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Department of Forensic Science

VIRGINIA

DEPARTMENT

OF
QUESTIONED DOCUMENTS

PROCEDURES MANUAL
FORENSIC SCIENCE

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TABLE OF CONTENTS

- 1 [Safety Measures](#)
- 2 [Maintenance and Calibration of Equipment](#)
- 3 [Reference Collections](#)
- 4 [General Procedures](#)
- 5 [Handwriting Examinations](#)
 - 5.1 Objective
 - 5.2 References
 - 5.3 Equipment
 - 5.4 Procedures
 - 5.5 Reporting Conclusions
- 6 [Typewriters and Printout Devices](#)
 - 6.1 Objective
 - 6.2 References
 - 6.3 Equipment
 - 6.4 Procedures
 - 6.5 Reporting Conclusions
- 7 [Photocopier Examinations](#)
 - 7.1 Objective
 - 7.2 References
 - 7.3 Equipment
 - 7.4 Safety Measures
 - 7.5 Procedures
 - 7.6 Reporting Conclusions
- 8 [Indented Writing Examinations](#)
 - 8.1 Objective
 - 8.2 References
 - 8.3 Equipment
 - 8.4 Safety Measures and Other Concerns
 - 8.5 Procedures
 - 8.6 Reporting Conclusions
- 9 [Paper Examinations](#)
 - 9.1 Objective
 - 9.2 References
 - 9.3 Equipment
 - 9.4 Safety Measures
 - 9.5 Interferences
 - 9.6 Procedures
 - 9.7 Reporting Conclusions
- 10 [Ink Examinations](#)
 - 10.1 Objective

- 10.2 References
- 10.3 Equipment
- 10.4 Safety Measures
- 10.5 Interferences
- 10.6 Procedures
- 10.7 Reporting Conclusions

11 [Alterations, Obliterations and Erasures Exams](#)

- 11.1 Objective
- 11.2 References
- 11.3 Equipment
- 11.4 Safety Measures
- 11.5 Procedures
- 11.6 Reporting Conclusions

12 [Charred Document Examinations](#)

- 12.1 Objective
- 12.2 References
- 12.3 Equipment
- 12.4 Safety Measures
- 12.5 Procedures
- 12.6 Reporting Conclusions

13 [Counterfeit Document Examinations](#)

- 13.1 Objective
- 13.2 References
- 13.3 Equipment
- 13.4 Safety Measures
- 13.5 Procedures
- 13.6 Reporting Conclusions

14 [Rubber Stamp Examinations](#)

- 14.1 Objective
- 14.2 References
- 14.3 Equipment
- 14.4 Interferences
- 14.5 Procedures
- 14.6 Reporting Conclusions

15 [Examination of Checkwriter Machines](#)

- 15.1 Objective
- 15.2 References
- 15.3 Equipment
- 15.4 Procedures
- 15.5 Reporting Conclusions

[Appendix A: Abbreviations](#)

1 SAFETY MEASURES

- 1.1** Relative to other forensic disciplines, document examinations generally pose few hazards. This is not to imply that general lab safety practices should be ignored. Examiners should be familiar with MSDS sheets for any chemicals used in the lab. Documents stained with bodily fluids (e.g., blood-stained suicide notes) should be considered a potential biohazard, and handled accordingly. Documents falling into this category should not be handled without protective gloves. If at all possible, work surfaces should be covered with some type of paper (e.g., brown wrapping paper). Caution must be exercised not to run the risk of potential contamination of other surfaces by such actions as failing to remove gloves prior to typing on keyboards, turning off lights, etc. All surfaces should be disinfected afterward (even those that may have been covered with paper) with a 10% bleach solution, followed by a 70% ethanol solution. This would include the glass platen on the photocopier and scanner, and the transmitted light box, if such items were used during the exam. Gloves, paper coverings, and any towels used during the clean-up should be properly disposed of in a marked Bio-Hazard refuse container.
- 1.2** The Electrostatic Detection Apparatus (ESDA) is a high voltage instrument, at times operating at a potential of 8 kV. No one should operate this instrument without first having read the manufacturer's operating instructions. Anyone in need of an operator's manual should contact their Section Supervisor.
- 1.3** Caution should be exercised when using any ultraviolet (UV) light source (especially short wave) not to expose areas of skin or eyes to direct light. Some type of UV eye protection is necessary when working with a light source of this type.

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2 MAINTENANCE AND CALIBRATION OF EQUIPMENT

- 2.1 Equipment Records (DFS Document 243-F102) and Maintenance Logs (DFS Document 243-F103) shall be maintained for the Electrostatic Detection Apparatus (ESDA), the VSC2000 and VSC6000 Video Spectral Comparators, , and the CrimeScope CS-16 Light Source. Maintenance logs should be used to document any maintenance, cleaning, adjustments, repairs, or other like activity. An entry should be made to record the date any new piece of equipment is put into service, as well as the date any repaired equipment is put back into service.
- 2.2 None of the instruments currently in use within the Questioned Documents Section (the Section) require any formal calibration. The bench mounted Ames micrometers can be easily 'zeroed' by the operator before each use, although even this procedure is not of absolute necessity since our measurements are generally relative in nature, meaning that we are generally only concerned with whether two pieces of paper have a similar or different thickness, regardless of what the actual thickness may be. The micrometer will be of use in making this determination, regardless of if it is reading true zero while at rest.
- 2.3 Instructions for performing a test of the Electrostatic Detection Apparatus (ESDA) are detailed in ¶ 8, Indented Writing Examinations.
- 2.4 Except for the sheets of adhesive-backed fixing film, consumable supplies for the ESDA shall be of Foster and Freeman, Ltd., manufacture (or equivalent). These supplies, none of which fall into the 'critical' category, consist of the toner, cascade developer, and imaging film.
- 2.5 Any malfunctioning of the VSC2000 or VSC6000 Video Spectral Comparators should be readily apparent to the operator. Notwithstanding this, in order to ensure that the instrument(s) is functioning satisfactorily, a function test shall be performed each time the instrument(s) is used on a case. The sample specimens provided by the manufacturer of the VSC shall be used to test either instrument. The manufacturer of the VSC units has supplied a number of sample specimens; however, only those necessary to establish that the instrument is functioning properly need be used. Test results shall be documented in the case notes as either "Positive" or "Negative".

Note: Standard abbreviations such as Pos, +, Neg, - , may be used.

A "Negative" test result will require the instrument be taken out of service until the specific problem is corrected.

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3 REFERENCE COLLECTIONS

- 3.1** Reference collections shall be stored in an access controlled area (e.g., the Section lab), and in a manner that minimizes the potential for damage or loss of any of the components (e.g., binders, card file boxes).
- 3.2** Reference collections available for use within the Section include the Haas Typewriter Atlas. No markings shall be placed on any of the components of the collection that in any way obscures or masks the unique identification of each specimen as part of the collection, nor shall anything be permanently removed from, or added to the collection except for bona fide updates from the source originator, as approved by the Section Supervisor. Any specimen sample from the collection that is used as a basis for a conclusion reported in a CoA shall be reproduced in hard copy form (e.g., photocopy, printout), and added to the case file examination documentation (notes).
- 3.3** In addition to commercially available reference collections, the Section receives specific requests to associate particular evidence with specimens from the same or other jurisdictions when the investigators are aware of similar offenses occurring in the area. Often, however, several officers in one jurisdiction, or multiple jurisdictions, are unknowingly conducting separate investigations that could be consolidated by the association of evidence. Many times, the Section is the only place that these investigations can be associated. Maintaining a reference collection/file of pertinent information identified to a particular DFS file number can allow an examiner to readily identify and locate specific DFS case files to screen for possible association. The Section maintains Robbery Demand Note and Counterfeit Bank Notes reference collections.

3.3.1 These files will consist of the following.

3.3.1.1 A copy of the pertinent items(s) identified with the DFS File number, item number(s) and date placed in the collection.

3.3.1.2 An index sheet of all items currently in the file.

3.3.2 Multiple items can be together on a single sheet. Additional information can be placed on the copy as appropriate.

3.3.3 The individual records (items) in each collection will be removed after four (4) years, unless a longer retention period is appropriate for a particular collection, as approved by the Section Supervisor.

3.3.4 These reference collections/files, in and of themselves, will not be used to make definitive conclusions. The inclusion of an image of a check, note or handwriting is to facilitate the location of the appropriate DFS case file, but is not intended to substitute for the appropriate examination and comparison with the evidence.

3.3.4.1 Reporting Conclusions

When a comparison is requested and/or conducted with a reference collection described in ¶ 3.3, the wording in the CoA will, to the extent possible, be as follows.

3.3.4.1.1 No similar robbery notes, bank notes, checks, etc., in reference collection.

A search of the _____ {type of collection, for example robbery demand note} revealed no similar _____ {notes, checks, etc.}.

3.3.4.1.2 Similar features found on robbery notes, bank notes, checks, etc., in collection.

A search of the _____ {type of collection, for example robbery demand note} revealed that _____ {item # and description, for example Item 1 robbery note} displays features and characteristics in common with the _____ {description of item, for example note} labeled as _____ {FS Lab #(s); item #(s)} contributed by _____ (Investigator/Officer) of the _____ (agency). For a more definitive conclusion, please have

Investigator _____ resubmit _____ (item #, description) from
_____ (FS Lab #).

