

Paints and Polymers General Approach to Report Writing

1 Scope

Reports issued by Paints and Polymers examiners summarize analytical findings and provide interpretation of paint/polymer results. Due to the wide variety of requests and evidence received, this standard operating procedure is only a general guideline for report writing. It will not always be possible to write a report using only the examples given here. It is acceptable to use other wording as long as the results of the examinations are accurately communicated, a summary of the methodology used to reach the results is included, any known limitations are addressed, and the wording is approved by a second qualified paint/polymer examiner during the technical review process. Additionally, any wording must comply with the *FBI Approved Standards for Scientific Testimony and Report Language for the Paints and Polymers Discipline* (P&P ASSTR).

This document applies to Chemistry Unit (CU) personnel that are authorized to author *Laboratory Reports* that pertain to Paints and Polymers materials.

2 Equipment/Materials/Reagents

Not applicable.

3 Standards and Controls

Not applicable.

4 Sampling

Not applicable.

5 Procedure

- a. Prepare and format the *Laboratory Report* in accordance with requirements set forth in the *FBI Laboratory Operations Manual*. Prepare a **Results of Examinations** section, an **Interpretation** section as applicable, and a **Remarks** section. Any substantive changes to the *Laboratory Report* that occur during technical review will be recorded.
- b. The **Results of Examinations** section will be used to communicate the results of the Paints and Polymers examinations and a summary of the methodology used, and will include the

requirements set forth in the *FBI Laboratory Operations Manual*. This section may also include a description of the items received, a statement regarding sampling (as appropriate), or any other information to assist in communicating the results (e.g., any pertinent limitations of the samples and/or the results that are not included in an **Interpretation** section). The below list contains guidance for additional information that is included in the **Results of Examinations** section for Paints and Polymers reports. Appendix 1 contains example text/scenarios for the **Results of Examinations** section.

- A conclusion statement for comparisons which describes the examiner's opinion as to whether the items could be associated/discriminated.
 - A category for the opinion is assigned to provide context for the conclusion within a scale framework. This category will align the results to the **Interpretation** Section.
 - An explanation as to why the assigned category was chosen.
- c. The **Interpretation** section will be used to communicate any limitations not described in the **Results of Examination** section as well as to provide further guidance that may aid the reader in understanding the examiner's opinion as to the significance of the reported results. This section will contain a *Characterization Scale* when reporting the chemical composition or manufacturing information of a material. A *Comparison Scale* is included when describing the stated conclusions in a comparative examination. These scales are included to provide context to the reported results. Appendices 2 and 3 contain example text that will appear under the heading of **Interpretation** in reports where a scale has been used.
- d. The **Remarks** section will include the requirements set forth in the *FBI Laboratory Operations Manual*. The following information may also be included in the **Remarks** section when applicable.
- A listing of the evidence received but not examined.
 - Guidance to properly collect, mark, and preserve paint/polymer specimens in the future.
 - Other information to assist the reader that does not belong in another section of the report.
- e. If cross-transfer is reported, text similar to the following may also be included: "From the above results, a cross transfer of material between A and B appears to have occurred. These results add additional weight to the association."
- f. If multiple evidentiary materials appear to have transferred from one source (e.g., vehicle, victim) to another, text similar to the following may also be included: "From the above results, transfer of multiple materials appears to have occurred from A to B. These results may add additional weight to the association."
- g. Copies of issued reports will be maintained for reference in a central, designated area.

6 Calculations

Not applicable.

7 Measurement Uncertainty

Not applicable.

8 Limitations

Not every scenario can be anticipated. This document serves as a general guideline only.

9 Safety

Not applicable.

10 References

FBI Laboratory Operations Manual

<http://projects.nfstc.org/trace/2009/presentations/4-bommarito-report.pdf>

Standard Practice for Interpretation and Report Writing in Forensic Comparisons of Trace Materials, Materials (Trace) Subcommittee, Chemistry Scientific Analysis Committee, Organization of Scientific Analysis Committees (OSAC), draft dated December 2019; available at <http://www.nist.gov/topics/forensic-science/materials-trace-subcommittee>.

