

FBI Approved Standards for Scientific Testimony and Report Language for Metallurgy

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1 INTRODUCTION

This document provides examples of the scientifically-supported conclusions and opinions approved for reporting examination conclusions and offering expert opinion statements during testimony by metallurgy examiners within the Chemistry Unit (CU). Metallurgy is an engineering field of very broad scope. Accordingly, these examples are not intended to be all inclusive. When conclusions can be drawn from sound engineering practices and substantiated through the technical review process, topics other than those listed may potentially be discussed in court testimony. Specific limitations may also be imposed by the judge or locality in which a testimony is provided. Such restrictions may require modification of the following examples. Further, these examples are not intended to serve as precedent for other forensic laboratories and do not imply that statements by other forensic laboratories are incorrect, indefensible, or erroneous.

2 SCOPE

This document applies to CU employees who prepare an FBI *Laboratory Report* and/or provide expert testimony in metallurgy. This document does not apply to CU employees who provide fact witness testimony.

3 RESPONSIBILITIES

- A. The examiner will ensure that a *Laboratory Report* is consistent with the approved statements contained within this document when applicable.
- B. The examiner will ensure that his/her testimony related to metallurgy examinations is consistent with the approved statements contained within this document when applicable.
- C. The Technical and Administrative reviewers will ensure compliance of the metallurgy *Laboratory Report* with the statements contained within this document.
- D. The authorized evaluator who reviews testimony in accordance with LAB-100 will assess if metallurgy testimony complies with the statements contained within this document and the Department of Justice *Uniform Language for Testimony and Reports for the Forensic Metallurgy Discipline* (Metallurgy ULTR).

4 STATEMENTS APPROVED FOR FBI METALLURGY TESTIMONY AND/OR LABORATORY REPORTS

For more detailed guidance on writing metallurgy reports, see METAL-210.

- An examiner may report and/or state the elemental composition of an item. For example, an examiner may report that a piece of jewelry is a gold-copper alloy. If the results are quantitative in nature, the estimated measurement uncertainty will also be reported.

- An examiner may report and/or state the alloy an object is comprised of, based on an elemental analysis of the item and comparison with published standards. For example, an examiner may state a drill bit is comprised of W2 tool steel and not M3 tool steel.
- An examiner may report and/or state the mechanical properties of an item, if supported by appropriate testing, and may opine as to whether these results are consistent with a particular published or contractual specification.
- An examiner may report and/or state the production process used to manufacture an item when the physical characteristics permit such an inference. For example, an examiner may indicate that fine wire is produced using a drawing process.
- An examiner may identify the company that is assigned a particular trademark, barcode, Underwriters Laboratory (UL) listing code, etc., by reference to an appropriate source (e.g., a database). The examiner will identify the source of the information.
- An examiner may report the physical mechanism(s) responsible for a particular failure (e.g., fatigue, creep, hydrogen embrittlement).
- An examiner may report the exclusion of a particular failure mechanism when supported by the physical features of the evidence, even if the actual failure mechanism remains undetermined.
- An examiner may report and/or state an estimate of the forces required to produce a given fracture. The examiner may also discuss the basis of the estimate.
- An examiner may report and/or state other factors which contributed to the failure such as inclusions, improperly machined notches, corrosive environment, etc.
- An examiner may report and/or state a determination that automotive lamps were operating or were off when subjected to an impact if the physical changes in the lamp are sufficient to support such a conclusion.
- If the physical characteristics are inconclusive, the examiner may report and/or state the operating condition of an automotive lamp could not be determined.
- An examiner may report and/or opine a Fracture Fit when portions of two or more items physically fit together and their chemical and physical characteristics show sufficient correspondence to indicate that they once comprised a single object.
- An examiner may report and/or opine an Inclusion conclusion that items could have originated either from the same metallurgy source or process or from another source or process that is substantially similar to the examined items in all observed characteristics. For the large majority of such cases, these comparisons are limited to the class characteristics of such items and, as such, are not individualizing.

