

Examining Friction Ridge Prints

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Examining Friction Ridge Prints

1 INTRODUCTION

- A. Friction ridge print examinations are conducted using a process known as Analysis, Comparison, and Evaluation, which includes an assessment of the quantity and quality of the information present.¹
- B. The comparison and evaluation of two areas of friction ridge prints are based on:
 - o the examination of ridge flow;
 - o ridge paths, including the location, direction, and spatial relationships of minutiae; and
 - o ridge structure and pores.
- C. The following are the fundamental principles for these examinations:
 - 1. The morphology of friction ridge skin is unique.
 - 2. The arrangement of friction ridges is persistent.
 - 3. During contact with a surface, the details of friction ridge skin may be transferred.
 - 4. Prints that contain sufficient quality and quantity of friction ridge detail may be identified, or excluded, as coming from the same source (i.e., the area of friction ridge skin)
 - 5. No predetermined number of friction ridge details is required to establish a conclusion.

1.1 Term Clarification

- A. Throughout all Friction Ridge Discipline level two documents and technical records, the terms *Source Identification* and *Source Exclusion* are interchangeable with the terms *identification* and *exclusion*, respectively.
- B. The term “friction ridge print” includes prints deposited on a surface as well as the capture of friction ridge skin in an image.

2 SCOPE

These procedures apply to all personnel who conduct friction ridge print Analysis, Comparison, and Evaluation examinations within the FBI Laboratory.

3 LIMITATIONS

- A. The presence of a friction ridge print on an item of evidence indicates contact was made between the source and the item.
- B. The presence of a friction ridge print alone does not necessarily indicate the significance of the contact or the time frame during which the contact occurred.
- C. Due to a variety of factors, the recovery of friction ridge prints on items of evidence is not always successful.

¹ SWGFAST Document #10 Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint), Ver 2.0, Issue Date 03/13/2013.

- D. A lack of friction ridge prints on an item or the exclusion of a friction ridge print from a given source does not necessarily mean that the given source did not come into contact with the item.
- E. See *Approved Standards for Scientific Testimony and Report Language for the Friction Ridge Discipline* (FRD-900)

4 EQUIPMENT

- Magnifiers
- Ridge Counters (or dissecting needles)
- Marking Pens
- Microscopes/Macroscopes
- Digital Imaging Systems
- Equipment providing adequate lighting

5 FACTORS AFFECTING EXAMINATIONS

- A. The quality and appearance of a print may be affected by various factors when a print is deposited or captured.
- B. An examiner must consider these factors when determining the tolerance for variation in the appearance of friction ridge features.
- C. Failure to properly assess these factors may result in a misinterpretation of the data.
- D. These factors must be considered in all phases of Analysis, Comparison, and Evaluation, when applicable and available.

5.1 Anatomical Aspects

- Possible areas of friction skin
- Presence, location, and orientation of additional friction ridge prints on the same items

5.2 Transfer Conditions

- Pressure applied during transfer
- Slippage or twisting
- Handling of item

5.3 Transfer Medium

- Eccrine
- Sebaceous
- Blood
- Paint
- Dirt
- Corrosives
- Oil/grease
- Other

5.4 Detection Method

- Visual
- Forensic light source
- Chemical
- Powder

5.5 Substrate

- Porous
- Non-porous
- Semi-porous
- Textured
- Adhesive

5.6 Environmental

- Protected
- Unprotected
- Wet
- Hot
- Dry

5.7 Preservation

- Lifting
- Casting
- Photography
- Digital capture

5.8 Condition of the Skin

- Dry
- Wet
- Mutilated
- Diseased
- Macerated
- Desiccated
- Burned

5.9 Effects from Photography or Reproduction

- Image properties (e.g., resolution, compression)
- Lighting
- Image quality
- Angle of capture
- Obstructions
- Digital processing
- Printer effects

6 LEVELS OF FRICTION RIDGE PRINT DETAIL

- A. The information (known as friction ridge print detail) can be classified into three levels of detail.
- B. An examiner will assess this information to determine the quality and quantity of data detected in the print.
- C. This information must be considered in all phases of Analysis, Comparison, and Evaluation, when applicable and available.