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4 GENERAL PROCEDURES

- 4.1 Upon receipt of a case check the RFLE to insure that requested exams are within the scope of the Section's capabilities.
- 4.2 Cases will typically be worked one at a time from beginning to conclusion. As long as cases are worked in this manner there is no limit on the length of time the evidence may remain in *short term storage*. Evidence not in the process of active examination may remain in *short term storage* for a period not to exceed 30 days.
- 4.3 Note other requested exams, such as latent fingerprints, and, if appropriate, fulfill *Primary Examiner* responsibilities as defined in the Department Quality Manual (the QM).
- 4.4 Note the condition of all evidence containers, and follow the procedures in ¶ 14 (Evidence Handling) of the QM.
- 4.5 Any discrepancies noted during the inventory of evidence should be verified by a second examiner prior to notifying a representative of the submitting agency.
- Note:** If the evidence container had been previously opened by other laboratory personnel prior to being transferred to the Section, contact those lab personnel having had access before contacting the submitter.
- Appropriate details should be recorded.
- 4.6 Establish the purpose(s) for the examination(s) as per the RFLE, and plan a logical sequence of methods to be used in order to insure an optimum systematic and efficient approach to the problem presented.
- 4.7 Follow the particular procedural guideline contained in this manual for the requested exam, and for any additional exam deemed necessary. Depending on the circumstances, it may not be necessary to complete each step in the order given, or to complete all of the steps detailed in the procedure.
- 4.8 Case file documentation accumulated during examinations (e.g., notes, charts) shall conform to appropriate QM directives.
- 4.9 Notes of salient features and observations should be recorded for each procedure undertaken. Examiner notes shall contain sufficient detail to allow another examiner, in the absence of the initial examiner, to evaluate the basis for the conclusion. All procedures used during an examination should be noted, regardless of the result (e.g., ESDA processing that does not result in the recovery of any significant indented entries). Notes can be made on photocopies, or other type reproduction of the evidence, or may be in narrative form (or combination of both). Narrative notes should be taken on the QD General Worksheet(s) (DFS Documents 243-F100 and the 243-F101 continuation sheet). Notes must be legible. Further information and a listing of acceptable abbreviations for use in note taking can be found at Appendix A.
- 4.10 Photocopies (or other type reproduction) of all questioned items shall be made whenever possible (except in high volume cases, where a representative sample will suffice). Copies of a representative sample of the known material should also be made.
- 4.11 Conclusions that fully associate (identify) or eliminate a particular individual or specific source with a questioned item shall be verified by another examiner. The verification shall be annotated in the case notes adjacent to the original examiner's noted conclusion by the verifying examiner writing "verified", dating and initialing.
- 4.12 When examining document evidence which will also be requiring latent fingerprint examination, those evidence markings required by the QM shall be done in pencil. In these types of cases markings of a more permanent nature (e.g., ink) shall be made on the proximal evidence container.
- 4.13 Conclusions shall not be drawn from case file documentation (e.g., file copies of previously examined evidence).

5 HANDWRITING EXAMINATIONS

5.1 Objective

To determine if two or more handwritten items were prepared by the same writer.

5.2 References

- Osborn, A.S.; Questioned Documents (Second Edition); Boyd Printing Company, 1929
- Huber, Roy A. & Headrick, A.M.; Handwriting Identification: Facts and Fundamentals; CRC Press, 1999
- Conway, James V.P.; Evidential Documents; Charles C. Thomas Publisher, 1959
- Harrison, Wilson R.; Suspect Documents (Second Edition); Sweet & Maxwell Ltd., 1966
- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- Hilton, Ordway; Scientific Examination of Questioned Documents (Revised Edition); Elsevier, 1982

5.3 Equipment

- Stereo microscope
- Magnifier
- Light Source

5.4 Procedures

5.4.1 These procedures may not address all aspects of any uncommon or unusual circumstances encountered during examinations.

5.4.2 All of the following steps may not be possible or necessary in every case.

5.4.3 This examination is commonly referred to as a 'Comparative Handwriting Examination', but in actuality covers the examination of any item written by hand (e.g., cursive writing, hand printing, signatures, and numerals). The approach to a handwriting problem can vary depending upon the case; however, the examination will generally include the following steps (not necessarily in this sequence).

- 5.4.3.1 Examine the questioned item(s) in order to assess any significance relative to quantity and quality, and to determine the presence (or absence) of any potential identifying qualities. If multiple questioned items exist, cross-compare in order to determine to the extent possible whether all are of common authorship, or there is evidence of multiple writers.
- 5.4.3.2 Examine the known item(s) in order to assess any significance relative to quantity and quality, as well as comparability to the questioned item(s). Cross-compare all of the known items in order to assess the particular writer's range of variation (syn. range of writing), and to verify to the extent possible that all of the known items were prepared by the same writer. Any question or possible discrepancy regarding authorship of items submitted as 'known' (or portions thereof) must be resolved before the affected portions can be included in any side-by-side comparison with the questioned material.
- 5.4.3.3 Conduct side-by-side comparison of the questioned and known items in an effort to determine if the features and characteristics displayed within the questioned item(s) are represented within the range of variation of the known items, and if there are any significant recurring dissimilarities. Applying established principles of handwriting identification, evaluate the significance and relative individuality of the comparable writing characteristics, and reach a conclusion within any limitations imposed by the particular nature of the evidence.

5.5 Reporting Conclusions

- 5.5.1 The term 'Indications' (with or without modification) shall be used to express less than definitive (qualified) conclusions in Certificates of Analysis.
- 5.5.2 An 'Indications' finding may be further modified with the terms 'Limited' or 'Strong', as appropriate.
- 5.5.3 The strength of any qualified conclusion shall be made clear in the Certificate of Analysis (see examples below).
- 5.5.4 Conclusions appearing in Certificates of Analysis shall conform to one of the following.

5.5.4.1 Wrote (made, prepared)

An unqualified identification. The agreement between the significant features of the questioned and known material is such that the examiner is absolutely certain both must have been prepared by the same writer.

Smith wrote the questioned signature on Item 1.

5.5.4.2 Strong Indications Wrote

A qualified conclusion wherein the examiner is virtually, yet not absolutely, certain the writer of the known material prepared the questioned writing. There is excellent agreement between the significant features of the questioned and known material, but in the opinion of the examiner it falls short of that which is required to reach an unqualified identification. The possibility of other writer involvement is considered extremely remote.

There are strong indications (meaning virtual certainty) Smith wrote the questioned signature on Item 1.

5.5.4.3 Indications Wrote

A qualified conclusion appropriate when there is good agreement between the significant features of the questioned and known material. The possibility of other writer involvement is considered very unlikely.

There are indications (meaning a high degree of likelihood) Smith wrote the questioned signature on Item 1.

5.5.4.4 Limited Indications Wrote

A qualified conclusion appropriate when there is some agreement between the significant features of the questioned and known material. The agreement is greater than what would normally be expected to occur in random writings as a matter of mere coincidence, and the possibility of other writer involvement is considered unlikely.

There are limited indications (meaning a likelihood) Smith wrote the questioned signature on Item 1.

5.5.4.5 Can Be Neither Identified Nor Eliminated

For any of a number of reasons, the examiner was unable to locate adequate significant features pointing toward or away from the writer under consideration, and could not reach any conclusion regarding authorship of the questioned writings. The examiner is essentially stating, "I don't know."

Smith can be neither identified nor eliminated as the writer of the questioned signature on Item 1.

5.5.4.6 Limited Indications Did Not Write

A qualified conclusion appropriate when there are some significant dissimilarities between the features of the questioned and known material. The possibility that both were prepared by the same writer is considered unlikely.

There are limited indications (meaning a likelihood) Smith did not write the questioned signature on Item 1.

5.5.4.7 Indications Did Not Write

A qualified conclusion appropriate when there are many significant dissimilarities between the features of the questioned and known writing. The possibility that both were prepared by the same writer is considered very unlikely.

There are indications (meaning a high degree of likelihood) Smith did not write the questioned signature on Item 1.

5.5.4.8 Strong Indications Did Not Write

A qualified conclusion appropriate when the significant dissimilarities between the features of the questioned and known material are such that the examiner is virtually certain the writer of the known material did not prepare the questioned writing. The possibility that both were prepared by the same writer is considered extremely remote.

There are strong indications (meaning virtual certainty) Smith did not write the questioned signature on Item 1.

5.5.4.9 Did Not Write

An unqualified elimination. Appropriate when the significant dissimilarities between the features of the questioned and known material are to the extent that the examiner can reach absolute certainty that both must have been prepared by different writers.

Smith did not write the questioned signature on Item 1.

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6 TYPEWRITERS AND PRINTOUT DEVICES

6.1 Objective

To conduct a wide range of examinations related to typewriters and printout devices. These examinations include, but are not limited to, typewriter/type element classification and identification, examinations and comparisons of typewriters and typed materials, and examinations and comparisons of various typewriter components, as well as similar types of examinations of computer printers and the documents generated by them.

6.2 References

- Conway, James V.P.; Evidential Documents; Charles C. Thomas Publisher, 1959
- Harrison, Wilson R.; Suspect Documents (Second Edition); Sweet & Maxwell Ltd., 1966
- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- Hilton, Ordway; Scientific Examination of Questioned Documents (Revised Edition); Elsevier, 1982
- New Zealand Police Department Examination Section; Printing Processes Manual (w/updates thru 2000)
- International Paper Company, NY, Pocket Pal, 18th Edition, 2000

6.3 Equipment

- Stereo microscope
- Magnifiers
- Typewriter test grids and other measuring devices
- Haas Atlas
- Bouffard Typestyle Classification Database

6.4 Procedures

- 6.4.1 These procedures may not address all aspects of any uncommon or unusual circumstances encountered during examinations.
- 6.4.2 The procedures outlined below may not be possible or necessary in each and every case. The order may vary depending on the case.
- 6.4.3 Examination of Typewritten Documents
- 6.4.3.1 Determine if the document is an original.
- 6.4.3.2 Establish if the document is typewritten, and not the product of some other sort of printout device. Photocopies are covered elsewhere (§ 7). Computer printers are covered in this Section and can be found beginning with § 6.4.7. If the document is typewritten proceed to § 6.4.3.3.
- 6.4.3.3 Determine the type of mechanism (e.g., typebar, single element ball, printwheel) if possible.
- 6.4.3.4 Determine horizontal spacing(s) (e.g., 254 mm, 212 mm); single, dual or multiple escapements.
- 6.4.3.5 Determine typestyle(s) (e.g., courier, prestige).
- 6.4.3.6 Determine size of characters (e.g., pica, elite, micro elite).
- 6.4.3.7 Determine other characteristics of type (e.g., bold type, justified margins).
- 6.4.3.8 Determine type of ribbon (e.g., fabric, carbon film permanent, lift-off correctable).

