



MASTER DOCUMENT LIST

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LAB-QD-20 Handwriting Comparison Worksheet (portrait orientation)

LAB-QD-20L Handwriting Comparison Worksheet (landscape orientation)

LAB-QD-21 ESDA Worksheet

LAB-QD-22 Image Enhancement Worksheet

LAB-QD-23 Plastic Bag Worksheet RES120817

LAB-QD-24 Case Documentation Checklist RES120817

LAB-QD-25 Exam Counting Worksheet RES120817



Standard Operating Procedures
Questioned Documents
Subject: Master Document List

DRN: QD-MDL

Revision History

Version #	Effective Date	Brief Description of Change(s)
00	12/01/2002	Original Issue
01	03/28/2007	Minor Revision, QD-08-01 Rescinded
02	05/24/2007	New: QD-01-01A, LAB-QD-09, LAB-QD-16, LAB-QD-17 , LAB-QD-18, LAB-QD-20
03	06/12/2007	New: LAB-QD-21, LAB-QD-22, LAB-QD-23 Revised: QD-02-04, QD-06-01, LAB-QD-09, LAB-QD-16, LAB-QD-17 , LAB-QD-18, LAB-QD-20
04	10/16/2009	Revised: QD-02-06
05	01/04/2010	New: LAB-QD-20L Revised: QD-02-06, QD-03-01
06	06/15/2010	Revised: QD-02-03, LAB-QD-17
07	09/16/2011	Revised: QD-01-01, QD-01-02, QD-01-03, QD-01-04, QD-02-01, QD-02-02, QD-02-03, QD-02-04, QD-02-05, QD-02-06, QD-03-01, QD-04-01, QD-04-02, QD-05-01, QD-06-01, QD-07-01, LAB-QD-09, LAB-QD-16, LAB-QD-17, LAB-QD-18, LAB-QD-20, LAB-QD-20L, LAB-QD-21, LAB-QD-22. LAB-QD-23 New: QD-01-05, LAB-QD-24, LAB-QD-25
08	05/03/2012	Revised: QD-03-01
08a	08/22/2013	Changed from TOC to MDL
09	04/25/2014	Revised: LAB-QD-20, LAB-QD-20L
10	12/08/2017	Renumbered and revised documents Rescinded: QD-01-01A, QD-01-05, QD-02-06, LAB-QD-16, LAB-QD-17, LAB-QD-18, LAB-QD-23, LAB-QD-24, LAB-QD-25
11	01/10/2019	Revised: QD-01-01, QD-01-05, QD-02-02, QD-02-03, QD-02-04, QD-02-05, QD-03-01, QD-03-02, QD-03-03, QD-04-01, QD-04-02, QD-05-01, QD-06-01, QD-07-01



QUESTIONED DOCUMENTS OVERVIEW AND SERVICES

1 Scope

- A. The Questioned Documents discipline offers the laboratory service of forensic document examination. The forensic document examiner (FDE) may: identify or eliminate a subject as the writer of a particular document(s) by the comparison of questioned and known handwriting, identify the source of a document, identify the machine(s) that produced a document, or ascertain any information related to how a document was created or altered which may be of value in a criminal investigation. These examinations may require physical or instrument-assisted analysis of a document.
- B. The forensic document examiner has the discretion to choose and apply the appropriate techniques or combination thereof, that are available, approved for use and included in the Questioned Documents Standard Operating Procedures.
- C. The Questioned Documents Section provides the following services:
 - 1. Handwriting Identification
 - 2. Forgery Detection
 - 3. Paper Batch and Edge Matching
 - 4. Envelope Batch Matching
 - 5. Examination and Preservation of Charred and Saturated Documents
 - 6. Image Enhancement
 - 7. Document Preparation and Sequence Determination
 - 8. Identification and Analysis of Conventional and Digital Print Processes
 - 9. Ink Comparison
 - 10. Alteration/Obliteration/Erasure Detection and Restoration
 - 11. Typewriting/ Examination of Carbon Ribbon Evidence
 - 12. Miscellaneous Document Examination: Rubber Stamps, Seals, Checkwriters, Sequence Determination and any other various document examinations

2 Examiner Approval

- A. An examiner must demonstrate competency and be authorized by the laboratory director before independent evidence examinations will be allowed.
- B. The Questioned Documents Training Manual contains modules for relevant testing procedures. The training records of each employee document completion of the required reading materials, training exercises and testing, whereby the employee demonstrates competency in relevant testing procedures.

3 Proficiency

Each analyst must successfully complete one (1) proficiency examination in either handwriting comparison or a relevant testing procedure to equate to two (2) tests per year.



4 Literature and Supporting Documentation

ASTM E1732, "Standard Terminology Relating to Forensic Science"

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Minimum Training Requirements for Forensic Document Examiners"

SWGDOC, "Terminology Relating to the Examination of Questioned Documents"



Revision History

Version #	Effective Date	Brief Description of Change(s)
	09/01/2001	Original Issue
00	12/01/2002	Reissue; Minor Revision
01	09/16/2011	Major revision – Sections 3, 4, 5, 6, and 9 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-01-01 was formerly “Physical Evidence Examination”
03	01/10/2019	Major Revision – Section 4



EQUIPMENT AND INSTRUMENTATION

1 Scope

This document applies to instruments and equipment in the Questioned Documents discipline.

2 Related Documents

Instruments and Equipment (LOG-03-07)

3 General Requirements

- A. Routine cleaning of the equipment will not be documented.
- B. The supervisor/analyst will determine if the equipment or instrument is ready to return to service for casework. The Quality Manager will authorize its use.