6.1 Level One Detail

- Overall ridge flow
- General morphology (e.g., overall size)
- Used for pattern interpretation
- To determine anatomical source (i.e., finger, palm, foot, toe) and/or orientation
- May not be used alone to identify
- May be used alone to exclude

6.2 Level Two Detail

- Individual ridge path
- Presence of a ridge event
 - Type of ridge event (e.g., ending ridge, dividing ridge, or dot)
 - Direction of ridge event
 - Location of ridge event
 - Spatial relationship of ridge events
- Absence of ridge events (e.g., continuous ridge)
- Combination of ridge events
- May be used in conjunction with level one detail to form a conclusion

6.3 Level Three Detail

- Structure of individual ridges (e.g., size, edge shapes)
- Relative pore position
- Other specific friction ridge skin morphology (e.g., ridge breaks)
- Appearance is highly variable, dependent on deposition pressure and other factors
- May be used in conjunction with level one and level two detail to form a conclusion

6.4 Other Features Associated with Friction Ridge Prints (e.g., creases, scars, warts, paper cuts, blisters)

- May be permanent or temporary
- May exist as level one, two, and/or three detail
- Appearance is highly variable, dependent on deposition pressure and other factors
- May be used in conjunction with friction ridge detail to form a conclusion

6.5 Reliability of Level Three Detail and/or Other Friction Ridge Print Features

- A. Level three detail and/or other friction ridge print features may be used to support a conclusion only when the corresponding area of the friction ridge print is reliable and with similar deposition pressure as the exemplar.
- B. If these details are significantly relied upon to reach a conclusion, the examiner must check all available intentionally recorded print(s) on file to determine whether the details utilized to support a conclusion are reliably and consistently reproduced and the details must be recorded.

7 PROCEDURES FOR FRICTION RIDGE PRINT EXAMINATIONS (ANALYSIS, COMPARISON, AND EVALUATION)

- A. Analysis, Comparison, and Evaluation is a process in which the examiner continually assesses the specificity and/or rarity of features and any similarity/dissimilarity between two prints.
 - 1. The process is applied in all types of friction ridge examinations (i.e., unknown to known, known to known, or unknown to unknown).
- B. Throughout Analysis, Comparison, and Evaluation, the examiner may re-analyze the friction ridge print based on new interpretations of friction ridge information (e.g., consultation).

8 ANALYSIS

- A. Analysis is the primary examination of a friction ridge print by an examiner, in which the quality and quantity of information, including the specificity and/or rarity of features and their relationships, are assessed in addition to tolerance for variations in appearance.
- B. A print is suitable for comparison when the examiner determines that sufficient reliable information may be present, such that an identification decision could be reached, and the observed information contains enough specificity and/or rarity that the examiner would not expect to see that same amount of information repeated in a different source.
- C. A print is not suitable for comparison if the print lacks sufficient reliable information such that an identification decision to any source would not be considered possible.

8.1 Analysis Procedure

- A. The examiner observes the print, using a magnifier, microscope, macroscope, digital imaging software, or other tools, when necessary.
- B. The examiner determines if the print is from friction ridge skin and, if so, analyzes the print considering the information outlined in [Section 5](#) and [Section 6](#).
- C. If a print is suitable for comparison, the examiner will move to the next step in the process, comparison, as applicable.
 - 1. There is no expectation that Comparison and Evaluation must be completed once a print has been analyzed and found suitable for comparison.

8.2 Analysis Records

8.2.1 Analysis Recording - Images

- A. For latent prints and non-standard intentionally recorded prints (e.g., single print on license or notary book), if the print is suitable for comparison, the examiner will complete the following steps.
 - 1. Orient the print in the correct anatomical position, if known.
 - 2. Indicate the type (e.g., fingerprint, palm print, toe print).
 - 3. Record sufficient level two detail to support a suitable for comparison decision on an image of the print.
 - 4. If level three detail is a significant factor in deeming the print suitable for comparison, record the level three detail relied upon to reach that decision
- B. For latent prints and non-standard intentionally recorded prints, the absence of an indication of claiming on captured or submitted images as defined in Section 8.2.1 A signifies the friction ridge detail was either not suitable for comparison or not analyzed.
- C. Due to the nature of the record, notation of orientation, type, and level two or three detail are not required for standard intentionally recorded prints (e.g., ten print card, fingerprint strip, major case prints).