- 6.4.3.9 Determine the consistency of typewriting throughout the document and note any possible interlineations.
- 6.4.3.10 Search the Bouffard database and, if appropriate, the Haas Typewriter Atlas in an effort to identify the typestyle and make/model of potential machines using that particular typestyle.
- 6.4.3.11 Conduct microscopic examinations of the typescript for identifying (individual) characteristics (e.g., character abnormalities/defects, misalignment of characters).
- 6.4.4 Comparison of Typewritten Documents
- 6.4.4.1 Compare the examination results from ¶ 6.4.3, above, for each typewritten document, noting whether there is, or is not, general agreement with respect to the class characteristics (e.g., typestyle, escapement, line spacing, typewriter mechanism, ribbon type, margins).
- 6.4.4.2 Compare the microscopic examination results from ¶ 6.4.3.11, above, for each typewritten document, noting whether there is, or is not, agreement with respect to any identifying (individual) characteristics present.
- 6.4.4.3 Evaluate the significance of any similarities or dissimilarities from ¶¶ 6.4.4.1 and 6.4.4.2, and form a conclusion within any appropriate limitations.
- 6.4.5 Examination of Typewriters/Typewriter Components and Comparison to Typewritten Documents
- 6.4.5.1 Note condition of typewriter and components as received (e.g., damaged, settings, etc.).
- 6.4.5.2 Record make, model, serial numbers, manufacturer, and any history of usage/repair (if known).
- 6.4.5.3 Examine element/printhead, or typefaces (typebar machine), and record any defects found.
- 6.4.5.4 Examine typewriter/printer platen for typewritten images.
- 6.4.5.5 On devices with memory capability, if possible print the contents of the memory.
- 6.4.5.6 Prepare exemplars (do not use questioned ribbon if possible). Use initial settings on typewriter prior to changing to other settings as appropriate. Exemplars should include strike-ups of the entire keyboard, questioned text, etc. Exemplars may need to be taken on various paper stocks.
- 6.4.5.7 Examine exemplars for identifying (individual) characteristics.
- 6.4.5.8 Conduct comparisons of exemplars to the questioned text, noting whether there is, or is not, agreement with respect to class and any individual characteristics.
- 6.4.5.9 Evaluate the significance of any similarities or dissimilarities from ¶ 6.4.5.8, consider any other significant observations, and form a conclusion within any appropriate limitations.
- 6.4.5.10 If an inoperable machine is submitted, check with submitter and/or the Commonwealth's Attorney before considering having the machine repaired in order to conduct any of the above.
- 6.4.6 Ribbon Examinations
- 6.4.6.1 Ribbon exams may be conducted on single use carbon film ribbons, correction ribbons (lift-off tape), thermal ink transfer ribbons, and other types of ribbons in certain cases.

- 6.4.6.2 Single use carbon film ribbons may be read manually. If a questioned text is located on the ribbon, record the location of the text prior to excising the section from the ribbon. Excised sections can be placed between layers of polyester film (e.g., document protectors). Note that portions of the questioned text may appear on correction ribbons.
- 6.4.6.3 If possible, match the text on the ribbon to the actual questioned document using fracture match and/or paper fiber impressions methods.
- 6.4.6.4 Consider the significance of observations in ¶¶ 6.4.6.2 and 6.4.6.3 and form a conclusion within any appropriate limitations.
- 6.4.7 Examination of Documents Generated by Computer Printers
- 6.4.7.1 Classify the document(s) as to the type of printout device(s) used (e.g., impact machine such as dot matrix, or non-impact such as inkjet or laser).
- 6.4.7.2 Determine the font size and spacing, keeping in mind that the spacing should be directly related to the font size, and that both the font and the font size are characteristics that are easily manipulated by the software of the computer feeding the text to the printer. Multi-font and size capabilities are standard on computers readily available on today's market.
- 6.4.7.3 Note the formatting, keeping in mind that formatting is again largely a function of the computer software, and is easily changed.
- 6.4.7.4 Note the color(s) present in the text and any other image areas on the document(s).
- 6.4.7.5 Make note of any class and potentially identifying (individual) characteristics. Examples of potentially identifying characteristics would include, but are not limited to, a printing defect that might be traceable to an inkjet with a malfunctioning nozzle, or an assortment of machine marks that might be present on the paper, such as those left by rollers or other mechanical parts of the actual printer mechanism.
- 6.4.8 Comparison of Documents Generated by Computer Printers
- 6.4.8.1 Compare the examination results from ¶ 6.4.7, above, for each printed document, noting whether there is, or is not, general agreement with respect to the class characteristics (e.g., classification of machine, ink color(s)).
- 6.4.8.2 Compare the examination results from ¶ 6.4.7, above, for each printed document, noting whether there is, or is not, agreement with respect to any potentially identifying (individual) characteristics present.
- 6.4.8.3 Evaluate the significance of any similarities or dissimilarities from ¶¶ 6.4.8.1 and 6.4.8.2, and form a conclusion within any appropriate limitations.
- 6.4.9 Examination of Printout Devices and Comparison to Printed Documents
- 6.4.9.1 Note condition of the device and its components as received (e.g., damaged, settings, etc.).
- 6.4.9.2 Record make, model, serial number, manufacture, date of manufacture, and any history of usage/repair (if known). If available, locate a user's manual for the device.
- 6.4.9.3 If appropriate, examine the component that actually forms the printed image to determine, to the extent possible, any defects that would be deposited on any documents produced by it.
- 6.4.9.4 Note roller orientation and location.

- 6.4.9.5 If appropriate, examine the printer platen for any printed images.
- 6.4.9.6 On devices with memory capability, if possible print the contents of the memory.
- 6.4.9.7 If possible, prepare exemplars from the device without changing any preset settings. If necessary, change settings in order to duplicate those present in the questioned document(s). Exemplars should begin with several blank sheets in order to best observe characteristics such as roller marks and any ink/grease stain deposits that might be present. Exemplars may also include strike-ups of the entire keyboard, as well as repetitions of the actual text from the questioned document(s). Ensure that file names are properly marked as 'sample' in order to avoid confusion with any similar preexisting files.
- 6.4.9.8 Examine the exemplars for the class characteristics, and if not already done in ¶ 6.4.9.2, classify as to type of printing device.
- 6.4.9.9 Examine the exemplars for evidence of any potentially identifying (individual) characteristics.
- 6.4.9.10 Conduct comparison(s) of exemplars to the text(s) on the questioned document(s), noting whether there is, or is not, agreement with respect to the class and any potential identifying (individual) characteristics.
- 6.4.9.11 Evaluate the significance of any similarities or dissimilarities from ¶ 6.4.9.10, and form a conclusion within any appropriate limitations.
- 6.4.9.12 If an inoperable device is submitted, check with submitter and or the Commonwealth's Attorney before considering having the device repaired in order to conduct any of the above.

6.5 Reporting Conclusions

6.5.1 Document to Document Comparisons

- 6.5.1.1 If there are significant individualizing characteristics in common, and there are no significant differences, it may be concluded that the documents were prepared on the same machine or share a common machine component.

The Item X and Y documents share a common source machine or machine component.

- 6.5.1.2 If significant differences are present, it may be concluded that the documents were not prepared on the same machine or with the same machine component combination.

The Item X and Y documents do not share a common source machine or machine component.

- 6.5.1.3 When there are limiting factors but the examination reveals significant similarities or differences the use of less than definitive (qualified) conclusions may be appropriate. When reporting less than definitive conclusions the provisions set forth in ¶¶ 5.5.1 through 5.5.3 shall be followed.

There are indications (meaning a high degree of likelihood) Items X and Y were (or were not) typed on the same machine or with the same machine component.

- 6.5.1.4 When there are significant limitations preventing a determination of identification (inclusion/association) or elimination (exclusion/disassociation), inconclusive results with appropriate explanation should be reported.

It could not be determined whether (or not) Items X and Y were prepared on the same machine or machine component combination due to the lack of individualizing characteristics.

Note: There may be similarities or differences on inconclusive results, and it may be appropriate to include that information in the report.

The typing (machine printing) on Item X shares similar class characteristics with the typing (machine printing) on Item Y, however due to the lack of individualizing characteristics it could not be determined whether (or not) the Items X and Y documents were prepared on the same machine or machine component combination.

6.5.2 Machine or Machine Component to Document Comparisons

- 6.5.2.1 If there are significant individualizing characteristics in common, and there are no significant differences, it may be concluded that the machine or machine component was used in the preparation of the document.

The Item Y document was prepared on the Item X typewriter.

or

The Item Z print wheel was used in the preparation of the Item Y document.

- 6.5.2.2 If significant differences are present, it may be concluded that the machine or machine component combination was not used in the preparation of the document.

The Item Y document was not prepared on the Item X typewriter.

or

The Item Z print wheel was not used to prepare the Item Y document.

- 6.5.2.3 When there are limiting factors but the examination reveals significant similarities or differences the use of less than definitive (qualified) conclusions may be appropriate. When reporting less than definitive conclusions the provisions set forth in ¶¶ 5.5.1 through 5.5.3 shall be followed.

There are indications (meaning a high degree of likelihood) the Item Y document was (or was not) prepared on the Item X typewriter (or with the Item Z print wheel).