4 Types of Equipment and Instrumentation

4.1 Video Spectral Comparator (VSC)

- A. Instrument instructions: QD-03-01
- B. Maintenance: Normal maintenance includes keeping the instrument clean and software updated provided by manufacturer

4.2 Electrostatic Detection Apparatus (ESDA) with Humidity Chamber

- A. Instrument instructions: QD-03-02
- B. Maintenance: Normal maintenance includes keeping the instrument clean and replacing fuses

4.3 Attestor Tornado

- A. Equipment instructions: Operating manual, as applicable
- B. Maintenance: Normal maintenance includes keeping the equipment clean and replacing filters, fuses, and/or light bulbs

4.4 Stereomicroscope

- A. Equipment instructions: Operating manual, as applicable
- B. Maintenance: Normal maintenance includes keeping the equipment clean and changing lamps as needed; does not need to be recorded.

4.5 MiScope

- A. Instrument instructions: QD-03-01
- B. Maintenance: Normal maintenance includes keeping the instrument clean.

4.6 General Equipment (loupes, magnifying glass, camera, etc.)

General Equipment with settings that cannot significantly affect the examinations or results is maintained by visual examination only. General equipment does not require a logbook.



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Questioned Documents
Subject: Equipment and Instrumentation

DRN: QD-01-02

Revision History

Version #	Effective Date	Brief Description of Change(s)
00	12/01/2002	Original Issue Minor Revision
01	09/16/2011	Major Revision – Sections 3, 4, 5, 6, 7, 8, and 9 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and Content QD-01-02 was formerly “Envelope Examination”



APPROVED LIST OF ABBREVIATIONS

1 Scope

This is a listing of abbreviations commonly used by forensic document examiners. This list has been generated to assist in the interpretation of case file notes and is not a standardized list of required abbreviations. While as comprehensive as possible, the list may not be complete. The abbreviations are not case sensitive. See also approved abbreviations found in Glossary (LOG-09-01).

<u>Abbreviation</u>	<u>Number Reference</u>	<u>Definition</u>
ASN		additional standards needed
A/O/E		alteration/obliteration/erasure
ANG	1	angularity
BLC	2	baseline conformation
B/P	3	ballpoint pen
B/S	4	beginning stroke
Cks		checks
Copier		photocopier
C/S	5	connecting stroke
DLB	7	deliberation
D/S	6	drag stroke
Elim		eliminated/elimination
EMB	8	embellishment
E/S	9	extraneous stroke
ESDA		Electrostatic Detection Apparatus
FDE		Forensic Document Examiner
FFC		far from conclusive
FSOC		far short of conclusive
FV	31	form variation
HL/HP		handlettering/handprinting
H/P	10	height proportion
H/Sp	11	horizontal spacing
HW		handwriting



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<u>Abbreviation</u>	<u>Number Reference</u>	<u>Definition</u>
ID		identified/identification
IL		investigative lead(s)
Inc		inconclusive
Insf		insufficient
K		known
L/F	12	letter form
LFLC		letter for letter comparability
LO	29	letter/letter portion omission
Lp	13	loop
L/Q	14	line quality
LR	30	letter/letter portion redundancy
LWI		latent writing impressions
N.B/P	15	non-ballpoint
NCOB		normal course of business
Oblit		obliteration
O/CR	16	open/closed retrace
O.H/P	17	overall height proportion
P/L	18	penlift
PLMT	19	placement
PMS	20	penmanship
PRS	32	pressure
Q		Questioned
QD		Questioned Documents
ROAI		Results of Analysis and Interpretation
ROT	21	rotation
ROV		range of variation
RTP		relevant testing procedure
S/D	23	stroke direction
SID		state identification number



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<u>Abbreviation</u>	<u>Number Reference</u>	<u>Definition</u>
SL	22	slant
SP, Strong Prob		strong probability
Tcg		tracing
TDL		Texas driver license
Tic	28	short, additional stroke
T/S	24	terminal stroke
TW		typewriter
UC/LC	27	uppercase/lowercase combination
UNK		unknown
VB		verbatim
VSC		Video Spectral Comparator
WFWC		word for word comparability
WIF	25	writing instrument failure
X	26	intersection



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DRN: QD-01-03

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	09/01/2001	Original Issue
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01	09/16/2011	Major revision – Sections 3, 4, 5, and 9 Minor revision – Sections 2 and 7 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-01-03 was formerly “Physical Match Comparison” Content was previously in QD-01-01A



QUESTIONED DOCUMENTS EXAM COUNTING

1 Scope

The count of Questioned Documents examinations is maintained in order to evaluate the work performed per case, compare workload trends and identify areas where a shift or resources could result in casework being completed in a more efficient manner. The count of Questioned Documents examinations will include the following:

1.1 Number of Questioned and Known Items Examined

The number of questioned or known evidence items submitted for analysis (i.e., documents/pages, envelopes, writing instruments, etc.)

1.2 Number of Examinations/Comparisons Performed

The number of examinations/comparisons performed on the evidence items (i.e., handwriting comparison, envelope batch match, ESDA, VSC, etc.)

2 Practice

The information requested by the Laboratory Information Management System (LIMS) is used for uniform statistical reporting to document the number of total examinations performed in a case. Enter all examination information in the LIMS prior to verification.

2.1 Number of Questioned and Known Items Examined

Indicate with a numerical value the total number of questioned exhibits and known exhibits submitted for comparison.

2.2 Number of Examinations/Comparisons Performed

Indicate with a numerical value the total number of examinations and/or comparisons performed on the evidence items. Only the actual examinations performed will be counted. Unless otherwise specified, the examination of one questioned item is counted as one examination and the examination of one known item is counted as one examination. The front and back of documents should be counted as separate examinations.

A. Physical Comparison

1. Paper Batch and Edge Matching

The examination of each document is counted as one examination and the examination of each piece is counted as one examination.

2. Envelope Batch Matching

The examination of each document is counted as one examination.

3. Charred and Saturated Documents

The examination of each document is counted as one examination.

4. Typewriting/Examination of Carbon Ribbon

The examination of each transcription of each portion of ribbon is counted as one examination.

B. Image Enhancement

1. ESDA



The total number of examinations is equal to the total number of ESDA lifts; not including the controls.

2. VSC

The total number of examinations is equal to the total number of items viewed at each light source or filter.

3. Oblique

The total number of examinations is equal to the total number of items viewed.