8.2.2 Analysis Recording – FBI Laboratory File

- A. The FBI Laboratory file must include the number and type of prints that are suitable for comparison for each item.
- B. For captured or submitted friction ridge detail with no indication of claiming, the FBI Laboratory file must state if the detail was not analyzed or not suitable for comparison.
 - 1. The contributor will be notified that prints that were not analyzed are available for future requests as needed.
- C. Unless otherwise noted in the FBI Laboratory file, standard intentionally recorded prints are assumed to be suitable for comparison if used for a comparison.
- D. With the exception of intentionally recorded prints (standard and non-standard) and unless otherwise noted in the FBI Laboratory file, all suitable for comparison prints are assumed to be latent prints.

8.3 Change in Analysis

8.3.1 Change in Analysis Disagreements for Un-Reported Prints

- A. If an examiner determines that a suitable for comparison print lacks sufficient reliable information such that an identification decision to any source would not be considered possible, and the print(s) has not been reported, the analysis decision can be changed with no approval required.
- B. All marked images will be retained in the FBI Laboratory File.
- C. If another examiner had made the original decision and the change in analysis did not occur as a result of the verification process, the change will not be addressed by

the *FBI Laboratory Operations Manual* (LAB-200) and the *Disagreements and Scientific Review Board in Casework* document (FRD-502) as the change would not fall under the conditions of those documents.

8.3.2 Change in Analysis Disagreements for Previously Reported Prints

- A. If an examiner determines that a suitable for comparison print lacks sufficient reliable information such that an identification decision to any source would not be considered possible, and the print(s) has been previously reported, the examiner will do the following:
 - 1. For a suitable for comparison print(s) (or claimed print) that has been reported, expanded analysis documentation and supervisory approval is required (e.g., digital markups).
 - 2. For a print(s) that has been reported as of value, supervisory approval is required.
- B. In addition, if the print(s) had been previously reported by another examiner currently employed in the FBI Laboratory Friction Ridge Discipline, changes in analysis will be handled as follows:
 - 1. Uncompared print(s) and print(s) previously reported as latent inconclusive will require a discussion with the original examiner.
 - 2. The discussion and conclusion will be noted in the FBI Laboratory file.
 - 3. The change will not be addressed by the *FBI Laboratory Operations Manual* and the *Disagreements and Scientific Review Board in Casework* document as the change would not fall under the conditions of those documents.
 - 4. Prints with any other reported conclusion (e.g., identified, excluded, known inconclusive, or automated search results) will require disagreement resolution with the original examiner.
 - 5. Relevant communications of results will be revised as needed.
- C. If the original examiner is no longer employed in the FBI Laboratory Friction Ridge Discipline, no disagreement discussions will occur.
 - 1. Relevant communications of results will be revised as needed.
- D. If an examiner determines that a not suitable for comparison print should now be suitable for comparison, no additional measures will be taken.
 - 1. The change will not be addressed by the *FBI Laboratory Operations Manual* and the *Disagreements and Scientific Review Board in Casework* document as the change would not fall under the conditions of those documents.

9 COMPARISON

- A. Comparison is the side-by-side observation of suitable for comparison friction ridge prints to determine whether the information observed during analysis is in agreement or disagreement between two prints.
- B. When determining if features correspond, an examiner considers variation in the appearance of the friction ridge prints that may be attributed to the factors listed in [Section 5](#).
- C. Throughout the comparison process, the examiner may re-analyze the prints being compared. (See [Section 8.3](#))

9.1 Comparison Procedure

- A. An examiner must conduct and record an analysis on a friction ridge print(s) before they conduct comparisons using the print(s).
- B. The examiner compares the corresponding area between two friction ridge prints.
 - 1. If a suitable for comparison print is determined to be an impression, all appropriate areas of the available intentionally recorded prints must be compared, unless otherwise noted.
 - 2. When comparing a latent print to an intentionally recorded print(s), the examiner will begin the comparison process with the latent print.
 - 3. Evaluation decisions are clarified in [Section 10](#).
- C. If appropriate, the examiner determines if a sufficient amount of level one detail is in disagreement for exclusion.
- D. If a print cannot be excluded based on level one detail, additional detail must be compared.
- E. The examiner selects a target group in a friction ridge print and searches for it in the comparable area of the second friction ridge print.
 - 1. If the initial target group is not found, alternative target groups may be selected.
- F. If similarity with the target group is found, the examiner continues comparing ridges in sequence until a sufficient correspondence of friction ridge detail allows the examiner to support an identification conclusion.
- G. If similarity with the target group is not found, the examiner continues comparing friction ridge detail until a sufficient amount of disagreement of friction ridge detail allows the examiner to support an exclusion conclusion.
- H. If after comparison of all relevant comparable areas, neither sufficient agreement nor sufficient disagreement of friction ridge details can be observed, the examiner may form an inconclusive conclusion.
- I. During comparison, the examiner may change the original analysis conclusion.
 - 1. If a change is made, the examiner must clearly record the change in the FBI Laboratory file. (See [Section 8.3](#).)

