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May 6, 2025

The Honorable Marc C. Lemieux, A.J.S.C.
Monmouth County Superior Courthouse
71 Monument Park
Freehold, NJ 07728

Re: **State v. Paul Caneiro**
Case No. 18-004915 / Indictment No. 19-02-283-I

Motion to Preclude Ballistics Evidence

Dear Judge Lemieux:

Please accept this letter brief in lieu of a formal memorandum of law in support of Mr. Caneiro's motion to preclude any ballistics testimony in this case due to the lack of proper documentation generated and provided about the ballistics analysis undertaken. Because of this lack of information, the State has failed to comply with our discovery rules, meet the requirements of N.J.R.E. 703, or demonstrate the as-applied validity of the ballistics evidence. Therefore, this evidence must be excluded.

SUMMARY OF ARGUMENT

The State intends to introduce in evidence that five bullets, one cartridge, and seven cartridge cases recovered in this case were identified by State Police Det. Sgt. Christopher Clayton as having been fired from a pistol and barrel that were recovered from 27 Tilton Drive in Ocean

Township, Paul Caneiro's home. In response to a detailed defense request for more information on the ballistics analysis that was undertaken, the State tendered some additional documents and informed the defense that the other requested documents simply do not exist or are still in the process of being obtained. Because the evidence turned over by the State is insufficient to comply with our discovery rules, meet the requirements of N.J.R.E. 703, or demonstrate the reliability of the ballistics[1] analysis that was done in this case, any testimony as to the ballistics analysis must be excluded.

STATEMENT OF FACTS AND PROCEDURAL HISTORY

A. Investigation and discovery requests

On November 20, 2018, the Monmouth County Prosecutor's Office responded to two fires, one at 15 Willow Brook Road in Colts Neck, where Jennifer, Jessie, Sophia, and Keith Caneiro were found dead, and one at Paul Caneiro's home at 27 Tilton Drive in Ocean Township. At 15 Willow Brook Road, the police collected seven cartridge casings, one cartridge, and four bullet specimens. See, e.g., Exhibit A, NJSP Evidence Receipt C18-10138, at 1. During the autopsies of Keith and Jennifer Caneiro, an additional five bullet specimens were collected. Ibid. And at 27 Tilton Drive in Ocean Township, the police collected nine firearms, a gun barrel, and "[u]nknown possible firearms parts." See, e.g., Exhibit B, NJSP Evidence Receipt C18-10139, at 1.

Det. Sgt. Christopher Clayton issued a two-page report on January 2, 2019, that consisted of three conclusory identification statements with no delineation of how he came to these conclusions. Exhibit C, January 2, 2019, Clayton Report.

- In the first conclusory statement—which addresses bullet specimens, he wrote: "The five bullet specimens marked #11, #12, #17, #20, and #26 were compared microscopically and identified as having been discharged from the same firearm." Id. at 1.

[1] "Ballistics" and "firearm and toolmark examination" are synonyms and are used interchangeably throughout the brief.

- He provides no explanation for how he arrived at this identification conclusion in his report. Ibid.

- In his two pages of written bench notes that correspond with this report, he lists "LIMPS," shorthand for land impressions, as the area of agreement. Exhibit D, January 2, 2019, Clayton Bench Notes, at 2.

- He provides no indication of how many LIMPs he found or where he found them or why he believed they were sufficient for identification. Ibid.

- In his second conclusory statement—which addresses cartridge cases, he wrote: "The seven cartridge cases marked #13 through #16, #18, #19, and #21 were compared microscopically and identified as having been discharged from the same firearm." Exhibit C, January 2, 2019, Clayton Report, at 2.

  - Again, he provides no explanation for how he arrived at this identification conclusion in his report. Ibid.

  - In his written bench notes, he lists "FP Imp [firing pin impression], BF [breach face] marks (primer), Chamber & Extractor marks" as the areas of agreement. Exhibit D, January 2, 2019, Clayton Bench Notes, at 2.

  - Again, he provides no indication of how many of these marks he found or where he found them or why he believed they were sufficient for identification. Ibid.

- In his third conclusory statement—which addresses the recovered cartridge and one of the cartridge cases, he wrote: "The bullet cartridge marked #10 was compared microscopically against the cartridge case marked #14 and identified as having been chambered in and extracted from the same firearm as the seven cartridge casings marked #13 through #16, #18, #19, and #21." Exhibit C, January 2, 2019, Clayton Report, at 2.

  - Yet again, he provides no explanation for how he arrived at this identification conclusion in his report. Ibid.

  - And in his bench notes, he lists "Extractor marks (Chamber in and Extracted from)" as the area of agreement. Exhibit D, January 2, 2019, Clayton Bench Notes, at 2.

  - Yet again, he provides no indication of how many extractor marks he found or where he found them or why he believed they were sufficient for identification. Ibid.

On February 4, 2019, Det. Sgt. Christopher Clayton test fired eight handguns recovered from 27 Tilton Drive, finding all of them operable. Exhibit E, February 4, 2019, Clayton Report, at 1. On February 7, 2019, he compared the evidence from his January 2 report with test fired

bullets from the guns he discharged on February 4 and issued two more conclusory identification statements. Exhibit F, February 7, 2019, Clayton Report, at 1.

- In the first conclusory statement of this report—which addresses bullet specimens, he wrote: "The five bullet specimens marked #11, #12, #17, #20, and #26 (C18-10138) were compared microscopically against test bullets discharged from the 9mm Luger caliber Sig barrel and were identified as having been discharged in the submitted Sig barrel (C18-10139)." Ibid.
    - Again, he provides no explanation for how he arrived at this identification conclusion in his report. Ibid.
    - In his single page of written bench notes that correspond with this report, he lists that this conclusion is based on the correspondence of "Several Land Impressions" between evidence bullet specimen #17 and a test bullet from the 9mm Luger Sig barrel. Exhibit G, February 7, 2019, Clayton Bench Notes, at 1.
    - And again, he provides no indication of how many land impressions he found or where he found them or why he believed they were sufficient for identification. Ibid.
- In the second conclusory statement of this report—which addresses the cartridge cases, he wrote: "The seven cartridge casings marked #13 through #16, #18, #19, and #12 [sic] (C18-10138) were compared microscopically against the test cartridge cases discharged in the 9mm Luger caliber Sig Sauer semiautomatic pistol, serial number B233959 (C18-10139) and were identified as having been discharged in the submitted pistol." Exhibit F, February 7, 2019, Clayton Report, at 1.
    - Again, he provides no explanation for how he arrived at this identification conclusion in his report. Ibid.
    - In his bench notes, he lists that this conclusion is based on the correspondence of "FP imp [firing pin impression], FP Drag marks, BF [breach face] marks (primer)" between evidence cartridge case #13 and two test bullets from the 9mm Luger caliber Sig Sauer semiautomatic pistol, serial number B233959. Exhibit G, February 7, 2019, Clayton Bench Notes, at 1.
    - And again, he provides no indication of how many marks he found or where he found them or why he believed they were sufficient for identification. Ibid.

Over a year later, on February 24, 2020, Det. Sgt. Christopher Clayton issued his last conclusory report, which consisted of a single sentence. Exhibit H, February 24, 2020, Clayton Report, at 1.

- In this single conclusory sentence, he wrote: "The bullet cartridge marked #10 (C18-10138) was compared microscopically against the test cartridge case marked (T4) that was discharged in the 9mm Luger caliber Sig Sauer semiautomatic pistol, serial number B233959 and was identified as having been chambered in and extracted from the above noted pistol." Ibid.

    - Again, he provides no explanation for how he arrived at this identification conclusion in his report. Ibid.

    - In his single page of written bench notes that correspond with this report, he lists "Extractor marks, Tool mark (case body)" as the areas of agreement between evidence bullet cartridge #10 and a test casing from the 9mm Luger caliber Sig Sauer semiautomatic pistol. Exhibit I, Feb. 24, 2020, Clayton Bench Notes, at 1.

    - Once again, he provides no indication of how many marks he found or where he found them or why he believed they were sufficient for identification. Ibid.

As seems to be his practice when making comparisons, he lists his opinion as to broad categories of areas of agreement, but he never explains which areas correspond to which other areas or how many areas he is referring to or how many areas of agreement and of what nature these areas must be for him to conclude they are sufficient for an identification.