- 6.5.2.4 When limitations prevent a determination of identification (inclusion/association) or elimination (exclusion/disassociation), inconclusive results with appropriate explanation should be reported.

It could not be determined whether (or not) the Item Y document was prepared on the Item X typewriter due to the lack of individualizing characteristics.

Note: There may be similarities or differences on inconclusive results, and it may be appropriate to include that information in the report.

The typing (machine printing) on Item Y shares similar class characteristics with the Item X typewriter, however due to the lack of individualizing characteristics it could not be determined whether (or not) the Item Y document was prepared on the Item X typewriter.

7 PHOTOCOPIER EXAMINATIONS

7.1 Objective

To determine if a particular photocopier was used to produce a questioned photocopy; or to determine a time frame a particular photocopy was made.

7.2 References

- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- Foster & Freeman Ltd.; Operating Instructions Manual for the Electrostatic Detection Apparatus (ESDA)

7.3 Equipment

- stereo microscope
- magnifiers
- measuring devices
- ESDA

7.4 Safety Measures

Precautionary measures due to the high voltage of the ESDA are contained in the Manufacturer's Operating Instructions Manual.

7.5 Procedures

7.5.1 These procedures may not address all aspects of any uncommon or unusual circumstances encountered during examinations.

7.5.2 The procedures outlined below may not be possible or necessary in every case. The order may vary depending on the case.

7.5.3 Examination of the Questioned Copy

7.5.3.1 Conduct microscopic examination in order to determine physical characteristics of the toner (e.g., liquid or dry, any patterns, size of particles, color, etc.).

7.5.3.2 Examine paper for any picker, grabber, or roller marks.

Note: ESDA processing may reveal marks not otherwise visible with side lighting.

7.5.3.3 Determine the presence of any individual identifying features (e.g., 'trash' marks from the glass platen or drum, marks from the lid or feeder belt, marks from the fusing rollers, defects from corona wires or optics).

7.5.4 Examination of Exemplars and Standards from a Known Machine

Examine the exemplars and standards following the same steps outlined in 7.5.3.1 through 7.5.3.3, above. Individual identifying features found on standards with a date of reproduction that coincides with that of the questioned copy may be especially helpful since photocopier defects are often transitory.

7.5.5 Comparison of Questioned Copy to Exemplars and Standards from a Known Machine

Compare the results obtained in 7.5.3 to those in 7.5.4. This is essentially a comparison of the questioned and known material in order to determine whether there is, or is not, agreement within the class and individual characteristics, sufficient to support a conclusion that both involved (or did not involve) the use of the same copier.

7.5.6 Dating Photocopies

Identifying characteristics from photocopiers are often transitory. If dated known samples are available they can be examined in an effort to bracket the dates when certain identifying characteristics appear, and when they disappear (or are replaced). It may be possible to determine the approximate date the questioned copy was made by establishing where those same identifying features from the questioned copy fit into the dated pattern. When preparing a CoA on a 'dating' case, consideration should be given to including the caveat that the findings are based upon the accuracy of the known sample dates provided.

7.6 Reporting Conclusions

7.6.1 Document to Document Comparisons (when both are questioned)

7.6.1.1 If there are significant individualizing characteristics in common, and there are no significant differences, it may be concluded that the documents were prepared on the same machine.

The Item X and Y documents were prepared on the same copier.

7.6.1.2 If significant differences are present, it may be concluded that the documents were not prepared on the same machine.

The Item X and Y documents were not prepared on the same copier.

7.6.1.3 When there are limiting factors but the examination reveals significant similarities or differences the use of less than definitive (qualified) conclusions may be appropriate. When reporting less than definitive conclusions the provisions set forth in §§ 5.5.1 through 5.5.3 shall be followed.

There are indications (meaning a high degree of likelihood) Items X and Y were (or were not) prepared on the same copier.

7.6.1.4 When limitations prevent a determination of identification (inclusion/association) or elimination (exclusion/disassociation), inconclusive results with appropriate explanation should be reported.

It could not be determined whether (or not) Items X and Y were prepared on the same copier due to the lack of individualizing characteristics.

Note: There may be similarities or differences on inconclusive results, and it may be appropriate to include that information in the report.

7.6.2 Document to Machine Exemplars/Standards Comparisons

7.6.2.1 If there are significant individualizing characteristics in common, and there are no significant differences, it may be concluded that the machine that produced the known exemplars and standards also produced the questioned document.

The copier used to produce the Item X known documents also produced the Item Y document.

7.6.2.2 If significant differences are present, it may be concluded that the machine that produced the known exemplars and standards did not produce the questioned document.

The copier used to produce the Item X known documents was not used to produce the Item Y questioned document.

- 7.6.2.3 When there are limiting factors but the examination reveals significant similarities or differences the use of less than definitive (qualified) conclusions may be appropriate. When reporting less than definitive conclusions the provisions set forth in ¶¶ 5.5.1 through 5.5.3 shall be followed.

There are indications (meaning a high degree of likelihood) the copier that produced the Item X known documents was (or was not) used to produce the Item Y questioned document.

- 7.6.2.4 When limitations prevent a determination of identification (inclusion/association) or elimination (exclusion/disassociation), inconclusive results with appropriate explanation should be reported.

It could not be determined whether (or not) the copier that produced the Item X known documents also produced the Item Y questioned document due to the lack of individualizing characteristics.

Note: There may be similarities or differences on inconclusive results, and it may be appropriate to include that information in the report.

- 7.6.3 Document to Machine Comparisons

In cases where the actual machine (copier) is submitted, the conclusions in 7.6.2, above, should be adapted to conform to that particular situation.

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8 INDENTED WRITING EXAMINATIONS

8.1 Objective

To locate and decipher indented entries (e.g., writing) on paper.

8.2 References

- Conway, James V.P.; Evidential Documents; Charles C. Thomas Publisher, 1959
- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- Hilton, Ordway; Scientific Examination of Questioned Documents (Revised Edition); Elsevier, 1982
- Saferstein, Richard; Criminalistics, An Introduction to Forensic Science; Prentice-Hall Inc., 1977
- Foster & Freeman Ltd.; ESDA Operating Instructions

8.3 Equipment

- ESDA
- light source of appropriate design to be used for oblique lighting
- magnifier
- stereo microscope
- transmitted light box

8.4 Safety Measures and Other Concerns

Precautionary measures due to the high voltage of the ESDA are contained in the Manufacturer's Operating Instructions Manual.

Note: Although considered a non-destructive process, the use of the ESDA can sometimes result in partial removal of pencil writing and typescript from the surface of documents being processed. Although the effect is generally minimal, reproductions (e.g., photograph, photocopy, scan) of such documents should be prepared prior to ESDA processing.

8.5 Procedures

- 8.5.1 These procedures may not address all aspects of any uncommon or unusual circumstances encountered during examinations.
- 8.5.2 The procedures outlined below may not be possible or necessary in each and every case. The order may vary depending on the case.
- 8.5.3 Examine the paper from all angles using side lighting. Use magnifiers or microscope if needed. Dimming any overhead lighting may be helpful. If significant indented writing impressions are found and are sufficiently legible, consider having them photographed (or reproduced by other similar means).
- 8.5.4 Process the paper on the ESDA. Prepare ESDA lifts as necessary to determine the presence of any indentations, or to recover any significant indented entries which are immediately apparent.

Note: In order to insure the ESDA is functioning properly a 'test' shall be performed according to the following.

- 8.5.4.1 Use a small strip of paper (approximately 1" x 8").
- 8.5.4.2 Fold it over so that it measures approximately 1" x 4".
- 8.5.4.3 Using ballpoint pen, write "ESDA TEST" (or similar verbiage) on the outside of the folded strip.

- 8.5.4.4 Unfold the test strip and place it (blank side up) on the vacuum bed with the actual evidence, and process both simultaneously.

Note: If you humidify the actual evidence, make sure you humidify the test strip as well. Also, if the evidence size does not permit simultaneous processing, the test strip should be performed first.

- 8.5.4.5 Development of a visible image from the indented writing on the test strip assures that the apparatus is functioning satisfactorily and shall be considered a “Positive” test result. Test results shall be documented in the examiner’s case file notes as either “Positive” or “Negative”.

Note: Standard abbreviations such as Pos, +, Neg, - may be used.

A positive test result must be obtained before an ESDA result can be used as the basis for any conclusion contained in a CoA. An initially negative test strip result can often be corrected by simply adding toner to the developer (beads) or by increasing the moisture content of the strip by placing it in the humidity chamber for several minutes.

- 8.5.4.6 When processing multiple documents during the same ESDA session a single test strip will suffice.

- 8.5.4.7 Neither the test strip, nor any portion of the indented test image recovered from it need be retained.

- 8.5.5 ESDA lifts need only be prepared when indentations are located. ESDA processing which produces blank pages, or images of obvious insignificance (e.g., markings from the evidence container, signatures from evidence chains) need not be preserved, but should be documented in the examiner’s case file notes. Any indentation which is not clearly insignificant should be considered significant.

- 8.5.6 In those instances where significant indentations are located, the ESDA lift(s) used in recovering those indentations shall be treated as evidence, and handled in accordance with the following.

- 8.5.6.1 Each ESDA lift shall be made a sub-item in the LIMS, and added to the original RFLE (with date). In an effort to make it as clear as possible within the ‘Evidence Submitted By’ section of the CoA, ESDA lifts should be described as ‘Indented entries recovered from Item ___ at the lab’.

- 8.5.6.2 Each ESDA lift shall be marked per ¶ 14.6.6 of the QM.

- 8.5.6.3 ESDA lifts shall be returned to the contributor with the source evidence, placed in the original evidence container when possible. When size or design restrictions are such that the evidence container will not accommodate the ESDA lift(s), proceed in accordance with ¶ 14.6.8 of the QM.

