentations) inside of a gun barrel will leave raised and depressed striae, known as lands and grooves, on the bullet as it is fired from the weapon, whereas the striking of the firing pin against the base of the cartridge, which initiates discharge of the ammunition, will leave an impression but not striae.

An examiner observes three types of characteristics on spent bullets or cartridges: class, subclass and individual. Class characteristics are gross features common to most if not all bullets and cartridge cases fired from a type of firearm, for example, the caliber and the number of lands and grooves on a bullet. Individual characteristics are microscopic markings produced in the manufacturing process by the random imperfections of tool surfaces (the constantly changing tool as described above) and by use of and/or damage to the gun post-manufacture. Subclass characteristics generally fill the gap between the class and individual characteristics categories. They are produced incidental to manufacture but apply only to a subset of the firearms produced, for example, as may occur when a batch of barrels is formed by the same irregular tool. *Id.* at 427–28; *see also* Ass'n of Firearm and Tool Mark Exam'rs, *Theory of Identification, Range of Striae Comparison Reports and Modified Glossary Definitions – An AFTE Criteria for Identification Committee Report*, 24 AFTE J. 336, 340 (1992) [hereinafter *AFTE 1992 Theory*] (defining class, subclass, and individual characteristics).

Toolmark analysis is a "forensic feature-comparison method," which is "a procedure by which an examiner seeks to determine whether an evidentiary sample (e.g., from a crime scene) is or is not associated with a source sample (e.g., from a suspect) based on similar features." President's Council of Advisors on Sci. & Tech., *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature Comparison Methods* 46 (2016) [hereinafter *PCAST Report*]; *see also AFTE 1992 Theory*, *supra*, at 339 (defining "toolmark identification" as "a discipline of forensic science.").

Toolmark analysis, along with other feature-comparison methods, belongs to the "scientific discipline [of] metrology, which is 'the science of measurement and its application;'" here, firearms examiners measure and compare impressions, striae, and other toolmarks on different pieces of ballistics evidence. *PCAST Report*, *supra*, at 23 (quoting Joint Comm. for Guides in Metrology [JCGM], *International Vocabulary of Metrology – Basic and General Concepts and Associated Terms*, at 16, JCGM 200 (3rd ed. 2012) ("That forensic feature-comparison methods belong to the field of metrology is clear from the fact that the [National Institute of Standards and Technology] . . . which is the world's leading metrological laboratory[,] is the home within the Federal government for research efforts on forensics science.")).

ii. The AFTE and the "Sufficient Agreement" Standard

The Association of Firearms and Toolmark Examiners ("AFTE") is the "international professional organization for practitioners of [f]irearm and/or [t]oolmark [i]dentification." AFTE, *What is AFTE?*, http://afte.org/about-us/what-is-afte (last visited Apr. 4, 2023). "Membership in the [AFTE] is limited to those persons of integrity with suitable education, training, and experience in the examination of firearms and/or toolmarks." AFTE, *Membership Requirements*, http://afte.org/membership/membership-requirements (last visited Apr. 4, 2023).

The "AFTE Theory" is "a theory of toolmark identification adopted by the [AFTE]." *United States v. Sebbern*, No. 10-CR-87 (SLT), 2012 WL 5989813, at *3 (E.D.N.Y. Nov. 30, 2012). Under the AFTE Theory, an examiner comparing two pieces of ballistics evidence may reach one of four conclusions: (1) "identification," meaning the pieces of evidence come from the same source; (2) "elimination," meaning that they came from different sources; (3) "inconclusive," meaning that there is not enough evidence for an examiner to make a determination; and (4) "unsuitable," which means that the recovered evidence lacks discernable class and individual characteristics. *Id.*

The AFTE standard for an "identification" determination is "sufficient agreement" between two pieces of evidence. The AFTE defines sufficient agreement as follows:

> "[S]ufficient agreement" is related to the significant duplication of random toolmarks as evidenced by the correspondence of a pattern or combination of patterns of surface contours. Significance is determined by the comparative examination of two or more sets of surface contour patterns comprised of individual peaks, ridges and furrows. Specifically, the relative height or depth, width, curvature and spatial relationship of the individual peaks, ridges and furrows within one set of surface contours are defined and compared to the corresponding features in the second set of surface contours. Agreement is significant when the agreement in individual characteristics exceeds the best agreement demonstrated between toolmarks known to have been produced by different tools and is consistent with agreement demonstrated by toolmarks known to have been produced by the same

> tool. The statement that "sufficient agreement" exists between two toolmarks means that the agreement of individual characteristics is of a quantity and quality that the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility.