10 EVALUATION

- A. Evaluation is the formation of a conclusion based on the examiner's observations, assessments, and records generated during the analysis and comparison of the friction ridge prints.
- B. The observation and assessment refer to the examiner's interpretation of the information found to be either in agreement or disagreement between two prints in order to come to a conclusion.
- C. The conclusion is supported by the examiner's ability to assess the specificity and/or rarity of information present within the print.
- D. The possible conclusions are as follows:
 - o Identification
 - o Exclusion
 - o Inconclusive

- Known
- Latent (also applies to non-standard intentionally recorded prints)

10.1 Identification

- A. Identification is an examiner's conclusion that two friction ridge prints originated from the same source.
- B. The conclusion is an examiner's opinion that the observed friction ridge skin features are in sufficient correspondence such that the examiner would not expect to see the same arrangement of features repeated in a print that came from a different source and has found insufficient friction ridge skin features in disagreement to conclude that the prints came from different sources.
- C. The basis for an identification conclusion is an examiner's opinion that the observed corresponding friction ridge skin features provide extremely strong support for the proposition that the two prints came from the same source and extremely weak support for the proposition that the two prints came from different sources.
- D. An identification is the statement of an examiner's opinion (an inductive inference²) that the probability that the two prints were made by different sources is so small that it is negligible.
- E. While an identification to the absolute exclusion of all others is not supported by research, an identification conclusion is supported by:
 1. the biological premise that friction ridge skin is persistent and unique,³
 2. population studies that have assessed the frequency of features,⁴ and
 3. statistical models, which have demonstrated that as more reliable features are found in agreement, it becomes less likely to find that same arrangement of features in a print from a different source.⁵
- F. Level three detail may be used to support a conclusion only when the corresponding areas of the prints are reliable.

10.2 Exclusion

- A. Exclusion is an examiner's conclusion that two friction ridge prints did not originate from the same source.
- B. The basis for an exclusion conclusion is an examiner's opinion that the observed friction ridge skin features are in sufficient disagreement and provide extremely strong support for the proposition that the two prints came from different sources

² "By the process of induction or inference, predictions about new situations are inferred or induced from the existing body of knowledge. In other words, an inference is a generalization, but one that is made in a logical and scientifically defensible manner." Oxford Dictionary of Forensic Science 130 (2012).

³ ---- (2011). National Institute of Justice. The Fingerprint Sourcebook. (www.nij.gov/pubs-sum/225320.htm) Chap. 2-3; Wertheim, K., & Maceo, A. (2002). The Critical Stage of Friction Ridge and Pattern Formation. *Journal of Forensic Identification* 52(1): 35-85

⁴ Gutierrez, E.; Galera, V.; Martinez, J. M.; and Alonso, C. (2007). Biological Variability of the Minutiae in the Fingerprints of a Sample of the Spanish Population. *Forensic Science International* 172:98-105; Gutierrez-Redomero, E.; Alonso-Rodriguez, C.; Hernandez-Hurtado, L. E.; and Rodriguez-Villalba, J. L. (2011). Distribution of the Minutiae in the Fingerprints of a Sample of the Spanish Population. *Forensic Science International* 208:79-90.

⁵ Neumann, C. et al (2012). Quantifying the weight of evidence from a forensic fingerprint comparison: a new paradigm. *Journal of the Royal Statistical Society*, Vol. 175, pp. 371-415.

and extremely weak or no support for the proposition that the two prints came from the same source.

10.3 Inconclusive

- A. Inconclusive is an examiner's conclusion that there is insufficient quantity and/or clarity of corresponding friction ridge skin features between two prints such that the examiner is unable to identify or exclude the two prints as originating from the same source.
- B. The basis for an inconclusive conclusion is an examiner's opinion that an identification or exclusion cannot be made due to insufficient information in either of the two prints examined.