- 8.5.6.4 A reproduction of the ESDA lift(s) (e.g., photograph, photocopy, scan) shall be placed in the case file in lieu of the actual lift(s). The CoA shall be annotated to reflect that an ESDA lift(s) has been included with the returned evidence, and that the lift(s) should be retained for possible future use.

8.6 Reporting Conclusions

Conclusions will generally address any indented writing that was deciphered and/or recovered. The text of any deciphered/recovered indentations may be cited within the results section of the report or, alternatively, provided by including a reproduction of the recovered entries with the report, or both.

Indented writing was recovered from Item X. The recovered entries included an apparent telephone number of '722-2222'. A copy depicting all of the recovered entries is included with this report. The transparent plastic-like lift used to recover the indentations is being returned to you in Container 1 along with Item X. The lift should be retained for any possible future use.

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9 PAPER EXAMINATIONS

9.1 Objective

To determine if two or more items of paper could have been derived from the same source; or to determine if two or more fragments of paper could have been joined together at one time.

9.2 References

- Conway, James V.P.; Evidential Documents; Charles C. Thomas Publisher, 1959
- Harrison, Wilson R.; Suspect Documents (Second Edition); Sweet & Maxwell Ltd., 1966
- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- Hilton, Ordway; Scientific Examination of Questioned Documents (Revised Edition); Elsevier, 1982
- Saferstein, Richard; Criminalistics, An Introduction to Forensic Science; Prentice-Hall Inc., 1977
- Brunelle, Richard L. & Reed, Robert W.; Forensic Examination of Ink and Paper; Charles C. Thomas Publisher, 1984
- Foster & Freeman Ltd.; ESDA Operating Instructions
- Foster & Freeman Ltd.; VSC2000 and VSC6000 Instruction Manuals

9.3 Equipment

- Light source
- Stereo microscope
- Magnifier
- Transmitted light box
- UV light source
- VSC2000 and VSC6000 Video Spectral Comparators
- Micrometer
- Linear measuring device(s) (e.g., ruler)
- ESDA

9.4 Safety Measures

Precautionary measures specified in ¶ 1.3 when working with a UV light source. Precautionary measures due to the high voltage of the ESDA are contained in the Manufacturer's Operating Instructions Manual.

9.5 Interferences

- 9.5.1 During the paper manufacturing process reams of paper are often comprised of sheets from one or more rolls of paper that are combined prior to the cutting process. For this reason, dissimilarities in areas such as color, brightness, fluorescence, opacity, thickness, and surface texture, could exist within sheets from the same ream.
- 9.5.2 Storage conditions (e.g., exposure to light, heat, moisture) and any prior processing with chemicals (e.g., latent prints processing) can affect the appearance of paper during certain tests.

9.6 Procedures

- 9.6.1 These procedures may not address any uncommon or unusual circumstances that may be encountered during examinations.
- 9.6.2 The procedures outlined below may not be possible or necessary in every case. The order may vary depending on the case.
- 9.6.3 Compare the dimensions (width, length, and thickness) of the papers. Evaluate the significance of any similarities or dissimilarities.

Note: Measurements shall be relative rather than absolute, meaning that the purpose is only to determine whether the items being compared have similar or dissimilar dimensions. Any measurements must all be taken at the same time under the same conditions.

- 9.6.4 Compare the color of the papers. Evaluate the significance of any similarities or dissimilarities.
- 9.6.5 Compare the opacity of the papers. Evaluate the significance of any similarities or dissimilarities.
- 9.6.6 Compare any surface printing (e.g., ruled lines) on the papers. Examine microscopically for any possible defects that might be in common. Evaluate the significance of any similarities or dissimilarities.
- 9.6.7 Compare any watermarks on the papers. Evaluate the significance of any similarities or dissimilarities.
- 9.6.8 Compare the surface morphology (texture) of the papers. Evaluate the significance of any similarities or dissimilarities.
- 9.6.9 Compare the shapes of the corners of the papers (e.g., squared, curved, rough finish). Evaluate the significance of any similarities or dissimilarities.
- 9.6.10 Compare any security features (e.g., colored fibers, planchettes) on the papers. Evaluate the significance of any similarities or dissimilarities.
- 9.6.11 Compare any remnants of adhesive binding or padding if either is present on the edges of the papers. Evaluate the significance of any similarities or dissimilarities.
- 9.6.12 Examine papers with oblique light for any surface damage common to both (e.g., folds, creases, paperclip marks, staple holes, crimp markings, indented writing). Processing with the ESDA should be considered since it could disclose indented writing and other marks which were not visible during the side light exam. Evaluate the significance of any similarities or dissimilarities.
- 9.6.13 Compare any perforations or microscopic striae that might be present on the edges of the papers. Evaluate the significance of any similarities or dissimilarities.
- 9.6.14 Compare the fluorescent properties of the papers using a UV light source (long and short wave). Evaluate the significance of the similarities or dissimilarities.
- 9.6.15 Examine the papers with the VSC6000. Compare the results of the IR/UV absorbance, reflectance and luminescent properties. Evaluate the significance of any similarities or dissimilarities.
- Note:** The VSC2000 may also be used, but only when the VSC6000 is not available for use. Although there will be situations where either instrument will yield adequate results, the VSC6000 has a broader range of capabilities and shall be the initial instrument of choice.
- 9.6.16 If reconstructing torn or cut paper fragments, match irregularly torn edges and/or make microscopic matches of cut/torn paper fibers.
- 9.6.17 Consider the significance of observations in §§ 9.6.3 through 9.6.16, both individually and in combination, and form a conclusion within any appropriate limitations.
- 9.6.18 Destructive exams (e.g., paper fiber analysis), if necessary, will generally be referred to the Trace Evidence Section.

9.7 Reporting Conclusions

- 9.7.1 In common source examinations conclusions will generally fall into one of the following categories.

- 9.7.1.1 If significant individualizing characteristics are common to both, such as indented writing, paper clip marks, etc., it may be concluded that the papers were at one time attached or in contact, or, if appropriate, from the same pad.

Based on indented writing common to both the Item X questioned sheet and the Item Y known sheet(s) it is concluded that Item X and Item Y were at one time in contact.

- 9.7.1.2 If significant manufacturing characteristics are common to both, and there are no significant differences, it may be concluded that the papers share a common manufacturing source. When using this conclusion language should be included explaining the significance and limits of the association.

The Item X questioned sheet and the Item Y known sheet(s) share a common manufacturing source; however it could not be conclusively determined whether (or not) the questioned and known sheets share a common post-manufacturing source, such as coming from the same pad, stack, or ream.

- 9.7.1.3 If significant differences are found between the questioned and known sheets it may be concluded that the two do not share a common manufacturing source.

The Item X questioned sheet and the Item Y known sheet(s) do not share a common manufacturing source.

- 9.7.1.4 When limitations prevent an identification (association) or elimination (disassociation), inconclusive results with appropriate explanation should be reported.

It could not be conclusively determined whether (or not) the Item X questioned sheet and the Item Y known sheet(s) share a common source due to the absence of individualizing characteristics.

Note: There may be similarities or differences with inconclusive results, and it may be appropriate to include this information in the report.

The Item X questioned sheet and the Item Y known sheet(s) share similar class characteristics, however due to the lack of individualizing characteristics it could not be conclusively determined whether (or not) Items X and Y share a common source or origin.

9.7.2 Torn Paper Comparisons

- 9.7.2.1 If significant individualizing characteristics in common are present along the torn edges of both fragments, and there are no significant differences, it may be concluded that both fragments were at one time part of the same sheet.

The Item X fragment and the Item Y fragment were at one time joined and part of the same sheet.

- 9.7.2.2 If significant differences are present along the torn edges of both fragments, it may be concluded that the fragments are not from the same original sheet.

The Item X fragment and the Item Y fragment were not at any time part of the same sheet.

- 9.7.2.3 When limitations prevent an identification (association) or elimination (disassociation), inconclusive results with appropriate explanation should be reported.

It could not be determined whether (or not) the Item X fragment and the Item Y fragment were part of the same original sheet. Missing portions of the original sheet was a significant limiting factor during the comparison.

Note: There may be similarities or differences with inconclusive results, and it may be appropriate to include this information in the report.

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10 INK EXAMINATIONS

10.1 Objective

To nondestructively examine inks on documents to determine whether they are different from or similar to other inks, or if they originated from a specific writing instrument.

10.2 References

- Conway, James V.P.; Evidential Documents; Charles C. Thomas Publisher, 1959
- Harrison, Wilson R.; Suspect Documents (Second Edition); Sweet & Maxwell Ltd., 1966
- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- Hilton, Ordway; Scientific Examination of Questioned Documents (Revised Edition); Elsevier, 1982
- Saferstein, Richard; Criminalistics, An Introduction to Forensic Science; Prentice-Hall Inc., 1977
- Brunelle, Richard L. & Reed, Robert W.; Forensic Examination of Ink and Paper; Charles C. Thomas Publisher, 1984
- Richards, G.B., “The Application of Electronic Video Techniques to Infrared and Ultraviolet Examinations”, JFS, Vol. 22, No. 1, 1977
- Foster & Freeman Ltd.; VSC2000 and VSC6000 Instruction Manuals

10.3 Equipment

- Light source
- Stereo microscope
- Magnifier
- VSC2000 and VSC6000 Video Spectral Comparators

10.4 Safety Measures

Precautionary measures specified in ¶ 1.3 when working with a UV light source.

10.5 Interferences

- 10.5.1 Differences detected in the optical characteristics (e.g., IR absorbance, luminescence) of inks on different documents (substrates) may not be of any significance, since differences in substrates may affect the optical properties of the inks.
- 10.5.2 Storage conditions (e.g., exposure to light, heat, moisture) and any prior processing with chemicals (e.g., latent print processing) can affect the optical characteristics of inks during certain tests. Other factors that can affect the optical characteristics include the length of time the ink has been on the paper, and the concentration (density) of the written entry.
- 10.5.3 Inks having the same class characteristics that appear on the same document and display similar optical properties may actually be different inks.