As a result of this lack of documentation of the ballistics analysis that was performed in this case, on February 26, 2025, Mr. Caneiro filed a detailed discovery request. Exhibit J, February 26, 2025, Discovery Request Letter. He requested:

1) **Case Files**: Please provide a legible copy of the complete case file (Lab #: C18-10138/ C18-10139) with all records pertaining to firearms/toolmarks examination testing in this case. For materials that are represented in any format other than black and white copies, please provide copies that are equivalent in content and quality (e.g., photographic quality copies of photographs, color copies of photographs, and CD/DVD-ROM/USB copies of electronic data). The records requested include, but are not limited to, the following, even if located separate from the laboratory "case file."

    a) Chain of custody reports for the following:
        i) Any firearm(s) in this case;
        ii) Any projectile(s) in this case;
        iii) Any cartridge casing(s) in this case;

    b) Bench notes associated with the firearm, cartridge casing, and/or projectile identification examinations conducted in this case;

c) Any worksheets and other notes prepared by the examiner and their reviewer;

d) Records of any errors or discrepancies, or trouble-shooting that occurred during the testing in this case, as well as an explanation of actions taken to remedy the problems;

e) All images, in color and in their entirety (not overlapping), that were submitted into IBIS in this case;

f) All images, in color and in their entirety, that were used for any Microscopic Comparison in this case;

g) All Laboratory and Supplementary Reports prepared by the New Jersey State Police Office of Forensic Sciences (NJSP-OFS) Ballistics Unit that reference C18-10138/ C18-10139;

h) Copies of phone and other communication logs reflecting conversations by laboratory personnel internally and externally with other people about testing in this case;

i) All communications between or among the Monmouth County Prosecutor's Office and DSG. C. Clayton/ S. Deady / Det. J. Smith/ Lt. Kulpinski/ Det. A. Sillipino or any other member of the NJSP-OFS Ballistics Unit;

j) Internal memoranda available to DSG. C. Clayton/ S. Deady / Det. J. Smith/ Lt. Kulpinski/ Det. A. Sillipino or any other member of the NJSP-OFS Ballistics Unit in reference to all related cases;

k) All information pertaining to the apparatus used to conduct the examination, including make, model, serial number, calibrations if any, any repairs and maintenance.

2) **Data files and database information for testing done in this case**: Please inform us whether any database of any kind, including but not limited to IBIS and NIBIN, was used in any way in this case. If so, please provide all documentation associated with the database search, including any images used, input commands and output (e.g. search results, candidate match listings, match scores). Please also provide the following:

a) Bullet or casing images: All electronic images of any and all bullet/casing images entered into a computerized database in this case;

b) Encoding: Please provide the encoding record, indicating any characteristics marked by laboratory personnel prior to any and all database searches, and any filters used in the search. Please also include any tolerances provided during encoding;

c) Database protocols: Please provide all protocols related to upload of images and related information to the database, searching of the database, generation of database hits/leads, and communication of such hits/leads;

d) Search results[2]: Hard copy printout or electronic output in easily readable format of the results of any and all database searches run in connection with this case. Information provided should include, but is not limited to:

i) Ranked list of "candidate matches";
ii) Identification numbers of all images appearing on the "candidate list";
iii) "Match scores" of all images appearing on the "candidate list";
iv) Candidate matches: Electronic images of all items appearing on the "candidate list";

e) Laboratory documentation: Any documents (including but not limited to notes, worksheets, photographs, annotated images, and communications) created by the laboratory related to review/analysis of any database "hit". Please confirm whether or not the "hit" has been confirmed, and whether confirmation was blind.

3) **Statistical information relied upon to interpret tests**: Please inform us whether any statistical method was used to calculate probabilities in the case. If so, please identify the statistical method used to calculate probabilities in this case. In addition, please provide copies of the materials that were used or relied upon in performing any statistical analyses in this case. These materials should include, but are not limited to, the following:

a) The complete database or databases used;

b) Copies of all documents describing the source or origin of samples in databases used, including documents regarding the method by which samples were collected, the background and/or characteristics of the tools that were the sources of the samples, the choice of firearms that were sampled, and the nature of the sampling procedure used to collect the samples;

c) Copies of all documents generated by computer statistical programs used to aid statistical calculations in this case;

d) Any and all information regarding the classes of gun sampled, where the guns were collected geographically, and how many of each type of gun was sampled;

e) Computer data files, notes, or other documentation relating to statistical analyses.

4) **Laboratory procedures relied upon when performing tests**: Please provide legible copies of all documents that were, or are claimed to have been, followed or relied upon

[2] These files should include all data necessary to, (i) independently reanalyze the raw data and (ii) reconstruct the analysis performed in this case.

in executing, interpreting, and/or reporting the firearms/toolmarks tests performed in the instant case. These materials should include, but are not limited to, the following:

a) All manuals and documents describing the standard operating procedures (SOPs) of the testing laboratory;

b) All quality assurance/quality control (QA/QC) manuals;

c) Any documentation of supplements or amendments to SOPs and/or QA/QC manuals (e.g. laboratory policy documents);

d) All standard operating procedures of the examiner, including all standards for documentation of firearms and toolmark examiners' conclusions and peer reviewing;

e) User manuals for all instrumentation used;

f) Calibration and maintenance records for all instrumentation used; and

g) Standard operating procedures of examiners in this field.

5) **Documentation of analyst background, training and expertise.** Please provide documentation of background information about each person involved in conducting or reviewing the firearm/toolmark testing performed in this case, including:

a) Current resume, job description, and certifications;

b) All records from the training(s) allegedly undertaken by the examiner and the reviewer as listed in their CV (this includes but is not limited to the records of attendance, results of any tests conducted, any certificates received at the training, materials presented at the training);

c) Laboratory training records, including but not limited to:
   i) Documentation of substance of training (e.g. training manuals; syllabus for training program);
   ii) Results of training examinations (e.g. moot court training results, mock case results);

d) Copies of all proficiency tests, including test questions, (whether internal or external) and results for the past five years. Please indicate whether the proficiency test was administered in a blind fashion (i.e. examiner was not aware he or she was being tested), or not;
   i) CV of individuals conducting the tests;
   ii) Additionally, provide all copies of all proficiency tests and results for the past five years of the individual who conducted the proficiency review/test.

e) Copies of any error records (whether known as records of unexpected results, discrepancies, non-conformances, or by some other name) and associated corrective actions kept by the laboratory for persons involved in testing or technically reviewing the results in this case;

f) All testimony reviews; and

g) A comprehensive list of cases in which the examiner(s) and reviewers(s) involved in testing testified.

6) **Documentation of laboratory expertise**: Please provide legible copies documenting how the testing laboratory meets scientific community standards and how laboratory personnel have been trained to conduct firearms testing. These materials should include, but are not limited to, the following:

a) Copies of all licenses or other certificates of accreditation held by the testing laboratory, including any attempts to gain licenses and/or certificates of accreditation; and

b) Copies of all audit reports for the last five years relating to the testing laboratory used in this case.

7) **Validation studies**: Copies of all validation studies conducted by the lab or agency and/or relied on by the lab or agency in connection with firearm/toolmark evaluation, analysis, and/or comparison. These should include (but are not limited to) studies to show that the specific protocols applied in this case produce reliable (repeatable, reproducible and accurate) results.

8) **Communications**: All communications, not previously addressed above, regarding the case between firearm examiners, police officers and members of the Monmouth County Prosecutor's Office including but not limited to oral communications, reports, letters, and emails.

In response, on March 28, 2025, the defense received some additional documents, but none of these additional documents offered any explanation as to how Det. Sgt. Christopher Clayton reached his conclusions or how the verifier reached their conclusions. On March 31, 2025, the defense was told that Det. Sgt. Christopher Clayton was "still attempting to obtain the NIBIN images" requested and that he has "no documented records" for sections h, i, and j of the discovery demand letter. Exhibit K, March 31, 2025, Letter from AP Christopher Decker.

