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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF OREGON

PORTLAND DIVISION

UNITED STATES OF AMERICA,	Case No. 3:17-cr-00226-JO
Plaintiff,	
vs.	**DEFENDANT'S MOTION TO EXCLUDE THE EXPERT REPORTS AND TESTIMONY OF FRANK PIAZZA, VICTORIA DICKERSON, MICHAEL HAAG, KEVIN TURPEN, AND TOBY TERPSTRA**
W. JOSEPH ASTARITA,	
Defendant.	

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W. Joseph Astarita, though counsel, moves this Honorable Court to exclude from trial

any testimony, reports, or exhibits offered by the government relating to the analyses of proposed

experts Frank Piazza, Victoria Dickerson, Michael Haag, Kevin Turpen, and Toby Terpstra. In

support of this motion, it is stated as follows:

INTRODUCTION

The government's theory of the case is predicated on Special Agent Astarita having fired

the bullet that caused the defect on the roof of Mr. Finicum's truck on January 26, 2016

("Round 5"), an assertion that Special Agent Astarita denies. Because the government has no

photographic, video, ballistic, or eyewitness proof that Special Agent Astarita fired his weapon,

this assumption rests entirely on the proposed testimony of so-called experts. The government

presents a daisy-chain of purported experts, each of whom comes from a completely different

background. These experts depend upon one another ultimately to create two different "visual

reconstructions," allegedly showing that Special Agent Astarita was the most likely person to

have fired Round 5. *These two "reconstruction" attempts are built upon a series of heretofore

unheard-of steps, none of which withstands scientific scrutiny on its own, much less in

combination.* The Court should exclude both reconstruction attempts, and all of the underlying

inputs, because they are riddled with unaccounted-for errors and are thus unreliable under

Federal Rule of Evidence 702, *Daubert*, and its progeny. They should also be excluded as

unduly prejudicial under Federal Rule of Evidence 403.

The government's two reconstruction experts are Kevin Turpen, a Deschutes County

patrol deputy, and Toby Terpstra, a forensic animator at a private accident reconstruction firm in

Denver, Colorado. Both of these purported experts attempted to reconstruct the scene at the

precise moment when Round 5 was fired. To do so, they relied on the government's proposed

audio/video ("AV") expert Frank Piazza to determine the timing of Round 5 in two different

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videos of the incident: (1) a camcorder video taken by a passenger in Mr. Finicum's truck ("Cox Video"); and (2) FBI aerial footage ("FBI Video"). Mr. Piazza analyzed the audio track of the Cox Video for evidence of recorded gunshot sounds, attempted to synchronize the Cox Video with the FBI Video, and then attempted to associate a single frame of the FBI Video with what he, *in consultation with the prosecution team*, identified as the sound of Round 5 in the Cox Video.

Although Messrs. Turpen and Terpstra both used Mr. Piazza's AV analysis as the starting point for their respective reconstruction attempts, their other inputs were very different. Mr. Turpen created several diagrams of the shooting scene ("Diagrams") based on multiple flawed inputs including: (1) Oregon State Police ("OSP") forensic analyst Victoria Dickerson's measurements of the angle of Mr. Finicum's truck as it continued to settle in the snow long after Round 5 was fired; (2) Mr. Turpen's flawed and imprecise visual estimation of the locations of one OSP trooper and two FBI agents in the FBI Video; and (3) Ms. Dickerson's flawed estimation of the bullet path. Mr. Terpstra created a three-dimensional model of the shooting scene ("Model"), which was also based on multiple flawed inputs including: (1) Michael Haag's flawed estimation of the bullet path; (2) poor quality photographs and video stills; and (3) Mr. Terpstra's flawed camera matching "photogrammetry" analysis of the FBI Video, which he used to manually place his computer models of the vehicles and law enforcement officers into his Model.

According to the government, Messrs. Turpen and Terpstra used completely different methods to produce two totally different yet allegedly "accurate" reconstructions. The fact that the government is presenting two different reconstructions in this case suggests that it knows that something is terribly wrong here. The Court cannot allow experts to present conclusions on such

important issues in a criminal trial without ample assurances of reliability. The government and its purported experts have failed to provide such assurances here, both as to the ultimate reconstruction attempts as well as to the underlying inputs upon which Messrs. Turpen and Terpstra relied.

As explained below, the Court should exclude the underlying inputs of Mr. Piazza's AV analysis, Ms. Dickerson's trajectory analysis, and Mr. Haag's trajectory analysis because they are each based on unsound methodologies and extrapolations. The Court should also exclude Mr. Turpen's Diagrams and Mr. Terpstra's Model because their methodologies and the inputs they used are fatally flawed.

LEGAL STANDARD

The burden is on the government to establish by a preponderance of the evidence that its proposed expert testimony satisfies Rule 702. *See Bourjaily v. U.S.*, 483 U.S. 171, 175-76 (1987). *In Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993) (*Daubert I*), the Supreme Court "charged district courts with the duty to act as 'gatekeepers,' to ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable." *Hall v. Baxter Healthcare Corp.*, 947 F. Supp. 1387, 1396 (D. Or. 1996) (citing *Daubert I,* 509 U.S. at 597–98).[1] The district court's gatekeeper task consists of several different inquiries. *Id.* First, the Court must determine whether the expert is qualified by special knowledge in the relevant area of expertise. *Id*. at 1393. Second, the Court must determine whether the underlying methodology is "scientifically valid and therefore reliable." *Id*. at 1396. Third, the Court must ensure that the expert has faithfully applied the methodology. *Id*. at 1397, 1400-01. Fourth, the

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[1] In *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 141 (1999)*,* the Court held the gatekeeping function is not limited to "scientific" expert testimony, but applies to all expert testimony.

Court must find that the proposed testimony "fits" the data and methodology cited. *Id*. at 1397,

1407, 1411. Finally, under Rule 403, the district court must weigh the probative value of the

proposed testimony against the danger of unfair prejudice. *See Daubert I*, 509 U.S. at 595.

I.   Qualifications

Rule 702 requires a proposed expert witness to be "qualified as an expert by knowledge,

skill, experience, training, or education." Fed. R. Evid. 702. To determine whether a proposed

expert is sufficiently qualified, courts consider education, experience, and specialized training.

See Jinro America Inc. v. Secure Investments, Inc., 266 F.3d 993, 1005-06 (9th Cir. 2001)

(excluding proposed expert testimony on Korean business culture and practices where expert

"had no education or training as a cultural expert generally, or as an expert on Korean culture

specifically"). If the expert relies primarily or solely on his experience, he "must explain how

that experience leads to the conclusions reached, *why that experience is a sufficient basis for the*

opinion, and how that experience is reliably applied to the facts." *In re Toyota Motor Corp.*

Unintended Acceleration Mktg., Sales Practices, and Prods. Liab. Litig., 978 F. Supp. 2d 1053,

1067 (C.D. Cal. 2013) (quotations and citations omitted) (emphasis in original). General

experience in a wide field does not qualify a person to opine on every specific subject. *See U.S.*

v. Chang, 207 F.3d 1169, 1172-73 (9th Cir. 2000) (upholding exclusion of expert with general

experience in international finance but no specific training in identifying counterfeit foreign

securities). Rather, the proposed testimony must have "a reliable basis in the knowledge and

experience of the relevant discipline." *Estate of Barabin v. AstenJohnson, Inc.*, 740 F.3d 457,

463 (9th Cir. 2014) (quotations and citations omitted).

II.   Valid and Reliable Methodology

Under Rule 702, *Daubert I*, and its progeny, "expert scientific opinion is admissible if it

qualifies as 'scientific knowledge' and is therefore sufficiently 'reliable.'" *Baxter*, 947 F. Supp.

at 1396 (quoting *Daubert I, 509* U.S. at 589–90). Thus, the Court must determine whether the

proposed testimony "reflects scientific knowledge, constitutes good science, and was derived by

the scientific method." *Id.* (quotations and citations omitted). The terms "reliable," "scientific,"

and "knowledge" are terms of art in this analysis. "Reliable" refers to "*evidentiary reliability*"

which is "based upon *scientific validity*." *Daubert I,* 509 U.S. at 590 n.9 (emphasis in original).

"'[S]cientific' implies a grounding in the methods and procedures of science." *Id.* at 590.

"'[K]nowledge' connotes more than subjective belief or unsupported speculation." *Id.* "[T]o

qualify as 'scientific knowledge,' an inference or assertion must be derived by the scientific

method." *Id.*

A non-exclusive list of factors for the Court to consider in this regard includes:

(1) general acceptance in the relevant scientific community; (2) peer review and publication;[2]

(3) existence and maintenance of standards controlling the operation of the

technique/methodology; (4) empirical testing;[3] and (5) known or potential error rate. *See*

Daubert I, 509 U.S. at 592-94; *Daubert II*, 43 F.3d at 1316-17; *Baxter*, 947 F. Supp. at 1396-97.

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[2] "Peer review and publication weigh heavily in the calculus of the reliability of expert testimony
because [it] 'increases the likelihood that substantive flaws in methodology will be detected.'"
Baxter, 947 F. Supp. at 1406 (quoting *Daubert I,* 509 U.S. at 594). To "rise to the level of
publication or peer review contemplated in *Daubert*," it must "bear directly on the issues before
[the] court" and be subject to the "usual rigors of peer review employed in scientific and
academic communities." *Harrison v. Howmedica Osteonics Corp.*, 2008 WL 906585, at *14-15
(D. Ariz. Mar. 31, 2008) (quotations and citations omitted). If the expert's research has not been
subjected to peer review, he must "point to some objective source—a learned treatise, the policy
statement of a professional association, a published article in a reputable scientific journal or the
like." *Daubert v. Merrell Dow Pharmaceuticals, Inc., 43* F.3d 1311, 1319 (9th Cir. 1995)
(*Daubert II*).

[3] There must be evidence indicating the methodology "can be or has been tested," otherwise, it is
"simply a subjective, conclusory approach that cannot reasonably be assessed for reliability."
City of Pomona v. SQM N. Am. Corp., 750 F.3d 1036, 1046 (9th Cir. 2014).