4. Alterations/Obliterations/Erasures

The total number of examinations is equal to the total number of A/O/E areas viewed.

C. Writing Instruments

1. Spectral

The total number of examinations is equal to the total number of ink areas examined.

2. Graphite Pencil

The total number of examinations is equal to the total number of pencil areas examined.

D. Conventional and Digital Print Process

The examination of each document is counted as one examination.

E. Rubber Stamp

The examination of each stamp is counted as one examination.

F. Checkwriter

The examination of each checkwriter is counted as one examination.

G. Seal

The examination of each seal is counted as one examination.

H. Questioned Sequence

The examination of each document is counted as one examination.

I. Examination and Comparison of Handwriting Evidence

1. Each evidence item submitted as a single entry but contains multiple signatures, each signature can be counted as one evidence item on both questioned and known documents. Furthermore, each evidence item submitted as a single entry but contains extended multiple lines of text, each line of text can be counted as one evidence item on both questioned and known documents.
2. The comparison of one questioned item to one known item is counted as one examination. The total number of comparisons is calculated by multiplying the number of questioned items by known items.
3. The comparison of one questioned item to one questioned item is counted as one examination. The total number of comparisons is calculated by multiplying the number of questioned items by questioned items.



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4. The total number of the handwriting comparisons is equal to the following:
(total number of Q examinations) x (total number of K examinations) + (total number of Q to K comparisons) or (total number of Q to Q examinations)



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01	09/16/2011	Major Revision – Sections 3, 4, 5, 8, and 9 Minor Revision – Sections 2 and 6 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-01-04 was formerly “Plastic Bag Comparison” Content was previously in QD-01-05



CASE REVIEW

1 Scope

In addition to the technical and administrative review processes noted in LOG-03-03, the following processes shall be performed in Questioned Document case review. Any disagreements that arise from the review process will be resolved before the report is issued.

2 Related Documents

Case Review (LOG-03-03)

Exam Verification (LOG-03-16)

3 Practice

3.1 Verification of Handwriting Comparison Examinations

Verification of handwriting comparison cases involves an independent interpretation/opinion from an examination by the verifying analyst which also involves the technical review process and administrative review process. All verifications will be reviewed by a qualified individual, other than the examiner, who has been competency tested and is authorized to perform the task. Both the technical review and administrative review processes are documented in the Laboratory Information Management System (LIMS).

- A. Observe evidence description and breakdown on report and compare to physical evidence to ensure accurate description of evidence.
- B. Ensure that case analyst's initials are on the evidence, along with the case number and exhibit number.
 1. If the evidence is for Latent Print analysis, ensure that the outermost container is marked with the case information and that the necessary notes are in LIMS.
- C. Observe questioned (Q) and known (K) evidence and assess the degree of similarity (as per QD-05-01).
- D. Observe case analyst's handwriting worksheets and confirm the characteristics marked or noted.
- E. Review case analyst's observations, conclusion(s) and investigative leads. Ensure all information is present in the header of the worksheets.
- F. Verifying analyst should initial and date the handwriting worksheets and evidence.
- G. Review case analyst's report to ensure conclusions are accurate, limitations are stated where applicable, and investigative leads are thorough.
- H. Conduct an administrative review of the report including grammar, punctuation and accuracy of submission information.
- I. Complete technical review and administrative review steps in LIMS.

3.2 Verification of Relevant Testing Procedure Examinations

Verification of relevant testing procedure examinations involves an independent interpretation/opinion from an examination by the verifying examiner that includes the technical review process and administrative review process. Relevant testing procedures may include, but are not limited to, Latent Writing Impression Restoration, Image Enhancement, Writing Instrument Examinations and Physical Document Examination. Most relevant testing



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procedures include a work product that will be reviewed by a qualified individual, other than the examiner, who has been competency tested and is authorized to perform the task. Both the technical review and administrative review processes are documented in LIMS.

- A. Observe evidence description and breakdown on report and compare to physical evidence to ensure accurate description of evidence.
- B. Ensure that case analyst's initials are on the evidence, along with the case number and exhibit number.
 1. If the evidence is for Latent Print analysis, ensure that the outermost container is marked with the case information and that the necessary notes are in LIMS.
- C. Review case analyst's work product and ensure analyst's initials, case number, and page number are present.
- D. Review any corresponding worksheets that relate to the analyst's work product; if applicable
 1. Laboratory Information Sheet (LAB-08/LAB-08L)
 2. ESDA Worksheet (LAB-QD-21)
 3. Image Enhancement Worksheet (LAB-QD-22)
- E. Verifying analyst should initial and date the worksheets.
- F. Review case analyst's report to ensure conclusions are accurate, limitations are stated where applicable, and investigative leads are thorough.
- G. Conduct an administrative review of the report including grammar, punctuation and accuracy of submission information.
- H. Complete technical review and administrative review steps in LIMS.



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DRN: QD-01-05

Subject: Case Review

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00	09/16/2011	Original Issue
	12/08/2017	Rescinded
01	01/10/2019	Major Revision – Title and content QD-01-05 was formerly “Questioned Documents Exam Counting”



PHYSICAL EVIDENCE EXAMINATION

1 Scope

The primary purpose of these procedures is to establish unifying documentation and collection procedures that will be utilized by the laboratory.

The initial examiner of an item is primarily responsible for the collection and preservation of evidentiary materials that may be on that item.

The examiner will be given flexibility to determine an appropriate course of action in regard to the collection, preservation, and analysis of evidence with the ultimate goal of efficiency and quality. The procedures presented are intended to assist the examiner in the inspection of physical evidence. They are to be used in conjunction with all applicable laboratory policies, good laboratory practice, and proper scientific methodology.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

For possible biohazardous materials use disposable coat, disposable gloves, approved eye protective devices, and a mask.

