

OSAC 2023-S-0017 Standard for the Articulation of Footwear and Tire Interpretations

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Draft OSAC Proposed Standard

OSAC 2023-S-0017 Standard for the Articulation of Footwear and Tire Interpretations

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Keywords: *footwear, tire, impression, evidence, articulation, interpretations*

1 **Foreword**

2 This document outlines a standard framework for articulating source opinions for the
3 forensic footwear/tire discipline. This standard describes necessary comparative
4 observations and interpretations and provides a model for articulating qualitative source
5 opinions using an evaluative reporting approach.

6
7 This document has been developed by the Footwear and Tire Subcommittee of the
8 Organization of Scientific Area Committees for Forensic Science through a consensus process
9 and is being proposed for further development through a Standard Developing Organization
10 (SDO). This document was developed with input from experts with a broad array of subject
11 matter expertise, including forensic practitioners, scientific researchers, measurement
12 scientists, statisticians, and legal experts.

13 All hyperlinks and web addresses shown in this document are current as of the publication
14 date of this standard.

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37 **1 Scope**

38 This standard provides a framework for a justifiable, transparent, and understandable
39 means of articulating results/interpretations in the footwear/tire evidence discipline. This
40 standard defines terms, describes comparative observations and interpretations of data, and
41 establishes model qualitative articulations for the range of results/interpretations that may
42 be reached following footwear/tire evidence comparisons. For the purpose of this standard,
43 results/interpretations are defined as expert opinions based on the questioned impression,
44 known items, direct observations, and any other task relevant information. The
45 results/interpretations are derived using acquired knowledge, training, skills, and
46 experience of the footwear/tire evidence examiner.

47 This standard does not cover the following topics:

- 48 ● Results/interpretations derived directly from and/or entirely dependent upon
49 validated probability models or quantitative processes.
- 50 ● Determination of the relevant population for evaluation.
- 51 ● Detailed guidelines for documentation of comparisons and results/interpretations.
- 52 ● Detailed guidelines for reporting and testifying.
- 53 ● Results/interpretations in which an examiner is assessing the type or categorization of
54 a single item.
- 55 ● Results/interpretations in which an examiner is comparing two questioned
56 impressions to each other (without known footwear/tire).
- 57 ● Results/interpretations in which an examiner is assessing the events or activities that
58 produced the given evidence.
- 59 ● Validation or verification of these results/interpretations.

60 **2 Terminology**

61 Key terms used in this document include the following¹:

- 62 ● **Source opinions** are those opinions in which an examiner is assessing the degree to
63 which the evidence supports whether two (or more) items came from the same source
64 versus different sources (e.g., whether two footwear impressions came from the same
65 item of footwear) OR whether one (or more) items came from a specified source (e.g.,
66 whether a tire impression came from a known tire or a different tire).
- 67 ● **Item of evidence** (“item”) refers to the object, sample, image, impression, or document
68 being examined. Items may be from unknown or known sources.
- 69 ● **Source** refers to a specific object (e.g., a shoe, or a tire).
- 70 ● **Observation**: recognizing and noting an occurrence. For the purpose of this document,
71 “occurrence” refers to features, attributes, and/or measurements.

¹ Additional relevant terminology can be found in the most recent version of the document entitled “Terminology Used for Forensic Footwear and Tire Evidence (as of this writing, this is ASB Technical Report 097, First Edition (2019) as well as in the OSAC Lexicon (<https://lexicon.forensicosac.org>). Unless specified otherwise, definitions included in this document supercede those in other documents for the purposes of this standard.