10.6 Procedures

- 10.6.1 These procedures may not address any uncommon or unusual circumstances that may be encountered during examinations.
- 10.6.2 The procedures outlined below may not be possible or necessary in every case. The order may vary depending on the case.
- 10.6.3 Compare the class characteristics of the inks (e.g., color, type). If the examination involves a comparison of an inked entry on a document to a writing instrument, a test mark must be made on that same document. Evaluate the significance of any similarities or dissimilarities.

- 10.6.4 Determine if the inked entries being compared were all made with the same type of writing instrument.
- 10.6.5 Determine if there are any writing instrument defects (e.g., burr striations, nib characteristics), and if they are consistent throughout the inked entries being compared.
- 10.6.6 Examine the inked entries with the VSC6000. Compare the results of the IR/UV absorbance, reflectance, and luminescent properties. Evaluate the significance of any similarities or dissimilarities.
- Note:** The VSC2000 may also be used, but only when the VSC6000 is unavailable. Although there will be situations where either instrument will yield adequate results, the VSC6000 has a broader range of capabilities and shall be the initial instrument of choice.
- 10.6.7 Consider the significance of observations in ¶¶ 10.6.3 through 10.6.6, both individually and in combination, and form a conclusion within any appropriate limitations.

10.7 Reporting Conclusions

10.7.1 Ink to Ink Comparisons

- 10.7.1.1 If significant differences are found between two or more ink samples it may be concluded that the inks do not have a common origin.

The ink used to write the date entry on Item X is different from the ink used to write the signature entry on Item X.

or

The date and signature on Item X were written with different inks.

- 10.7.1.2 When the comparison of two or more ink samples reveals no significant differences, it may be concluded that non-destructive testing revealed no differences, or that non-destructive testing determined that both shared similar class characteristics. A conclusion of this type shall include language explaining the significance and limitations of the association.

Non-destructive examination of the ink used to write the date on Item X and the ink used to write the signature on Item X revealed no differences. However, the absence of individualizing characteristics in common prevents a conclusive determination regarding whether (or not) the inks share a common origin.

or

Non-destructive analysis of the ink used to write the date on Item X and the ink used to write the signature on Item X determined that both share similar class characteristics. However, it could not be conclusively determined whether (or not) the inks share a common origin due to the lack of individual characteristics.

- 10.7.1.3 When comparisons are significantly limited by interferences (e.g., problems with substrate, prior treatment with chemicals, charring, saturation, etc.) inconclusive results, with appropriate explanation, should be reported.

It could not be determined whether (or not) the ink from Item X and the ink from Item Y share a common source. The differences in the substrates of Items X and Y significantly limited the examination.

10.7.2 Ink to Writing Instrument Comparisons

- 10.7.2.1 If significant and reproducible individual characteristics (e.g., burr striations from a defective ball housing) are present, and there are no significant differences, it may be concluded that a particular writing instrument was used to prepare an entry.

The Item X ballpoint pen was used to prepare the entries on Item Y.

- 10.7.2.2 If significant differences are found it may be concluded that a particular writing instrument was not used to prepare an entry.

The Item X pen was not used to prepare the entries on Item Y.

- 10.7.2.3 When the comparison reveals no significant differences, it may be concluded that non-destructive testing revealed no differences, or that non-destructive testing determined that both shared similar class characteristics. A conclusion of this type shall include language explaining the significance and limitations of the association.

Non-destructive examination of the Item X pen and the entries on Item Y revealed no differences. However, the absence of individualizing characteristics in common prevents a conclusive determination regarding whether (or not) the Item X pen was used to prepare the entries on Item Y.

or

Non-destructive analysis of the Item X pen and the entries on Item Y determined that both share similar class characteristics. However, it could not be conclusively determined whether (or not) the Item X pen was used to prepare the entries on Item Y due to the lack of individual characteristics in common.

- 10.7.2.4 When comparisons are significantly limited by interferences (e.g., substrate problems, prior treatment with chemicals, charring, saturation, aged inks, dry pen) inconclusive results, with appropriate explanation, should be reported.

It could not be determined whether (or not) the Item X pen was used to prepare the entries on Item Y. The prior treatment of Item Y with ninhydrin significantly limited the examination.

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11 ALTERATIONS, OBLITERATIONS AND ERASURES EXAMS

11.1 Objective

To detect alterations to documents, and to decipher those entries which have been altered, obliterated, or erased.

11.2 References

- Conway, James V.P.; Evidential Documents; Charles C. Thomas Publisher, 1959
- Harrison, Wilson R.; Suspect Documents (Second Edition); Sweet & Maxwell Ltd., 1966
- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- Hilton, Ordway; Scientific Examination of Questioned Documents (Revised Edition); Elsevier, 1982
- Saferstein, Richard; Criminalistics, An Introduction to Forensic Science; Prentice-Hall Inc., 1977
- Hilton, Ordway; Detecting and Deciphering Erased Pencil Writing; Charles C. Thomas Publisher, 1991
- Brunelle, Richard L. & Reed, Robert W.; Forensic Examination of Ink and Paper; Charles C. Thomas Publisher, 1984
- Richards, G.B., "The Application of Electronic Video Techniques to Infrared and Ultraviolet Examinations, JFS, Vol. 22, No. 1, 1977
- Foster & Freeman Ltd.; ESDA Operating Instructions
- Foster & Freeman Ltd.; VSC2000 and VSC6000 Instruction Manuals

11.3 Equipment

- Stereo microscope
- Magnifier
- Light source of appropriate design for oblique lighting capability
- VSC2000 and VSC6000 Video Spectral Comparators
- UV light source
- Transmitted light box
- ESDA
- Typewriter test grids

11.4 Safety Measures

Precautionary measures specified in ¶ 1.3 when working with a UV light source. Precautionary measures due to the high voltage of the ESDA are contained in the Manufacturer's Operating Instructions Manual.

11.5 Procedures

- 11.5.1 The procedures outlined below may not be possible or necessary in every case. The order of procedures may also vary depending on the case. The nature of these type problems varies widely, and as a result the procedures appropriate to a given case will vary. What follows is a list of techniques commonly applied to this category of examination.
- 11.5.2 The procedures set forth in ¶ 10 (Ink Examinations) may be applicable to this type of problem, and should be reviewed if necessary.
- 11.5.3 Examine document(s) for any evidence of alteration (e.g., paper fiber disturbance, overwriting, opaquing fluid). Useful instruments might include microscope, side light, transmitted light box, ESDA, erasure detection powders, and typewriter test grids.
- 11.5.4 Compare the basic physical properties of the written entries, such as color and type (e.g., pencil, ballpoint or non-ballpoint). Evaluate the significance of any similarities or differences. If the entries are machine produced, establish the process used (e.g., typewriter).

- 11.5.5 Determine if the type (class) of writing instrument is consistent throughout the written entries. If machine produced, determine if there is consistency throughout, or there is evidence of a second machine (e.g., difference in font, spacing, process).
- 11.5.6 Determine if any writing instrument individualities (e.g., burr striation defects, nib characteristics) are present, and if they are consistent throughout the written entries. Evaluate the significance. If machine produced, determine the consistency of any defects or abnormalities.
- 11.5.7 Examine with long and short wave UV light, and evaluate the significance of the results.
- 11.5.8 Examine with the VSC6000. Evaluate the significance of results in the IR/UV absorbance, reflectance and luminescent properties.
- Note:** The VSC2000 may be used, but only when the VSC6000 is unavailable. Although there will be situations where either instrument will provide adequate results, the VSC6000 has a broader range of capabilities and shall be the initial instrument of choice.
- 11.5.9 Examine with laser or other type of alternate light source in conjunction with various filters (if available).
- 11.5.10 If possible, prepare a permanent record (photograph or similar type reproduction) of any significant results obtained.
- 11.5.11 If the obliteration involved the use of an opaquing fluid such as 'wite-out', and the original entry is not readily observable from the reverse side, solvents such as petroleum ether or 'Liquid Window' can be used to render the paper momentarily transparent so that the original entry can be observed.
- 11.5.11.1 Complete removal of the opaquing fluid by abrasion or through the use of solvents (eg. 'Turpentine') may be possible, but this is considered a destructive process, and should not be performed without the permission of the submitter or Commonwealth Attorney. Record photographs (or similar type reproduction) should be prepared prior to the initiation of any destructive process.
- 11.5.12 Consider the significance of observations in ¶¶ 11.5.2 through 11.5.11.1, both individually and in combination, and form a conclusion.

11.6 Reporting Conclusions

- 11.6.1 Conclusions will generally include the following types of information as appropriate.
- 11.6.2 If evidence of alteration was found (e.g., mechanical erasure, multiple inks).

Examination of Item X revealed sites of mechanical erasure.

or

Examination of Item X revealed no evidence of alteration.

- 11.6.3 The texts of any of any original entries that were deciphered or recovered.

Examination of Item X revealed an overwritten entry. The entry on Item X that currently reads '8' originally read '3'.

or

Examination of Item X revealed an overwritten entry in the area of the document that currently reads '8'. A printout depicting the original entry is included with this report.

or

Examination of Item X revealed an overwritten entry. Although the original entry could not be completely deciphered the entry that currently reads '8' appears to have originally read '3'.

or
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Examination of Item X revealed overwriting in the area that currently reads '8'. The overwriting is extensive, and the original entry could not be deciphered.

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12 CHARRED DOCUMENT EXAMINATIONS

12.1 Objective

To decipher texts on charred documents.