AFTE, *Theory of Identification as it Relates to Tool Marks: Revised*, 43 AFTE J. 4, 287 (2011) [hereinafter "*AFTE Revised Theory of Identification*"] (emphasis omitted).

The AFTE Theory explains that the act of determining whether two pieces of ballistics evidence came from the same source is "[c]urrently ... subjective in nature, founded on scientific principles and based on the examiner's training and experience." *Id.*

Firearm toolmark analysis has been scrutinized by at least two scientific reports published in the past ten years. *See* Comm. on Identifying the Needs of the Forensic Sci. Cmty., Nat'l Rsch. Council, *Strengthening Forensic Science in the United States: A Path Forward* (2009) [hereinafter "NRC Report"]; *PCAST Report, supra*. The Court finds the analysis provided in *United States v. Shipp,* 422 F. Supp. 3d 762, 769–71 (E.D.N.Y. 2019) informative.

iii. The NRC Report

The NRC Report was published in 2009 with an intent to "chart an agenda for progress in the forensic science community and its scientific disciplines." *Id.* at xix. It considered several branches of forensic science, including firearms toolmark analysis. *See, e.g.*, *id.* at 3–4. After reviewing the theory underlying toolmark analysis, *id.* at 150–51, the NRC Report noted several weaknesses in the field: "Knowing the extent of agreement in marks made by different tools, and the extent of variation in marks made by the same tool, is a challenging task." *Id.* at 153. The report noted the potential for new technology or techniques to improve accuracy but emphasized that "the decision of the toolmark examiner remains a subjective decision based on unarticulated standards and no statistical foundation for the estimation of error rates." *Id.* at 153–54. The report concluded that "[i]ndividual patterns from manufacture or wear might, in some cases, be distinctive enough to suggest one particular source, but additional studies should be performed to make the process of individualization more precise and repeatable." *Id.* at 154.

iv. The PCAST Report

The PCAST Report was published in 2016, seven years after the NRC Report. The report aimed to provide "clarity about the scientific standards for the validity and reliability of forensic methods" and to "evaluate specific forensic methods to determine whether they have been scientifically established to be valid and reliable." *PCAST Report*, *supra*, at 1.

The PCAST Report analyzed the scientific research on seven branches of forensic sciences, including firearms analysis. *Id.* at 7–14. The report sought to establish whether each branch of forensic science had achieved (1) "foundational validity," which the report defined as "the

scientific standard corresponding to the legal standard of evidence being based on 'reliable principles and methods' " and (2) "validity as applied," which the report defined as "the scientific standard corresponding to the legal standard of an expert having 'reliably applied the principles and methods.'" *Id.* at 43 (quoting Fed. R. Evid. 702) (emphasis omitted). The report identified "two key elements" of foundational validity. *Id.* at 48. First, a method must have "a reproducible and consistent procedure for (a) identifying features within evidence samples; (b) comparing the features in two samples; and (c) determining … whether the samples should be declared to be a [match]." *Id.* Second, there must be "empirical measurements, from multiple independent studies, of (a) the method's false positive rate … [and] (b) the method's sensitivity," which is the "probability that it declares a [match] between samples that actually come from the same source." *Id.* (emphasis omitted).

Finally, the report noted a difference between "objective" and "subjective" forensic science methods: objective methods "consist[ ] of procedures that are each defined with enough standardized and quantifiable detail that they can be performed by either an automated system or human examiners exercising little or no judgment," and subjective methods "includ[e] key procedures that involve significant human judgment." *Id.* at 47.