- 72 ● **Articulation:** communication or explanation of the entire examination and decision-
73 making process to encompass observations and interpretations
- 74 ● **Characteristics of Use:** features that are acquired through the wearing/usage of shoes
75 and tires, to include general wear, specific wear, Schallamach, and randomly acquired
76 characteristics (RACs)
- 77 ● **Specific characteristics of use:** a subcategory of “characteristics of use” to encompass
78 only non-class characteristics (i.e., those characteristics with higher discriminability),
79 including specific wear and RACs
- 80 ● **Similarity (similar):** an observation that an impression and a footwear outsole or tire
81 track share a likeness of details; not to be confused with correspondence.
- 82 ● **Dissimilarity (dissimilar):** an observation that characteristics have the appearance of
83 being potentially different but do not meet the criteria for an exclusionary difference.
84 This observation could be caused by numerous factors including but not limited to the
85 impression-making process, factors prior to recovery, and/or the recovery process.
- 86 ● **Correspondence:** an interpretation that observed similarities between one or more
87 features or properties between the compared items are considered to constitute
88 agreement.
- 89 ● **Exclusionary difference:** A difference in one or more characteristics between
90 compared items that is sufficient to determine that the compared items did not
91 originate from the same source, are not the same source, or do not share the same
92 composition or classification. NOTE: What is sufficient depends on the performance and
93 limitations of the method used on the material in question.
- 94 ● **Quality:** a property of footwear and tire impressions or known images/exemplars
95 which denotes the fidelity of reproduction of the outsole or tire. This includes the
96 accuracy and clarity of the reproduction which will determine the suitability of the
97 evidence (or its value for comparison).
- 98 ● **Discriminability (or distinctiveness):** the degree to which information in an
99 impression can be used to reliably distinguish between different sources. The
100 discriminability of an impression encompasses its features’ quantity, spatial
101 arrangement, quality, and rarity/perceived rarity.
- 102 ● **Measured rarity²:** the measured prevalence of a feature or set of features observed in
103 evidence using representative databases, research, and/or manufacturing/distribution
104 information. NOTE: very few (if any) such data currently exist for practical use in
105 footwear or tire evidence.
- 106 ● **Perceived rarity³:** an examiner’s assessment of the prevalence of a feature or set of
107 features based upon his/her training, experience, and/or case factors, in the absence of
108 data (as outlined under “measured rarity”). When perceived rarity is considered during

² Rarity (either measured or perceived) of the class characteristic of make/model and/or size of a footwear or tire refers to how often that type of feature is encountered in a group of footwear or tires (its prevalence), either in isolation or in conjunction with other information about its local context. Rarity of the location and degree of wear as well as the size and shape of randomly acquired characteristics refers to how frequently these types of features are encountered in a group of footwear or tires (their prevalence), either in isolation or in conjunction with other information about local context.

³ See footnote 2.

109 the decision-making process, the examiner must clearly and thoroughly describe the
110 information considered.

- 111 • **Inclusion:** the known footwear or tire exhibits similarities in class characteristics and/or
112 characteristics of use that indicate the footwear/tire may have made the questioned
113 impression and thus is part of the pool of potential sources for the questioned
114 impression.
- 115 • **Exclusion:** the known footwear or tire exhibits differences in class characteristics or
116 characteristics of use that indicate the footwear/tire did not make the questioned
117 impression and thus is NOT part of the pool of potential sources for the questioned
118 impression.
- 119 • **Specific wear:** wear that is more discriminable than general wear by virtue of its
120 specific location, degree and orientation (e.g., erosion causing tears/holes, advanced
121 wear in an atypical contact area). Specific wear also includes Schallamach patterns.

122 3 Value (Suitability) Determinations

123 A value or suitability determination is a judgment of whether an item contains sufficient
124 information for a comparison.

125 3.1 Not Suitable for Comparison

126 A **not suitable for comparison** determination is a judgment that a more detailed
127 examination is not warranted. The examiner determined there were minimal or no
128 confirmable or discernable features present. This determination applies when there is
129 insufficient detail to conduct any comparison.

130 3.2 Suitable for Comparison

131 A **suitable for comparison** determination is a judgment that a source opinion can potentially
132 be reached. The examiner determined that the item contains sufficient observed data (e.g.,
133 sufficient quality and quantity of features, size, or condition of any evidence items) to be used
134 for a comparison.

135 4 Articulation of Source Opinions

136 Source opinions apply to the comparison and evaluation of two (or more) items. In
137 particular, these items of evidence are generally categorized as one of two types: questioned
138 footwear/tire impressions and known footwear/tires. In reaching source opinions, an
139 examiner evaluates the quality, quantity, and discriminability of characteristics in the
140 evidence, the persistence of characteristics on the outsole/tread over time (if applicable),
141 and the extent of similarities and dissimilarities of the observed characteristics, while taking
142 into account the measured or perceived rarity of these observed characteristics and any
143 potential limitations of the items. Potential limitations may include distortion, improper
144 recovery methods, photographic issues, and time delay between deposition and collection.