- The examiner will report and/or state a description of the relative strength of an Inclusion conclusion based on reference to relevant data. For example, when an Inclusion is made to a broad general population of items or materials (such as mass-produced items), the chance of finding coincidentally indistinguishable materials may be high (e.g., two Coca Cola cans). As the population of items or materials narrows, the chance of finding coincidentally indistinguishable materials decreases.
- When relevant data for evaluating the relative strength of agreement between two or more items, materials or processes is unknown, the examiner must explain this limitation in reports and/or testimony.
- An examiner may report and/or opine an Exclusion determination that two items or materials could not have originated from the same source or process due to substantial dissimilarities in their observed characteristics.
- An examiner may report and/or opine an Inconclusive conclusion that no determination could be reached as to whether two or more items or materials could have originated from the same source or process based on insufficient quality and/or quantity of corresponding information. The reason(s) for the Inconclusive conclusion must be included in the report and testimony.
- The examiner may report and/or state the limitations of his/her examinations and expert opinion.

5 STATEMENTS NOT APPROVED FOR FBI METALLURGY TESTIMONY AND/OR LABORATORY REPORTS

- An examiner may not report or state an opinion that any metallurgical examination is infallible or has a zero error rate.
- An examiner will not report or state a conclusion that includes a statistical or numerical degree of probability except when based on relevant and appropriate data.
- Under most circumstances, an examiner may not report or state an opinion that the damage to an automotive lamp was the result of the particular accident under investigation.
- An examiner may not report or state an opinion that two or more items were once part of the same object unless portions of the items physically fit together.
- When offering a Fracture Fit conclusion, an examiner may not assert that the fragments originated from the same source object “to the exclusion” of all other metal objects. This may wrongly imply that a Fracture Fit conclusion is based on statistically-derived or verified measurement or actual comparison of the items to all other metallurgy sources in the world, rather than on the examiner’s opinion.

- An examiner may not report or state an opinion that a particular company must have produced an item based on the markings present on it. For example, Rolex watches are widely counterfeited. Therefore, the presence of a Rolex trademark does not mean Rolex produced it.
- An examiner may not report or state an opinion that a mass-produced item can be exclusively associated with others of its type in the possession of an individual. For example, the examiner may not say that a screw from an explosive device must have originated from a defendant's box of screws.
- An examiner may not report or state the results of calculations pertaining to evidence that is presented for the first time to the examiner in the courtroom. The examiner will respectfully decline to perform such calculations on the grounds that such work requires technical verification. Estimates based on prior analyses are permissible.
- An examiner may not cite the number of forensic metallurgy examinations performed in his or her career as a direct measure for the accuracy of a proffered conclusion. (However, such information may be cited for the purpose of establishing, defending, or describing the examiner's qualification or expertise.)
- An examiner may not use the expressions "reasonable degree of scientific certainty," "reasonable scientific certainty," or similar assertions of reasonable certainty in either report or testimony unless required to do so by a judge or applicable law.

6 LABORATORY REPORT REVIEWS

The content of a metallurgy *Laboratory Report* will be reviewed per the requirements within LAB-200 and CHEM-100, ensuring compliance with the approved statements in this document and the metallurgy ULTR.

7 TESTIMONY REVIEWS

Metallurgy testimonies will be reviewed per the requirements within LAB-100. The review will ensure compliance with the statements in this document and the metallurgy ULTR.

8 REFERENCES

- CHEM-100, Chemistry Unit, Federal Bureau of Investigation, Laboratory Division, latest revision
- LAB-100, Federal Bureau of Investigation, Laboratory Division, latest revision
- LAB-200, Federal Bureau of Investigation, Laboratory Division, latest revision
- METAL-210, Chemistry Unit, latest revision

- *Uniform Language for Testimony and Reports for the Forensic Metallurgy Discipline*, Department of Justice, latest revision

9 REVISION HISTORY

| Revision | Issued | Changes |
|-----------------|---------------|--|
| 02 | 07/15/2022 | Revised to conform with new formatting requirements. |
| 03 | 09/30/2022 | Revised to reflect new location of metallurgy report guidance. |