Rev. #	Issue Date	History
0	06/08/10	New document.
1	03/14/12	Example text for cross-transfer and multiple transfers moved from section 7, part 2, to section 7, parts 5 and 6, and the remainder renumbered accordingly. The “supporting documentation” statement was removed from section 7, part 4. Section 7, old part 6, deleted. Added reference to section 12.
2	02/03/14	Updated item designator example in Appendix 1 to reflect new QA policies and made minor grammatical changes.
3	08/03/15	Removed sections no longer required by <i>Practices for Writing Standard Operating Procedures</i> and re-numbered sections accordingly; changed “Levels” to “Types” throughout the entire document, combined <i>Levels IV</i> and <i>V</i> in Appendices 1 and 2 to now read as <i>Type IV</i> , and modified verbiage in Appendix 2 to align more closely with Trace/Materials OSAC subcommittee language; resultant minor terminology changes to coincide with same in Section 6 of the Procedure, step #6, and updated references.
4	02/27/18	Removed “subunit” throughout. Added “limitations are addressed” to Section 1. Edited Scope per LOM changes. Removed Sections that pertain only to technical procedures and renumbered remaining sections. Reordered Section 3 (previously 6) to describe Results, Interpretation, and Remarks in the order these would appear in a report. Added language in Section 6 to describe results involving identifications and classifications of materials as well as reporting no transfer observed or transfer in one direction only. Updated references. Changed Appendix 1 to include examples of identification and classification and no transfer observed language and deleted analytical techniques wording; updated Appendix 2 to Interpretation Scale for characterization; added Appendix 3 to be the Interpretation scale for comparisons and edited wording.
5	01/15/20	Moved content of Introduction section to Scope section and re-numbered sections accordingly; added <i>Inconclusive</i> and <i>Negative</i> definitions and examples to the <i>Characterization</i> scale; added sections required by FBI Laboratory Operations Manual; updated references; minor edits throughout to align with other Chemistry Unit documents.

Approval

Redacted - Signatures on File

Paints and Polymers
Technical Leader:

Date: 01/14/2020

Chemistry Unit Chief

Date: 01/14/2020

Appendix 1: Examples of Appropriate Wording for the Results of Examinations Section of a Paints and Polymers Report

Characterizations:

Identification:

The Item 1 paint chip was *identified* as an original equipment manufacturer (OEM) automotive paint system.

Classification:

Based on resources available to the FBI Laboratory, the Item 1 paint chip is consistent with originating from a 2006 Hyundai Elantra produced in Ulsan, Korea, with the color code VZ, also known as Spruce Green (*Classification*).

Indication:

Physical and chemical characterization of the material *indicates* that it is possibly a decal.

Inconclusive:

Item 1 was visually and stereomicroscopically examined for the presence of glue. Extraneous material was observed and chemically characterized. This material is consistent with a chemical used in both latent print processing as well as in common glue formulations. Therefore, it cannot be determined whether this extraneous material was applied before or during laboratory processing (*Inconclusive*).

Negative:

The Item 1 through 3 clothing and their associated debris were visually and stereomicroscopically examined for the presence of automotive paint. None was observed (*Negative*).

Comparisons:

Type I:

The Item 1 paint chip was visually and microscopically examined and compared to the Item 2 paint chip recovered from the suspect vehicle. Based on these examinations, Item 1 fractured from Item 2. This reconstruction demonstrates that Item 1 and Item 2 were once a single item (*Type I Association*).

Type II:

Item 1 is a six-layered blue metallic automotive paint chip. Visual and microscopical examinations revealed that Item 1 contains a layer structure consistent with Item 2. The layer structures consist of four factory-applied, original equipment manufacturer's (OEM) layers with

additional aftermarket clear and blue layers applied on top. These specimens were further compared chemically.

Based on the examinations conducted, the six layers of paint comprising the Item 1 paint chip are comparable in sequence, color, texture, relative thickness, and chemical composition with the corresponding layers of paint in the Item 2 paint exemplar. Therefore, the Item 1 paint chip originated from a repainted area of the suspect vehicle represented by Item 2, or from another vehicle painted in the same manner (*Type II Association*). This type of association was reached due to the presence of two aftermarket repaint layers on top of four OEM paint layers.

Type III:

Item 1 is a black nonmetallic four-layered automotive paint chip. This paint chip was examined and compared to the Item 2 paint exemplar.

Based on the examinations conducted, both Item 1 and Item 2 are factory-applied, original equipment manufacturer's (OEM) automotive finishes. The four layers of paint comprising Item 1 are comparable in sequence, color, texture, relative thickness, and chemical composition to the corresponding layers of paint in Item 2. Accordingly, Item 1 and Item 2 originated from the same vehicle or from different vehicles painted in the same manner (*Type III Association*). This type of association was reached because vehicles produced at the same manufacturing plant as the source of Item 2, which were painted with the same color code and same paint formulations, would also be indistinguishable from the source of Item 2.