For subjective methods like firearms toolmark analysis, *see id.* at 104, "the foundational validity ... can be established only through empirical studies of examiner's performance to determine whether they can provide accurate answers" because "the black box in the examiner's head cannot be examined directly for its foundational basis in science." *Id.* at 49 (emphasis in original).

The report found that "firearms analysis currently falls short of the criteria for foundational validity." *Id.* at 112. The report asserted that the "sufficient agreement" standard falls short of the necessary "reproducible and consistent procedure" to reliably compare forensics evidence; the report characterized the AFTE Theory of Identification ("AFTE Theory") as "clearly not a scientific theory" and "circular." *Id.* at 60. The report also found that the toolmark analysis failed to meet the second key element of foundational validity. It analyzed several studies with different study designs, *id.* at 106–10, and concluded that there was "only a single study that was appropriately designed to test foundational validity and estimate reliability." *Id.* at 111. It concluded by observing the "need for additional, appropriately designed ... studies to provide estimates of reliability." *Id.*

v. U.S. Department of Justice Statement on the PCAST Report

The U.S. Department of Justice issued the *United States Department of Justice Statement on the PCAST Report: Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* on January 13, 2021, following publication of the PCAST Report.

The DOJ found that:

> Unfortunately, the PCAST Report contained several fundamentally incorrect claims. Among these are: 1) that traditional forensic pattern comparison disciplines, as currently practiced, are part of the scientific field of metrology; 2) that the validation of pattern comparison methods can only be accomplished by strict adherence to a non-severable set of experimental design criteria; and 3) that error rates for forensic pattern comparison methods can only be established through "appropriately designed" black box studies. The purpose of this statement is to address these claims and to explain why each is incorrect.

The DOJ statement then assessed each of the flaws of the PCAST Report in depth and provided the following conclusion:

> The error rates derived from scientific studies of various size, scope, and experimental design can and do provide important information about the decision-making abilities and proclivities of examiner-participants. For most pattern comparison disciplines, extant studies show that examiners, on average, perform extremely well under a variety of experimental conditions. Competency and proficiency tests add to the body of knowledge by measuring how often examiners make correct decisions using known, ground truth samples. Verification by a second examiner, technical review, case controls, and other quality assurance measures used by accredited laboratories are critical components of risk management and mitigation. Lastly, as noted by the NRC, a wrongfully accused person's best insurance against false incrimination is the opportunity to have the evidence retested. In most cases, the typically non-consumptive nature of forensic pattern examination easily facilitates this final safeguard.

vi. 2017 Addendum to the PCAST Report on Forensic Science in Criminal Courts

PCAST then issued an Addendum to the PCAST Report in response to criticism from various stakeholders, including the FBI and the DOJ. See, President's Council of Advisors on Sci. & Tech *PCAST, An Addendum to the PCAST Report on Forensic Science in Criminal Courts 7* (2017),https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensics_addendum_fin alv2.pdf [https://perma.cc/EH8W-FQUD].

PCAST reaffirmed its commitment to the need for empirically validated scientific evidence of existing forensic practices, across multiple disciplines. PCAST also urged the forensic science community to establish standards through the formation of a Forensic Science Study Group and to advance research, standards, and practices in the U.S. judicial system.

vii. Application of Daubert Analysis

In *Shreck*, the Colorado Supreme Court adopted a "liberal," "totality of the circumstances" test, grounded in relevant rules of evidence, for determining whether scientific evidence is admissible through expert testimony. The *Shreck* court discussed the United States Supreme Court's decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993). *Shreck,* 22 P.3d at 77. Rather than adopting the *Daubert* approach the Colorado Supreme Court adopted a rubric already discussed as supported by CRE 403 and 702 "because their flexibility is consistent with a liberal approach that considers a wide range of issues." *Shreck*, 22 P.3d at 77.[2] In making these determinations, the court can consider a broad range of indicia "that may be pertinent to the evidence at issue." *Shreck*, 22 P.3d at 77. These may include, but aren't limited to, the factors identified in *Daubert*. *Id.* at 77–78.