To date, the defense has not received:

- Any of the photos that were used for Microscopic Comparison in their entirety and in a legible form
- Any of the photos submitted to NIBIN
- Any photos that have been marked up to identify and delineate the alleged areas of agreement that lead to the examiner's or the verifier's conclusions
- Any information about the verification allegedly performed in this case
- Any proficiency testing for the verifier(s)
- Any internal validation studies performed by the New Jersey State Police Ballistics Laboratory
- Any communications regarding the case between the examiner, the verifier(s), and any other state agents with whom they communicated

To better understand the causes of error in ballistics analysis, the defense consulted Dr. Jeff Kukucka, a tenured professor at Towson University and expert in how cognitive bias impacts the reliability of ballistics examinations. Exhibit L, Dr. Kukucka CV. On April 30, 2025, Dr. Kukucka issued a report "to provide the Court with general information about how cognitive bias can weaken the reliability of forensic pattern-matching decisions, to describe research-based procedural safeguards against cognitive bias, and to discuss the extent to which those safeguards have become commonplace in forensic best practice standards." Exhibit M, Dr. Kukucka Report, at #8.

For the reasons discussed below, the evidence turned over by the State is simply insufficient to demonstrate the reliability of the ballistics analysis that was done in this case. N.J.R.E. 702, 401, and 403 require the State—as the proponent of the evidence—to prove that a reliable methodology was applied reliability in this particular case. The State has not met this burden. Nor has the State met its burden under N.J.R.E. 703 or complied with our discovery rules. As a result, the ballistics analysis that was done in this case must be excluded at trial.

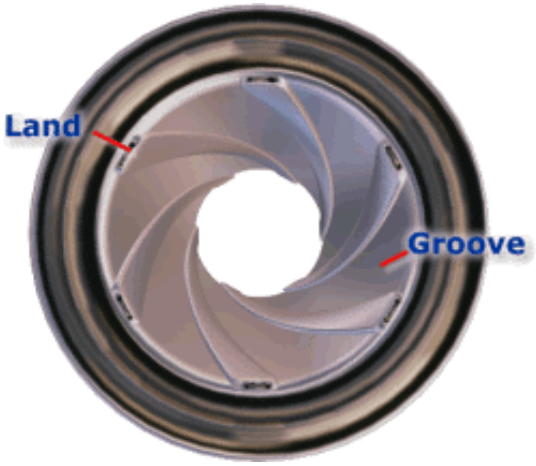
B. Firearms-Related Toolmark Identification – A Primer

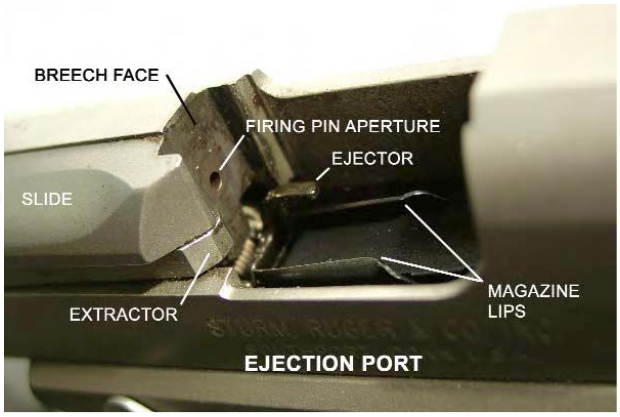
To understand how important the missing information is, some background in firearms-related toolmark identification is necessary. Firearms examiners are generally asked to determine either (1) whether multiple recovered bullets or cartridge cases match one another (i.e. do the markings on the projectiles indicate that they were fired from the same gun), or (2) whether a recovered cartridge case or bullet was fired from a specific recovered gun. In the latter instance, examiners test fire the gun into a water tank and use the bullet or cartridge case from that test fire for comparison. Robert Thompson, Firearms Identification in the Forensic Laboratory, at 7 (2010), available at http://www.crime-scene-investigator.net/firearm-Identification-in-the-forensic-laboratory.pdf. Examiners have not updated their approach to answering those questions over the last 80 years: they use a comparison microscope to view two bullets or cartridge cases side by side, and make a determination based on the correspondence or lack thereof of the markings that they observe. Id. at 8. Said markings are divided into 3 categories: (1) class characteristics are the features predetermined by a manufacturer (and thus common to all guns of certain makes and models) such as the number of lands and grooves or the shape of a firing pin; (2) subclass characteristics are microscopic marks left behind by imperfections in gun parts and thus incidental to manufacture, but that are carried over and shared by multiple guns from the same batch; and (3) individual characteristics are marks produced by random irregularities of gun surfaces, which firearms examiners believe (without scientific justification) are unique to each gun. Id. at 8-9.

i. Class characteristics

Firearms examiners first examine bullets and cartridge cases for class characteristics. "Class characteristics" are distinctive features shared by many items of the same or similar type—such as the width of a groove cut into the barrel of a firearm, or the shape of a firing pin—and are

determined before manufacturing. National Research Council, Committee on Identifying the Needs of the Forensic Science Community, Strengthening Forensic Science in the United States: A Path Forward 152 (2009) [hereinafter NRC Forensics Report]. Class characteristics are used to narrow the pool of suspect firearms to one or more makes and models. See National Research Council, Committee to Assess the Feasibility, Accuracy, and Technical Capability of a National Ballistics Database, Ballistics Imaging 58 (2008) [hereinafter Ballistics Imaging Report]. In other words, class characteristics are measurable features that are common to a class of firearms that are intentionally made by the manufacturer. Some of those class characteristics are the caliber, which is essentially the diameter of the bullet, and rifling, which is a pattern of channels that run along the barrel of a firearm and are manufactured with a twist in order to eject the bullet in a spiral (like a football). The raised parts of the rifling are called lands, and the lowered parts are called grooves, demonstrated below:





When bullets are propelled forward through a barrel they may take on the inverse of the lands and grooves (respectively peaks and valleys) of its rifling as well as the imperfections/ scratches (striations or striae) within those lands and grooves; cartridge cases may in turn be marked by the surfaces they impact, such as a gun's breech face and firing pin. Id. at 7-8.

ii. Subclass Characteristics

If the class characteristics between two casings are the same, the examiner next evaluates marks left on bullets or cartridge cases by features of a weapon that are accidentally imparted during manufacture, or through subsequent use. President's Council of Advisors on Science and Technology, Forensic Science in Criminal Courts: Ensuring Validity of Feature-Comparison Methods 104 (2016) [hereinafter PCAST Report].

One group of accidental marks, "subclass characteristics," is defined as features left on multiple items fabricated by the same tool: imperfections on the tool's cutting surface are imparted on a series of weapons. NRC Forensics Report at 152.

Subclass characteristics are markings "that may be common to a small group of firearms and that are produced by the manufacturing process, such as when a worn or dull tool is used to cut barrel rifling." Ibid.; Ballistics Imaging Report at 58. The Association of Firearm and Tool Mark Examiners (AFTE) has no objective standards to distinguish subclass characteristics from individual characteristics, and "[t]he possibility of subclass marks is one of the biggest problems in forensic firearm identification." Pavel Giverts and Andrey V. Kokin, The Problem of Subclass Features in Forensic Firearms Identification, 15 Theory and Practice of Forensic Science 109, 116 (2020).

iii. "Individual Characteristics"

"Individual characteristics" are the other type of accidental marks sometimes found on guns. NRC Forensics Report at 152. Like with subclass characteristics, firearms examiners believe that individual characteristics result from imperfections on tool cutting surfaces during the firearm manufacturing process, as well as through "wear and tear of the firearm." See PCAST Report at

104.[3] Unlike subclass characteristics, firearms examiners presume that the imperfections that result in individual characteristics are imparted upon, and thus unique to, a particular gun. See NRC Forensics Report at 150–52.

Because of these so-called individual characteristics, firearm examiners assume that each firearm has a unique set of patterns or marks that it imparts on bullets or casings that are not shared by any other firearm. See State v. Ghigliotty, 463 N.J. Super. 355, 362 (App. Div. 2020); PCAST Report at 105. While class characteristics are well-defined, firearms examiners lack defined standards for distinguishing between subclass characteristics, which are shared by multiple firearms, and individual characteristics, which are not. PCAST Report at 113; NRC Forensics Report at 153. Instead, the examiner relies on training and experience. PCAST Report at 60.