12.2 References

- Conway, James V.P.; Evidential Documents; Charles C. Thomas Publisher, 1959
- Harrison, Wilson R.; Suspect Documents (Second Edition); Sweet & Maxwell Ltd., 1966
- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- Hilton, Ordway; Scientific Examination of Questioned Documents (Revised Edition); Elsevier, 1982
- Saferstein, Richard; Criminalistics, An Introduction to Forensic Science; Prentice-Hall Inc., 1977
- Richards, G.B., "The Application of Electronic Video Techniques to Infrared and Ultraviolet Examinations", JFS, Vol. 22, No. 1, 1977
- Foster & Freeman Ltd.; VSC2000 and VSC6000 Instruction Manuals

12.3 Equipment

- Light source
- Stereo microscope
- magnifier
- UV light source
- VSC2000 and VSC6000 Video Spectral Comparators

12.4 Safety Measures

Precautionary measures specified in ¶ 1.3 when working with a UV light source.

12.5 Procedures

- 12.5.1 These procedures may not address all aspects of any uncommon or unusual circumstances that may be encountered during examinations.
- 12.5.2 The procedures outlined below may not be possible or necessary in every case.
- 12.5.3 Conduct examination in a low traffic area, relatively free of air currents.
- 12.5.4 If necessary, moisturize the document.
- 12.5.5 Conduct visual exam using natural and/or artificial lighting. Vary the angle at which the light reflects off the paper in an effort to contrast any text (e.g., handwriting, typewriting) against the charred background.
- 12.5.6 Conduct microscopic examination. If available, polarizing filters may be helpful.
- 12.5.7 Examine with UV light source (long and short wave).
- 12.5.8 Examine with the VSC6000. Evaluate the significance of results in the IR/UV absorbance, reflectance and luminescent properties.
- Note:** The VSC2000 may be used, but only when the VSC6000 is unavailable. Although there will be situations where either instrument will provide adequate results, the VSC6000 has a broader range of capabilities and shall be the initial instrument of choice.
- 12.5.9 Examine with laser or other type of alternate light source with various filters (if available).

12.5.10 If possible, prepare a permanent record (photograph or similar type reproduction) depicting any significant results obtained.

12.6 Reporting Conclusions

Conclusions will generally include any text that was deciphered or recovered.

Examination of Item X revealed material (handwritten, machine printed text, pictures, symbols, etc.) that appears to read (or depict).....

or

Examination of Item X revealed material (handwritten, machine printed text, pictures, symbols, etc.). Images of the recovered material are included with this report.

or

Examination of the Item X charred material did not result in the recovery of any written or printed text of any type.

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13 COUNTERFEIT DOCUMENT EXAMINATIONS

13.1 Objective

To determine if a particular document (e.g., birth certificate, car title) is a counterfeit reproduction.

13.2 References

- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- International Paper Company; Pocket Pal (graphic arts production handbook)
- New Zealand Police Document Examination Section; Printing Processes Manual
- Brunelle, Richard L. & Reed, Robert W.; Forensic Examination of Ink and Paper; Charles C. Thomas Publisher, 1984
- Richards, G.B., “The Application of Electronic Video Techniques to Infrared and Ultraviolet Examinations”, JFS, Vol. 22, No. 1, 1977
- Foster & Freeman Ltd.; VSC2000 and VSC6000 Instruction Manuals
- Dannerose Information Systems; DOYA IR Video Analyzer Instruction Manual

13.3 Equipment

- Stereo microscope
- Magnifier
- U.V. light source
- VSC2000 and VSC6000 Video Spectral Comparators
- Transmitted light box

13.4 Safety Measures

Precautionary measures specified in ¶ 1.3 when working with a UV light source.

13.5 Procedures

- 13.5.1 In all cases of suspected counterfeiting, authentic specimens (standards) of the same type of document should be available for comparison purposes. If a known standard is not available, a reliable reference source with detailed information may be used. All aspects of the documents should be examined and compared until such point that it can be determined with certainty (if possible) that the document in question is either genuine or a counterfeit reproduction. In arriving at this determination, differences generally take on a greater significance than do similarities. The nature of counterfeit examinations will vary, and as a result the procedures appropriate to a given case will vary. What follows is a list of techniques commonly applied to this category of examination. They may not address all aspects of any uncommon or unusual circumstances that might be encountered during examinations, and some may not be possible or necessary in every case. The order may vary depending on the case.
- 13.5.2 Determine if both documents (questioned and known standard) were produced by the same process (e.g., lithography, gravure, inkjet, handwritten). The entirety of the documents should be checked since more than one process may have been used. Evaluate the significance of any similarities or dissimilarities.
- 13.5.3 Compare the physical characteristics (e.g., dimensions, opacity, color) of the documents. Evaluate the significance of any similarities or dissimilarities.
- 13.5.4 Compare any security features within the documents (e.g., micro-line printing, wet or dry seals, fibers, rainbow printing, holograms, latent images, watermarks, planchettes). Evaluate the significance of any similarities or dissimilarities.
- 13.5.5 Compare the quality of printing on the documents. Use a microscope and pay particular attention to areas of fine detail. Evaluate the significance of any similarities or dissimilarities.

13.5.6 Examine both documents with UV long and short wave radiation. Compare the results and evaluate the significance of any similarities or dissimilarities. Security features not previously detected might be visible under UV light.

13.5.7 Examine both documents with the VSC6000. Evaluate the significance of results.

Note: The VSC2000 may be used, but only when the VSC6000 is unavailable. Although there will be situations where either instrument will provide adequate results, the VSC6000 has a broader range of capabilities and shall be the initial instrument of choice.

13.5.8 Consider the significance of observations in ¶¶ 13.5.2 through 13.5.7, both individually and in combination, and form a conclusion.

13.6 Reporting Conclusions

13.6.1 If there are significant differences between the questioned document and the applicable known standard, it may be concluded that the questioned document is not genuine, and is a counterfeit reproduction. The report may also include information regarding how the counterfeit was prepared.

Item X is counterfeit U.S. currency.

or

Item X is counterfeit U.S. currency prepared on an inkjet printing device.

13.6.2 If there are no significant differences between the questioned document and the applicable known standard, and incorporated into the documents are adequate safety/security features, it may be concluded that the questioned document is genuine.

Item X is genuine U.S. currency.

13.6.3 When significant limitations prevent any determination regarding genuineness or non-genuineness, inconclusive results with appropriate explanation should be reported.

Due to the absence of a suitable known standard, it could not be determined whether the Item X document is counterfeit or whether it is genuine.

or

The Item X questioned document and the Item Y known standard display similar class characteristics, however the absence of adequate safety/security features incorporated into the known standard prevents any determination regarding whether Item X is genuine or whether it is a counterfeit reproduction.

14 RUBBER STAMP EXAMINATIONS

14.1 Objective

To determine if two or more stamped impressions were made with the same stamp; or to determine whether a particular stamp was or was not used to make a specific stamped impression.

14.2 References

- Herbertson, Gary; Rubber Stamp Examination; Wide Line Publishing, 1997
- Seaman-Kelly, Jan; Forensic Examination of Rubber Stamps; Charles C. Thomas Publisher, 2002
- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997

14.3 Equipment

- Stereo microscope
- Magnifier
- Transmitted light box
- Measuring device
- Light source of such a design to allow for oblique lighting

14.4 Interferences

Counterfeit rubber stamps produced through a photopolymer process may duplicate many, if not all, of the characteristics previously thought to be individual and unique to a particular rubber stamp.

14.5 Procedures

- 14.5.1 These procedures may not address all aspects of any uncommon or unusual circumstances encountered during examinations.
- 14.5.2 The procedures outlined below may not be possible or necessary in each and every case. The order may vary depending on the case.
- 14.5.3 Establish whether the examination is a comparison of exclusively questioned impressions, a comparison of a questioned impression(s) with a known impression(s), or a comparison of a questioned impression(s) with a rubber stamp.
- 14.5.4 Examine all impressions (questioned and any known) to establish that each is an original stamped impression and not the product of some other type of process (e.g., photocopy, lithography).
- 14.5.5 Determine if the questioned impression(s) is suitable for comparison. Factors affecting suitability include such things as clarity, detail, degree of inking, and general condition of the document.
- 14.5.6 If known specimen impressions are submitted, determine their suitability for comparison.
- 14.5.7 If a rubber stamp(s) is submitted, note its condition (e.g., clean, dirty, inked, worn, damaged). Prepare appropriate specimens and evaluate their suitability for comparison with the questioned impression(s).
- 14.5.8 Conduct side-by-side comparison of the questioned impressions; or of the questioned impression(s) to the known impression(s) and/or to the rubber stamp(s).
 - 14.5.8.1 Compare the class characteristics, which are those that are largely the result of the manufacturing process, and are likely to be repeated in other rubber stamps (e.g., size, shape, text, type style).

14.5.8.2 Compare any individual characteristics in common, which are those that result from physical damage after manufacture, and which would not be shared with other rubber stamps (e.g., nicks, breaks, blemishes, impression voids, coincidental peripheral printing).

14.5.9 Evaluate the significance of any similarities, dissimilarities, or limitations observed in ¶¶ 14.5.8.1 and 14.5.8.2 and form a conclusion.

14.6 Reporting Conclusions

14.6.1 When there are no significant differences, and there are significant individualizing characteristics in common, an identification may be appropriate. For an identification to be effected, any possibility of a duplicate (or counterfeit) stamp must be eliminated.

The Item X stamped impression was made with the Item Y stamping device.

14.6.2 If there are significant differences, an elimination may be appropriate.

The Item X stamped impression was not made by the Item Y stamping device.

or

The Item X stamped impression and the Item Y stamped impression were not made with the same stamping device.

14.6.3 When there are limiting factors but the examination reveals significant similarities or differences the use of less than definitive (qualified) conclusions may be appropriate. When reporting less than definitive conclusions the provisions set forth in ¶¶ 5.5.1 through 5.5.3 shall be followed.

There are indications (meaning a high degree of likelihood) the Item X stamped impression was (or was not) made with the Item Y stamping device.