The *Daubert* factors are: (1) whether the particular theory can be and has been tested, (2) whether the theory has been subjected to peer review and publication, (3) the known or potential rate of error, (4) the existence and maintenance of standards controlling the technique's operation, and (5) whether the technique has achieved general acceptance in the relevant scientific or expert community. *Daubert*, 509 U.S. at 592–94. The Court finds that an application of the *Daubert* factors is of assistance in the analysis here.

The first factor under *Daubert* is whether a technique "can be (and has been) tested." *Daubert*, 509 U.S. at 592. As Mr. Kotas testified and many courts have found, the AFTE Theory has been subjected to considerable testing. In response, defendant points out that this area of forensic science, which has been in practice for over a century, went largely unchallenged until only recently and thus not all of the studies are equally probative of the AFTE Theory's reliability.

This Court finds that courts across this country nearly uniformly conclude that AFTE methodology can, and has, been tested. *See, e.g.*, *United States v. Johnson*¸ No. (S5) 16 Cr. 281 (PGG), 2019 WL 1130258, at *15 (S.D.N.Y. Mar. 11, 2019) (collecting cases and concluding that "[t]here appears to be little dispute that toolmark identification is testable as a general matter"); *United States v. Harris*, 502 F. Supp. 3d 28, 37 (D.D.C. 2020) (collecting cases and concluding that "firearm toolmark identification can be tested and reproduced"); *United States v. Diaz*, No. CR 05-00167 WHA, 2007 WL 485967, at *5 (N.D. Cal. 2007) (holding that the theory of firearms identification, though based on examiners' subjective assessment of individual characteristics, "has been and continues to be tested."). In *United States v. Tibbs*, the court concluded that "virtually every court that has evaluated the admissibility of firearms and toolmark

[2] An admissibility analysis under *Shreck* requires the court to determine whether "(1) the scientific principles underlying the testimony are reasonably reliable; (2) the expert is qualified to opine on such matters; (3) the expert testimony will be helpful to the jury; and (4) the evidence satisfies CRE 403." *Rector*, 248 P.3d at 1200; *see Shreck*, 22 P.3d at 77–79.

identification has found the AFTE method to be testable and that the method has been repeatedly tested." No. 2016-CF1-19431, 2019 WL 4359486, at *7 (D.C. Super. Ct. Sept. 5, 2019) (collecting cases).

The Court finds that the AFTE Theory can be and has been tested and this factor therefore weighs in favor of reliability. The probative value of different study designs is more appropriately considered as part of the analysis of the method's error rate.

The second *Daubert* factor is whether the AFTE Theory has been subjected to "peer review and publication." *Daubert*, 509 U.S. at 594, 113 S. Ct. 2786. Prior decisions have almost exclusively determined that the AFTE Theory has been subjected to peer review and found this factor to weigh in favor of a finding of admissibility.[3] Brandon L. Garrett et al., *Judging Firearms Evidence*, Duke Law Sch. Pub. L. & Legal Theory Series No. 2023-10 (Feb. 3, 2023), https://ssrn.com/abstract=4325329. *See also*, *United States v. Tibbs*, No. 2016-CF1-19431, 2019 WL 4359486, at *9 (D.C. Super. Sep. 5, 2019) (collecting cases and noting that other courts have found that "publication in the *AFTE Journal* satisfies this prong of the admissibility analysis").

In *Tibbs*, the court challenged the quality of the AFTE Journal's peer review process. *Id.* In particular, the court expressed concern that the reviewers, who are all members of the AFTE, "have a vested, career-based interest in publishing studies that validate their own field and methodologies." And of further concern was the possibility that the reviewers "may be trained and experienced in the field of firearms and toolmark identification, but [may] not necessarily have any specialized or even relevant training in research design and methodology." *Id.* at 10.[4]

However, in the instant case, two of the government reports on which the defendant relies, the 2009 NAS Report and the 2016 PCAST Report, "themselves constitute peer review despite the unfavorable view the two reports have of the AFTE method." *See United States v. Romero-Lobato*, 379 F. Supp. 3d 1111, 1119 (D. Nev. 2019).