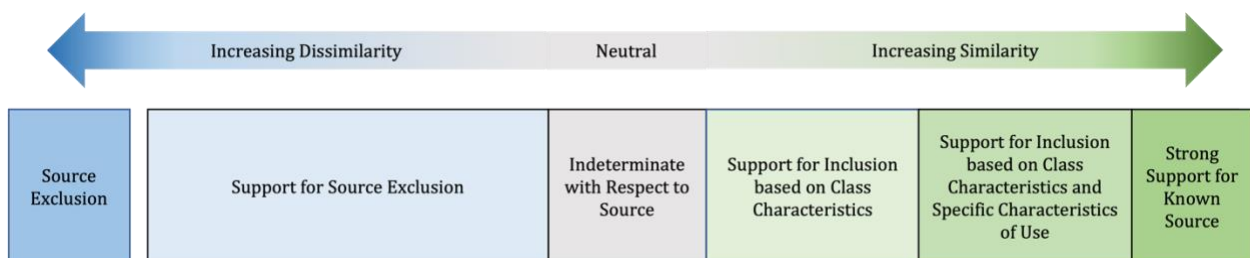
145 Examiners shall assess the strength of evidence by considering the prospect of encountering
 146 the observed combination of characteristics if the questioned impression came from the
 147 known footwear or tire, relative to the prospect of finding the observed combination of
 148 characteristics if the questioned impression came from a different source. The size of the
 149 pool of other potential sources is typically unknown, but can be expected to decrease as the
 150 number and type of features in correspondence increases. Examiners shall express their
 151 assessments of strength of evidence using the categories herein.

152 Examiners shall state their opinions using the full articulations below, not merely using the
 153 category labels (e.g., “support for source exclusion”), including in documentation and
 154 reporting. Examiners should provide the entire articulation scale in their documentation and
 155 reporting. Where possible, the same articulation requirements apply to testimony. In
 156 particular, examiners shall state their opinions in terms of the support for the following two
 157 propositions given their observations and interpretations of said observations:

- 158 ● The support for the proposition that the known footwear/tire made the questioned
 159 impression (known source)
- 160 ● The support for the proposition that a different footwear/tire made the questioned
 161 impression (different source)

162 For example, an examiner might state that the observed characteristics provide strong
 163 support for the proposition that the questioned impression came from a different source and
 164 negligible support for the proposition that the questioned impression came from the known
 165 footwear/tire.

166 Figure 1 shows the articulation categories for footwear and tire interpretations. The
 167 following descriptions are meant to provide context to the levels of opinions reached in
 168 footwear and tire impression comparisons. The descriptions of each level are not intended
 169 to be all inclusive for every possible observation. Each source opinion is broken down into
 170 the required observations, the appropriate interpretations of said observations, and the
 171 necessary articulation to report the given opinion.



172
 173 *Figure 1. Articulation of source opinions for footwear and tire interpretations. (Note: the size of the categories are not meant to*
 174 *reflect the expected frequency of each opinion category or the size of the pool of potential sources)*

175 **4.1 Source Exclusion**

176 **4.1.1 Observation**

177 Significant dissimilarities were noted in the comparison of class characteristics and/or
 178 characteristics of use between the questioned impression and the known footwear or tire.

179 **4.1.2 Interpretation**

180 **Source exclusion** is an examiner’s opinion that the observed characteristics provide
181 extremely strong support for the proposition that a different footwear or tire made the
182 questioned impression **and** no support for the proposition that the known footwear or tire
183 made the questioned impression. Source exclusion is only justified if the examiner’s opinion
184 is that the prospect of finding the observed characteristics, if the two items came from the
185 same source, is negligible.

186 Source exclusion can be expressed using absolutes if there is a logical impossibility that the
187 items came from the same source (e.g., an outsole design composed of zig zags and circles
188 can be definitively excluded as the source of an impression in which only square blocks are
189 apparent). In this scenario, an opinion of source exclusion represents a posterior odds
190 statement in which there is no support for the proposition that the known footwear or tire
191 made the questioned impression.

192 Characteristics of use should only be used as the sole observation in forming an opinion of
193 source exclusion if the known footwear or tire is recovered shortly after the deposition of
194 the impression and differs significantly in the quality and quantity of characteristics of use
195 or when the quality of the questioned impression is very high.

196 **4.1.3 Articulation**

197 Sufficient exclusionary differences were noted in the comparison of class characteristics
198 and/or characteristics of use between the questioned impression and the known footwear
199 or tire to state that the prospect of finding the observed characteristics, if the two items came
200 from the same source, is negligible.