As discussed in the sections that follow, the government's proposed expert testimony utterly fails to withstand scrutiny in light of these factors. For example, a pervasive problem with virtually every step of the purported experts' analyses is the failure to establish a reliable error rate (or to establish any error rate at all). In that regard, the relevant inquiry is whether the margin of error claimed by the proposed expert is properly supported and connected to an "objective source." *In re Countrywide Fin. Corp. Mortg.-Backed Sec. Litig.*, 984 F. Supp. 2d 1021, 1037 (C.D. Cal. 2013); *United States v. Saelee*, 162 F. Supp. 2d 1097, 1102 (D. Alaska 2001) (concluding that studies did not conclusively establish that forensic handwriting examiners can reliably do what they say they can do). If a methodology has "no *controlling* standards to ensure proper protocol," it cannot have a reliable error rate. *See United States v. Cordoba*, 991 F. Supp. 1199, 1208 (C.D. Cal. 1998), *aff'd*, 194 F.3d 1053 (9th Cir. 1999) (emphasis in original). Likewise, if a methodology has not been tested, it cannot have a reliable error rate. *See United States v. Frabizio*, 445 F. Supp. 2d 152, 166 (D. Mass. 2006). The lack of a known error rate is an especially important consideration in the Court's gatekeeper calculus because it "prevents the jury from assessing the proper level of deference to accord the expert's conclusions." *Id.* Exclusion is "especially pertinent" where the proposed expert testimony consists of "an array of figures conveying a delusive impression of exactness in an area where a jury's common sense is less available than usual to protect it." *Herman Schwabe, Inc. v. United Shoe Mach. Corp.*, 297 F.2d 906, 912 (2d Cir. 1962) (Friendly, J.).

III.   **Faithful Application of the Methodology**

The proponent of expert testimony must "demonstrate in some objectively verifiable way that the expert has both chosen a reliable scientific method and *followed it faithfully*." *See Daubert* II, 43 F.3d at 1319 n.11 (emphasis added). "When a scientist claims to rely on a method practiced by most scientists, yet presents conclusions that are shared by no other scientist, the

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district court should be wary that the method has not been faithfully applied." *Lust v. Merrell Dow Pharmaceuticals, Inc.,* 89 F.3d 594, 598 (9th Cir. 1996).

Critically important here, "the requirement of reliability, or 'good grounds,' extends to each step in an expert's analysis all the way through the step that connects the work of the expert to the particular case." *Baxter*, 947 F. Supp. at 1397 (quotations and citations omitted). The Court "should not ignore any step in [the expert's] process, but must ensure that in each step, from initial premise to ultimate conclusion, the expert faithfully followed valid scientific methodology." *Id.* at 1401. "*[A]ny* step that renders the analysis unreliable under the *Daubert factors renders the expert's testimony inadmissible. This is true whether the step completely changes a reliable methodology or merely misapplies that methodology.*" *In re Paoli R.R. Yard PCB Litigation,* 35 F.3d 717, 745 (3d Cir. 1994) (*Paoli II*) (emphases in original).

IV.   Whether the Proposed Testimony "Fits" the Data and Methodology

Finally, the Court must determine whether the expert's proposed testimony "fits" the data and methodology upon which the expert claims to rely. *Baxter*, 947 F. Supp. 1397, 1407, 1411. "[T]he expert's view that a particular conclusion 'fits' a particular case must itself constitute scientific knowledge." *Paoli II,* 35 F.3d at 746. Courts, of course, recognize that "scientific validity for one purpose is not necessarily scientific validity for other, unrelated purposes." *Id.* at 743 (quotations and citations omitted). If the proposed testimony makes "too great a leap of faith from the scientific knowledge currently available," the Court must exclude it. *Baxter*, 947 F. Supp. at 1411. Likewise, the Court "need not accept, as scientifically reliable, any conclusion that good science does not permit to be drawn from the underlying data but which, instead, constitutes unsupported speculation, or . . . a leap of faith." *Id.* at 1401 (quotations and citations omitted). While "experts commonly extrapolate from existing data . . . . nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that

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is connected to existing data only by the *ipse dixit* of the expert." *See General Electric v. Joiner*, 522 U.S. 136, 146 (1997) (upholding district court's decision to exclude proposed expert testimony about human cancer based solely on animal studies conducted under vastly different conditions).

<div align="center">ARGUMENT</div>

I.   The Court Should Exclude Frank Piazza's Audio and Video Analyses

Frank Piazza is the President of Legal Audio Video, a New York production company. The government proposes to offer Mr. Piazza as an expert in several different kinds of AV analysis, including acoustic gunshot analysis. The government asked Mr. Piazza to perform five different tasks in connection with the Cox Video and FBI Video:

- *First*, the government asked Mr. Piazza to examine the audio track of the Cox Video for evidence of recorded gunshots.

- *Second*, the government asked Mr. Piazza to create a synchronized version of the Cox Video and the FBI Video ("Synchronized Video").

- *Third*, the government asked Mr. Piazza to identify in his Synchronized Video the exact frame associated with Round 5.

- *Fourth*, the government asked Mr. Piazza to "enhance" the FBI Video.

- *Fifth*, the government asked Mr. Piazza to review portions of the FBI Video recorded in infrared mode, and to generate "spotting notes" (i.e., his own subjective observations) regarding what he saw.

In connection with these five tasks, Mr. Piazza generated numerous exhibits, which OIG Special Agent Cunningham presented to the grand jury on January 26, 2017. Agent Cunningham described Mr. Piazza's methodology to the grand jury as follows:

- "[The government] wanted a true syncing . . . . We supplied [Mr. Piazza] the videos and he worked with us." *See* Declaration of Bruce Koenig ("Koenig Decl.") Ex. 2 (Cunningham Testimony) at WJA 299.

- "[Mr. Piazza] was able to hook [the audio track of the Cox Video] up to some kind of

audio spectrometer and confirm that we have eight distinct gunshots." *Id*. at WJA 321.

- "[The Synchronized Video shows] where everybody is standing [at the time of Round 5]. That was what was so important about syncing this accurately, so that when I push pause [at the frame associated with Round 5] you hear it and you can see it." *Id*.

- "The [government's] order to [Mr. Piazza for enhancing the FBI Video] was to see if [he] could get flash or a muzzle rise or recoil rise [at the time of Round 5]. And just because [the FBI Video] was too shaky, [he] was not able to do that." *Id*. at WJA 328.

For the reasons explained below, each and every aspect of Mr. Piazza's proposed

testimony fails to satisfy the reliability threshold required by Rule 702, *Daubert I*, and its

progeny. In addition, the minimal probative value of the proposed testimony is far outweighed

by the certainty that it will greatly prejudice and mislead the jury. Therefore, the Court should

also exclude Mr. Piazza's proposed testimony under Rule 403.

A.   Piazza's Audio Analysis of the Cox Video is Not Reliable

The government asked Mr. Piazza "to perform analysis on the audio [track of the Cox

Video] to determine and confirm certain events," specifically, eight gunshots. Report of Frank

Piazza (Jan. 29, 2018) ("Piazza Report") at WJA 87680.[4] There is an insurmountable analytical

gap, however, between Mr. Piazza's proposed testimony regarding these gunshots and the

methodology he used to examine the Cox Video. Specifically, as defense expert Bruce Koenig

explains, "it is not possible to scientifically associate any part of the Cox Video track with

gunshots" based on the methodology that Mr. Piazza used. Koenig Decl. ¶ 24. As Mr. Koenig

explains, "[i]n order to make a forensically valid association, it would be necessary for an

examiner trained in gunshot analysis to conduct the additional procedures described in subpart C

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[4] The relevant reports and *curricula vitae* for the government's experts, as well as the government's December 1, 2017 Expert Witness Summary Letter ("Gov't Summary Letter") are collectively attached as Exhibit 1.

[of Mr. Koenig's declaration]." *Id.* Mr. Piazza lacks that expertise, and he did not conduct those procedures.

Mr. Piazza has conceded that he is not an expert in gunshot analysis. Koenig Decl. ¶ 23. By contrast, Mr. Koenig has been "involved in conducting scientific examinations of recorded gunshots for over 40 years." Koenig Decl. ¶ 15. As Mr. Koenig explains, "[s]cientific examinations of recorded gunshot events are complex analyses" that require the use of multiple forensic techniques including "critical listening, high-resolution waveform analysis, and specialized computer analysis tools such as correlation." *Id.* ¶ 16. Mr. Piazza did not use any of these techniques; his analysis was limited to generating spectrograms, audio exhibits, and low-resolution waveform displays. *Id.* ¶ 23. As Mr. Koenig's declaration explains, however, spectrograms do not provide "accurate information regarding [gunshot] timing." *Id.* ¶¶ 20-21. Further undercutting the rigor of Mr. Piazza's analysis is his failure to maintain work notes describing the procedures he used. *Id.* ¶ 23. Perhaps most shocking of all is Mr. Piazza's admission that, in the end, the decision to associate certain sounds with gunshots was "mutually decided" in a meeting between Mr. Piazza, a government attorney, and a government agent. *Id.*

In light of all this, the Court should exclude Mr. Piazza's proposed testimony regarding gunshots on the Cox Video for multiple reasons. First, Mr. Piazza's description of the meeting that he had with the government agent and attorney is both shocking and immediately disqualifying, as it utterly undercuts the independence and objectivity of his work. Second, Mr. Piazza's gunshot conclusions do not "fit" either his qualifications (he is admittedly not a gunshot expert) or his methodology (he did not perform a forensic gunshot analysis). Third, the potential for prejudicing and misleading the jury outweighs the probative value (if any) of his proposed testimony. The government would have the jury believe that "Mr. Piazza identified 8 rounds

from the audio of Ms. Cox's video recording . . . . [which are] individually labeled in his

provided audio spectral analysis image." Report of Toby Terpstra (Nov. 30, 2017) ("Terpstra

Report") at 1-2. For the reasons explained above, this is not an accurate characterization of Mr.

Piazza's analysis.

B.   Piazza's Synchronized Video Is Not Reliable

As Mr. Koenig explains, there are many steps that an expert should use when attempting

to synchronize videos. Koenig Decl. ¶ 33. It is unclear whether Mr. Piazza followed those steps,

because the Piazza Report fails to specify the methodology that he used, and Mr. Piazza could

not provide this information to Mr. Koenig because he did not maintain contemporaneous work

notes. Koenig Decl. ¶¶ 29-31. Mr. Piazza informed Mr. Koenig that these procedures involved

"conduct[ing] visual and aural reviews, as appropriate." *Id.* at ¶ 31. Mr. Piazza also informed

Mr. Koenig that he "made no measurements." *Id.* The limited information that Mr. Piazza

provided is insufficient for Mr. Koenig (or the Court) to evaluate the "methodology behind or the

accuracy of Mr. Piazza's synchronization." *Id.* In order to do so, Mr. Koenig (and the Court)

would need to know: (1) the exact frames in the Cox Video and FBI Video that Mr. Piazza

considered to be a "match"; (2) the image files of the "matching" frames selected from each

video; and (3) the reasons why Mr. Piazza considered these frames to be a "match." *Id.* Mr.

Piazza apparently cannot provide that information.