10.3.1 Known Inconclusive

- A. A known inconclusive conclusion can be rendered due to insufficient quantity and/or clarity of information in the known print.
 - 1. For example, if the print to be compared is from the tip or lower joint of a finger and the corresponding area is not fully captured on the available exemplar(s), or the corresponding area is unusable (e.g., due to distortion), then a known inconclusive conclusion would be reached.
 - 2. Additional recordings from the compared individual may allow for a conclusive decision to be reached.
- B. A known inconclusive conclusion is not used if the corresponding exemplar(s) is not available.
 - 1. For example, if the print to be compared is a palm print and no known palm prints are available for an individual, a known inconclusive conclusion is not appropriate.
 - 2. Instead, the examiner will record the absence of known palm prints in the FBI Laboratory file.
- C. If the print to be compared is an impression, the comparison conclusion will be specific to the type of known prints available (e.g., one latent impression is not a fingerprint of JOHN DOE. No palm prints are available for DOE.).
- D. Any time a known inconclusive evaluation decision is rendered through a manual comparison, the examiner will review any available records on the Biometric Information Retrieval screen and the Certification File per the *Next Generation Identification System* document (FRD-600) for that identity that contains the corresponding area until a conclusive decision is rendered or no additional useful records exist.
 - 1. If no additional records have higher quality and/or quantity of corresponding areas for comparison, the evaluation result remains known inconclusive, and the examiner must record the lack of additional records in the case notes.
- E. A known inconclusive conclusion will be denoted in the FBI Laboratory file as "inconclusive" with no additional explanation.

10.3.2 Latent Inconclusive

- A. A latent inconclusive conclusion can be rendered due to insufficient agreement and insufficient disagreement of information between the latent print or non-standard intentionally recorded print and the known print.
- B. This conclusion is appropriate if the examiner is unable to identify or exclude the prints as having come from the same source and the following two conditions are met:
 - 1. additional recordings from the compared individual are not expected to allow for a conclusive decision to be reached AND
 - 2. The latent print may still contain sufficient reliable information such that an identification decision to another individual could be reached.
- C. A latent inconclusive decision is not appropriate if it is determined that the latent print is no longer suitable for comparison (i.e., no longer contains sufficient information for an identification to any individual).
 - 1. Instead, the examiner will record a change in the analysis of the print as written in [Section 8.3](#).
- D. If the examiner reaches a latent inconclusive decision, they will refer to the conclusion as “latent inconclusive”.

10.4 Recording Evaluations

10.4.1 Recording Evaluations – Images

- A. If a latent or intentionally recorded non-standard friction ridge print is identified to a known source, the annotated image will indicate:
 - An identification was effected,
 - Correct anatomical source designation (e.g., finger #, left/right palm/foot), and
 - Last name or unique identifier (e.g., Universal Control Number (UCN)) of the individual.
 - Additional information may be needed if the last name is not unique to the FBI Laboratory file.
- B. No notations are required on images for exclusion, known inconclusive, or latent inconclusive decisions.
- C. Standard intentionally recorded prints do not require Analysis, Comparison, and Evaluation markings on the image for any evaluation conclusions.
- D. If a latent-to-latent comparison results in an identification, the conclusion must be recorded on both images.

10.4.2 Recording Evaluations – FBI Laboratory file

- A. The case notes must contain a record of the evaluation conclusion reached for all print comparisons.
- B. Case notes will indicate if the print(s) are not compared (e.g., latent palm prints in the case, but no known palm prints are available).

- C. If a latent-to-latent comparison is requested, the examiner must clearly record which prints were compared and whether the prints were identified or if no identifications were effected.

11 INFORMATION TO SUPPORT ANALYSIS, COMPARISON, AND EVALUATION CONCLUSION(S)

- A. If the data relied upon to support the evaluation conclusion are different from the information initially recorded during analysis, the examiner must record the new information.
- B. The FBI Laboratory file must clearly indicate at what stage the recorded information was observed (e.g., analysis or comparison).
- C. The examiner may need to use multiple images to record their Analysis, Comparison, and Evaluation process, with each image clearly marked with the stage(s) of information (e.g., writing “analysis” on a second analysis image or adding “comparison” to asset information in a digital image).
- D. The examiner must compare the data observed in the initial analysis to the data relied upon to support the final analysis and evaluation conclusion.
- E. The use of level three detail to effect a conclusion must be recorded in the FBI Laboratory file.