Type IV:

The Item 1 paint chips recovered from the BMW consist of two factory-applied, original equipment manufacturer's (OEM) layers: a clear coat and a silver metallic layer. These chips are physically consistent with the corresponding layers of the Item 2 silver metallic paint exemplar from the Honda. Further, the corresponding paint layers in Item 1 and Item 2 are comparable in chemical composition. Based on these examinations, the area of the vehicle represented by Item 2 cannot be excluded as the source of the Item 1 paint chips (*Type IV Association*). This type of association was reached due to the limited layer structure of the Item 1 paint chips as well as the prevalence of silver metallic automobiles.

or

Visual and microscopical examination of the red smears present on the Item 1 paint chip from the GMC Yukon could not definitively ascertain how many layers were transferred to its surface. However, chemical analyses indicated that these red smears are generally consistent with the aftermarket refinish topcoat on the Item 2 paint exemplar from the Jeep. Therefore, the area of the Jeep represented by Item 2 cannot be excluded as the source of the red smears present on the Item 1 paint chip (*Type IV Association*). This type of association was reached because of the limited sample size of the smear as well as potential variations within the sample.

Inconclusive:

A black smear was noted on the Item 1 paint chip and was compared to the Item 2 paint. Due to variations in the composition of the black smear on Item 1, a comprehensive comparison to Item 2 could not be conducted (*Inconclusive*).

Elimination:

The Item 1 paint chips were examined and compared to the Item 2 paint. Based on the examinations conducted, the Item 1 paint chips did not originate from the same source as Item 2 (*Elimination*). This conclusion was reached because Item 1 and Item 2 differ in layer structure.

No transfer or one-way transfer:

No transfer observed:

Such a result can be interpreted in several ways: 1) automotive paints/polymers had no contact with the items, 2) automotive paints/polymers may not have transferred during contact, or 3) automotive paints/polymers that did transfer may have been lost prior to submission to the FBI Laboratory.

Transfer observed in one direction only:

Possible reasons for this result (e.g., paint transfer is being reported from Vehicle A to Vehicle B, but not in the opposite direction) are that the transfer on Vehicle A did not result from contact with Vehicle B; paint recovered from Vehicle A may not have transferred during contact with Vehicle B; or the area represented by Item X is not the area of Vehicle B that made contact with Vehicle A.

Appendix 2: Appropriate Wording for the Interpretations Section of a Characterization Paints and Polymers Report

The following categories and their descriptions are meant to provide context to the conclusions reached in this report. Every category may not be applicable in every case nor for every material.

Identification: The analytical data provides reliable information to specify a particular chemical or product.

Classification: The analytical data does not support an identification of a specific chemical or product but does provide reliable information to include the substance within a class of materials. The phrase “consistent with” may be used in this context.

Indication: The analytical data suggests a particular type of material but does not support a classification or identification. The terms “possible” and “similar to” may be used in this context.

Inconclusive: No conclusion could be reached.

Negative: No material of interest was observed.

Appendix 3: Appropriate Wording for the Interpretations Section of a Comparative Paints and Polymers Report

The following categories and their descriptions are meant to provide context to the conclusions reached in this report. Every category may not be applicable in every case nor for every material.

Type I Association: Physical/Fracture Match – The items exhibit physical features that demonstrate they were once part of the same object.

Associations of Evidence with Class Characteristics:

Class characteristics are physical and/or chemical properties that place an item within a particular group of items. Associations of evidence with class characteristics can have varying degrees of significance. In general, the smaller the size of the group relative to the relevant population, the more significant the association. A class association cannot definitively establish that the items came from the same source.

Type II: Association with Highly Discriminating Characteristics – An association in which items could not be differentiated. Therefore, the possibility that the items came from the same source cannot be eliminated. Additionally, the items share unusual characteristics that would not be expected to be encountered in the relevant population.

Type III: Association with Discriminating Characteristics – An association in which items could not be differentiated. Therefore, the possibility that the items came from the same source cannot be eliminated. Other items have been manufactured that would also be indistinguishable from the submitted items and could be encountered in the relevant population.

Type IV: Association with Limitations – An association in which items could not be differentiated. Therefore, the possibility that the items came from the same source cannot be eliminated. As compared to the categories above, this type of association has decreased evidential value. For example, the items are more commonly encountered in the relevant population, a complete analysis was not performed due to limited characteristics or a limited analytical scheme, or minor variations were observed in the data.

Inconclusive – No conclusion could be reached.

Elimination – The items exhibit exclusionary differences that demonstrate they did not originate from the same source.