If the examiner finds "sufficient agreement" between the individual characteristics seen in the two sets of ammunition, he declares a match and concludes that the ammunition was fired from the same gun. PCAST Report at 104. No standard or protocol, however, dictates how many characteristics the examiner must find in agreement to declare a match. See ibid. Instead, firearms examiners utilize a subjective pattern matching methodology that allows each examiner to set his or her own criteria based on training and experience. See ibid.; see also Ballistics Imaging Report at 54. The Association of Firearm and Tool Mark Examiners (AFTE), the leading proponent of the validity of firearms examination, states so explicitly in its "Theory Of Identification:" "the interpretation of individualization/identification is subjective in nature, founded on scientific principles and based on the examiner's training and experience." AFTE, AFTE Theory of

[3] The defense would note that the assumption that wear and tear creates unique marks on all bullets and shell casings shot by a particular gun is puzzling, as this would require "wear and tear" to remain constant over the life and use of a gun. This is contrary to the idea of "wear and tear."

Identification As it Relates to Toolmarks, available at https://nij.ojp.gov/nij-hosted-online-training-courses/firearms-examiner-training/module-09/afte-theory-identification.

Put differently, there is no standardized guideline informed by empirical research that defines "sufficient agreement" such that an examiner can identify the firearm which expelled a particular bullet or cartridge case. "Sufficient agreement" means whatever the examiner believes it to be in any given case. The materials relied upon to guide the examiner in making that determination and the basis for his determination are therefore essential for the examiner to demonstrate he applied the technique as currently accepted, for the jury to assess the validity of that determination, and for the defense to have any meaningful right to cross-examine that conclusion.

LEGAL ARGUMENT

WITHOUT EVIDENCE DEMONSTRATING THAT A RELIABLE METHODOLGOY WAS RELIABLY APPLIED IN THE FIREARM AND TOOLMARK ANALYSIS IN THIS CASE, THE RESULTS OF THAT ANALYSIS CANNOT BE ADMITTED AT MR. CANEIRO'S TRIAL.

In every case, the court must consider the as-applied reliability of the specific analysis conducted. State v. Olenowski, 255 N.J. 529, 576 (2023) (Olenowski II). In Mr. Caneiro's case, the State has failed to demonstrate the reliability of the specific analysis that was conducted. The State's proffered ballistics testimony violates our discovery rules as well as N.J.R.E. 702, 703, 401, and 403. While all of these discovery and evidence rules have been violated in this case, as this Court is well aware, a violation of any one of these rules compels the exclusion of the evidence from Mr. Caneiro's trial.

A. The firearms examiner failed to explain the bases for his opinion, violating Rule 3:13-3.

"The purpose of discovery is to prevent surprise, eliminate gamesmanship, and afford a party an opportunity to obtain evidence and research law in anticipation of evidence and testimony which an adversary will produce at trial." State v. Wyles, 462 N.J. Super. 115, 122 (App. Div. 2020) (internal quotation marks omitted). To further these purposes, the Court Rules "entitle[] defendants to broad discovery and impose[] an affirmative duty on the State to make timely disclosure of relevant information." State v. Smith, 224 N.J. 36, 48 (2016). Some of those rules apply specifically to discovery about proposed expert testimony. Rule 3:13-3(b)(1)(I) requires that the State provide the defendant certain disclosures about anticipated expert testimony within 30 days before trial begins. If the State fails to comply, "the expert witness may, upon application by the defendant, be barred from testifying at trial." Id.

The State failed to comply with Rule 3:13-3(b)(1) because the information provided did not explain the bases of the examiner's opinion. Subsection I of the Rule clarifies what the bare minimum required by the Rule is: if no "report" is issued, "a statement of the facts and opinions to which the expert is expected to testify and a summary of the grounds for each opinion" is necessary. Rule 3:13-3(b)(1)(I) (emphasis added). The discovery here fails to explain the facts the examiner relied on to reach his opinion and does not give any explanation for that opinion.

To comply with the rule is not to give the defense enough information from which to divine the opinion an expert will provide and perhaps guess about how the expert got there. It is to allow for "[e]ffective cross-examination of an expert witness[, which] requires advance preparation. The lawyer even with the help of his own experts frequently cannot anticipate the particular approach his adversary's expert will take or the data on which he will base his judgment on the stand." Rail

Intermodal Specialists v. Gen. Elec. Cap. Corp., 154 F.R.D. 218, 221 (N.D. Iowa 1994) (quoting Fed. R. Civ. P. 26(b)(4) advisory committee's note to 1970 amendment).[4]

The discovery provided here in no way allows for defense counsel to anticipate the approach the examiner took, to be able to do research to determine the weakness in that approach, or to consult with a defense expert on the weaknesses of that approach. Det. Sgt. Christopher Clayton reported a number of identification conclusions in this case, but he did not explain in his report or in his notes how he reached those conclusions. Rather, he listed broad categories of areas of agreement and left it at that. He never explained which areas correspond to which other areas. He never explained how many areas he is referring to. He never explained how many areas of agreement and of what nature these areas must be for him to conclude they are sufficient for an identification. And perhaps most fundamentally, he never even explained what methodology he used in making his conclusions:

- ➔ Did he apply solely the AFTE's circular Theory of Identification?
- ➔ Or did he, at times or in every instance, apply some other method or methods?
- ➔ Did the method vary based on the comparison?
- ➔ How many allegedly unique marks did he observe on each comparison?
- ➔ Where are these located? How did he determine how many and of what type were sufficient for him to declare an identification conclusion?
- ➔ Why did he choose not to mark up any photos in this case to identify and delineate the alleged areas of agreement but leave us all to guess on what data he relied to reach his identification conclusions?
- ➔ What potentially biasing information did he know about this case before his analysis?

[4] The federal criminal discovery rule, discussed further below, has a substantially similar disclosure requirement for the bases of experts' opinions. The language requiring such disclosure is drawn from the federal civil discovery rule. See Fed. R. Crim. P. 16 advisory committee's note to 2022 amendment.

➔ What additional biasing information did he learn during his analysis, which took place over the course of more than a year?

As Your Honor found in the Motion to Change Venue, "media coverage has included articles on developments in the investigation" and has been the subject of podcasts, YouTube videos, and innumerable social media posts. The Honorable Marc C. Lemieux, A.J.S.C., Statement of Reasons, at 3. This extensive media coverage was "concentrated in 2018 and early 2019," precisely when the majority of the ballistics analysis was being conducted in this case. Id. at 39. How much additional information did the examiner know about this high-profile, high-publicity case than he usually is exposed to in a typical case? What potentially biasing information did he share with the verifier? And vice versa? The defense has no way of answering these questions because of Det. Sgt. Christopher Clayton's insufficient documentation of the analysis he allegedly performed in this case and the complete lack of documentation of the verification that allegedly took place after each conclusion he reached. The discovery is devoid of any of the content necessary to embark on trial preparation and to determine a trial strategy. The disclosure fails to comply with the text or purpose of our discovery rules.

The Sixth Circuit has held that such meager discovery does not comply with the similar federal criminal discovery rule, which requires disclosure of "the bases and reasons" for "all opinions that the government will elicit from the witness." Fed. R. Crim. P. 16(a)(1)(G). In United States v. Davis, 514 F.3d 596, 603-04, 612 (6th Cir. 2008), the defense was provided with a laboratory report asserting that a substance was cocaine and that it weighed 3.8 grams; a letter indicating that "[a] chemist will testify consistent with the laboratory report" and that "[t]he chemist's testimony will be based on training, including formal education, and experience, including having conducted numerous such examinations"; and a notice of expert testimony that "described, in broad terms, the educational background of the chemists, their experience, and the

basis of their findings." The Sixth Circuit held that "none of these documents adequately indicate the bases for the chemists' laboratory reports; if Davis had hired a chemist, he or she would not have been able to analyze the steps that led the government's chemists to their conclusions." Id. at 612-13.