It is also noteworthy that the FBI Audio Video lab conducted its own synchronization of

the Cox Video and the FBI Video. When Mr. Koenig compared the FBI's synchronization to

Mr. Piazza's Synchronized Video, he found "a five-frame difference between the files," *id.* ¶ 35,

which is significant given the importance of identifying the precise frame in which Round 5 was

allegedly fired, *see* Koenig Decl. Ex. 2 (Cunningham Testimony) at WJA 321 ("That was what

was so important about syncing this accurately, so that when I push pause [at the frame

associated with Round 5] you hear it and you can see it.").

The Court should exclude Mr. Piazza's Synchronized Video because his inadequate documentation prevents the defense—and the Court—from evaluating his methodology, obfuscates potential problems, and frustrates cross-examination that could further shed light on those problems. Mr. Piazza's proposed testimony should also be excluded because it fails to state any error rate, which would mislead the jury because, as Mr. Koenig points out, any attempt to synchronize two different videos by "comparing images between two video files always has an inherent error rate." *Id*. ¶ 32. Indeed, the chances of error are heightened when the synchronization involves an audio/video file (such as the Cox Video) and a video only file (such as the FBI Video) because "the individual images will never match." *Id*. The potential for misleading the jury therefore dramatically outweighs whatever minimal probative value may be inherent in the Synchronized Video.

C.   Piazza's Enhancement of the FBI Video Is Not Reliable

In addition to generating the Synchronized Video, Mr. Piazza generated multiple "enhanced" versions of the FBI Video. According to the government, Mr. Piazza "zoomed, centered, and enhanced the FBI footage for clarity and stability." *See* Gov't. Expert Summary at 4. Mr. Piazza also created "separate, slow-motion copies of the enhanced video, and placed colored circles around individual HRT operators and certain OSP SWAT members to make it easier for viewers to track their movement and positioning in the [FBI Video]." *Id*. Agent Cunningham presented these enhanced versions of the FBI Video to the grand jury as exhibits 34A, 34C, 34D, 34E, 34F, 34G, 34H, and 34J. *See* Koenig Decl. ¶ 45.

Mr. Piazza used a software program to perform his "analysis, editing, and enhancement" of the FBI Video. *See* Piazza Report at 8. When Mr. Koenig asked Mr. Piazza what software settings he used, however, Mr. Piazza could not provide that critical information because "he did

not keep a list of the settings and the locations where he edited and/or enhanced the FBI Video." *Id.* ¶ 47. "Without this information, [Mr. Koenig] cannot properly evaluate [Mr. Piazza's] methodology and determine all of the effects produced by the enhancement and editing processes." *Id.*

The Court should exclude Mr. Piazza's "enhancements" of the FBI Video because his inability to describe his specific methodology prevents the defense—and the Court—from digging more deeply into his methodology, obfuscates potential problems, and frustrates cross-examination. In addition, the potential for prejudicing the jury outweighs the probative value (if there is any at all) of Mr. Piazza's proposed testimony regarding his "enhancements."

D.   Piazza's "Spotting Notes" are Not Based on Scientific Principles

In connection with his review of the FBI Video, Mr. Piazza generated a document titled "Spotting Notes." *See* Koenig Decl. Ex. 5. This document consists of 28 still frames from the FBI Video that were recorded after dark on January 26, 2016, with the camera in infrared mode. *Id.* Under each frame, Mr. Piazza has made notes such as, "man inspects road in front of dog" and "man picks up object at roadside." *Id.* Mr. Koenig reviewed this document and determined that Mr. Piazza's "notes are not based on known measurements or other forensic analyses" and "do not represent scientific findings." Koenig Decl. ¶ 49.

The Court should exclude Mr. Piazza's "Spotting Notes" because they are based on nothing more than his subjective beliefs and unsupported speculation, and they would improperly intrude upon the province of the jury, which can determine for itself what the images in question show.

II.   The Court Should Exclude Victoria Dickerson's Trajectory Analysis

Victoria Dickerson is an analyst with the Oregon State Police Forensic Laboratory who will testify as follows:

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> The bullet [that caused Impact W] entered and passed through the roof and headliner. The measured trajectory indicated the bullet was traveling at a 20° downward angle and from left to right at an angle measured 35° left of midline. If the trajectory continued in a straight line, the bullet would have impacted the rear driver side window. No bullet fragments were recovered in the vehicle.

See Declaration of Matthew Noedel ("Noedel Decl.") Ex. 1 (March 28, 2016 Report of Victoria Dickerson) at WJA 3199. For the reasons explained below, Ms. Dickerson's proposed testimony is not reliable under Rule 702, *Daubert I*, and its progeny. Ms. Dickerson's analysis should also be excluded under Rule 403 because its probative value (if there is any value at all) is substantially outweighed by the danger of confusing, misleading, and prejudicing the jury.

A.   Dickerson's Centering Cone Method Is Not a Reliable Method for Measuring the Trajectory of the Round that Caused "Impact W"

Ms. Dickerson used a method known as the Centering Cone Method to estimate the path of the bullet that caused Impact W. *See* Noedel Decl. ¶¶ 37-43. As defense trajectory expert Matthew Noedel explains, Ms. Dickerson's application of this method to Impact W was not reliable. The Centering Cone Method can only be reliably applied where "the bullet hole shape [is] elliptical, symmetric, and reliably reproducible." *Id*. ¶ 41. Impact W does not fit this profile. *Id*. Rather, Impact W has many unusual features, including: (1) "an asymmetric tear or tab at the start of the opening of the defect," *id*. ¶ 22; (2) "an atypically long example of a pinch point," *id*. ¶ 20; and (3) "a curved partial ovoid raised lip . . . at the upper end of the defect," *id*. ¶ 24. According to Mr. Noedel, all of these unique characteristics of Impact W make the Centering Cone Method a very poor fit for Impact W. *Id.* ¶ 41. It is also telling that Mr. Haag (the government's other proffered trajectory expert) specifically chose *not* to use the Centering Cone Method after he saw that Ms. Dickerson had done so.

Mr. Noedel also criticizes Ms. Dickerson for assuming that "there was no secondary deflection or fragmentation of the fired bullet that caused [Impact W]." *Id*. ¶ 43. As noted above,

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Ms. Dickerson simply assumed that the bullet continued in a "straight line" after impact.

According to Mr. Noedel, however, "[t]he raised lip area [of Impact W] suggests that the bullet

(or part of the bullet) had deflected creating an upward push of metal along the otherwise

downward bullet path." *Id.* ¶ 24. Mr. Noedel also observed that "it is unknown how much the

bullet fragmented or how much the bullet changed direction upon perforation of the roof." *Id.*

¶ 18. All of these unusual features of Impact W make the Centering Cone Method an unreliable

technique for measuring the trajectory of the round in question.

      B.   **Dickerson's Stated Uncertainty of ±5 Degrees is Unsupported and Unreliable**

Mr. Noedel also concluded that Ms. Dickerson failed to state a scientifically sound

uncertainty range for her estimated bullet path. Ms. Dickerson used a ±5 degrees uncertainty

range, which she derived from a study that the government's other trajectory expert, Michael

Haag, conducted in 2008 ("2008 Study"). *See* Declaration of Alexander Jason ("Jason Decl.")

Ex. 1 (Haag, Michael, "The Accuracy and Precision of Trajectory Measurements," AFTE

Journal Vol. 40 No. 2, Spring 2008, 145-182). However, Ms. Dickerson's extrapolation of the

±5 degrees uncertainty range from Mr. Haag's 2008 Study is not scientifically reliable, given the

unique characteristics of Impact W. As Mr. Noedel points out, Ms. Dickerson failed to

recognize that "the properties of [Impact W] are different than the properties described in Haag's

2008 study." *Id.* ¶ 61. For example, Impact W is a "shallow, low angle perforation[] to car

metal," unlike any of the specimens in the 2008 Study. *Id.* ¶ 55. Therefore "the ±5 degree rate

of error is inappropriate to apply" to Ms. Dickerson's estimate. *Id.* ¶ 61. Indeed, Mr. Noedel

believes that this error rate *greatly* underestimates the true error associated with Ms. Dickerson's

estimate of the path of the bullet that caused Impact W:

> Because of the atypical nature of impact "W", the known
> unreliability of car metal, and the potential that the path of the
> bullet may have deflected somewhat while breaking apart upon

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> impact, the potential error for the use of this technique for impact
> "W" is likely ***much greater*** than the reported ±5 degrees.

Id. ¶ 42 (emphasis added).

III.   The Court Should Exclude Michael Haag's Trajectory Analysis

Michael Haag is a Senior Forensic Scientist with the Albuquerque, New Mexico Police

Department (as well as a private consultant) who will testify as follows:

> [Impact W] is a shallow angle impact with several common
> features that reliably establish direction of travel, azimuth angle,
> and vertical angle. The perforation is regular, meaning that
> characteristics such as the symmetrical parabolic shape at the
> entrance side of the hole reflects the fact that the bullet was stable,
> undeformed, and intact. . . . The bullet perforated a series of layers
> of the interior cab headliner and continued out of the vehicle
> through the area of the left rear tempered glass window. No
> additional bullet fragments or impact sites were observed inside
> the vehicle.
>
> As is common with shallow angle impacts on horizontal sheet
> metal, the most accurate method of azimuth angle determination
> requires that a trajectory rod be placed down the central axis of the
> parabola at the entry side of the impact, while the vertical angle is
> determined by establishing the end of the trajectory rod firmly in
> the rocker point, which is directly over the pinch point in this case.
> A trajectory rod was placed in this manner at the perforation . . . .
> This bullet was travelling from the rear of the vehicle towards the
> front, from the right side to the left with a 58 degree angle between
> the trajectory and the centerline of the vehicle. The downward
> component of this path was 9 degrees.

See Noedel Decl. Ex. 2 (November 21, 2017 Report of Michael Haag) at 13-15.

Because Mr. Haag's methodology bears none of the hallmarks of admissibility—it is

untested, has never been peer-reviewed, has not been adopted by the scientific community, and

has no known error rate—the Court should not permit him to present his opinions to the jury

under the guise of science. His opinion does not pass muster under Rule 702, *Daubert*, and its

progeny. Mr. Haag's trajectory analysis should also be excluded under Rule 403 because its

probative value (if there is any value at all) is substantially outweighed by the danger of unfairly

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prejudicing and misleading the jury.

A.   Haag's Characterization of "Impact W" as "Regular" is Inaccurate

Mr. Haag's description of Impact W as "regular" and having "common features," *see*

Noedel Decl. Ex. 2 (Report of Michael Haag) at 13, is not accurate. As explained by defense

experts Matthew Noedel and Alec Jason, Impact W is actually highly unusual and atypical. *See*

Noedel Decl. ¶¶ 20-26, 62; Jason Decl. ¶¶ 10-13. Mr. Jason observed that Impact W is a "non-

regular, non-typical defect" with many "features and characteristics which make it unsuitable for

the standard method of analysis." Jason Decl. ¶ 13.