This Court finds that this factor weighs in favor of admissibility. *Daubert* found the existence of peer-reviewed literature important because "submission to the scrutiny of the scientific community ... increases the likelihood that substantive flaws in the methodology will be detected." *Daubert*, 509 U.S. at 593. Here, the AFTE Theory has been subjected to significant

[3] An academic paper on this subject was recently completed, and in doing their research the authors endeavored to locate all reported rulings in the United States and created a database with their findings.

[4] *Tibbs* took issue with three aspects of the AFTE Journal peer review process: (1) The AFTE Journal employs an "open" instead of "double-blind" peer review process, i.e., the review process is not anonymous; (2) the "AFTE does not make [its journal] generally available to the public or the world of possible reviewers and commentators outside of the organization's membership;" and (3) articles proposed for publication are reviewed by members of the editorial board "composed entirely of members of AFTE," who "may be trained and experienced in the field of firearms and toolmark examination, but do not necessarily have any specialized or even relevant training in research design and methodology" and who "have a vested interest in publishing studies that validate their own field and methodologies." *Tibbs*, 2019 WL 4359486, at *9–10.

scrutiny through a multitude of peer reviews and publications sufficient to balance any imbalance in the process of review.

The third *Daubert* factor considers the known or potential rate of error. Mr. Kotas testified at length about the more than twenty-five separate studies examining error rates in this field of analysis. Those studies are consistent in identifying a very low error rate of under two percentage points. In particular, Mr. Kotas highlighted very recent comprehensive studies consistently showing an error rate of less than two percent. These included black box studies of 3,000 and 8,000 comparisons conducted by the Ames Institute of Iowa and the FBI. *See* AFTE, *Testability of the Scientific Principle*, https://tinyurl.com/yal3ja4t (last visited Apr. 4, 2023) (citing David P. Baldwin et al., Ames Laboratory, USDOE, *A Study of False-Positive and False-Negative Error Rates in Cartridge Case Comparisons*, Tech. Rep. # IS-5207 (Apr. 7, 2014); Keith L. Monson et al., *Accuracy of Comparison Decisions by Forensic Firearms Examiners*, 68 J. Forensic Sci. 86 (2022); Thomas G. Fadul et al., *An Empirical Study to Improve the Scientific Foundation of Forensic Firearm and Tool Mark Identification Utilizing 10 Consecutively Manufactured Slides*, 45 AFTE J. 376, 376–89 (2013)).

Mr. Kotas also testified as to a study completed by the Department of Justice utilizing GelSight surface topography imaging system and custom feature-based image comparison software. In using this alternative technology in a study of more than 8,000 comparisons, the premise that individual firearms do mark differently was confirmed. *See* Ryan Lilien, *Applied Research and Development of a Three-Dimensional Topography System for Firearm Identification using GelSight*, U.S. Dep't of Just. Doc. No. 248639 (Feb. 2015).

The Court has reviewed the concerns raised by the *Tibbs* court as to the limitations of the studies as to error rates. 2019 WL 4359486 (D.C. Super. Sep. 5, 2019). Based on the record received in this case, the Court finds that the known and potential rate of error is for forensic firearm and toolmark analysis is well-founded and reliably very small, of around two percent or less. *See United States v. Johnson*, 875 F.3d 1265, 1280 (9th Cir. 2017) (concluding that a 2.2% error rate for firearm and toolmark analysis is not impermissibly high). The 2016 PCAST Report itself posits that an acceptable error rate from a scientific perspective is 5%. Thus a 2.2% error rate would still be significantly lower than the recommended threshold by scientific experts. *United States v. Chavez,* 15-CR-00285-LHK-1, 2021 WL 5882466, at *1 (N.D. Cal. Dec. 13, 2021).

Further, accredited labs use a second examiner who independently examines the results of the first examiner, as testified to by Mr. Kotas, as part of the standard operating procedures. This provides an additional layer of reliability and further reduces the opportunity for error.