The same failing presented in Davis is present in this case. There is not enough information provided for a defense attorney to understand how the examiner got to his opinion, to understand how to challenge his opinion, or to consult with an expert and adequately prepare for trial. See also Exhibit N, Order on Motion for Leave to Appeal, State v. Irving, No. AM-497-22 (App. Div. June 12, 2023) (holding that the State violated Rule 3:13-3 and that the trial court properly excluded fingerprint evidence when sparse discovery failed to meaningfully explain the facts to which the expert would testify or the basis for his opinion); Exhibit O, State v. Warren, No. A-3772-16T4, 2019 N.J. Super. Unpub. LEXIS 2608, at *15 (App. Div. Dec. 20, 2019) (holding that the Hudson County Prosecutor's Office failed to comply with Rule 3:13-3 because the documents about the expert's testimony that were provided "did not provide defendant with the length and breadth of information [the expert] testified to justifying her conclusion that the prints matched."); see also United States v. Willock, 696 F. Supp. 2d 536, 578 (D. Md. 2010), aff'd sub nom. United States v. Mouzone, 687 F.3d 207 (4th Cir. 2012) (asserting the State's late production of documents that constituted the bases for its expert firearms toolmark identifications was "disdainful of the Defendant's due process rights to a fair trial, the Court's obligation to ensure one, and the jury's obligation to make sense out of a highly technical subject matter that has generated intense disagreement within the scientific, technical, and judicial communities.").

Given this total failure to comply with Rule 3:13-3, the only appropriate remedy is to preclude the admission of any ballistics evidence at Mr. Caneiro's trial. In determining the

appropriate remedy for a discovery violation, the trial court should consider "(1) the absence of any design to mislead, (2) the absence of the element of surprise if the evidence is admitted and (3) the absence of prejudice which would result from the admission of evidence." State v. Washington, 453 N.J. Super 164, 191 (App. Div. 2018).

All the factors support exclusion here. First, the State provided this scant discovery by design. The State asserts it has provided full discovery. It seeks to have expert evidence admitted without the bases for that evidence disclosed; that is misleading. Likewise, the second and third factors weigh in favor of exclusion for the same essential reason: because the defense has no idea what the basis for the examiner's opinion is, it will be surprised and prejudiced by whatever the examiner says on the stand.

B. The ballistics examination that was performed in this case also fails to meet the requirements of N.J.R.E. 703 and the net opinion rule.

The net-opinion rule, a corollary to N.J.R.E. 703, is violated by an opinion that is unsupported by the necessary, documented, facts. The net-opinion rule "forbids the admission into evidence of an expert's conclusions that are not supported by factual evidence or other data." State v. Burney, 255 N.J. 1, 23 (2023) (quoting Townsend v. Pierre, 221 N.J. 36, 53-54 (2015)). The rule "mandates that experts be able to identify the factual bases for their conclusions, explain their methodology, and demonstrate that both the factual bases and the methodology are reliable." Townsend, 221 N.J. at 55 (emphasis added). The rule "requires that an expert give the why and wherefor that supports the opinion, rather than a mere conclusion." Id. at 54 (internal quotation marks omitted).

Thus, the net opinion rule requires the bases of the expert's opinion be explained, not just the conclusory opinion. The "bottom line" conclusion is simply not enough to pass muster under this rule. Relatedly, without the actual bases of an expert's opinions explained, the defense is

unable to properly cross-examine that expert, violating both defendant's confrontation clause rights and due process rights. See Burney, 255 N.J. at 25 (holding that the trial court erred in permitting the State's cell site expert to testify about his "rule of thumb" about cell tower ranges "because it was unsupported by any factual evidence or other data" and instead "was based on nothing more than [the expert's] personal experience"); see also Exhibit N, Order, State v. Irving, AM-497-22, unpub. order (App. Div. June 12, 2023) (noting that the fingerprint expert's report "can best be described as a net opinion" because it "contains bare, unexplained conclusions without setting forth the facts he relied upon, the methods he used, or the protocols he followed").

C. The ballistics examination that was performed in this case fails to meet either prong 2 or prong 3 of N.J.R.E. 702.

N.J.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 order for evidence to be admissible under N.J.R.E. 702, three requirements must be met:

> (1) the intended testimony must concern a subject matter that is beyond the ken of the average juror;
>
> (2) the field testified to must be at a state of the art such that an expert's testimony could be sufficiently reliable; and
>
> (3) the witness must have sufficient expertise to offer the intended testimony.

State v. Kelly, 97 N.J. 178, 208 (1984). In this case, neither prong (2) nor prong (3) have been met as applied to this expert's testimony.[5]

[5] The defense does not concede that the field as a whole is reliable, but this brief mounts only an as-applied challenge.

"Reliability is critical to the admissibility of expert testimony. Indeed, '[a]n expert opinion that is not reliable is of no assistance to anyone.'" State v. Olenowski (Olenowski I), 253 N.J. 133, 150 (2023). In assessing whether a methodology is sufficiently reliable to be admissible, our courts must now analyze the Olenowski factors, which include but are not limited to the Daubert factors:

> (1) whether the scientific theory or technique can be, or has been, tested;
> (2) whether it "has been subjected to peer review and publication";
> (3) "the known or potential rate of error" as well as the existence of standards governing the operation of the particular scientific technique; and
> (4) general acceptance in the relevant scientific community.

Ibid. (quoting Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 580 (1993)).

Trial judges serve as "gatekeepers" to "ensure that proceedings are fair to both the accused and the victim. In that role, they must assess whether expert testimony is sufficiently reliable before it can be presented to a jury." State v. J.L.G., 234 N.J. 265, 308-09 (2018). "The gatekeeper role 'entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is . . . valid and of whether that reasoning or methodology properly can be applied to the facts in issue.'" United States v. Hermanek, 289 F.3d 1076, 1094 (9th Cir. 2002) (finding error in admission of slang expert testimony when the expert possessed the requite "experience but failed to explain his methodology") (cited with approval in State v. Hyman, 451 N.J. Super. 429, 449 (2017)) (quoting Daubert, 509 U.S. at 597); see also Fed. R. Evid 702 advisory committee note ("[A]ny step that renders the analysis unreliable . . . renders the expert testimony inadmissible. This is true whether the step completely changes a reliable methodology or merely misapplies that methodology.") (emphasis added).

In other words, even if a technique is generally accepted or foundationally valid, which the defense assumes only for the sake of this motion that firearm examination is, in order for its application in any given case to be reliable enough to be admitted, it must be valid as applied,

"mean[ing] that the method has been reliably applied in practice." PCAST Report at 5 (emphasis in original); see also State v. Olenowski (Olenowski II), 255 N.J. 529, 616 (2023) (reaffirming that it is the trial court's duty to act as a gatekeeper and ensure that "expert witnesses demonstrate that they have reliably applied [their] methodology"); Olenowski I, 253 N.J. at 147 (stating that trial courts must make a preliminary assessment "of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue"); United States v. Green, 405 F. Supp. 2d 104, 119 (D. Mass. 2005) (emphasizing that, when assessing the admissibility of ballistics expert testimony, "[t]he issue is not whether the field in general uses a reliable methodology, but the reliability of the expert's methodology in the case at bar[.]" (emphasis in original)).Our trial courts must directly "examine actual measures of reliability," which include both "the soundness of the methodology" and "the accuracy of the theory or technique in practice." Olenowski I, 253 N.J. at 150.

That means that the examiner "must have been shown to be capable of reliably applying the method and must actually have done so." PCAST Report at 6 (emphasis in original). Moreover,

> The practitioner's assertions about the probative value of proposed identifications must be scientifically valid. The expert should report the overall false-positive rate and sensitivity for the method established in the studies of foundational validity and should demonstrate that the samples used in the foundational studies are relevant to the facts of the case. Where applicable, the expert should report the probative value of the observed match based on the specific features observed in the case.

Ibid. (Emphasis added).

Courts confronting this issue have held that firearms testimony does not meet the requirements of Rule 702 unless the methodology used in the specific analysis at issue is sufficiently described and comports with relevant standards. See, e.g., United States v. Monteiro, 407 F. Supp. 2d 351, 375 (D. Mass. 2006) (excluding ballistics evidence because the State failed

to demonstrate that the analysis "comports with the established standards in the field for peer review and documentation."); Sexton v. State, 93 S.W.3d 96, 101 (Tex. Crim. App. 2002) (concluding that while "the underlying theory of toolmark examination could be reliable in a given case," toolmark expert testimony should have been excluded where the state "failed to produce evidence of the reliability of the technique used in this case."). Recently, the Maryland Supreme Court criticized the firearms identification analysis that was performed in a case because it "lack[ed] any guiding standard other than the examiner's own subjective judgment." Abruquah v. State, 296 A.3d 961, 992 (2023). The court concluded that the available evidence did not "provide a reliable basis for [the examiner's] unqualified opinion that four bullets and one bullet fragment found at the crime scene in this case were fired from [defendant's] revolver." Id. at 997. As such, the court held that the firearms examiner's testimony should have been limited to noting "whether the patterns and markings on the crime scene bullets are consistent or inconsistent with the patterns and markings on the known bullets." Id. at 998.