11.1 Record Retention- Images

- A. A copy of all latent print images (to include any negatives) captured by FBI personnel must be retained, with the exception of images deemed “test” or “exploratory” per the *Digital Images* document (FRD-400).
- B. All annotated images must be retained, regardless of whether the print was determined to be suitable for comparison.

11.2 Intentionally Recorded Prints Used for Comparison

- A. If used for comparison, a legible reproduction of the intentionally recorded print(s) must be retained in the FBI Laboratory file.
- B. An examiner using intentionally recorded prints for examinations must record which prints were used.
 - 1. Examples of acknowledgement include
 - initialing a copy of the intentionally recorded print(s),
 - associating a secure electronic signature with the exemplar, or
 - assigning a unique identifier to each card and recording the appropriate identifier in the FBI Laboratory file.

12 VERIFICATION AND BLIND VERIFICATION

Refer to the *Verification and Blind Verification* (FRD-501) document for definitions and specific procedures and their application.

13 SUPERVISOR REVIEW

- A. A Supervisor may deem it necessary to review the casework of any examiner in their unit for all or part of a case that has not yet been reported.

1. Another qualified individual may be directed to act as a Supervisor for this review.
- B. These examinations are referred to as a Supervisor review and are recorded in the FBI Laboratory file.
- C. The record will show what was reviewed in addition to the Supervisor's name and the date(s) of the review.
- D. The Supervisor must retain any additional records they generate in the FBI Laboratory file.

14 CONSULTATIONS

14.1 Consultation

- A. A consultation is a significant interaction between examiners regarding one or more prints in question.
- B. An interaction is considered significant when the consultant examiner conducts an analysis or comparison of the print(s).
- C. The commonality of the examples below is that they include, at a minimum, an analysis of the print(s), and may also include a comparison and evaluation.
- D. Examples of significant interactions that rise to the level of consultation include:
 - Determination of suitability for comparison in analysis
 - Presence of significant distortions impacting the analysis or comparison
 - Presence of specific features during the analysis or comparison
 - Whether an examination is complex or non-complex

14.2 Not Consultation

- A. Discussions falling below the level of a significant interaction usually involve minimal (or no) analysis.
- B. Discussions typically have less potential to impact the key decision stages of Analysis, Comparison, and Evaluation and are often related to case efficiency, strategy for workflow, or case management.
- C. Examples of discussions that do not rise to the level of consultation include:
 - Suitability for Next Generation Identification system and/or its parameters
 - Administrative decisions such as triage (e.g., prioritizing prints for examination)
 - Searching efficiency (search smart clues)
 - Processing choices
 - Anatomical origin
 - Orientation

14.3 Recording Consultations

- A. Only consultations must be recorded in the FBI Laboratory file.
- B. The FBI Laboratory file will clearly describe what the examiner consulted on (e.g., specific print or situation) as well as the consultant's name and the date of consultation.

- C. Any new examination records created as a result of consultation must be retained in the FBI Laboratory file.
- D. Discussions or other communications that do not reach the level of a consultation do not need to be recorded.

15 COMPLEX ANALYSIS OR CONCLUSION

- A. When dissimilarities or factors influencing the quality of a latent print are present, and their presence could interfere with the proper interpretation of the print, the resulting analysis or evaluation conclusion may be considered complex.
- B. Some factors that may result in a complex analysis or evaluation conclusion include:
 - o irregular substrate,
 - o excessive deposition and/or lateral pressure, and
 - o limited level two detail.
- C. Examiners should reflect any factors and/or interpretations in the FBI Laboratory File.

16 REVISION HISTORY

Revision	Issued	Changes
15	05/24/2022	Updated Section 8.2.1 and Section 8.2.2 to address prints with no indications of claiming. Section 8.3.1 updated to exclude verification process.
16	10/15/2024	Information in document reorganized as needed. Section 1 – duplicative information removed. Section 6 – Heading more accurate. Section 7 – unnecessary information removed. Section 8 – “claimed” removed. Section 14.3-B – example added. Section 15-C – modified to a should.