Mr. Jason noted many unique characteristics of Impact W by contrasting its odd shape to

that of Impact T on the hood of Mr. Finicum's truck. *Id*. ¶ 11. First, he noted that Impact W is

"almost twice as wide and twice as long" as Impact T. *Id*. In addition, he noted that Impact W

has "an asymmetrical 'landing tab' . . . an everted, pushed-out edge at the far end of the defect

. . . [and] a 'keyhole' shape." *Id*. By contrast, Impact T has "a symmetrical 'landing tab' . . . a

pushed-in, inverted edge at the far end . . . [and no] second ovoid [i.e., keyhole] shape. *Id*.

In his declaration, Mr. Jason also raised the following important issues that Mr. Haag

apparently failed to consider in his preliminary assessment of Impact W:

> a.   The apparent copper transfer . . . on the raised, everted edge
> is consistent with a bullet yawing (flying somewhat tilted)
> at some point before striking the far edge . . . possibly
> breaking the bullet into two or more pieces, with one
> fragment traveling over the roof while the other fragments
> went inside the truck.

> b.   The physical evidence is consistent with the bullet that caused
> defect "W" breaking into multiple fragments. ***This fact appears to
> be overlooked or ignored [by Mr. Haag]***. The photos showing the
> truck cab's interior roof fabric . . . does not have one bullet hole. It
> has several small defects consistent with pieces of the fragmented
> bullet entering the truck cab; not a single, intact bullet.

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       c.   [I]t is also possible the bullet that caused the gaping defect did not enter into the defect at all but continued traveling over the truck. (I have personally seen this dynamic with a .223 bullet against a car body).

Id. ¶ 12 (emphasis added). According to Mr. Jason, Mr. Haag should have—but did not—consider these features and possibilities in his preliminary analysis of Impact W. *Id*. ¶¶ 10, 12.

Instead, Mr. Haag inexplicably chose to ignore all of these unusual features and unanswerable questions that make Impact W unsuitable for standard analysis.

B.   Haag's Rocker Point Method Is Untested, Unreliable, and Has No Established Error Rate

To estimate the path of the bullet that caused Impact W, Mr. Haag did not rely on any established, tested, peer-reviewed methodology; instead, he apparently came up with a method out of whole cloth ("Rocker Point Method"). Mr. Haag's use of the Rocker Point Method to estimate the path of the bullet that caused Impact W is unreliable for multiple reasons. He has provided no scientific support for this method, either in general or as applied to Impact W. Mr. Haag has never published any studies on the Rocker Point Method nor has he cited any such studies published by others. If he has conducted any testing or experiments on the Rocker Point Method, Mr. Haag has done so on his own, without seeking formal feedback from his peers in the forensic community or vetting his results through publication.[5] Finally, Mr. Haag's subjective application of the Rocker Point Method to Impact W introduces a host of potential errors given the unique characteristics of Impact W. *See supra* Part V.A.

Defense experts Noedel and Jason convincingly debunk the Rocker Point Method as a

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[5] The government has failed to produce any expert to cosign Mr. Haag's use of the novel, unpublished, and untested Rocker Point Method to estimate the path of the bullet that caused Impact W. It is noteworthy that the government's initial trajectory expert, Victoria Dickerson, used a completely different method (the Centering Cone Method) to estimate the same path.

scientifically valid methodology for estimating the path of the bullet that caused Impact W. As

described by Mr. Noedel, the Rocker Point Method involves multiple interpretive steps based on

the subjective "feel" of the examiner:

> The rocker point refers to an area of indentation at the front of the
> bullet impact location; the rod itself never enters or is involved
> with the actual perforation of car metal. ***The rod is then rolled
> back and forth and side to side until the examiner finds a
> position where the end of the rod feels "settled" into the rocker
> indentation.*** While the rod is held in this position, angle
> measurements are recorded and back-tracked to estimate the area
> of origin.

Noedel Decl. ¶ 10 (emphasis added). This subjective "feel" method is a far cry from the

type of objective, reliable, and verifiable process that can make it past *Daubert's*

reliability "gate." Mr. Jason agrees with Mr. Noedel that the Rocker Point Method is not

a reliable technique for estimating the bullet path associated with Impact W:

> Mr. Haag's method of determining an azimuth and vertical angle
> by use of a "rocker point" method is not a reliable method to
> accurately determine bullet entry angles in vehicle bodies. There
> are many unknown variables which could affect the formation of
> the lead-in groove or "rocker point" which [Mr. Haag did not
> consider, including]: [t]he amount of 'bounce back' or elasticity of
> the truck roof steel . . . . [t]he presence of a support structure under
> the area of the roof defect . . . that could affect the shape of the
> groove . . . . [and] points in the roof steel that still retain stress
> from the high pressure sheet metal stamping or bending processes
> during the manufacturing.

Jason Decl. ¶ 14.

The Rocker Point Method fails to pass scientific muster in many ways. First, it "is not

commonly known or used in the field of forensic science." Jason Decl. ¶ 15; *see also* Noedel

Decl. ¶ 12. Second, there is no specific, reproducible protocol for the method. Noedel Decl.

¶ 13. Third, it is an inherently subjective technique that involves multiple interpretive steps that

cannot be reliably described or recreated by another examiner. *Id*. ¶¶ 10, 45-46. Fourth, the

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method has never been formally studied or peer-reviewed. Jason Decl. ¶ 15. Fifth, the reliability

of the method has never been empirically tested. *Id.* ¶ 20. Finally, because the method "has not

been tested, [it] therefore has no known error rate." *In re Mirena IUD Prods. Liab. Litig.*, 169 F.

Supp. 3d 396, 448 (S.D.N.Y. 2016).

In summary, Mr. Haag's "Rocker Point Method" is cut from whole cloth. It has never

been peer-reviewed, empirically tested, or accepted by any academic community. All of this

weighs heavily against admissibility. Even if Mr. Haag were qualified to develop this new

method, his failure to standardize it, publish it, vet it with his peers, and test it is fatal to its

admissibility. Mr. Haag's subjective beliefs and unsupported speculation regarding the Rocker

Point Method do not provide adequate support under the *Daubert* standard.[6] The lack of

independent testing and peer review are particularly problematic in this case, because Impact W

has very unusual and unique characteristics. Finally, the subjectivity of the method and the

absence of a specific and objectively verifiable procedure renders cross-examination an

ineffective tool for rooting out flaws. Under these circumstances, the Court's gatekeeper role is

all the more crucial. For all of the reasons stated above, Mr. Haag's Rocker Point Method is

unreliable, and all of his opinions based on his use of this method should be excluded.

C.   Haag's Claimed Uncertainty of ±5 Degrees is Unsupported and Unreliable

Like Ms. Dickerson, Mr. Haag has stated an uncertainty of ±5 degrees for his estimated

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[6] The Court must satisfy itself that the experts "arrived at their conclusions using scientific
methods and procedures . . . not mere subjective beliefs or unsupported speculation." *Claar v.
Burlington Northern R. Co.*, 29 F.3d 499, 502 (9th Cir. 1994). An opinion that is merely the
personal view of an expert cannot satisfy Rule 702, no matter how qualified or well-regarded the
expert. *See Ollier v. Sweetwater Union High Sch. Dist.*, 768 F.3d 843, 861 (9th Cir. 2014)
("[P]ersonal opinion testimony is inadmissible as a matter of law under Rule 702, and
speculative testimony is inherently unreliable.") (quotations and citations omitted).

bullet path. And like Ms. Dickerson, Mr. Haag simply plucked this purportedly "standard"

uncertainty measure from his 2008 Study without providing any good scientific grounds for

doing so. This kind of unsupported extrapolation does not come close to satisfying *Daubert*.

Extrapolation is not proper if the expert cannot provide any scientific support for doing so other

than his own judgment. *See In re Bextra & Celebrex Mktg. Sales Practices & Prod. Liab. Litig.*,

524 F. Supp. 2d 1166, 1180 (N.D. Cal. 2007). Building a reliable bridge between a controlled

study and a real-world fact pattern "requires sophisticated scientific technique and analysis (i.e.,

more than 'straight extrapolation')." *Metabolife Int'l, Inc. v. Wornick*, 264 F.3d 832, 842 n.14

(9th Cir. 2001); *see also Domingo ex rel. Domingo v. T.K.*, 289 F.3d 600, 606 (9th Cir. 2002) ("It

is true that animal studies can be used to support theories on human health, but the district court

retains its gatekeeper function in requiring analytical support for the extrapolation from animals

to human."). The Court must exclude proposed expert testimony where there is "too great an

analytical gap between the data and the opinion proffered." *Joiner*, 522 U.S. at 146.

        According to Messrs. Noedel and Jason, Mr. Haag failed to provide good grounds for

plucking the ±5 degrees uncertainty measure out of his 2008 Study because *there are none*. Both

of these experts have closely reviewed Mr. Haag's 2008 Study and opined that the analytical gap

between that study and this case is insurmountable without further empirical research and testing.

Specifically, Mr. Haag cannot extrapolate the results of his 2008 Study to the path that he

estimated in this case for two main reasons. First, the 2008 Study did not include any impacts

that share the unique characteristics of Impact W. Second, the 2008 Study did not include any

bullet paths that were measured using the Rocker Point Method.

        Mr. Noedel's report notes many important differences between Impact W and the impacts

that were examined in Mr. Haag's 2008 Study:

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> [The 2008 Study] evaluated a collection of participants measuring bullet paths from various training courses which [Mr. Haag] had instructed. Averaging these results, that study determined a cumulative and comprehensive error rate of approximately ±5 degrees for all of the calibers, angles and trials considered. . . .
>
> The data included in the [2008 Study] that was specific for vertical accuracy appeared to consider only measurements known to be delivered between -50 to -70 degrees . . . . Therefore, *this data does not reflect shallow, low angle perforations to car metal (as was apparent with path "W") and should not be used to represent the error rate for the rocker point method of analysis.*
>
> [The 2008 Study also] warns that some situations of bullet path determination may require a greater amount of variance such as shallow angle impacts and perforations of heavier materials with an increased likelihood of deflection. These are features readily observed in bullet impact "W".

Id. ¶ 50, 55, 56 (emphasis added). Mr. Noedel ultimately concludes that Mr. Haag's

extrapolation "is inappropriate . . . because the properties of impact 'W' are different than

the properties described in Haag's 2008 study." *Id*. ¶ 61.

Mr. Jason reached the same conclusion and additionally pointed out that Mr.