3 Related Documents

Laboratory Submission Form (LAB-06)

Laboratory Information Sheet (LAB-08/LAB-08L)

Evidence Management (LOG-05-01)

4 Equipment, Materials, and Reagents

Varies with the type of technique used to collect any evidence

Envelopes, tape, examination paper

Any writing utensil

Plastic bags, paper envelopes, or appropriate evidence containers

Ruler

Forceps or probe

5 Standards and Controls

None

6 Procedure

1. Retrieve evidence from evidence storage, evidence custodian or another examiner. Verify that the Laboratory Submission Form (LAB-06) is appropriately completed and a chain of custody maintained. Document any differences noted, make the appropriate changes or additions, and initial to preserve the integrity of the evidence. Identify the pertinent forensic question(s). Plan the approach to the case. Evaluate the potential value of trace evidence relative to the items of evidence submitted for examination.
2. Prepare work surfaces.



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3. Verify that the evidence package, the nature of seals, and labeling are in order and match LIMS descriptions. Open the container (avoid breaking previous seals if possible).
4. Examine the evidence, with gloved hands where applicable.
5. If the evidence is saturated, the items should be immediately dried in a vent hood or allowed to air dry away from direct sunlight or a heavy air current.
6. Note whether other items were packaged together with the selected item and itemize accordingly.
7. Visually examine the evidence, record its physical appearance and describe items of evidence.
 - a) *Note the condition of the evidence and/or possible contamination or preservation issues*
 - b) *Physical description such as color, size, holes and tears, broken parts, missing parts, or other modifications that make the item appear unusual*
 - c) *Manufacturers' identification, serial numbers, or other marks*
 - d) *Record and collect loose trace evidence; where applicable*
 - e) *Record the nature and location of "stain(s)"*
 - f) *Record and preserve fractured, torn or cut portion(s) of an item*
 - g) *Record and preserve patterned marks or impressions on an item*
 - h) *Itemize the evidence in LIMS. After itemization of evidence, mark external package with case number, item numbers and examiner's initials.*
 - i) *Uniquely label or tag each item with case number, item number, and examiner initials. If the evidence is too small to mark, place the evidence in a package or clear folder then mark the package. Markings and notations on the evidence should not interfere with or obstruct forensically significant areas (e.g. bloodstains).*
 - j) *As needed for comparison, record, collect, and uniquely label known substrates such that it depicts sufficient representation of the evidence and/or treatment*
 - k) *Collected items may be sorted and preserved for future or immediate analysis to protect it from loss and/or contamination*
 - l) *Conduct the appropriate analytical/comparative procedure(s) as necessary.*
8. All original exhibits will be re-packaged in the original container if possible. The inner and outer packaging of the evidence is re-sealed in a manner that would detect tampering. Trace, stains, and/or other samples collected from evidence are considered derived evidence that will be packaged separately, uniquely labeled, tape-sealed, initialed, and dated.
9. The evidence should be transferred to the evidence storage area, evidence custodian or appropriate examiner.



7 Interpretation

Evaluation of the case synopsis, scene, and evidence will be conducted on a case-by-case basis with the determination of the appropriate method of recovery and documentation made by the forensic examiner at the time of observation.

8 Limitations

- A. Latent writing impressions of evidentiary value may be obscured by the handwriting from the outer packaging of submitting agency.
- B. Destructive examinations performed on the evidence items prior to submission to the crime laboratory may limit the examinations performed in the Questioned Documents Section.

9 Literature and Supporting Documentation

ASTM E1492, "Standard Guide for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory"

ASTM E1188, "Standard Practice for Collection and Preservation of Information and Physical Items by a Technical Investigator"

ASTM E1459, "Standard Guide for Physical Evidence Labeling and Related Documentation"



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01	09/16/2011	Major Revision – Sections 3, 4, 5, 6, 7, and 9 Minor Revision – Sections 2 and 8 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-02-01 was formerly “Initial Examination of Ink Evidence” Content was previously in QD-01-01



PAPER BATCH AND EDGE MATCHING

1 Scope

Paper batch and edge matching comparisons are performed in order to associate documents to an original source. This may include, but is not limited to, microscopic/macroscopic examination of questioned documents to known documents, assembly of torn or shredded documents, and comparison of torn edges and perforations.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

3 Related Documents

Laboratory Information Sheet (LAB-08/LAB-08L)

ESDA Worksheet (LAB-QD-21)

Image Enhancement Worksheet (LAB-QD-22)

4 Equipment, Materials, and Reagents

An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, hand-held magnifiers, etc.)

A light source of sufficient intensity to allow fine detail to be distinguished

Forceps

Electrostatic Detection Apparatus (ESDA)

Attestor TORnado

Video Spectral Comparator (VSC) and/or MiScope

Fixing film/tape/sticky board

5 Standards and Controls

Positive ESDA control sheet

6 Procedure

6.1 Edge Matching

- A. Perform a visual examination (macroscopic/microscopic) of each item and evaluate any individualizing features.
- B. If similar shaped edges are found, test them by holding them closely together at different positions.
- C. If the pieces fit together, the analyst should examine the separation line (macroscopic/microscopic) for continuity of surface markings such as pattern striations, and/or any irregularities.
- D. If the same individualizing features are found, the physical match should be documented.
- E. If individualizing features are not found, observations should be documented.



6.2 Paper Batch

- A. Perform a visual examination (macroscopic/microscopic) of each item and evaluate any individualizing features.
- B. If the same individualizing features are found, the physical match should be documented.
- C. If individualizing features are not found, observations should be documented.

7 Interpretation

7.1 Edge Matching

- A. If the items fit together and have sufficient continuous characteristics along the separation line, the analyst would conclude a physical match exists.
- B. If the items fit together but there are insufficient continuous characteristics along the separation line, the analyst would conclude the items could have originated from a common source but a physical match could not be determined. This could occur in items having smooth, straight edges.
- C. If items do not fit together but have similar overall characteristics, the analyst could conclude that either:
 1. The items originated from a common source but a connecting piece is missing
 2. The items originated from similar but different sources.
- D. If items do not have similar overall characteristics, the analyst would conclude the items originated from different sources.