The Court finds that this factor weighs in favor of admissibility.

The Court next considers the fourth *Daubert* factor, the existence and maintenance of standards controlling the technique's operation. As described above, an examiner applying the

AFTE Theory may conclude two pieces of evidence to be of "common origin ... when the unique surface contours of two toolmarks are in 'sufficient agreement.'" *AFTE Revised Theory of Identification*, *supra*, at 287. The determination that the similarly between two sets of toolmarks indicates sufficient agreement between them and is not, instead, a result of subclass characteristics or random similarities between different firearms is left to the examiner's "training and experience." *AFTE Revised Theory of Identification*, *supra*, at 287.

The People concede that other courts have found this factor weighs against admissibility. *See United States v. Hunt*, No. CR-19-073-R, 2020 WL 2842844, at *2 (W.D. Okla. June 1, 2020). The *Hunt* court noted that the "subjectivity" of a portion of the AFTE methodology weighed against there being "standards that control the technique's operation" *Id.*

Further, the PCAST Report argues against relying on an examiner's training and experience when making a reliability determination:

> "Experience" is an inadequate foundation for drawing judgments about whether two sets of features could have been produced by ... different sources. Even if examiners could recall in sufficient detail all the patterns or sets of features that they have seen, they would have no way of knowing accurately in which cases two patterns actually came from different sources, because the correct answers are rarely known in casework.
>
> . . . .
>
> "Training" is an even weaker foundation. The mere fact that an individual has been trained in a method does not mean that the method itself is scientifically valid nor that the individual is capable of producing reliable answers when applying the method.

PCAST Report, *supra*, at 61.

The Court finds that this circumstance, however, is true of a substantial number of expert opinions. For example, medical and psychological diagnoses are not based upon strictly objective criteria without an application of the judgment and experience of the doctor or psychologist. See also, *United States v. Glynn*, 578 F. Supp. 2d 567, 573 (S.D.N.Y. 2008) (exercising a considerable degree of subjective judgment is true of many kinds of accepted expertise). Further, CRE 702 permits qualification of an expert based upon experience, not just education or training. The fact that a firearms examiner's criteria, and therefore his accuracy, will improve as he compares more and more bullets and cartridges is wholly consistent with the concept that experts can opine based upon their knowledge acquired through experience.

As testified to in the April 3, 2023, *Shreck* hearing, Mr. Kotas indicated that his training and experience and those of the examiners he supervises is very standardized. Further, the AFTE methodology requires trained examiners, using high-powered microscopes, to observe and

compare the surfaces of the collected casing in evidence and a known test-fired sample. The examiner reviews similarities or dissimilarities between the two, comparing them to the best known non-match, a cartridge case of same manufacture known to be fired from a different gun. In order for there to be sufficient agreement, the comparison before the examiner must have significantly more agreement than any non-match cartridge case comparison the examiner has ever viewed. A different examiner then repeats this process.

Based on the evidence before this Court, the science relied upon by Mr. Von Rentzell, and as testified to at the *Shreck* hearing by Mr. Kotas, the Court finds that there are professional and scientific standards that are maintained which control the operation of the techniques utilized in AFTE firearm and toolmark examination.

Finally, the Court must consider the fifth *Daubert* factor and determine whether toolmark analysis has achieved general acceptance in the "relevant scientific community." *Daubert*, 509 U.S. at 594 ("Widespread acceptance can be an important factor in ruling particular evidence admissible, and a known technique which has been able to attract only minimal support within the community may properly be viewed with skepticism.").

Courts have generally concluded that "[t]here is no dispute here that toolmark identification analysis is a generally accepted method in the community of forensic scientists, and firearms examiners in particular." *Johnson*, 2019 WL 1130258, at *19. Moreover, "[e]ven courts that have been critical of the validity of the discipline have conceded that it does enjoy general acceptance as a reliable methodology in the relevant scientific community of examiners." *United States v. Harris*, 502 F. Supp. 3d 28, 40 (D.D.C. 2020). In addition to the 209 accredited labs in the United States, there are accredited labs throughout the world practicing firearm identification, such as "England (Scotland Yard), New Zealand, Canada, South Africa, Australia, Germany, Sweden, Greece, Turkey, China, Mexico, Singapore, Malaysia, Belgium, Netherlands, and Denmark.". *United States v. Chavez*, 15-CR-00285-LHK-1, 2021 WL 5882466, at *5 (N.D. Cal. Dec. 13, 2021).