Haag's 2008 Study did not include any impacts that were measured using the Rocker

Point Method:

> In his report, Mr. Haag used an uncertainty value of ±5 degrees on the angles he derived from defect "W". There is no basis for utilizing this value with defect "W." I have read Mr. Haag's [2008 Study] in which he established this value after doing experiments with shooting into car bodies. But *all the angle measurements [in that study] were based upon the fact that each of the bullet defects in the car bodies also had a second point of bullet contact* – so these had two points on which a rod could be aligned and measured. *The Rocker Point Method [by contrast] only has a single point – a shallow groove.*

Jason Decl. ¶ 16 (emphasis added). Mr. Jason concludes that the ±5 degrees uncertainty

range from Mr. Haag's 2008 Study cannot be "legitimately applied" to bullet paths

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measured using the Rocker Point Method "without a specific validation" or further

"empirical testing." *Id.* ¶¶ 17, 20.

IV.   The Court Should Exclude Kevin Turpen's Diagrams

Kevin Turpen is a Patrol Deputy with the Deschutes County Sheriff's Office who will

testify that he created Diagrams of the scene at the precise times when Rounds 4 and 5 were

fired. Mr. Turpen's Report outlines the methodology he used to construct his Diagrams:

- [Ms. Dickerson] measured the angle of [Mr. Finicum's truck] as it rested in the snow bank, with the passenger side lower than the driver side. . . . [at] 13.8 to 14.9 degrees of side tilt. . . . [F]or mathematical consistency, I placed the vehicle at a resting position of 15 degrees.

- [Ms. Dickerson estimated Round 5] was fired at a 20 degree downward angle [and] 35 degrees rearward from 90 degrees to the passenger side. . . . I also then added green lines to indicate a 5 degree +/- cone of travel . . . . [I] extended those [estimated] lines out [from Impact W] to represent the location and angle the bullet traveled.

- I used the [FBI Video] to help place [one OSP trooper and two HRT agents] in the[ir] *possible* locations when [Rounds 4 and 5 were] fired.

See Declaration of Eugene Liscio ("Liscio Decl.") Ex. 3 (DCSO Suppl. Rep. 23) at WJA 9523

(emphasis added).

For the reasons explained below, Mr. Turpen's proposed testimony is not reliable under

Rule 702, *Daubert I*, and its progeny. In addition, the minute probative value of the proposed

testimony is far outweighed by the fact that it will confuse, prejudice, and mislead the jury.

A.   Turpen's Diagrams Ignore the Fact that Finicum's Truck Settled in the Snow

To place Mr. Finicum's truck into his Diagrams, Mr. Turpen relied on measurements that

were taken by Oregon State Police forensic analyst Victoria Dickerson in the early morning

hours of January 27, 2016. *See* Liscio Decl. Ex. 7 (Report of Victoria Dickerson) at WJA 3194

(noting that Ms. Dickerson did not arrive on the scene until after 1:00 am on January 27, 2016).

In her report, Ms. Dickerson noted that Mr. Finicum's truck was "deeply embedded in the snow

with the passenger side angled downward toward the highway at an approximate 14 to 15 degree

angle." *Id*. at WJA 3196. DCSO Detective Ron Brown also observed the angle of Mr.

Finicum's truck in the snow when he arrived on the scene. Based on his review of the FBI

Video, however, he believed the angle was even steeper at the time that Round 5 was fired:

> The pickup was lodged in the snow at an angle with the driver's
> side sitting higher than the passenger side. . . . The driver's side
> was buried up to the bottom of the doors which caused the doors to
> make a slight indentation in the snow when they were opened. ***I
> saw when I later reviewed the [FBI Video] that the driver's side
> was higher at the time of the shooting***. . . . I also saw that the door
> made no impression in the snow when Finicum opened it. I
> noticed that when I opened the driver's door, that it scraped more
> snow than it had earlier. ***This indicated to me that the heat and
> weight of the pickup caused it to sink further into the snow as
> time progressed***.

Liscio Decl. Ex. 9 (Detective Brown Case Narrative) at WJA 9092 (emphasis added).

Because he had no choice but to rely on Ms. Dickerson's belated measurements,

Mr. Turpen's Diagrams fail to account for the fact that Mr. Finicum's truck was in a

different resting position in the snow bank when Round 5 was fired than it was when Ms.

Dickerson arrived hours later to take her measurements. Mr. Turpen admitted this flaw

when he presented his Diagrams to the grand jury. Consistent with Detective Brown's

observations, Mr. Turpen told the grand jury that Mr. Finicum's truck "settled" in the

snow between the time when Round 5 was fired and the time when Ms. Dickerson took

her measurements:

> Our belief is that ***Finicum's truck settled*** . . . . [W]hen he went off
> the road, from a reconstruction crash standpoint, he's going to
> plow snow, because he was turning left. He's going to plow snow
> harder with the right front of his vehicle, and the left is going to
> ride up on the snow . . . . I believe he rode up and stopped. And

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> then, as time went on, the heat and the pressure from the truck
> settled him back down. . . . It settled passenger side to driver's
> side. It never flat-spinned on the ground to rotate itself on the
> ground . . . . [O]ur best estimation is [that the truck settled] about
> three to four inches.

Liscio Decl. Ex. 5 (June 20, 2017 Turpen Testimony) at WJA 7091-96.

Mr. Turpen's Diagrams fail to account for the "settling" of Mr. Finicum's truck because

he placed the truck based on the angle that Ms. Dickerson measured on the scene long after the

truck had already settled. Liscio Decl. Ex. 3 (DCSO Suppl. Rep. 23) at WJA 9522. Mr.

Turpen's proposed testimony also assumes—*without citing any scientific support*—that when

Mr. Finicum's truck settled, it did not also rotate. *See* Liscio Decl. Ex. 5 (June 20, 2017 Turpen

Testimony) at WJA 7094 ("It settled passenger side to driver's side. It never flat-spinned on the

ground to rotate itself on the ground"). *This baseless assumption undermines Mr. Turpen's*

entire reconstruction as it affects the rotational placement of Impact W in the roof of Finicum's

truck.

B.   Turpen's Visual Comparison Method Is Not Scientifically Reliable

Mr. Turpen did not use any scientific method whatsoever to perform the critical task of

placing one OSP trooper and two FBI HRT agents in his Diagrams, choosing instead to simply

"eyeball" it:

> So, using the [FBI Video] I was able to say, okay, we've got one
> person that is standing in front of . . . . the silver vehicle in the
> middle of the road. . . . We then looked at . . . where this other
> individual is standing in the middle of the road, he is ***right about*** at
> where the door jamb would be if that door was open . . . and that's
> where I placed [him] . . . ***as best I can there***. . . . So, now we
> looked at . . . the OSP trooper that comes off the back of the
> vehicle and he's now in the video . . . . [and] [w]e tried to place
> him ***as best we could*** where he is at the time those rounds are
> fired. . . . He's on one side of the center line at [Round 4]. He's
> moved to the other side of the center line at [Round 5].

Id. at WJA 7085-87 (emphasis added). Based on Mr. Turpen's own description, this technique

amounts to nothing more than "eyeballing" and utterly lacks all of the hallmarks of good science that have been recognized by *Daubert I* and its progeny. This method is not generally recognized, accepted, or applied in the fields of accident reconstruction or shooting reconstruction, and it has never been studied or written about in a peer-reviewed publication. Thus, it appears that Mr. Turpen devised the method solely for the purpose of his proposed testimony in this case. There are no standards controlling the operation of the method, and it is not based on any objective or repeatable measurements. Rather, the method involves multiple interpretive steps that are inherently subjective and cannot be repeated or tested by another forensic examiner. Liscio Decl. Ex. 1 ("Liscio Report") at 42.

In summary, Mr. Turpen's method of eyeballing where to place various law enforcement officers into his Diagrams is a far cry from the objective, reliable, and verifiable process that courts have allowed past *Daubert's* reliability "gate." The absence of specific and objectively verifiable procedures for this method makes cross-examination less effective in rooting out flaws, rendering the Court's gatekeeper role all the more crucial.

C.   Turpen Failed to State an Appropriate Error Rate

Mr. Turpen failed to make any attempt to place an error rate on his Diagrams. However, there is obviously a margin of error—likely a significant one—in placing people "as best we could" into the Diagrams. And yet, Mr. Turpen completely fails to quantify that error, pretending instead that it does not exist. Mr. Turpen's Diagrams also carry forward the errors of Mr. Piazza's AV analysis and Ms. Dickerson's trajectory analysis, yet he fails to quantify or incorporate any error rate associated with those flaws (other than Ms. Dickerson's unsupported and unreliable ±5 degrees uncertainty range).

V.   The Court Should Exclude Toby Terpstra's Model

Toby Terpstra is a Senior Forensic Animator with Kineticorp, a private firm based in

Denver, Colorado that specializes in accident reconstruction and forensic animation. The

government proposes to offer Mr. Terpstra as "an expert in the fields of photogrammetry, video

analysis, 3D digitization, and shooting reconstruction." *See* Gov't. Expert Summary at 6. Mr.

Terpstra used multiple methodologies, data sources, and computer programs to generate his 3D

Model of the shooting scene. The government has summarized Mr. Terpstra's proposed

testimony regarding his Model as follows:

> Mr. Terpstra will testify that he produced an accurate 3D model of
> the scene of the shooting at the point in time a bullet struck the top
> of Finicum's truck, and will describe how he did so. He will
> describe the science of photogrammetry, and how he used it to
> accurately place the vehicles and people in a 3D model of the
> shooting scene. He will demonstrate how he was able to develop a
> dimensionally accurate representation of the incident location, the
> vehicles and people present, and the trajectory measurements from
> his own and Mr. Haag's 3D scans of Finicum's truck and the
> shooting scene. From that data, he reliably and accurately
> measured the horizontal and vertical azimuth angles for the
> trajectory of the bullet that struck the roof of Finicum's truck, and
> accurately included Mr. Haag's trajectory measurements into the
> 3D model of the shooting scene.
>
> Mr. Terpstra relied on Mr. Haag's trajectory analysis, Mr. Piazza's
> video and audio analysis, other reports and data as listed in Exhibit
> H2, and his own computer modeling and photogrammetry analysis
> to create a fair and accurate 3D model of the shooting scene at the
> point in time that the bullet struck the roof of Finicum's truck. Mr.
> Terpstra concluded that at that point in time, defendant was the
> only person in a position consistent with having taken the shot. No
> other trooper or agent was in a position consistent with having
> fired the bullet that struck the roof of Finicum's truck.

Id. at 7. The "details of [Mr. Terpstra's] methodologies, findings, conclusions, and opinions" are

contained in his November 30, 2017 report. *Id*.