7.2 Paper Batch

- A. If the items exhibit similar features, the analyst can conclude a match exists.
- B. If the items have similar overall features, but some feature is unaccounted for the analyst can conclude:
 1. The item may have originated from a common source.
 2. The item may have originated from a similar, but different source.
- C. If the item does not have similar features, analyst can conclude the items originated from different sources.

8 Limitations

The condition and physical characteristics of the items

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Physical Match of Paper Cuts, Tears, and Perforations in Forensic Document Examinations"

SWGDOC, "Standard for Non-destructive Examination of Paper"

SWGDOC, "Standard for Indentation Examinations"

VSC 6000 Video Spectral Comparator Software Manual



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Zarbeco MiScope User Manual
ESDA-2 User Manual
Attestor TORnado SF91 User Manual



Standard Operating Procedures
Questioned Documents
Subject: Paper Batch and Edge Matching

DRN: QD-02-02

Revision History

Version #	Effective Date	Brief Description of Change(s)
	09/01/2001	Original Issue
00	12/01/2002	Reissue; Minor Revision
01	09/16/2011	Major Revision – Sections 1, 3, 4, 5, 6, 7, and 9 Minor Revision – Sections 2 and 8 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-02-02 was formerly “Spectral Examination of Ink Evidence” Content was previously in QD-01-03.
03	01/10/2019	Minor Revision – Section 9



ENVELOPE BATCH MATCHING

1 Scope

Envelope Batch Matching comparisons are performed in order to associate any number of envelopes to one another. This includes comparison of questioned envelopes to those found in possession of subject(s).

Envelope evidence may be subject to the same testing procedures as any type of document evidence, including latent print processing, latent writing impression processing, trace evidence collection (especially from sealed flap and postage stamp) and recovery of ink for analysis, and DNA examination (especially from sealed flap). The examiner should preserve the envelope evidence accordingly.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

3 Related Documents

Laboratory Information Sheet (LAB-08/LAB-08L)

ESDA Worksheet (LAB-QD-21)

Image Enhancement Worksheet (LAB-QD-22)

4 Equipment, Materials, and Reagents

- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, comparison microscope, hand-held magnifiers, etc.)
- A light source of sufficient intensity to allow fine detail to be distinguished
- Electrostatic Detection Apparatus (ESDA)
- Video Spectral Comparator (VSC) and/or MiScope
- Ruler
- Forceps

5 Standards and Controls

Positive ESDA control sheet

6 Procedure

1. Perform a visual examination of each item, preferably with gloved hands.
2. Describe the individual items of evidence (a sketch and/or digital image may also be included). Note whether other items were packaged together with the selected item.
3. Contact submitting agency to obtain authorization to cut the sides of the envelope(s) for examination purposes.



4. Examine the known and/or questioned evidence and record its macroscopic external and internal features, microscopic features and UV responses, as applicable:
 - a) *Note the condition of the evidence and/or possible contamination or preservation issues*
 - b) *Physical description such as dimensions, fold characteristics, paper thickness, color, size, holes and tears*
 - c) *Manufacturer's identification on packaging, security printing, any other printing, or other marks*
 - d) *Record fold defects, e.g., asymmetry, fold holes and fold ears*
 - e) *Record the nature and location of edge defects, e.g., nicks, nibs, and creases (gripper or die)*
 - f) *Record features of stamps and/or postage meter, which may include UV responses*
 - g) *Record the responses of paper and glue, which may include UV responses*
 - h) *Record and preserve torn and/or cut portion(s) of an item*
 - i) *Record and preserve patterned marks and/or impressions including any latent writing impressions detected on each questioned envelope*
 - j) *Uniquely label or tag each item with case number, item number, and examiner initials. Markings and notations on the evidence should not interfere or obstruct forensically significant areas (e.g. bloodstains)*
 - k) *Compare macroscopic, microscopic, and UV characteristics of questioned and known-source envelopes and uniquely label known envelope exhibit(s)*
 - l) *Record and collect trace evidence contained in the questioned envelopes and/or trapped under the sealed flap or postage stamp. Preserve for examination by appropriate laboratory personnel*

7 Interpretation

- A. If the two envelopes have different class characteristics, the analyst would conclude the envelopes did not originate from the same manufacturer packaging.
- B. If the two envelopes have similar class characteristics (e.g., dimensions, color, UV paper and glue responses, cut pattern) but do not have batch individualizing features, the analyst would conclude the envelopes could have originated from the same manufacturer (class match).
- C. If the two envelopes have similar class characteristics and batch individualizing features (e.g., gross cut defects, nicks, nibs, creases, paper and glue pattern defects), the analyst would conclude the envelopes originated from the same manufacturing facility during the same service period (batch match).

8 Limitations

- A. Condition of evidence



- B. Class and batch envelope matches limit association to large groups of known-source envelopes. Associated analyses of envelopes, e.g., trace, latent writing impressions and latent prints, may permit association with a particular individual.

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Non-Destructive Examination of Paper"

SWGDOC, "Standard for Indentation Examinations"

VSC 6000 Video Spectral Comparator Software Manual

Zarbeco MiScope User Manual

ESDA-2 User Manual

Attestor TORnado SF91 User Manual



Revision History

Version #	Effective Date	Brief Description of Change(s)
	09/01/2001	Original Issue
00	12/01/2002	Reissue; Minor Revision
01	06/15/2010	Major revision – Section 6 Minor revision – Sections 3 and 9
02	09/16/2011	Major revision – Sections 1, 3, 4, 5, 6, 7, and 9 Minor revision – Sections 2 and 8 Advisory Board recommendations
03	12/08/2017	Major Revision – Title and content QD-02-03 was formerly “Thin-Layer Chromatography of Ink Evidence” Content was previously in QD-01-02
04	01/10/2019	Minor Revision – Section 9



EXAMINATION AND PRESERVATION OF CHARRED AND SATURATED DOCUMENTS

1 Scope

Documents that have been burned, charred, or saturated may be submitted to the laboratory for decipherment of the text or drawings found within or a physical match may be performed. Charred documents are very fragile and must be handled with extreme care. Saturated documents also require special handling.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