As-applied validity in the firearms context requires evidence that (1) the protocols that the examiner applies and other quality assurance measures are sufficient to ensure reliable and repeatable analysis;[6] (2) those protocols and quality assurance measures were in fact followed and sufficient documentation is produced to be able to assess this; and (3) the examiner—an inextricable part of any subjective pattern matching discipline—is capable of reliable analysis on sufficiently challenging samples to ensure proficiency. The State is unable to make such a showing in this case.

[6] "If a laboratory consistently fails to use certain quality controls so that its results are rendered unreliable, attempting to ascertain whether the lack of quality controls constitutes a failure of methodology or a failure of application of methodology may be an exercise in metaphysics." In re Paoli R.R. Yard PCB Litig., 35 F.3d at 745 (3d Cir. 1994).

PCAST found that firearms examination is not foundationally valid, as have other bodies; that is beyond the scope of the current motion. PCAST Report at 11. As a result of this finding, however, PCAST had very little to say about as-applied validity because the field of ballistics lacks the foundation for any specific analysis to be applied reliably. That said, "[i]f firearms analysis is allowed in court," PCAST found that at least two things must be required: (1) the expert must have "undergone rigorous proficiency testing on a large number of test problems to evaluate his or her capability or performance, and discloses the results of that proficiency testing" and (2) "disclose[] whether, when performing the examiner, he or she was aware of any other facts of the case that might influence the conclusion." Id. at 113.

In fingerprint examination, another pattern-matching field that was found to have some foundational validity, the following requirements were set forth for as-applied validity, which apply with equal force here:

> Scientific validity as applied, then, requires that an expert: (1) has undergone relevant proficiency testing to test his or her accuracy and reports the results of the proficiency testing; (2) discloses whether he or she documented the features in the latent print in writing before comparing it to the known print; (3) provides a written analysis explaining the selection and comparison of the features; (4) discloses whether, when performing the examination, he or she was aware of any other facts of the case that might influence the conclusion; and (5) verifies that the latent print in the case at hand is similar in quality to the range of latent prints considered in the foundational studies.

Id. at 10 (emphasis added).

Recently, a California appellate court ruled that the ballistics expert should not have been allowed to testify at trial because he "provided no sufficient basis for his opinion matching the cartridge case to the gun." Exhibit P, People v. Tidd, 324 Cal. Rptr. 3d 916, 919 (Ct. App. 2024), ordered not to be officially published (Dec. 18, 2024). The court held that "an expert may offer a

subjective opinion, but the opinion must still be established as reasonably reliable." Id. at 926. By way of analogy, the court explained its reasoning:

> Suppose the prosecution had sought to introduce expert testimony from a palm reader who, after careful study of the lines on defendant's hands, was prepared to testify as to certain events in defendant's past—perhaps including whether he had committed the offense with which he was charged. . . . Is [the ballistics expert]'s testimony appreciably different? On this record, we cannot say that it is.

Id. at 922. Like the palm reader, the ballistics expert's opinion could not be established as reasonably reliable:

> [The expert]'s methodology was to look carefully at the evidence and then simply make a judgment based on "the pattern overall." Because his technique employs no articulable standards—no minimum criteria for declaring two cartridge cases a match, and no protocol for addressing observed differences between them—it is not possible to validate his work by examining results that other practitioners of the "AFTE theory of identification" achieve. After all, an outside reviewer would not know whether the analysts who chose to subject their work to scrutiny were using the same criteria as [the expert] employed, or different ones. The only way to validate [the expert]'s technique is with an individualized assessment of *[the expert]*'s ability correctly to distinguish cartridge cases fired from the same weapon from cartridge cases fired from different weapons with the same class characteristics.

Ibid. (emphasis in original).

As will be described in further detail in the subsections below, neither prong 2 nor prong 3 of N.J.R.E. have been satisfied in Mr. Caneiro's case. Because the ballistics examiner and verifier failed to provide the bases for their opinions and document how the examination and the alleged verification were performed, the State has provided no information upon which this Court can find that the examiner in this case and the verifier in this case 1) have the expertise required to reliability perform ballistics examination or 2) even if they are generally capable, that they actually performed a reliable ballistics examination in Mr. Caneiro's case. As a result of the State's failure

to show that prongs 2 and 3 of N.J.R.E. 702 have been satisfied in this case, the ballistics analysis must be excluded from Mr. Caneiro's trial.

i. The missing photographs and explanations as to how conclusions were reached precludes any finding of as-applied validity.

As explained above, a ballistics examiner makes his comparison by looking at images of two bullets or cartridge cases and comparing them. The defense asked for copies of those images in their entity and in legible form. It received only some partial photos and at such a low quality that distinguishing features cannot be discerned. Moreover, no reports or notes were provided identifying the alleged individual characteristics—where they are located and how many of them were observed to be in agreement—that the examiner believed provided the basis of identification. That means that there is no way to understand if any protocol was followed, much less followed properly. Therefore, the State cannot demonstrate the validity of this analysis.

Notably, the failure to take appropriate pictures and document findings is in violation of all ballistic examiner standards. "[T]he guidelines of the Association of Firearm and Tool Mark Examiners require examiners to document identifications by notes, sketches, or photographs." Monteiro, 407 F. Supp. 2d at374. See also United States v. Taylor, 663 F. Supp. 2d 1170, 1176 (D.N.M. 2009) ("[I]ndustry standards generally require an examiner to document in detail, through note-taking and photographs, the basis for his findings."); Ramirez v. State, 810 So. 2d 836, 850-51 (Fla. 2001) (criticizing the testimony of state toolmark experts that "they [did] not prepare notes or written reports delineating the basis for identifications because to do so would not be helpful.").

The Scientific Working Group for Firearms and Toolmarks, a group established by the FBI, whose members include crime lab directors, the President of AFTE, and other staunch defenders of ballistics analysis, requires the same. Specifically, it requires that:

> 2.1 The case record must contain documentation of observations that support a reported conclusion.
>
> 2.2 At a minimum, the documentation must include depictions or descriptions of the agreement or disagreement of individual and/or class characteristics to the extent that another qualified firearm and toolmark examiner, without the benefit of the evidence itself, can review the case record, understand what was compared, and evaluate why the examiner arrived at the reported conclusion.
>
> 2.3 The supporting documentation of one comparison may be used for additional evidence within a case, provided the agreement described or depicted is representative of the additional comparison(s).
>
> 2.4 It must be documented in the case record which items are being depicted and/or described.
>
> 2.5 Methods of documentation including imaging, narrative descriptions, sketches, diagrams, charts, worksheets, tabulation of consecutive matching striae (CMS), or a combination of the above methods may serve to satisfy the requirements of this standard. (NOTE: The above mentioned documentation methods are not sufficient for the determination or verification of a conclusion.)

SWGGUN, Guidelines for the Standardization of Comparison Documentation, available at https://www.nist.gov/system/files/documents/2016/11/28/guidelines_for_the_standardization_of_comparison_documentation.pdf (emphasis added). None of these established protocols were followed here.

The Bureau of Alcohol, Tobacco, Firearms and Explosives has similar documentation requirements:

> 3.2. Case notes must contain comprehensive detailed observations. For a firearm and toolmark examination, this can require a variety of documentation that is specific to the type of examination. These guidelines define the variety of documentation that is required and optional for various firearms evidence to support the conclusion(s) that must be stated in the notes by the examiner.
>
> 3.3. Worksheets are a good tool for aiding the examiner in data collection and recording observations and measurements. [. . .]