201 The examiner shall explicitly detail his/her observations regarding:

- 202 ● The specific class characteristics and/or characteristics of use observed in the
203 questioned impression versus the known footwear or tire
- 204 ● Any observed similarities between these characteristics
- 205 ● Any observed dissimilarities between these characteristics, why these were
206 interpreted to be exclusionary differences, and why they were determined to be
207 sufficiently strong to report **source exclusion**
- 208 ● Any limiting factors that were encountered during the examination and how these
209 limitations were accounted for, evaluated, and/or mitigated

210 **4.2 Support for Source Exclusion**

211 **4.2.1 Observation**

212 The questioned impression exhibits dissimilarities in class characteristics and/or
213 characteristics of use when compared to the known footwear or tire.

214 **4.2.2 Interpretation**

215 **Support for source exclusion** is an examiner’s opinion that there are limitations associated
216 with the observed characteristics or evidence (e.g., quality, quantity, availability) that
217 prevent the examiner from reaching a stronger exclusion, but provide support for the
218 proposition that a different footwear or tire made the questioned impression and weak

219 support for the proposition that the known footwear or tire made the questioned
220 impression.

221 An opinion of support for source exclusion may be reached if (i.) there are observed
222 dissimilarities in class characteristics and/or characteristics of use **and** (ii.) one or more
223 limiting factors, such as:

- 224 ● The questioned impression is partial, fragmented, or distorted
- 225 ● The quality of the evidence is poor or lacking (e.g., low clarity, damage to the known
226 shoe/tire or the questioned impression, improper photographic techniques, etc.)
- 227 ● The time between the deposition of the impression and the recovery of the known
228 footwear/tire may not account for the dissimilarities observed
- 229 ● The examiner does not have access to the known footwear/tire (and only have
230 photographs) and/or limited test impressions

231 **4.2.3 Articulation**

232 The questioned impression exhibits dissimilarities when compared to the known footwear
233 or tire and provides stronger support for the proposition that the questioned impression
234 came from a different source than the proposition that the questioned impression came from
235 the known footwear or tire.

236 The examiner shall explicitly detail observations and interpretations regarding:

- 237 ● The specific class characteristics and/or characteristics of use observed in the
238 questioned impression versus the known footwear or tire
- 239 ● Any observed similarities between these characteristics
- 240 ● Any observed dissimilarities between these characteristics
- 241 ● Why any observed dissimilarities were/were not interpreted to be exclusionary
242 differences
- 243 ● Why any exclusionary differences were determined to be sufficient to report
244 **support for source exclusion**, but limited enough to preclude an opinion of **source**
245 **exclusion**
- 246 ● Any limiting factors that were encountered during the examination and how these
247 limitations were accounted for, evaluated, and/or mitigated

248 **4.3 Indeterminate with respect to source**

249 **4.3.1 Observation**

250 Although the evidence items were determined to be suitable for comparison, there were
251 significant limiting factors in the questioned impression and/or known footwear or tire.
252 These factors may include, but are not limited to: partial, fragmented or distorted
253 impression, insufficient information, lack of scale, improper position of scale, improper
254 photographic techniques, or significant length of time between the date of the occurrence
255 and when the footwear or tires were recovered that could account for a different degree of
256 general wear.

257 **4.3.2 Interpretation**

258 **Indeterminate with respect to source** is an examiner’s opinion that the observed
259 characteristics are insufficient or too ambiguous to support any source opinions (as defined
260 in the other sections).

261 In the opinion of the examiner, there was insufficient information and/or significant limiting
262 factors observed in the questioned impression to warrant a meaningful opinion regarding
263 the particular known footwear outsole or tire tread. This opinion only applies to the known
264 footwear or tire that was examined and does not necessarily preclude future examinations
265 with other known footwear or tires.

266 **4.3.3 Articulation**

267 The questioned impression does not exhibit sufficient observable similarities or
268 dissimilarities when compared to the known footwear or tire to provide support for either
269 proposition. The observations provide relatively equivalent support for both known source
270 and different source propositions.

271 The examiner shall explicitly detail observations and interpretations regarding:

- 272 ● The specific class characteristics and/or characteristics of use observed in the
273 questioned impression
- 274 ● How the observed characteristics in the questioned impression compare to those
275 observed on the known footwear or tire
- 276 ● Any observed similarities and/or dissimilarities between these characteristics and
277 why these were determined to be insufficient to provide stronger support for
278 inclusion or exclusion
- 279 ● Any limiting factors that were encountered during the examination

280 **4.4 Support for Inclusion based on Class Characteristics**

281 **4.4.1 Observation**

282 The class characteristics of design and physical size (if available) correspond between the
283 questioned impression and the known footwear or tire. Correspondence of general wear (a
284 characteristic of use) may also be observed. Factors limiting the comparison and/or
285 dissimilarities may also be observed (see *Interpretation* below for further details).