3 Related Documents

Laboratory Information Sheet (LAB-08/LAB-08L)

Image Enhancement Worksheet (LAB-QD-22)

4 Equipment, Materials, and Reagents

- Sheets of Mylar film
- Double sided clear tape
- Video Spectral Comparator (VSC) and/or MiScope
- A light source of sufficient intensity to allow fine detail to be distinguished
- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, hand-held magnifiers, etc.)
- Forceps, broad tip and narrow tip
- Weights
- Plexiglass or glass
- Clear sheet protectors
- Image capture device (scanner, digital camera, etc.)
- Computer imaging software (i.e. Adobe Photoshop)

5 Standards and Controls

None

6 Procedure

6.1 Encapsulation of Documents

1. Before the beginning of an examination, photograph documents as they are submitted.
2. The document can be encapsulated in either Mylar film, glass or clear report covers. The encapsulating material should be at least one inch larger on all sides than the document to be encapsulated.



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3. Use a soft cloth to wipe free any dust or particles on the encapsulating material.
4. Using broad-tipped forceps or by sliding a sheet of paper under the evidence, place the document in the center of the base piece. If the questioned document is torn or broken, reassemble the pieces as they are placed onto the base piece.
5. Apply one side of the double-sided tape to the base piece approximately ½ inch from all edges. Make sure there is enough room between the document and tape so that the document does not come into contact with the tape. Leave a slight gap in the taped edges at the corners for air to escape.
6. Place the second piece of encapsulating material on top of the document, making sure it is aligned with the base piece. Use small weights to hold the encapsulated document in place.
7. Trim the edges, if applicable, and round any corners.
8. With a permanent marker, mark the material with the case number, exhibit number, analyst initials and date.
9. If glass is used as the encapsulating material, perform any necessary examinations, then remove the document from the glass and preserve in a clear plastic report cover marked with the case number, exhibit number, analyst initials and date.

6.2 Decipherment Techniques

1. View document under the VSC, under each different wavelength of light and with the appropriate filters, recording any text deciphered.
2. View document using stereomicroscope, recording any text deciphered.
3. View document with oblique lighting, using fiber optic light source, recording any text deciphered.
4. View document with computer imaging software (i.e Adobe Photoshop), recording any text deciphered.

6.3 Documentation of Results

1. If using VSC or computer imaging software, capture image and print.
2. If using microscope, use digital camera to capture image and print.
3. Create worksheet documenting procedure and results, and attach to pictures of text deciphered.

7 Interpretation

- A. Indicate whether information is present on the documents.
- B. See Examination and Analysis of Ink Evidence (QD-04-01) if needed.
- C. Interpret the characters/text/drawings and record results.

8 Limitations

- A. Charred documents are extremely fragile. Extreme care must be used in the handling of the document.



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- B. Extreme care must be used in the interpretation of specific characters found on the document. Either report all possible characters that the unknown character could represent, or report that the image of the document is attached.
- C. Saturated documents are also fragile. Items should be immediately dried in vent hood or allowed to air dry away from direct sunlight and heavy air current. On some occasions the document might need to be humidified to aid in unfolding any documents that may have dried folded or creased.

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Preservation of Charred Documents"

SWGDOC, "Standard for Preservation of Liquid Soaked Documents"

VSC 6000 Video Spectral Comparator Software Manual

Zarbeco MiScope User Manual



Standard Operating Procedures

DRN: QD-02-04

Questioned Documents

Subject: Examination and Preservation of Charred and Saturated Documents

Revision History

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00	12/01/2002	Reissue; Minor Revision
01	06/12/2007	Minor Revision: deletion of reference to form
02	09/16/2011	Major revision – Sections 3, 4, 5, 6, 8, and 9 Advisory Board recommendations
03	12/08/2017	Major Revision – Title and content QD-02-04 was formerly “Examination of Graphite Pencil Evidence” Content was previously in QD-07-01
04	01/10/2019	Major Revision – Section 9



TYPEWRITING/EXAMINATION OF CARBON RIBBON EVIDENCE

1 Scope

The examination of typewritten carbon ribbon evidence is intended to assist the analyst in determining if a known typewriter carbon ribbon was used to produce a questioned document.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

3 Related Documents

Laboratory Information Sheet (LAB-08/LAB-08L)

4 Equipment, Materials, and Reagents

- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, comparison microscope, hand-held magnifiers, etc.)
- A light source of sufficient intensity to allow fine detail to be distinguished

5 Standards and Controls

None

6 Procedure

1. Remove typewriter carbon ribbon from typewriter if not already removed
2. Examine ribbon for characters of the questioned text
3. Photograph or copy the characters on the ribbon
4. Compare the void area of a character on the ribbon to the corresponding type letter on the questioned document
 - a) *Examine and record fracture edge matches*
 - b) *Examine and record paper fiber impressions*
 - c) *Repeat for different letter forms*
5. Transcribe any characters found

7 Interpretation

- A. If the questioned text is not found on the known ribbon, the examiner would conclude that the questioned document was not produced using the known ribbon.
- B. If the questioned text was located on the known ribbon and sufficient identifying characteristics were found on the known ribbon and questioned document, the examiner would conclude the questioned document was produced using the known ribbon.
- C. If the questioned text was located on the known ribbon and identifying characteristics found on the ribbon were not found on the questioned document, the examiner would conclude the questioned document was not produced using the known ribbon.



8 Limitations

- A. Condition of questioned document and ribbon
- B. This examination can only be used on carbon ribbons. Fabric ribbons do not retain image of characters striking them, therefore no text decipherment is possible.