The Court should exclude Mr. Terpstra's proposed testimony regarding his Model for

several reasons. First, Mr. Terpstra's Model is based upon multiple flawed analyses, including

Mr. Piazza's flawed audio/video analysis and Mr. Haag's flawed trajectory analysis, both of

which are discussed in detail above. Second, neither Mr. Terpstra's camera matching method (discussed below) nor his method for placing the vehicles and individuals into the 3D environment (also discussed below) are scientifically reliable. Third, Mr. Terpstra's methods were applied unreliably. Finally, Mr. Terpstra has failed to state an appropriate error rate for his Model, and therefore cannot support his claim that the Model produces "accurate" results.[7] Consequently, Mr. Terpstra's proposed testimony is not reliable under Rule 702, *Daubert I*, and its progeny. In addition, the minimal probative value of Mr. Terpstra's proposed testimony is far outweighed by the certainty that it will greatly prejudice and mislead the jury. Therefore, the Court should also exclude Mr. Terpstra's proposed testimony under Rule 403.

A.   **Terpstra's Model Is Completely Dependent on the Validity and Accuracy of Piazza and Haag's Flawed Analyses**

Mr. Terpstra created his Model by combining results generated by other government experts (particularly, Messrs. Piazza and Haag) with his own measurements and observations, utilizing multiple different methodologies and computer programs. Specifically, Mr. Terpstra employed the following "procedures":

- Select the key frame from the FBI Video that, according to Mr. Piazza, corresponds with the time Round 5 was fired. Terpstra Report at 1-5.

- Choose additional video frames and photos to use in subsequent camera-matching analysis. *Id*. at 4.

- Scan Mr. Finicum's truck using a FARO Focus 3D X330 Laser Scanner ("X330 scanner"). *Id*. at 5-6.

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[7] Moreover, it is far from clear that Mr. Terpstra is qualified to render an opinion on shooting reconstruction. We will not know until the hearing whether Mr. Terpstra has ever conducted a shooting reconstruction at all, much less a reconstruction of the sort he is purporting to do here. The defense reserves the right to challenge Mr. Terpstra and the government's other experts for additional grounds discovered at the hearing when they are subject to cross-examination.

- Use a handheld, FARO Freestyle 3D Objects Scanner ("handheld scanner") to scan a portion of Finicum's truck as well as the trajectory rod placed by Mr. Haag and held in place with duct tape during the scanning process. *Id*. at 5; Liscio Report at 17; Noedel Decl. ¶¶ 45-47.

- Scan the incident site using the X330 scanner and a Sokkia total station. Terpstra Report at 12.

- Combine the two scans of Finicum's truck to create a 3D model illustrating both Finicum's truck and Mr. Haag's trajectory rod. *Id*. at 9-10; Liscio Report at 17-18.

- Purchase computer models of three roadblock vehicles and adjust them to fit the known or published dimensions. Terpstra Report at 11-12; Liscio Report at 19.

- Create models of human "bipeds" using reported heights for Mr. Finicum, Special Agent Astarita, the OSP Trooper, and three other FBI agents. Terpstra Report at 14.

- Create a scaled computer model of the incident site using the X330 scan data and total station data. Terpstra Report at 13-14.

- Use a manual "camera matching" procedure to estimate the position, orientation, and focal length of a "virtual camera" based on where Mr. Terpstra believed he could see a "match" between the 3D scan data and the photographs/video frames that he selected for this analysis. Terpstra Report at 16; Liscio Report at 28.

- Manually add the computer models of Finicum's truck, Haag's trajectory rod, the blocking vehicles, and six individuals into the 3D scene, adjusting the positioning of each until Mr. Terpstra considered them to be "visually aligned" with the selected photographs/video frames. Terpstra Report at 16-24; Liscio Report at 29-30.

- Move the estimated "virtual camera" throughout the 3D environment to view the where Mr. Haag's estimated trajectory "cone" appears to intersect with the biped models of three individuals positioned on the roadway. Terpstra Report at 25-28.

What is unique—indeed unprecedented—about this "procedure" is the way that it strings

multiple different measurements, analyses, and conclusions together. In particular, Mr.

Terpstra's conclusions depend entirely on the flawed conclusions of proposed AV expert Mr.

Piazza and proposed trajectory expert Mr. Haag. Mr. Terpstra relied on Mr. Piazza's unreliable

synchronization and gunshot identification decisions to determine when Round 5 was fired, and

therefore which frame from the FBI Video to use in his analysis. Liscio Report at 15. However,

as defense AV expert Bruce Koenig concluded (and as discussed in detail above), there is "no

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scientific basis" for Mr. Terpstra's claim that "Mr. Piazza identified 8 rounds" from the audio of

the Cox Video. Koenig Decl. ¶ 25. This critical flaw undermines Mr. Terpstra's entire

subsequent analysis, since the selection of a different video frame would result in the relevant

law enforcement officers being in different positions at the time when Round 5 was fired. *Id.* In

addition, Mr. Terpstra relied on Mr. Haag's untested and unreliable Rocker Point Method in

order to assign a trajectory to Round 5 in his Model. Terpstra Report at 5, 7. Mr. Haag also

supplied Terpstra with the inappropriately small and scientifically meaningless ±5 degrees cone

of uncertainty for the trajectory he estimated. Terpstra Report at 21.

Accordingly, if the Court excludes Mr. Piazza's AV analyses, and/or Mr. Haag's use of

the Rocker Point Method, it must necessarily exclude Mr. Terpstra's Model because it collapses

entirely if either portion of that foundational undergirding is removed.

B.   Terpstra's Methodology Is Generally Unreliable and Must Be Excluded

Mr. Terpstra's laser-scanning equipment, 3D models, and purported use of "the science

of photogrammetry" lend a misleading veneer of sophistication and precision to his Model. At

its core, however, Mr. Terpstra's Model is based on subjective "eyeballing," and must therefore

be excluded for the same reasons as Mr. Turpen's Diagrams.

Mr. Terpstra utilized two distinct methodologies to construct his Model. First, he used a

manual "camera matching" method to place "virtual cameras" in his 3D environment to

approximate the position, orientation, and focal length of the actual cameras that captured the

photographs and video frames that he selected for analysis. Second, he positioned his computer

models of Mr. Finicum's truck, Mr. Haag's trajectory rod, the blocking vehicles, and the six

individuals into the 3D scene. Both techniques fall far short of *Daubert's* reliability

requirements.

1. Terpstra's "Camera Matching" Method Is Not Scientifically Reliable

Although Mr. Terpstra's manual camera matching method borrows principles from the science of photogrammetry, it is no substitute for rigorous, analytic photogrammetry.[8] Unlike analytic photogrammetry techniques, which are based on very sophisticated and precise mathematical calculations,[9] Mr. Terpstra's manual camera matching method relies on "empirical *estimation*." Declaration of Clifford Mugnier ("Mugnier Decl.") ¶ 25 (emphasis added). Far from analytic photogrammetry, manual camera matching is a "last resort," guess-and-check method of manually adjusting the position, orientation, and focal length of a "virtual camera" until, in the *subjective* mind of the operator, it "lines up" with a selected photograph or video frame. Terpstra Report at 16; Liscio Report at 28.

Mr. Terpstra is not qualified to conduct an analytic photogrammetry analysis.[10] In the hands of a forensic animator such as Mr. Terpstra, the manual camera matching method is a

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[8] Although Mr. Terpstra's camera matching method "borrows from a principle of photogrammetry," Liscio Report at 28, it is not generally accepted among photogrammetrists, *see* Mugnier Decl. ¶¶ 15, 17-19. The articles that Mr. Terpstra cites on camera matching are not peer-reviewed by the relevant professional societies for photogrammetry, but rather by members of the Society of Automotive Engineers, whose members are not experts in photogrammetry. *Id.* ¶ 18.

[9] Professional photogrammetrists utilize the analytic technique of "resection" to precisely calculate not only a camera's position and orientation, but also the accompanying range of uncertainty. Mugnier Decl. ¶ 8; Liscio Report at 26-27. This is not what Mr. Terpstra did here.

[10] Although the government asserts that Mr. Terpstra used "the science of photogrammetry . . . to accurately place the vehicles and people in a 3D model of the shooting scene," Gov't. Expert Summary at 7, Mr. Terpstra is a forensic animator, and is not a photogrammetrist or an expert in photogrammetry. Although he earned an associate degree in applied science and has completed programs in multimedia, graphic design, and architecture, he is not a member of the American Society of Photogrammetry and Remote Sensing (ASPRS). Résumé of Toby Terpstra, AAS. Nor has his work appeared in any of the journals or technical publications published by the relevant professional societies for photogrammetrists. *Id.*; Mugnier Decl. ¶ 18. His resume demonstrates that he has used techniques derived from photogrammetric principles in his work,

completely subjective process from start to finish. Liscio Report at 28. Since the entire process

is left up to the user, different users can arrive at significantly varying results based on how a

particular individual thinks a photograph should "line up" with the 3D environment. Liscio

Report at 28-29. Unlike analytic photogrammetry, this process employs only "visual

estimation," and does not provide any mathematical means of calculating the accuracy of the

final result. Liscio Report at 28; Mugnier Decl. ¶¶ 26-27. As the defense's photogrammetry

expert, Clifford Mugnier, explains, "[t]he difference between an empirical attempt and an

analytical attempt is that empirical methods offer *zero chance of scientific statistical validity*."

Mugnier Decl. ¶ 25 (emphasis added).

In addition to lacking a mathematically derived analytic error rate, camera matching lacks

any generally applicable empirical error rate derived through experimentation. Liscio Report at

45; Mugnier Decl. ¶ 22. Although Mr. Terpstra has cited an article describing a particular

controlled experiment,[11] the measured "accuracy" of camera matching is only valid for the

particular crash scene constructed for and described in that article, and "cannot be extrapolated to

other applications of the camera-matching technique." Mugnier Decl. ¶ 22.

2. Terpstra's Method for Placing the Missing Evidence into the 3D Environment Is Not Scientifically Reliable

After Mr. Terpstra used the manual camera matching method to position the "virtual

camera" in 3D space, he "placed" Mr. Finicum's truck, the three roadblock vehicles, Mr.

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but his background and experience do not demonstrate that he has the necessary expertise in the
theoretical underpinnings (and theoretical limitations) of those techniques.

[11] *See* Coleman, C., Tandy, D., Colborn, J., and Ault, N., "Applying Camera Matching Methods
to Laser Scanned Three Dimensional Scene Data with Comparisons to Other Methods," SAE
Technical Paper 2015-01-1416, 2015 ("Coleman").

Finicum, and the relevant law enforcement officers into his Model. In order to do so, Mr.