286 **4.4.2 Interpretation**

287 **Support for inclusion based on class characteristics** is an examiner’s opinion that the
288 observed characteristics provide more support for the proposition that the questioned
289 impression was made by the known footwear or tire than for the proposition that the
290 questioned impression was made by a different footwear or tire. However, the relative
291 support does not rise to the level required for a stronger support for inclusion (based upon
292 characteristics of use) for the known footwear or tire.

293 Any other footwear/tire that shares the same class characteristics (design and potentially
294 size) and general wear (if observed) as the known footwear/tire is also included in the pool
295 of potential sources for the questioned impression.

296 Limiting factors may be present, such as: limited detail, insufficient RACs, improper
297 photographic techniques, distortion or significant lengths of time between the date of the

298 occurrence and when the footwear or tires were recovered that could account for dissimilar
299 characteristics of use.

300 Any observed dissimilarities shall be interpreted as explainable by the examiner (i.e., no
301 exclusionary differences are observed).

302 **4.4.3 Articulation**

303 The questioned impression and known footwear or tire correspond in class characteristics
304 (design and size, if available). Correspondence of general wear may also be observed. The
305 observed characteristics of the items provide more support for the proposition that the
306 questioned impression was made by the known footwear or tire than for the proposition that
307 the questioned impression came from a different source.

308 Other footwear or tires with the class characteristics observed in the impression are
309 included as possible sources. If general wear is observed in the questioned impression, any
310 differences in general wear with the known shall be explainable by case circumstances (e.g.,
311 time delay between deposition and collection).

312 The examiner shall explicitly detail observations and interpretations regarding:

- 313 ● The class characteristics observed in the questioned impression and the known
314 footwear or tire
- 315 ● Any observed similarities between these characteristics and why these were
316 interpreted to be correspondences
- 317 ● Any observed dissimilarities between these characteristics and why these were
318 interpreted to be explainable
- 319 ● Any limiting factors that were encountered during the examination and how these
320 limitations were accounted for, evaluated, and/or mitigated

321 **4.5 Support for Inclusion based on Class Characteristics and Specific** 322 **Characteristics of Use**

323 **4.5.1 Observation**

324 The questioned impression and known footwear or tire correspond in all observed class
325 characteristics. Correspondence of general wear (a characteristic of use) may also be
326 observed. There is also specific wear and/or one or more randomly acquired
327 characteristic(s) in correspondence. Factors limiting the comparison and/or dissimilarities
328 may also be observed (see *Interpretation* below for further details).

329 **4.5.2 Interpretation**

330 ***Support for inclusion based upon class characteristics and specific characteristics of use***
331 is an examiner's opinion that the observed characteristics provide substantially more
332 support for the proposition that the questioned impression was made by the known
333 footwear or tire than for the proposition that the questioned impression was made by a
334 different footwear/tire. However, the relative support does not rise to the level required for
335 **strong support for known source.**

336 Any other footwear/tire that shares the same class characteristics and characteristics of use
337 as the known footwear/tire is also included in the pool of potential sources for the
338 questioned impression.

339 Limiting factors may be present, such as: limited detail, insufficient RACs, improper
340 photographic techniques, distortion or significant lengths of time between the date of the
341 occurrence and when the footwear or tires were recovered that could account for dissimilar
342 characteristics of use.

343 Any observed dissimilarities shall be interpreted as explainable by the examiner (i.e., no
344 exclusionary differences are observed).

345 **4.5.3 Articulation**

346 The questioned impression and the known footwear or tire share agreement of all class
347 characteristics and one or more specific characteristics of use. These corresponding
348 characteristics offer substantially more support for the proposition that the questioned
349 impression came from the known footwear or tire than for the proposition that the
350 questioned impression came from a different source.

351 Other footwear or tires with the same class characteristics observed in the impression are
352 included in the pool of possible sources **only if** they display the same specific characteristics
353 of use observed in the questioned impression.

354 The examiner shall explicitly detail observations and interpretations regarding:

- 355 ● The class characteristics and specific characteristics of use observed in the
356 questioned impression and the known footwear or tire
- 357 ● Any observed similarities between these characteristics and why these were
358 interpreted to be correspondences
- 359 ● Explanation of why the observed similarities and correspondences were not
360 sufficient to report **strong support for known source**
- 361 ● Any observed dissimilarities between these characteristics and why these were
362 interpreted to be explainable
- 363 ● Any limiting factors that were encountered during the examination and how these
364 limitations were accounted for, evaluated, and/or mitigated

365 **4.6 Strong Support for Known Source**

366 **4.6.1 Observation**

367 The questioned impression and the known footwear or tire correspond in all observed class
368 characteristics and specific characteristics of use, including one or more randomly acquired
369 characteristics of high quality and/or discriminability. Dissimilarities may also be observed.