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Examination of Fracture Patterns and Paper Fiber Impressions on Single-Strike Film Ribbons and Typed Text"

SWGDOC, "Standard for Examination of Typewritten Items"



Standard Operating Procedures
Questioned Documents
Subject: Typewriting/Examination of Carbon Ribbon Evidence

DRN: QD-02-05

Revision History

Version #	Effective Date	Brief Description of Change(s)
	09/01/2001	Original Issue
00	12/01/2002	Reissue; Minor Revision
01	09/16/2011	Major revision – Sections 1 and 3-9 Minor revision – Section 2 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-02-05 was formerly “Alterations/Erasures/Obliterations” Content was previously in QD-04-01 and QD-04-02.
03	01/10/2019	Major Revision – Section 9



IMAGE ENHANCEMENT

1 Scope

Image Enhancement includes procedures for the non-destructive restoration, recording and visualization of images, and any other various techniques that are computer aided to help establish the origin and authenticity of a document. It also includes the procedure by which images of document evidence can be acquired in digital format and increased legibility of these images can be attained through the use of computer software.

2 Related Documents

Image Enhancement Worksheet (LAB-QD-22)

Laboratory Information Sheet (LAB-08/LAB-08L)

3 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

4 Equipment, Materials, and Reagents

- Video Spectral Comparator (VSC)
- MiScope
- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, hand-held magnifiers, etc.)
- A light source of sufficient intensity to allow fine detail to be distinguished
- Computer
- Image capture device (scanner, digital camera, etc.)
- Computer imaging software (i.e. Adobe Photoshop)

5 Standards, Controls, and Calibration

None

6 Procedure

- A. Examine questioned document(s) macroscopically and microscopically
- B. Perform examination using any of the various lighting techniques
- C. Visualize image where applicable
- D. Capture image and print, where applicable

7 Interpretation

- A. The restoration, recording or visualization of any document(s) is accomplished through observation by the examiner.
- B. Reports may include one or more of the following types of result(s) and other finding(s):
 1. Information as to the source



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2. Whether or not the document is authentic
3. Whether or not there are underlying images or writing
4. Photographs or reproductions of the images

8 Limitations

- A. Condition of the evidence
- B. Not all images can be deciphered; make sure no assumptions are made when interpreting
- C. No known standards for comparison in authentication cases

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Non-destructive Examination of Paper"

SWGDOC, "Standard for Use of Image Capture and Storage Technology in Forensic Document Examination"

VSC 6000 Video Spectral Comparator Software Manual

Zarbeco MiScope User Manual



Quality Assurance Coordinator

Revision History

Version #	Effective Date	Brief Description of Change(s)
	09/01/2001	Original Issue
00	12/01/2002	Reissue; Minor Revision
01	01/04/2010	Major Revision – Section 6.1 Minor Revision – Section 9
02	09/16/2011	Major Revision – Sections 3-9 Minor Revision – Sections 2 Advisory Board recommendations
03	05/03/2012	Major Revision – Section 7 Advisory Board recommendations
04	12/08/2017	Major Revision – Title and content QD-03-01 was formerly “Examination and Comparison of Handwriting Evidence”
05	01/10/2019	Minor Revision – Section 6 Major Revision – Section 9



LATENT WRITING IMPRESSION RESTORATION

1 Scope

Latent writing impressions may be made when writing is performed on one sheet of paper and leaves indentations on the pages below. The ESDA sheet provides a restoration or partial restoration of the original writing which created the impressions.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

3 Related Documents

Image Enhancement Worksheet (LAB-QD-22)

ESDA Worksheet (LAB-QD-21)

Laboratory Information Sheet (LAB-08/LAB-08L)

4 Equipment, Materials, and Reagents

- Electrostatic Detection Apparatus (ESDA)
- Video Spectral Comparator (VSC) and/or MiScope
- A light source of sufficient intensity to allow fine detail to be distinguished
- Computer
- Image capture device (scanner, digital camera, etc.)
- Computer imaging software (i.e. Adobe Photoshop)
- An optical instrument of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, hand-held magnification, etc.)

5 Standards and Controls

Positive ESDA control sheet

6 Procedure

1. Examine questioned document(s) with oblique lighting and record results (LAB-QD-22)
2. Determine whether questioned item is suitable for ESDA examination
 - a) *If suitable, continue*
 - b) *If not suitable, discontinue examination*
3. Develop and preserve positive ESDA control sheet (each day ESDA is performed)
4. Perform ESDA examination on questioned document(s). Humidification duration can be 0, 2, and 5 minutes, or at the discretion of the analyst.
5. Preserve results of ESDA examination by applying self-adhesive plastic sheet over developed image.



6. Photocopy, photograph, or scan the developed ESDA image
7. Developed ESDA images are considered to be evidence and will be properly marked, sealed, and retained in the Questioned Document vault.

7 Interpretation

- A. The visualization of latent writing impressions is accomplished through observation by the examiner.
- B. Reports may include one or more of the following types of result(s) and other finding(s):
 1. Whether latent writing impressions were observed
 2. The text of deciphered latent writing impressions
 3. Information as to the source of latent writing impressions
 4. Photographs or photocopies of the developed ESDA images

8 Limitations

- A. Not all items are suitable for ESDA examination (book cover, file folders, documents that have been wet after impressions were made, etc.)
- B. Condition of evidence
- C. Improper handling of the items (i.e., handling documents with cloth gloves or compressed during storage)
- D. Not all images can be deciphered; make sure no assumptions are made when interpreting.

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Indentation Examinations"

SWGDOC, "Standard for Non-Destructive Examination of Paper"

SWGDOC, "Standard for Use of Image Capture and Storage Technology in Forensic Document Examination"

VSC 6000 Video Spectral Comparator Software Manual

Zarbeco MiScope User Manual

ESDA-2 User Manual

Attestor TORnado SF91 User Manual



Standard Operating Procedures
Questioned Documents
Subject: Latent Writing Impression Restoration

DRN: QD-03-02

Revision History

Version #	Effective Date	Brief Description of Change(s)
00	12/08/2017	Original Issue Content was previously in QD-02-06
01	01/10/2019	Minor Revision – Section 6 Major Revision – Section 9



ALTERATIONS/OBLITERATIONS/ERASURES

1 Scope

This procedure describes the methods the examiner would use to detect and/or visualize alterations, which are modifications that include but are not limited to, obliterations, additions, overwritings, and erasures.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