4.5. Fired cartridge case/shotshell examinations

4.5.1. The following minimum information will be included in case note documentation.
• Packaging
• Basic description
• Exhibit number
• Headstamp
• Caliber/gauge
• Firing pin impression shape/characteristics
• Breech face impression shape/characteristics
• Ejector toolmark
• Extractor toolmark
• Trace evidence
• Suitability for comparison
• Subclass characteristics assessment
• Examiner ID marks (location)

4.5.2. Depending on the scope of the examination, recording of additional information as described below may be necessary.
• Manufacturers toolmarks
• Comparison documented
• Support for conclusion
• Photograph/photomicrograph
• Cannelures
• Case finish type
• Anvil marks
• Ejection port marks
• Chamber marks
• Primer finish type
• Chamber toolmarks shape/characteristic

ATF, Firearm and Toolmark Examination Documentation, available at https://www.atf.gov/file/128836/download (emphasis added).

Given that there are no legible photographs and no explanation of which areas correspond to which other areas, where these areas are located, how many areas he found to be in agreement, and how he decided he had sufficient information to conclude these area or areas of agreement were sufficient for an identification, the analysis in this case fails to comply with the requirements that are industry standard. Therefore, the State cannot prove that the analysis in this case was

done following an established, reliable methodology, and the final conclusions are mere net opinions.

ii. The total lack of information about the verifier and his verification renders the examination unreliable.

AFTE standards "require comparison with test-fired components and that peer review of each examination … [should] be conducted by another firearms examiner to ensure the integrity of the examination process and accurate results." United States v. Otero, 849 F. Supp. 2d 425, 434-35 (D.N.J. 2012). See also Taylor, 663 F. Supp. 2d 1770 at 1176 ("industry standards require confirmation by at least one other examiner when the first examiner reaches an identification."); Monteiro, 407 F. Supp. 2d at 374 (excluding ballistics testimony where "[t]here is no evidence that [the initial examiner] had an independent second examiner from his lab review his work or conclusions in accordance with the generally accepted standard in the field."). All the information that is lacking about the examiner's analysis is equally lacking with the verifier's analysis. In fact, what the verifier did, if anything, and how he reached his conclusions is a complete mystery because there is no documentation whatsoever of the verification that was allegedly performed in Mr. Caneiro's case. That mystery falls woefully short of what is required to establish as-applied validity.

iii. The lack of evidence as to any bias mitigation procedures combined with the unknown extent to which the examiner and the verifier were exposed to biasing information before or during their examinations render their conclusions unreliable.

A serious issue in all sciences is the impact of cognitive bias. Cognitive bias is the tendency to interpret data so that it confirms with expectations and discount data that appears to conflict with these expectations. See generally, Itiel E. Dror, Cognitive and Human Factors in Expert Decision Making: Six Fallacies and the Eight Sources of Bias, 92 Anal. Chem. 7998-8004 (2020).

The risk is that the "observer's conclusions become contaminated with a pre-existing expectation and perception, reducing the observer's objectivity and laying the groundwork for selective attention to evidence." Paul Bieber, Fire Investigation and Cognitive Bias, Encyclopedia of Forensic Science (2014). Scientists have long acknowledged that cognitive bias "can lead to perceptual distortion, inaccurate judgment, or illogical interpretation," Working Group on Human Factors in Latent Print Analysis, National Institute of Justice, Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach at 10 (2012), specifically because it causes decisionmakers to "seek information that they consider supportive of a favored hypothesis or existing beliefs and to interpret information in ways that are partial to those hypotheses or beliefs," Raymond Nickerson, Confirmation Bias: A Ubiquitous Phenomenon in Many Guises, Review of General Psychology 2, p. 177 (1998). Biasing contextual information has been documented to cause serious mistakes and misidentifications across a wealth of forensic disciplines. See generally Saul Kassin, et al., The forensic confirmation bias: Problems, perspectives, and proposed solutions, 2 J. of Applied Research in Memory and Cognition 45-52 (2013). Bias is an unavoidable product of human decision making and is particularly problematic in subjective forensic techniques like firearm and toolmark analysis. NRC Forensics Report at 122 ("[C]ognitive biases are not the result of character flaws; instead, they are common features of decision making, and they cannot be willed away.") See also Olenowski II, 255 N.J. at 608-09 (noting the "palpable risks of confirmation bias . . . particularly in the more subjective aspects" of the examination, which "may consciously or subconsciously affect" the expert's opinion are one of the reasons for the limitations placed on expert testimony).

The influence of cognitive bias on an examiner's decision making process has been recognized even by the community of firearm and toolmark examiners themselves. See, e.g.,

Ronald Nichols, Firearm and Toolmark Identification, Acad. Press (2018), Ch. 6 "The Influence of Bias." It is well recognized that for subjective pattern-matching disciplines, the failure to document characteristics of the evidence sample (i.e. microscopic characteristics on the recovered bullet or cartridge case) before comparing it to the reference sample (i.e. microscopic characteristics on the bullet or cartridge case test fired from the recovered firearm) "introduces a serious risk of confirmation bias" as it permits "reverse reasoning" from the reference sample that can "le[a]d to an exaggerated focus on apparent similarities and inadequate attention to differences." PCAST Report at 28, 102 (discussing cognitive bias in the latent print context); Pauw-Vugets et al., FAID 2009: Proficiency Test and Workshop, 45 AFTE Journal 115, 126 (2013) (describing overvaluing of similarities and discounting of differences that led to false firearm identifications in the FAID 2009 test). As a result, best practices for all pattern-matching disciplines—including firearm and toolmark comparison—include both shielding an examiner from all extraneous case-related information and linear sequential unmasking, where "the evidential material is not examined simultaneously with the reference material, but before examination of and comparison with the reference material." Erwin Mattijssen et al, Validity and Reliability of Forensic Firearm Examiners, 307 Forensic Sc. Int'l 110 (2019).

As Dr. Kukucka explains in his report:

> There is now ample scientific evidence that judgments of forensic patterns (including those found on ballistics items) are vulnerable to cognitive bias, such that extraneous influences can lead even diligent examiners to inconsistent judgments of the same patterns. When examiners disagree in this way, at least one of their judgments must be factually incorrect, which poses the risk of a costly error. Accordingly, scientists and practitioners have jointly developed, endorsed, and implemented practicable safeguards against cognitive bias in forensic labs, such as: (a) clearly articulating one's decision criteria before visually comparing two patterns; (b) shielding examiners from case information that is irrelevant to their analysis; (c) having all decisions independently verified by a qualified peer;

> and (d) using technology to supplement rather than usurp human decision-making.

Exhibit M, Dr. Kukucka Report, at #9. Importantly, Dr. Kukucka cautions that:

> Despite ample evidence to the contrary, many forensic analysts still believe that willpower, training, and/or experience can create immunity to cognitive bias. Conversely, some studies suggest that expertise can actually increase vulnerability to cognitive bias insofar as experts rely more heavily on "cognitive shortcuts" that allow them to process information more quickly but also limit their mental flexibility.

Id. at #16. In conclusion, Dr. Kukucka explains:

> It is surely not my intent to denigrate the firearms examiners in this case. Cognitive bias— not unlike a reflex—is intrinsic to human decision-making; it is not a sign of incompetence, dishonesty, or laziness. However, it has become clear that forensic laboratories can and must take steps to protect examiners against cognitive bias and thus maximize the reliability of their decisions. While other forensic disciplines are doing just that, the field of firearms examination—which is especially vulnerable to bias by virtue of its inherent subjectivity—has noticeably lagged behind.

Id. at #52.

In Mr. Caneiro's case, because we have no documentation of the manner in which Det. Sgt. Christopher Clayton performed his analysis or how the verifier performed his alleged verification, there is no evidence that the examiner or the verifier utilized any bias control measures or attempted to mitigate the known influence of cognitive bias in any way. There is also no information about the potentially biasing communications the examiner or the verifier received before or during their examinations, contrary to PCAST's requirements for as-applied validity. As a result of this complete lack of information, the extent to which the conclusions in this case are the result of cognitive bias cannot be determined, and the State has not—and cannot—prove that the conclusions reached in this case are reliable.

iv. The standard operating procedures that do exist are too subjective to reliably channel discretion, rendering the examination unreliable.

