

# Paper Comparisons

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# Paper Comparisons

## 1 INTRODUCTION

This procedure is intended to be utilized by trained personnel to ensure consistency and transparency of methods employed during the examination of paper evidence received in the Questioned Documents Unit (QDU).

## 2 SCOPE

These procedures will be used by a forensic document examiner in the examination and comparison of paper and other document substrates to determine similarities or differences.

## 3 EQUIPMENT

- 150-watt tungsten halogen light, or comparable equipment
- 30-watt transmitted light box, or comparable equipment
- Hand magnifier (minimum magnification, 4X)
- Stereomicroscope (minimum magnification, 6.3X), or comparable equipment
- Foster and Freeman Video Spectral Comparator (VSC), or comparable equipment
- ChemImage Hyperspectral Imager (HSI) Examiner 200 QD, or comparable equipment
- Keyence VHX-2000E Digital Microscope, or comparable equipment
- Mitutoyo Digimatic Caliper, or comparable equipment
- Ruler (marked in a minimum of 1 millimeter and/or 1/16<sup>th</sup> inch increments)
- Puissant 30-watt short wave Ultraviolet (UV) source, or comparable equipment
- Personal protective equipment (e.g., safety goggles, gloves)

## 4 PROCEDURE

- Only nondestructive examinations of paper will be conducted in the QDU.

### 4.1 Destructive Paper Analyses

- **Redacted**
  1. Chemical paper analysis and/or paper fiber composition analysis are destructive techniques. As such, the employee will contact the contributor and record contributor consent or non-consent to have the other laboratory conduct examination(s) of the submitted items.
    - i. Contributor consent/non-consent will be recorded on the case communication log.
  2. If it is determined that use of the destructive technique may interfere with examinations of another forensic discipline, contact the affected unit to determine if preliminary examinations need to be conducted prior to questioned document examinations.

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## 4.2 Analysis

- A. Visually examine the items using lighting and magnification sufficient to allow fine detail to be distinguished and note their physical properties in the examination records.
  - o The following characteristics should be noted for each piece of paper, when probative. These characteristics do not need to be assessed in the order listed below.

### 4.2.1 Dimensions

- A. Use a ruler to measure the approximate width and length of the paper and record the measurements in standard or metric increments
- B. Use a calibrated caliper to measure the approximate thickness of the paper and record the measurement in standard or metric increments as follows:
  - 1. Set the caliper to zero prior to each measurement.
  - 2. Measure the thickness of the paper in at least three locations as follows:
    - i. Document center (as far into the substrate's center as the caliper allows)
    - ii. Opposite ends of the substrate
  - 3. Averaging the measurements is recommended.
  - 4. Record the specific caliper used.

### 4.2.2 Optical Properties

- A. Visually assess the paper color in general terms, such as white, off-white, or yellow.
- B. Examine the paper with transmitted light utilizing a transmitted light box, the transmitted light feature of the VSC or HSI, or by holding the document up to a natural or artificial light source.
  - 1. Note the general opacity of the paper in general comparative terms, such as transparent, semi-transparent, or opaque.
  - 2. Note the presence of any watermarks.
- C. Redacted

D.

Redacted

#### 4.2.3 Physical Construction and Components

- A. Observe and record the paper's physical construction and components for all general class characteristics (e.g., [dimensions](#), color, opacity, [optical properties](#)), and manufacturing class characteristics and post-manufacturing characteristics (e.g., lines, punch holes, perforations, folds, cuts, staple holes).
  - o Measure the relative spacing and approximate size of the components utilizing a ruler and record measurements in standard or metric increments.
- B. If a physical component of the paper is a printing process, **Redacted** and not a physical feature in the paper, refer to [DOC-207 Graphic Arts, Photocopier, and Printer Examinations](#).
- C. If a physical component of the paper is a watermark or other brand marking, refer to [DOC-225 Conducting a Watermark Search](#).
- D. **Redacted**

#### 4.3 Comparison

- A. Compare and evaluate the approximate dimensions, optical properties, and physical construction and components of the items.

#### 4.4 Evaluation

- A. Evaluate the quality and quantity of the similarities, differences, and limitations and reach a conclusion.
- B. Once examinations have been completed, reports may include one or more of the following types of conclusion(s), opinion(s), and other findings, as applicable:
  - o Correspond in General Class Characteristics and Manufacturing Characteristics

- There is agreement in general class characteristics and manufacturing characteristics. This indicates the items may have been produced by the same manufacturing source. There may be other paper with characteristics that are indistinguishable from the known paper that could also correspond to the questioned paper. This opinion requires an explanation of the limiting factor(s).
- No Conclusion/No Determination
  - When there are limiting factors, a report that no conclusion could be reached is appropriate. It may be possible to report that the items correspond in general class characteristics. This opinion requires explanation of the limiting factor(s).
- Do Not Correspond in General Class Characteristics and/or Manufacturing Characteristics
  - The items do not correspond to one another due to disagreement in general class characteristics and/or manufacturing characteristics. Any limited similarities are far outweighed by the combined effect of sufficient disagreement in all other details.

#### 4.5 Records

- All observations used to support your conclusions must be noted in the examination records.
  - Records describing optical, physical, or microscopic characteristics may include the following:
    - Instrumentation printouts or images
    - Copies
    - Photographs or digital images
    - Overlays
    - Drawings

#### 5 LIMITATIONS

- The following factors could affect the examination process and/or the results rendered:
  - **Redacted**
  - Lack of a sufficient quantity of questioned and/or known items
  - Variations or dissimilarities **Redacted** present in individual paper items that have been packaged or distributed together
  - Prior handling of items **Redacted**
  - Lack of individual characteristics
  - Inability to determine the quantity of similar items produced

## 6 SAFETY

Standard precautions should be followed for the handling of chemical and biological materials. Chemical and biological materials that are hazardous or potentially hazardous will be maintained and examined in specifically designated areas within QDU space. QDU personnel may refer to the [FBI Laboratory Safety Manual](#) for additional guidance.

Use appropriate personal protection equipment when utilizing harmful wavelengths of illumination, including short wave UV illumination. The VSC is equipped with safety flaps that are electronically interlocked with the selection of harmful wavelengths to prevent operator exposure.

## 7 REVISION HISTORY

Revision	Issued	Changes
05	01/14/2022	Updated and reformatted to meet the new technical procedure template.