Defendant relies on a small minority of court cases which have found that firearm examination does not enjoy "general acceptance" in the scientific community because several scientists *outside* of the firearms expert community have been critical of the methodology. To adopt this analysis would require the Court to expand the definition of relevant scientific community beyond the firearm expert community to include, at minimum, the members of the 2009 NRC and 2016 PCAST reports, who were "admittedly not members of the forensic ballistic community" but were "preeminent scientists and scholars" who were "undoubtedly capable of assessing the validity of a metrological method." *United States v. Shipp*, 422 F. Supp. 3d 762, 782–83 (E.D.N.Y. 2019).

Setting aside whether this is a correct definition of the relevant scientific community under *Daubert*, the Court respectfully disagrees with the minority view. In *Daubert,* the United

States Supreme Court explained that this "general acceptance" factor can include an "express determination of a particular degree of acceptance within that community." 509 U.S. at 594. Thus, "[w]idespread acceptance can be an important factor in ruling particular evidence admissible, while "a known technique which has been able to attract *only minimal support* within the community," may be properly viewed with skepticism." *Id.* (emphasis added).

Here, there is no question on the record that even including the non-firearm experts from the NRC and PCAST reports, there is still an overwhelming acceptance in the United States and worldwide of firearm identification methodology. More importantly, even accepting defendant's implicit premise that more weight should be given to neutral scientists and independent scientific organizations, defendant cannot show that the technique in question has "only minimal support" to warrant skepticism. *See Romero-Lobato*, 379 F. Supp. 3d at 1122 ("[T]echniques do not need to have universal acceptance before they are allowed to be presented before a court.").

The Court finds that this factor also weighs in favor of admissibility.

For all of the foregoing reasons and analysis, the Court find that the scientific principles underlying the firearm and toolmark analysis underlying the testimony offered by Mr. Von Rentzall are reasonably reliable.

B. Qualifications of Expert

Defendant has not challenged the qualification of Nathan Von Rentzell. The Court has sufficient information through the submission of Mr. Von Rentzell's curriculum vitae to determine that he is qualified to opine as an expert in "Forensic Toolmark Analysis, Firearm Identification and Functionality."

Mr. Von Rentzell is a Forensic Scientist II with the Denver Crime Lab. He earned his Bachelor of Science degree in Biology, with an emphasis in Forensic Science, from Concordia University Nebraska in 2014, where he also worked as a Laboratory Assistant in 2012. He next interned in the firearm and toolmark unit of the Colorado Bureau of Investigation's laboratory in Denver, Colorado in 2013. He started his career with the Denver Police Department Crime Lab in 2015 as a Crime Gun Intelligence Coordinator before being hired as a Forensic Scientist I. In 2017, he was accepted into the National Firearm Examiner Academy ("NFEA"), a highly competitive training program administered by the Bureau of Alcohol, Tobacco, Firearms, and Explosives ("ATF"). This 12-month national training program provides a standardized curriculum for education in firearms forensics, including: (1) firearm/toolmark examination and comparison; (2) microscopy and instrumentation; (3) courtroom testimony; (4) firearm and ammunition manufacturing tours; and (5) required research culminating in a paper and presentation. See the attached document for a thorough description of the training program.

Upon completing his NFEA training and number of competency and proficiency tests, Mr. Von Rentzell was qualified to conduct casework in firearm evidence examination and comparison and has completed analysis in 443 cases. As required by the Lab's QA program, he regularly takes external proficiency tests and has passed each test without issue. He has been through numerous trainings, including multiple AFTE seminars, and was selected for the Best Technical Paper Award for his research presentation at the 2018 AFTE Annual training seminar. He has been a member of AFTE since 2016 and has been peer-review published in the AFTE Journal.