Terpstra did not employ any professional photogrammetric technique. First, he is not qualified

to do so. Second, even if he were qualified to do so, photogrammetric analysis is not even

possible under the circumstances presented by this case because photogrammetric methods

cannot be used to mathematically calculate the location of evidence that does not touch the

ground, such as Mr. Finicum's truck in the snowbank of unknown depth.[12] As recognized in an

article cited in Mr. Terpstra's report, this limitation extends to the camera matching method as

well:

> Once the "virtual camera" in the scene has been properly matched
> to the desired photo, the missing evidence to ground interface can
> be traced. . . . ***Note that the method will only work for the points***
> ***where the evidence interacts with a scanned surface (the ground,***
> ***walls, curbs, etc.).*** . . . You can only trace the interaction area
> between the evidence and the scanned surface.

Coleman at 5. As Mr. Liscio explains, this method cannot be used to accurately place Mr.

Finicum's truck as it was sitting in a snowbank of unknown depth that Mr. Terpstra did not scan.

Liscio Report at 29.

Because he could not (and did not) utilize photogrammetry or even camera matching

techniques, Mr. Terpstra instead placed the vehicles into his Model by positioning and rotating

them so that they "aligned" with the video frames and photographs. Terpstra Report at 16. He

placed the HRT agents and OSP Trooper "such that their alignment was most representative of

what could be seen in the video." *Id.* at 21. In other words, Mr. Terpstra placed the critical

evidence into his Model (including Mr. Finicum's truck and therefore Mr. Haag's trajectory rod)

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[12] Photogrammetric methods can be used mathematically to calculate the location of missing
evidence only if they are on the same plane of reference provided by the control points (i.e., the
ground or another scanned surface). Liscio Report at 27, 29; Mugnier Decl. ¶ 15.

by *eyeballing* where it looked like they should go. Liscio Report at 29-30; Mugnier Decl. ¶¶ 13-14. This is not photogrammetry—or even science at all. There are no procedures or published literature supporting the use of this technique to obtain accurate or reliable measurements, Liscio Report at 29, and the results of this procedure have "the scientific weight of a guess, at best." Mugnier Decl. ¶ 13.

As defense expert Eugene Liscio highlights in his report, Terpstra's method of manually placing and orienting evidence into the 3D environment is unreliable in part due to how dependent the technique is on the quality of the images and the subjectivity of the technician. Liscio Report at 29, 32-37. To illustrate this concern, Mr. Liscio was able to "visually align" the positions of an HRT agent and the OSP Trooper such that their positions differed from Mr. Terpstra's by 12 inches and 47 inches, respectively. *Id.* at 32-35. Similarly, Mr. Liscio could adjust the rotation of Mr. Finicum's truck by up to two degrees. *Id.* at 36-37. The issue is not whether Mr. Liscio can "eyeball" these images better than Mr. Terpstra can, but rather to demonstrate the unreliability of such a subjective technique, particularly where the technique purports to give results with such precision. Such wild swings would obviously result in dramatic shifts in the positioning of the "cone" of probability.

The accuracy Mr. Terpstra claims for his results is not only unwarranted, *see infra* Part V.D, but it is also unsupportable. Mr. Terpstra has provided us with an estimate of his own *precision*—the range of values that all look correct to him in his subjective estimation, *see* Terpstra Report at 29-31. What he cannot provide is any indication of his technique's *accuracy*—how far these results are likely to be from the true answer. Liscio Report at 30-32. This leaves us with a cluster of shots, with no indication of where the bullseye might be:

Not Accurate
Precise

Id. Therefore, Mr. Terpstra's description of his results as an "accurate" representation of "the

incident site, Mr. Finicum's vehicle, the three vehicles used in creating the roadblock,

trajectories placed by Mr. Haag, and the locations of both the vehicles and the involved parties,"

Terpstra Report at 32, is simply false. His implicit claim that his techniques can produce

"accurate" results are "connected to existing data only by the *ipse dixit* of the expert," *Joiner*,

522 U.S. at 146, and must therefore be rejected.

<p style="text-align:center">*   *   *</p>

Mr. Terpsta has constructed his Model using techniques that employ ideas derived from

photogrammetry, but only up to a very limited point. The final, critical steps of Mr. Terpstra's

camera matching and evidence placement methods are *not* photogrammetry, but rather the

subjective, manual "eyeballing" of images with no way of determining whether the resulting

illustrations *accurately* depict the scene being analyzed with known and quantifiable measures of

uncertainty. These techniques therefore are not objective, reliable, and verifiable scientific

methods that this Court should allow to be presented to a jury.

C.   Terpstra's Camera Matching and Evidence Placement Methodologies in This Case Were Unreliably Applied

Apart from the reliability of Mr. Terpstra's camera matching and manual evidence

placement techniques in general, testimony regarding Mr. Terpstra's Model must be excluded

because the *application* of these methodologies in this case renders Mr. Terpstra's findings deeply unreliable.

1.   Poor Image Quality

As Mr. Terpstra has previously stated, camera matching "rel[ies] on the quality of the image being analyzed to accurately measure and place what is in the photograph." Neale, W.T.C., Hessel, D., Terpstra, T., "Photogrammetric Measurement Error Associated with Lens Distortion", Paper Number 2011-01-0286, Society of Automotive Engineers, 2011. Defense expert Eugene Liscio and the papers cited by Mr. Terpstra himself cite a number of criteria for judging whether a particular image is appropriate for camera matching. Liscio Report at 7. The images Terpstra used in his analysis fall well short of these criteria, dramatically undermining the reliability of Mr. Terpstra's conclusions.

Mr. Liscio evaluated the video frame from the Brittany Doherty video selected and relied upon by Mr. Terpstra and found numerous deficiencies that make this image "not suitable for a camera matching project where accuracy is of importance." *Id.* at 9. Similarly, one of the photographs taken by an OSP trooper had similar image quality issues that make it "difficult to make an accurate estimate of [the] location, position and orientation" of Finicum's truck. *Id.* at 10.

Troublingly, the poorest quality image used by Mr. Terpstra in his analysis is the most important: the video frame from the FBI Video that Mr. Piazza believes corresponds with the time that Round 5 was fired. This video was taken from nearly a mile away at an extreme focal length and is of generally low quality due to low resolution, video compression, low lighting, and other factors. *Id.* at 12; Koenig Decl. ¶ 42. The resolution is such that each *pixel* represents approximately 1.5 inches at the ground plane, Liscio Report at 13, and the resulting video frame reflects the "obvious loss of detail and contrast," a "total lack of sharpness," and the

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"indistinctiveness of ground objects." Koenig Decl. ¶ 43. Moreover, the image suffers from

blurring due to aircraft movement, vibration, camera panning and other factors, which can make

objects appear to be longer or wider than they actually are. Liscio Report at 14.

Mr. Terpstra discusses his efforts to analyze and correct for lens distortion by stating that

the images used in his analysis "were . . . analyzed for lens distortion," and that "[l]ens

distortion was then corrected for in photographs and video frames *with known camera*

characteristics." Terpstra Report at 16 (emphasis added). *What Mr. Terpstra inexplicably fails*

to mention, however, is that he did not correct for lens distortion in the FBI Video. Liscio

Report at 26; Mugnier Decl. ¶ 20. This omission is particularly troubling in light of Mr.

Terpstra's own writing on the error than failing to correct for lens distortion can introduce into

this type of analysis:

> [S]ince all camera lenses contain some aberrations or
> imperfections, due to the physical characteristics of the lens,
> photographic images contain distortion resulting from lens
> aberrations. In short, these aberrations can shift the location of the
> image on the pixel matrix, and hence shift the position, size and
> shape of the geometry the pixels represent. *As a result, when*
> *measuring a distorted image, the size, shape and position of an*
> *object of interest may be misrepresented.*

Neale, W.T.C., Hessel, D., Terpstra, T., "Photogrammetric Measurement Error Associated with

Lens Distortion", Paper Number 2011-01-0286, Society of Automotive Engineers, 2011

(emphasis added).

Even the use of video frames themselves (as opposed to photographs) introduces a

number of serious errors "that could result in the misinterpretation of the images" unless they are

"considered carefully by a trained video analyst." Liscio Report at 15. Here, there is no

evidence that these issues were even considered by Mr. Terpstra, let alone analyzed by a trained

video analyst. And the defense's video analyst, Mr. Bruce Koenig, concluded that "exact

measurements based on these images *are not possible*," and that "a fairly large error rate should be used to ensure accuracy." Koenig Decl. ¶ 44 (emphasis added).

Despite these issues, Mr. Terpstra purports to be able to determine the positions of the HRT agents and OSP Trooper at the time that Round 5 was fired *solely* by eyeballing where these individuals line up with this single, blurry frame of uncorrected video. Mr. Terpstra's opinion that he can reach this conclusion squarely implicates the Court's role in scrutinizing the "fit" between the Mr. Terpstra's conclusion and the data and methodology upon which Mr. Terpstra claims to rely. Mr. Terpstra's procedure may be perfectly acceptable for general crime and collision scene mapping, which does not require a high degree of accuracy. Liscio Report at 7. "However, if this data is now used for a substantive purpose such as a bloodstain pattern analysis, *bullet trajectory analysis*, suspect height analysis or vehicle speed analysis, then the level of scrutiny, quality of evidence and accuracy level required is much higher," *id*. (emphasis added), particularly where the three potential shooters are all standing within mere feet of each other.

2.   Obviously Anomalous Results

The proponent of expert testimony must "demonstrate in some objectively verifiable way that the expert has both chosen a reliable scientific method and *followed it faithfully*." *See Daubert II*, 43 F.3d at 1319 n.11 (emphasis added). The Court should carefully scrutinize an expert's anomalous conclusions, particularly where that expert fails to identify and explain those anomalies. *See Lust v. Merrell Dow Pharmaceuticals, Inc.*, 89 F.3d 594, 598 (9th Cir. 1996) (emphasis added) ("When a scientist claims to rely on a method practiced by most scientists, yet presents conclusions that are shared by no other scientist, *the district court should be wary that the method has not been faithfully applied.*"); *W. Parcel Express v. United Parcel Serv. of Am.,*

Inc., 65 F. Supp. 2d 1052, 1060 (N.D. Cal. 1998) ("[W]hen the indisputable record contradicts or otherwise renders [an expert opinion] unreasonable, [it] cannot be relied upon.").