14.6.4 When limitations prevent a determination of identification or elimination, inconclusive results with appropriate explanation should be reported.

It could not be determined whether (or not) the Item X stamped impression and the Item Y stamped impression were both made with the same stamping device due to the lack of individualizing characteristics.

Note: There may be similarities or differences with inconclusive results and it may be appropriate to include this information in the report.

It could not be conclusively determined whether (or not) the Item X and Item Y stamped impressions were made with the same stamping device. Although Items X and Y share a number of characteristics in common (e.g., design, size), the possibility of a duplicate stamp(s) displaying these same characteristics cannot be eliminated. Submission of a suspect stamping device might be helpful toward reaching a definitive conclusion.

15 EXAMINATION OF CHECKWRITER MACHINES

15.1 Objective

To determine if two (or more) impressions were prepared with the same checkwriter; or to determine if a specific impression was prepared with a particular checkwriter.

15.2 References

- Harrison, Wilson R.; Suspect Documents (Second Edition); Sweet & Maxwell Ltd., 1966
- Ellen, David; The Scientific Examination of Documents (Second Edition); Taylor & Francis Ltd., 1997
- Hilton, Ordway; Scientific Examination of Questioned Documents (Revised Edition); Elsevier, 1982
- Vastrick, T., "Classification and Identification of Checkwriters", ABFDE monograph, Houston, TX, 1991
- Hargett, J.W. & Dusak, R.A., "A Compilation of Research on the Checkwriter Industry for the Purpose of Classification and Identification", 29th Meeting of the AAFS, San Diego, CA, 1977
- Crane, Adrian, "Identification of Ridge and Groove Cheque Protectors by Platen Ridge Defects", CSFS, Vol. 20, No. 1, March 1987
- Vastrick, T.W. & Smith, E.J., "Checkwriter Identification – Individuality", JFS, Vol. 27, No.1, January, 1982

15.3 Equipment

- Stereo microscope
- Light source of such a design to allow for oblique lighting
- Transmitted light box
- Magnifier

15.4 Procedures

- 15.4.1 These procedures may not address all aspects of any uncommon or unusual circumstances encountered during examinations.
- 15.4.2 The procedures outlined below may not be possible or necessary in each and every case. The order may vary depending on the case.
- 15.4.3 Establish that the submitted impression(s) was prepared on a checkwriter, and is not the result of some other process made to resemble a checkwriter impression (e.g., hand drawn).
- 15.4.4 Establish whether the examination will be a comparison of exclusively questioned impressions, a comparison of a questioned impression(s) with a known impression(s), or a comparison of a questioned impression(s) with a checkwriter machine.
- 15.4.5 Evaluate the suitability of the submitted questioned impression(s) for comparison. Factors affecting suitability include clarity, detail, degree of inking, and general condition of the document.
- 15.4.6 Evaluate the suitability of any known impressions submitted for comparison.
- 15.4.7 If a checkwriter machine is submitted the following may be applicable.
- 15.4.7.1 Note its general condition (e.g., damaged).
- 15.4.7.2 Note the settings, particularly the amount the machine is set to imprint.
- 15.4.7.3 Prepare appropriate specimens, as needed, and evaluate their suitability for comparison.

Note: Begin without changing any machine settings, then change as necessary to obtain appropriate specimens for comparison.

15.4.8 Conduct appropriate side-by-side comparison (questioned impression to questioned impression, questioned impression to known impression, or questioned impression to the checkwriter machine using the specimens prepared in ¶ 15.4.7.3, above).

15.4.8.1 Compare the class characteristics (e.g., impression format, typeface design and size, printing element characters, prefix, payee perforator, platen impressions, inking system).

Note: Prefixes in some machines are removable and interchangeable.

15.4.8.2 Compare any individual characteristics in common (e.g., wear and damage defects, perforation patterns, misalignments, reproducible blemishes, ribbon shift, impression voids, improper inking, extraneous inking, individual prefix features).

15.4.9 Evaluate the significance of any similarities, dissimilarities, or limitations observed in ¶¶ 15.4.8.1 and 15.4.8.2, and form a conclusion.

15.5 Reporting Conclusions

15.5.1 When there are no significant differences, and there are significant individualizing characteristics in common, an identification may be appropriate.

The Item X and Item Y impressions were both made by the same checkwriter.

or

The Item X impression was made by the Item Y checkwriter.

15.5.2 If there are significant inexplicable differences an elimination may be appropriate.

The Item X and Item Y impressions were not made by the same checkwriter.

or

The Item X impression was not made by the Item Y checkwriter.

15.5.3 When there are limiting factors but the examination reveals significant similarities or differences the use of less than definitive (qualified) conclusions may be appropriate. When reporting less than definitive conclusions the provisions set forth in ¶¶ 5.5.1 through 5.5.3 shall be followed.

There are indications (meaning a high degree of likelihood) Item X was (or was not) made by the Item Y checkwriter.

15.5.4 When limitations prevent a determination of identification or elimination, inconclusive results with appropriate explanation should be reported.

It could not be determined whether (or not) the Item X and Item Y were made by the same checkwriter due to the lack of individualizing characteristics.

or

It could not be determined whether (or not) the Item X impression was made by the Item Y checkwriter due to the lack of individualizing characteristics.

Appendix A - Abbreviations

The following is a listing of acceptable abbreviations generated in an effort to assist in the interpretation of Section case file notes. While as comprehensive as possible, the list may not be complete. Other abbreviations, including symbols such as the type used in mathematics or proof reading for which commonly understood definitions already exist, though not listed here, may also be used so long as their applicable meaning is logical and clear. For example, using an 'equal' sign (=) to indicate similarity, likeness or sameness, and a 'does not equal' sign (\neq) to indicate dissimilarity or difference would be acceptable note taking abbreviations. Abbreviations may be written or printed in upper or lower case, but must be legible.

Abbreviations	Definitions
acct, acc	account
ac	absent characteristic
acd	accidental
aiw, \$iw	amount in words
al	alignment
amt	amount
approx	approximately
ar, arr	arrangement
as	approach stroke
asc	ascender
auth	author, authorship
ball pt, bp	ballpoint pen
bl	baseline
blk	black
blu	blue
c	container
ca	common author or commonwealth attorney (contextual)
ccw	counter-clockwise
cf	carbon film ribbon
cic	characteristics in common
ck, chk, chq	check
coll	collected
commcomp	common authorship for comparable entries
comp	comparable
concl	conclusion
conn	connect
cont	continued
cpi	characters per inch
cq, cyq	copy quality
cs	connecting stroke
cw	clockwise
cy	copy
cymk	cyan, yellow, magenta and black
cyn	cyan
desc	descender
dict	dictated
dif, diff	difference
dir	direction
dis, dissim	dissimilar
doc	document
dysub	dye sublimation
elim	eliminate
es,esig	endorsement signature
evid	evidence
ex, exc	except for, exception

fax, fx	facsimile
fc	features and characteristics
flexo	flexography
flo, flu	fluorescence
fmt	format
fp	fingerprints
fpc	fingerprint card
fpd	fingerprinted
g, grn	green
hp	hand printing
hr, htr	height ratio
ht	height
hp	hand printing
hw, hwg	handwriting
id	identify
ij	inkjet
ik	insufficient known
in	inch
incl	inconclusive
ind	indications
indents	indentations
init	initial
insuf, insuff	insufficient
ir	infrared
irl	infrared luminescence
irr	infrared reflected
iw	indented writing
j, just	justification
k, kn	known
kw	known writing
ks	known signature
l	left
lc	lower case
lcomp	limited comparability
lf	letter form
lim	limited
lind, li	limited indications
litho	lithography
lk	lack of known
lm	left margin
lo, loc	lift-off correction tape
lp	latent prints or letterpress (contextual)
lq	line quality
lzp	laser printer
mag	magenta or magnetic (contextual)
mal	mal-aligned
max	maximum
mc, mcy	machine copy
mgf	magnification, magnifier
mic	microscope
min	minimum
misc	miscellaneous
ms, msig	maker signature
nc	not comparable
n/c	no conclusion
ncr	no carbon required (carbonless system)
nh	no have

nn	can be neither identified nor eliminated
nr	not represented
num	numeral
pc	personal computer
pfp, pres for prts	preserve/protect for fingerprints
phc	photocopier
pm	postmark
poss	possibly
pp	printing process
ps	proportional spacing
q, que	questioned
qe	questioned entry
r, rt	right
recd	received
rgb	red, green and blue
rh, rht	relative height
rm	right margin
rov	range of variation
rp	relief printing
rs	relative size
rst	rubber stamp
rsti	rubber stamped impression
s, sub	submission
sab	same as before (same as above)
sb	sealed box
scrcni	sealed container received contents not inventoried
sgf	significant
sig	signature
sim	similar
simo	simulation
si, sind	strong indications
sk	skill
sme	sealed manila envelope
sp	spacing
spb	sealed paper bag
splb	sealed plastic bag
swe	sealed white envelope
sye	sealed yellow envelope
tc	"T" crossing
tf	type font
tl	transmitted light
tnr	toner
tr	tracing
ts	terminal stroke
tw	typewriter
tw	typewritten
uc	upper case
uch	unexplained characteristic
uv	ultraviolet
uvf	ultraviolet fluorescence
var	variation
w	with
wo	without
wof	white-out fluid
wm	watermark
y, yel	yellow

↑ area of similarity

Note: If color-coding is used arrows (or circles) indicating similarity shall be drawn in green ink. Those indicating dissimilarity shall be drawn in red ink.). Arrows may also be used to indicate direction.

↔ area of dissimilarity (for use in non color-coded case notes)

♂ unexplained characteristic

↻ clockwise

↺ counter-clockwise

+, □ positive, plus, good for

-, □ negative, minus, bad for

∅ neutral

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