Given that AFTE's theory of ballistics "does not provide a specific protocol," NRC Forensics Report at 155, and "the lack of a precisely defined process" has been described as a "fundamental problem" with firearm examinations, ibid., it is all the more important that the examiner and the verifier have robust, detailed standard operating procedures to ensure the reliability of the analysis. According to the AFTE theory of identification, "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." AFTE Theory of Identification, supra (emphasis added). However, it is up to the laboratory to provide a step-by-step methodology on how to "define" and "compare" these features in a way that produces reliable results.

A lack of detailed, objective procedures is particularly concerning in a subjective field, such as ballistics. Because subjective judgments are "more susceptible to human error, bias, and performance variability across examiners," it is especially important that these judgments follow repeatable and reproducible procedures.[7] PCAST Report at 47. "For subjective methods, procedures must still be carefully defined—but they involve substantial human judgment" and an attendant increased likelihood of error. PCAST Report at 49. Cognitive bias, as discussed above, is a systematic pattern of deviation from rationality in decision-making that is automatic, efficient, outside of conscious awareness, and creates "predictable patterns of error in how the human brain

[7] "Repeatability refers to the consistency of the decisions made by the same examiner in judging the same sample (or evidence) at two different times. Reproducibility refers to the consistency of the decisions made by different examiners in judging the same sample." Harsh Arora, Alicja Gosiewska, Heike Hofmann & Alicia Carriquiry, Combining Reproducibility and Repeatability Studies with Applications in Forensic Science, 22 Law, Probability & Risk 1, 2 (2023), available at https://doi.org/10.1093/lpr/mgad007.

functions." Stephen Eldridge, "Cognitive Bias," Britannica, available at https://www.britannica.com/science/cognitive-bias. Without detailed, objective, and meticulously followed procedures, there are insufficient criteria to channel the examiner's and the verifier's significant discretion, and their cognitive biases fill in the gaps, leading to unreliable, unrepeatable, and unreproducible results.

As Dr. Kukucka explains in his report: "[T]he field of firearm and toolmark identification—which entails highly subjective judgments that are especially vulnerable to bias and thus especially warrant safeguards against it—has largely declined to adopt these precautions." Exhibit M, Dr. Kukucka Report, at #10. He then explains why this failure leads to untrustworthy, unreliable results:

> If an examiner does not document in advance which or how many corresponding features between two items will inform their decision, the trustworthiness of their decision suffers. That is to say, if an examiner (a) analyzes one item alone, (b) identifies features *X*, *Y*, and Z as unique and meaningful, (c) subsequently finds those same features in the other item, and (d) cites those correspondence as evidence that the two items share a common source, then we can have considerable confidence in their decision. But if an examiner does not pre-specify their decision criteria, they effectively have *carte blanche* to select any number or type of observed features as *post hoc* justification for a same-source decision.

Id. at #29. With regard to verification procedures in particular, Dr. Kukucka explains that "verification procedures are often flawed in two critical ways such that they provide only the illusion of independent corroboration." Id. at #40. "First, the verifier is often made aware of the original examiner's decision before they analyze the evidence for themselves (i.e., non-blind or open verification), and that knowledge predisposes them to agree with the original decision rather than giving a truly independent opinion." Id. at #41. "Second, even if verification is blind in principle, it is not blind in practice unless a range of decisions undergo verification—i.e., if a lab

only or predominantly verifies a certain type of decision, then verifiers can reasonably infer the original examiner's decision even if they are not informed of it." Id. at #45.

In this case, the New Jersey State Police Ballistics Unit has Standard Operating Procedures (SOPs) that purport to govern how ballistics comparisons are made, but these SOPs are markedly insufficient to perform their function of guiding examiner and verifier discretion to ensure the reliability of the results obtained. Exhibit Q, NJSP Ballistics Comparison SOPs, at 54-63. Simply put, the New Jersey State Police's SOPs are simply too meager and too permissive to fulfill that function. To begin, there are less than ten pages that address how all ballistic comparisons are to be made, including:

- Microscopic comparisons of test bullets
- Microscopic comparisons of evidence bullets to test bullets
- Comparing evidence bullets without a suspected firearm
- Microscopic comparison of test cartridge cases
- Microscopic comparisons of evidence cartridge cases to test cartridge cases
- Comparing evidence cartridge cases without a suspected firearm
- Comparison unfired evidence ammunition to other unfired ammunition or to test-fires or evidence cartridge cases
- Verification of comparisons
- Interpretation of results
- General conclusions

Ibid. While the short length of the SOPs is, of course, not determinative in and of itself, it is indicative of the lack of specificity detailed in the SOPs. This lack of specificity is directly tied to the permissiveness of the SOPs, which rely heavily on the examiner's intuition and subjective judgment to determine whether an identification can be made. Indeed, the SOPs are rife with non-objective suggestions like "recommended," "once satisfied," "may," "possible," "if applicable," "sufficient," and "at the discretion of the examiner." Id. at 55-61. When it comes to verification, the SOPs do not delineate at all how verifications are to be performed. See id. at 61-62. Moreover,

there is no mention of cognitive bias in the NJSP SOPs, and we have no evidence that the NJSP employs any bias mitigation procedures. Thus, while SOPs should "arm analysts with the tools needed to make educated and empirically supported decisions and reduce inter- and intra-analyst variability," the NJSP SOPs here simply do not. National Institute of Standards and Technology, Forensic DNA Interpretation and Human factors: Improving Practice Through a Systems Approach 28 (2024), available at https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8503.pdf?utm. As the proponent of the evidence, the State is required to establish the reliability and admissibility of the evidence it seeks to admit. Because the NJSP SOPs are too meager and too permissive to fulfill their function of guiding examiner and verifier discretion, the State cannot demonstrate the as-applied validity of the ballistics analysis that was performed in Mr. Caneiro's case.

D. The ballistics examination that was performed in this case also fails to meet the requirements of N.J.R.E. 401 and 403.

N.J.R.E. 401 defines "relevant evidence" as "evidence having a tendency in reason to prove or disprove any fact of consequence to the determination of the action." N.J.R.E. 403 bans the admission of evidence that is substantially more prejudicial than probative. As the Court unequivocally held in Olenowski I, "an expert opinion that is not reliable is of no assistance to anyone." 253 N.J. at 150. Indeed, an "expert" opinion has no probative value at all if it is not based on a sound scientific methodology that has been demonstrated to have been reliably applied in this case. At the same time, expert opinions are incredibly prejudicial, especially because of the amount of deference and trust juries give to so-called expert testimony. State v. Jamerson, 153 N.J. 318, 342 (1998) ("The aura of special reliability and trustworthiness surrounding expert testimony, which ought to caution its use, especially when offered by the prosecution in criminal cases, poses a special risk when it involves the question of a defendant's guilt." (internal quotation marks

omitted)); see also Mark A. Godsey & Marie Alao, She Blinded Me with Science: Wrongful Convictions and the "Reverse CSI Effect," 17 Tex. Wesleyan L. Rev. 481, 495 (2011) (noting that "jurors in this country often accept state forensic testimony as if each prosecution expert witness is the NASA scientist who first put man on the moon").

Here, because there is no evidence as to what method(s) was applied or if that method(s) was adhered to at each and every stage, the State's proffered expert testimony is simply not relevant. Even if an expert's opinion—offered without any support or justification—were relevant, this "just-trust-me" opinion not based on facts or data would clearly be substantially more prejudicial than probative given the great weight jurors lend to anyone called as an expert witness at trial. Thus, in addition to being inadmissible under Rule 3:13-3, N.J.R.E. 702, and N.J.R.E. 703, the ballistics evidence is also inadmissible at Mr. Caneiro's trial because it violates both N.J.R.E. 401 and 403.

CONCLUSION

Because of the lack of any meaningful information about how the examiner reached his conclusions, the complete lack of information about the peer review of those conclusions, the absence of quality assurance mechanisms that provide some assurance of quality work, the lack of information as to whether the examiner or the verifier received any biasing information before or during their review, and the lack of standard operating procedures that fulfill their function of guiding examiner and verifier discretion to ensure reliable results, there are insufficient case-specific indicia of reliability to allow the admission of the firearm and toolmark identification evidence at Mr. Caneiro's trial. As a result of the State's failure to comply with our discovery

rules, meet the requirements of N.J.R.E. 703, or demonstrate the reliability of the ballistics analysis that was done in this case, any testimony as to the ballistics analysis must be excluded.

Respectfully submitted,

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