370 **4.6.2 Interpretation**

371 **Strong Support for Known Source** is an examiner's opinion that the observed
372 characteristics provide overwhelmingly more support for the proposition that the
373 questioned impression was made by the known footwear or tire than for the proposition that
374 the questioned impression was made by a different footwear/tire. There is extremely weak

375 support for the proposition that the questioned impression was made by a different
376 footwear/tire.

377 This opinion shall not be expressed using absolutes such as “to the exclusion of all other
378 sources in the world” or “100% certainty.” Other footwear or tires with the same class
379 characteristics and specific characteristics of use observed in the questioned impression are
380 included in the pool of possible sources— which is exceedingly small in the opinion of the
381 examiner given the quantity, quality, and discriminability of the observed corresponding
382 characteristics.

383 Any observed dissimilarities shall be interpreted as explainable by the examiner (i.e., no
384 exclusionary differences are observed).

385 **4.6.3 Articulation**

386 The questioned impression and the known footwear or tire share agreement of class
387 characteristics and specific characteristics of use, including one or more RACs of high quality
388 and/or discriminability. The observed characteristics provide overwhelmingly more
389 support for the proposition that the questioned impression came from the known footwear
390 or tire than for the proposition that the questioned impression came from a different source.

391 The examiner shall explicitly detail observations and interpretations regarding:

- 392 ● The specific class characteristics and characteristics of use observed in the
393 questioned impression and the known footwear or tire
- 394 ● Any observed similarities between these characteristics and why these were
395 interpreted to be correspondences
- 396 ● Explanation of why the observed similarities and correspondences were sufficiently
397 strong to report **strong support for known source**
- 398 ● Any observed dissimilarities between these characteristics and why these were
399 interpreted to be explainable
- 400 ● Any limiting factors that were encountered during the examination and how these
401 limitations were accounted for, evaluated, and/or mitigated

402 **5 General Considerations**

403 Proper documentation of the source opinions detailed herein provides transparency, and
404 aids in the interpretation of the results. Documentation of an examiner’s observations and
405 findings should be balanced, logical, robust, thorough, and transparent and shall explicitly
406 describe the bases for conclusions, acknowledging limitations of the information available to
407 the examiner, and disclosing contextual information or assumptions (if any) used to make
408 conclusions. All source opinions require such documentation.

409 The source opinions detailed in this document do not refer to the chances that evidence
410 items originate from a known source or from a different source. This is beyond the scope of
411 the examiner's responsibilities. Instead, all opinions refer to whether evidence supports the
412 known source or different source propositions.

413 **6 Limitations**

414 When articulating footwear/tire interpretations in reports and testimony, the examiner
415 shall adhere to the following limitations:

- 416 ● A source opinion provided in a report or during testimony is ultimately an
417 examiner’s opinion and is not based upon a comparison to all other footwear/tire
418 items.
- 419 ● An examiner shall not assert that a “strong support for known source” is based on
420 the “uniqueness” of an item of evidence.
- 421 ● An examiner shall not use the terms “individualize”, “individualization”,
422 “identification”, or “match” when describing a source opinion.
- 423 ● An examiner shall not assert that the known footwear item or tire made the
424 questioned impression with absolute or 100% certainty, or use the expressions
425 “reasonable degree of scientific certainty,” “reasonable scientific certainty,” or
426 similar assertions of reasonable certainty in either reports or testimony.
- 427 ● An examiner shall not assert that the known footwear or tire made the questioned
428 impression to the exclusion of all other footwear or tires.
- 429 ● An examiner shall not provide an “inclusion” opinion without explaining that there
430 may be other footwear or tires with similar characteristics that could have also
431 made the impression(s).
- 432 ● An examiner shall not assert that forensic footwear or tire examinations are
433 infallible or have a zero-error rate.
- 434 ● An examiner shall not provide an opinion that includes a numerical estimate of
435 probability or a statistically-derived measurement except when based on
436 appropriate data.
- 437 ● An examiner shall not cite the number of forensic footwear or tire examinations
438 performed in their career as a direct measure for the accuracy of a conclusion
439 provided.

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