Here, Mr. Terpstra's Model contains several dramatic indications of unreliability in his methodologies, their application to this case, or both.

a.   Camera Height

Mr. Terpstra used his manual camera matching methodology to place a "virtual camera" into his 3D environment that, he claims, corresponded with the position and orientation of the FBI aerial video footage. Terpstra Report at 16, 22. Mr. Terpstra placed and aligned this virtual camera such that it was approximately 3500 feet above ground level. Liscio Report at 12-13. The problem with this is that the FBI aircraft was in fact flying over 5200 feet above ground level at this time. *Id.* This difference of over *1700 feet* between where Mr. Terpstra believes the FBI Video camera was and its actual altitude is both a demonstration of "how camera matching may contain rather severe errors" as a general matter, Liscio Report at 12, and an *actual error* in Mr. Terpstra's analysis so severe that it cannot help but create grave doubt regarding the validity of his entire analysis.

b.   Visible Parallax in Overlaid Images

Clifford Mugnier, an expert photogrammetrist with over 40 years' experience in the field, performed a simple experiment to "check" the precision of Mr. Terpstra's 3D model against the original photographs and video frames. Mugnier Decl. ¶ 33. By placing the original images in one eye of a stereoscope and Mr. Terpstra's 3D modeling results superimposed onto those same images in the other eye of the device, Mr. Mugnier was able to examine the image to determine if particular portions appeared "flat" or "three dimensional," as they would in a simple View-Master toy. *Id.* ¶¶ 30-33. Each pair of images viewed in this manner appeared three-

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dimensional only in the area around the 3D-modeled vehicles that Mr. Terpstra had "placed" into these images, an "unmistakable indication of error" in Mr. Terpstra's results. *Id.* ¶ 34.

c.   Inconsistency with Measured Position of Finicum's Truck

Using his camera matching and manual evidence placement methodologies, Mr. Terpstra concluded that at the time Round 5 was fired, Finicum's truck had a roll angle of approximately 14 degrees. Terpstra Report at 25. This conclusion is completely inconsistent with the testimony, actual measurements, and conclusions of the government's own experts and investigators.

Oregon State Police forensic analyst Victoria Dickerson was present at the scene on the morning of January 27, 2016, where she measured and recorded the roll angle of Finicum's truck approximately 10-14 hours after Round 5 was fired. Liscio Decl. Ex. 4 (May 24, 2016 Turpen Testimony) at WJA 1032. In her report, she noted that Mr. Finicum's truck was "deeply embedded in the snow with the passenger side angled downward toward the highway at an approximate 14 to 15 degree angle." Liscio Decl. Ex. 7 (Report of Victoria Dickerson) at WJA 3196. She measured the "angle of vehicle as it rested in the snow" at four different points on the truck as follows: Tailgate: 14.8 degrees; Canopy Center: 13.8 degrees**;** Front Bumper: 14.3 degrees; Roof Center: 14.9 degrees. Liscio Decl. Ex. 8 (Dickerson Handwritten Notes) at WJA 3128. These measurements average to an angle of 14.45 degrees. *Id.* DCSO Detective Ron Brown also observed Mr. Finicum's truck, and observed that the driver's side appeared higher at the time of the shooting than it did hours later. Liscio Decl. Ex. 9 (Detective Brown Case Narrative) at WJA 9092. Similarly, Mr. Turpen testified to the grand jury about his observations that Mr. Finicum's truck had "settled" in the snow "***by three to four inches***" between the time when Round 5 was fired and the time when the truck was finally removed from the snow, and that the vehicle had "***settled five degrees***" between when Round 5 was fired and when Ms.

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Dickerson measured the roll angle of Finicum's truck. *See* Liscio Decl. Ex. 4 (May 24, 2016 Turpen Testimony) at WJA 1031-36; Liscio Decl. Ex. 5 (June 20, 2017 Turpen Testimony) at WJA 7090-96.

The problem here should be apparent: multiple witnesses observed Finicum's truck settling in the snow over the course of the evening due to the heat and weight of the vehicle. The next morning, Ms. Dickerson measured the vehicle's roll angle and found it to be approximately 14.45 degrees: *almost exactly what Mr. Terpstra's Model says that it was at the time Round 5 was fired*, before it had settled by 3-4 inches, changing its roll angle by (according to the sworn testimony of the government's proposed expert Mr. Turpen) an estimated 5 degrees! This is an *enormous* error in Mr. Terpstra's methodology or his application of the methodology, and its significance cannot be overstated given that the position of Mr. Haag's trajectory rod in Mr. Turpen's 3D scene is completely dependent on the position and angle of Finicum's truck.

*   *   *

Even were the Court somehow to conclude that Mr. Terpstra's methodologies were reliable as a general matter, Mr. Terpstra has disregarded the known limits of these techniques when applied to poor quality, uncorrected images and has produced a Model with obvious and material flaws in its ultimate conclusions. The Court should therefore conclude that Mr. Terpstra's methodologies have not been reliably applied to the facts at hand, and exclude his testimony.

D.   Terpstra Failed to State an Appropriate Error Rate

As noted above, *see supra* Part V.A, Mr. Terpstra's analysis is a multi-step process that strings together multiple separate measurements and methodologies (including analyses by other purported experts) into a final result. Any inappropriate methodology, inherent error rate, or outright mistakes in the initial steps will carry through to the final result in a process known as

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"error propagation." Mugnier Decl. ¶ 5. A proper calculation of the error rate inherent in this analysis would quantify (or at least conservatively estimate) each potential source of error to calculate the uncertainty inherent in Mr. Terpstra's final model.

Instead, Mr. Terpstra accounts for only two potential sources of error. First, Mr. Terpstra adopts the ±5 degrees "range of certainty cone" as specified by Mr. Haag. Terpstra Report at 21. To this, Mr. Terpstra adds his own "range of certainty" corresponding with the placement and rotation of Finicum's truck and the locations of the OSP Trooper and HRT agents. *Id.* at 29-31. Mr. Terpstra derives this "range of certainty" for his placement of the missing evidence in a manner similar to the way he placed these objects in the first place: by eyeballing. Specifically, Mr. Terpstra would shift or rotate a given object until it no longer appeared (subjectively to Mr. Terpstra) to be "aligned" with the photographs. Liscio Report at 30-32.

Mr. Terpstra then combines his "range of certainty" with Mr. Haag's "cone of certainty" and makes the implicit claim that these represent the overall uncertainty for the final trajectory cone and individual positions. Terpstra Report at 32. The resulting error rate is *demonstrably false*, as it completely ignores numerous known sources of error.

First, Mr. Terpstra ignores the error rate accompanying the selection of the specific video frame from the FBI Video purporting to represent the time that Round 5 was fired. Specifically, it takes no account of any error rate accompanying Mr. Piazza's lay identification of which sounds represent gunshots, or any subjectivity and bias concerns that could arise from his selection of these gunshots "mutually" with a government investigator and an attorney for the government. *See supra* Part I.B. And it ignores the error rate inherent in *any* synchronization of two videos as described by Mr. Koenig (but ignored by Mr. Piazza). *Id.*

Second, Mr. Terpstra assumes that Mr. Haag's "cone of certainty" for this shot is limited to ±5 degrees. Mr. Haag derived this error rate by extrapolating from his 2008 Study, but as previously noted, there are important differences between the shots analyzed in that study and the trajectory analysis conducted by Mr. Haag in this case using the Rocker Point Method. *See supra* Part III.C; Noedel Decl. ¶¶ 50, 53,55-56, 61; Jason Decl. ¶¶ 16-20. As a result, it is a fallacy to assume that the error rate for the placement of the trajectory rod is ±5 degrees, and any increased uncertainty must carry through to Mr. Terpstra's analysis. *Id.*

In addition, Mr. Terpstra omits any mention of the error rate inherent in his "camera matching" method for placing the virtual cameras. In the papers cited in Mr. Terpstra's own report, manual camera matching methods were shown to have errors even when the conditions were optimal and controlled. Liscio Report at 50. These papers describe experiments done with good quality photographs, taken at roughly the same time, relatively close to the objects being photographed (ensuring a high pixel count). *Id*. at 45-46. The images were taken with appropriate lighting, proper exposure, and not at extremely large focal lengths. *Id.* Critically, the cameras and objects were not in motion when the photographs were taken, eliminating blurring as a factor. *Id.* And evidence was placed into the 3D environments in locations where it clearly touched the ground. *Id.* at 8. Even under such ideal conditions, camera matching was shown to introduce errors of up to several inches. *Id.* at 48, 50. The "accuracy" measured during these experiments "is limited to the particular crash scene constructed for and described in the[se] article[s], and cannot be extrapolated to other applications of the camera-matching technique." Mugnier Decl. ¶ 22; *see also* Liscio Report at 50. It should be obvious that the inadequate quality of the evidence used by Mr. Terpstra in this case would result in an error rate significantly greater than what was observed in the cited papers. Liscio Report at 50. *And yet*

Mr. Terpstra's report makes no mention of this error rate, not even bothering to add the error rate measured under *ideal conditions* to his "cone of certainty."

Mr. Terpstra *cannot* (and therefore does not) account for the error rate that accompanies his subjective placement of the relevant pieces of evidence by eyeballing their positions until they "align." One might be tempted to think that this is one of the only sources of error that Mr. Terpstra *does* account for, given his attempt to quantify the "range of certainty" in placing Finicum's truck and the relevant individuals. The problem with this "range of certainty" is that it represents the range of positions that all look correct to him. It is, in other words, a subjective estimate of his *precision*. Liscio Report at 30-32. What Mr. Terpstra fails to provide is any analysis or data supporting this technique's *accuracy*—that is, *how far these results are likely to be from the true answer*. *Id.* The difference is critical: no matter how tightly clustered Mr. Terpstra's results may appear to be, they are scientifically meaningless without an analytic or experimental basis to conclude that they in fact represent reality. *Id.*

Finally, above and beyond the many sources of error inherent, but unaccounted for, in Mr. Terpstra's analysis as a general matter, Mr. Terpstra fails to take into account the *increased* error rate that would accompany the particular compromises he was forced to make in order to complete the analysis at issue in this case. In particular, Mr. Terpstra had only a single, blurry frame of video purportedly capturing the scene at the time Round 5 was fired, and should have used a "fairly large error rate . . . to ensure accuracy," given that "exact measurements based on these images are not possible." Koenig Decl. ¶ 44.[13]

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[13] Mr. Liscio's report also catalogs numerous additional potential sources of error that Mr. Terpstra fails to take into account. Liscio Report at 17-18, 21-22.

Each and every one of the above factors contributes to the overall uncertainty of the final result. By ignoring them, Mr. Terpstra is implicitly asserting (without any basis whatsoever) that the associated error rate for each of these factors is *zero*. This is obviously wrong and completely unacceptable. The government's combined analysis purports to be able to determine which of three individuals, standing within mere feet of each other, was able to fire the shot in question. The point is not that a different analysis or a better analysis might shift the cone in one direction or another. Instead, the critical problem is that the government wished to give the jury—literally—a sense of *false certainty*. The *actual* margin of error for this analysis is indisputably larger than the government says it is, and likely significantly larger.

CONCLUSION

For the foregoing reasons, the Court should exclude from trial any testimony, reports, or exhibits offered by the government relating to the analyses of proposed experts Frank Piazza, Victoria Dickerson, Michael Haag, Kevin Turpen, and Toby Terpstra.

DATED this 4th day of April 2018.

Respectfully submitted,

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