C. Helpfulness of Expert Testimony to the Jury

Defendant has not contested the helpfulness of Mr. Von Rentzell's testimony to the jury. Helpfulness to the jury hinges on whether the proffered testimony is relevant to the particular case: whether it "fits." Fit demands more than simple relevance; it requires that there be a logical relationship between the proffered testimony and the factual issues involved in the litigation. That is, even if good grounds exist for the expert's opinion, it must be validly and scientifically related to the issues in the case. That particular expert testimony fits or is valid for one facet or purpose of a proceeding does not necessarily compel the conclusion that it fits all facets. Therefore, the admissibility of evidence must be evaluated in light of its offered purpose. *People v. Martinez*, 74 P.3d 316, 323 (Colo. 2003) (internal citations omitted).

The firearm and toolmark evidence at issue relates to the spent cartridge cases found shortly after the incident in this case. The Prosecution intends to elicit the proffered opinion that, based on Mr. Von Rentzell's training and experience and the observations he made in this case, the cartridge case found is consistent to test-fired cartridge cases that were expelled from the gun found in the defendant's apartment. In evaluating this testimony in light of its offered purpose the Court finds that it is logically related to the central factual issues of this case.

Further, "[t]he bar for helpfulness is low — whether the expert can offer 'appreciable assistance' on a subject beyond the understanding of a typical juror." *People v. Vidauri*, 2019 COA 140, ¶ 60. The Court finds that Mr. Von Rentzell will offer appreciable assistance on a subject that is beyond the understanding of the typical juror as to forensic toolmark analysis, firearm identification and functionality.

D. CRE 403

The Court finds that Mr. Von Rentzell's testimony would not be unfairly prejudicial. "(U)nfair prejudice" as the phrase is used in CRE 403 means 'an undue tendency on the part of admissible evidence to suggest a decision made on an improper basis.'" *Kelly v. Haralampopoulos*, 327 P.3d 255, 268 (Colo. 2014) (quoting *People v. Gibbens*, 905 P.2d 604, 608 (Colo. 1995)). CRE 403 requires that there be a danger of unfair prejudice, and that such danger must "substantially outweigh" the probative value of the evidence. *Kelly*, 327 P.3d at 268.

The requirement that the danger of unfair prejudice substantially outweigh the probative value of the evidence "is meant to make clear that the need for exclusion must be clear since exclusion is a drastic remedy and less restrictive measures, such as cautionary instructions to the jury, may suffice to reduce the danger of prejudice to an acceptable level." *Id.* "In weighing those dangers and considerations, the proffered evidence 'should be given its maximal probative weight and its minimal prejudicial effect.'" *Murray v. Just In Case Bus. Lighthouse, LLC*, 374 P.3d 443, 451 (Colo. 2016).

Here, the Court finds that the probative value of the evidence is overwhelming. If believed by the jury, the evidence establishes that the handgun recovered in the possession of the defendant was the one used to shoot the victim. which is a central issue in this case. The reliability of the methodology used to match bullets and casings with particular firearms substantially reduces the risk of unfair prejudice. More importantly, the principles upon which firearms identification is founded and the fact that the determination involves a subjective analysis based upon the experience of the examiner are easily understandable and can be effectively presented through direct and cross-examination such that there is little risk of the jury uncritically adopting Mr. Von Rentzall's opinions without due consideration of these issues. Accordingly, any risk of unfair prejudice or confusion of the issues does not outweigh the probative value of the evidence.

The Court finds that the probative value of Mr. Von Rentzell's testimony is not substantially outweighed by the danger of unfair prejudice to the defendant.

IV. Conclusion

For the foregoing reasons and analysis, the Defendant's Motion to Preclude or Limit Expert Opinion Regarding Firearm Toolmark Analysis is DENIED.

SO ORDERED this 6th day of April, 2023.

BY THE COURT:

Jennifer Torrington
DISTRICT COURT JUDGE