3 Related Documents

ESDA Worksheet (LAB-QD-21)

Image Enhancement Worksheet (LAB-QD-22)

Laboratory Information Sheet (LAB-08/LAB-08L)

4 Equipment, Materials, and Reagents

- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, comparison microscope, hand-held magnifiers, etc.)
- A light source of sufficient intensity to allow fine detail to be distinguished
- Video Spectral Comparator (VSC) and/or MiScope
- Electrostatic Detection Apparatus (ESDA)
- Computer
- Image capture device (scanner, digital camera, etc.)
- Computer imaging software (i.e. Adobe Photoshop)
- Ruler

5 Standards and Controls

Positive ESDA control sheet

6 Procedure

6.1 Additions

1. Compare ink in suspected area to remainder of document. See Initial Examination of Ink Evidence (QD-04-01).
2. Compare the print process in suspected area to remainder of document. See Typewriting/Examination of Carbon Ribbon Evidence (QD-02-05) and/or Identification and Analysis of Conventional and Digital Print Processes (QD-06-01)
3. Examine documents for printing defects.



6.2 Erasures

1. Chemical eradications – use the following examinations and record observations:
 - a) *Transmitted light*
 - b) *UV light using appropriate equipment and filters*
 - c) *IR light using appropriate equipment and filters*
 - d) *Capture image and print*
2. Mechanical erasures – use the following examinations and record observations:
 - a) *Oblique lighting*
 - b) *UV light using appropriate equipment and filters*
 - c) *IR light using appropriate equipment and filters*
 - d) *ESDA if applicable (QD-03-02)*
 - e) *Capture image and print*
3. Substitutions – use the following examinations and record observations:
 - a) *Compare ink in suspected area to remainder of document. See Initial Examination of Ink Evidence (QD-04-01)*
 - b) *Compare the print process in suspected area to remainder of document. See Typewriting/Examination of Carbon Ribbon Evidence (QD-02-05) and/or Identification and Analysis of Conventional and Digital Print Processes (QD-06-01)*
 - c) *Examine documents for printing defects.*

6.3 Obliterations

Use the following examinations and record observations:

1. Transmitted light
2. UV light using appropriate equipment and filters
3. IR light using appropriate equipment and filters. Modify contrast, intensity, or other adjustments as necessary.
4. Removal of covering material (must receive authorization from submitting agency because of destructive nature of examination)

7 Interpretation

The detection and/or visualization of alterations, erasures, obliterations, and/or substitutions are accomplished through observation by the examiner. Reports may include one or more of the following types of conclusion(s) and other finding(s):

- A. Whether alterations were observed
- B. The text or description of altered entries
- C. Method or sequence of alterations



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- D. Images of alterations and original entries
- E. Other information about the alterations

8 Limitations

- A. Condition of evidence
- B. Authorization from the submitting agency to perform some examinations is required.

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Indentation Examinations"

SWGDOC, "Standard for Non-Destructive Examination of Paper"

SWGDOC, "Standard for Use of Image Capture and Storage Technology in Forensic Document Examination"

SWGDOC, "Standard for Examination of Altered Documents"

VSC 6000 Video Spectral Comparator Software Manual

Zarbeco MiScope User Manual

ESDA-2 User Manual

Attestor TORnado SF91 User Manual



Standard Operating Procedures
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00	12/08/2017	Original Issue This document was formerly QD-02-05
01	01/10/2019	Major Revision – Section 9



EXAMINATION AND ANALYSIS OF INK EVIDENCE

1 Scope

Examiner will begin with an initial examination of the ink evidence. This is a preliminary step to compare the physical characteristics of the inks.

The spectral examination of ink evidence is a non-destructive step in the analysis to reach conclusions as to the common or different origin of samples of ink.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

3 Related Documents

Image Enhancement Worksheet (LAB-QD-22)

Laboratory Information Sheet (LAB-08/LAB-08L)

4 Equipment, Materials, and Reagents

- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, hand-held magnifiers, etc.)
- A light source of sufficient intensity to allow fine detail to be distinguished
- Video Spectral Comparator (VSC)

5 Standards and Controls

White reference tile, as applicable

6 Procedure

A. Initial Examination

1. Examine each ink sample separately.
2. Record descriptive information and physical characteristics of ink (as applicable):
 - a) *Microscopic analysis*
 - b) *Writing instrument type*
 - c) *Color and hue*
 - d) *Line width/depth*
 - e) *Surface or texture features (striations, gooping, etc.)*

B. Spectral Examination

1. Examine inks with the VSC using side by side comparison. Use light sources and filters to determine if differentiation occurs.
2. Print VSC images where inks appear to differentiate.



3. Perform Hyper-Spectral Imaging on ink samples. See VSC 6000 Software Manual (pages 54-1 through 54-4) for detailed procedural instructions.
4. Print chromaticity chart where applicable

7 Interpretation

- A. If no significant differences are observed during the initial and spectral examination of the inks, the examiner can conclude that the inks could have originated from the same source; however, other sources of ink with similar spectral responses cannot be eliminated as potential sources.
- B. If significant differences are observed during the initial and spectral examination of the inks, the examiner could conclude the inks did not originate from the same source.

8 Limitations

Sample size, condition of evidence, type of sample, multi-layered or mixed samples

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Test Methods for Forensic Writing Ink Comparison"

SWGDOC, "Standard for Writing Ink Identification"

VSC 6000 Video Spectral Comparator Software Manual



Revision History

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	09/01/2001	Original Issue
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01	09/16/2011	Major revision – Title, Sections 1 and 3-8 Minor revision – Sections 2 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-04-01 was formerly “Examination and Comparison of Typewritten Evidence” Content was previously in QD-02-01 and QD-02-02
03	01/10/2019	Minor Revision – Section 6 and 9



EXAMINATION OF GRAPHITE PENCIL EVIDENCE

1 Scope

Examination of graphite pencil marking on a document is a non-destructive microscopic examination that can determine several characteristics about the pencil used to mark the document.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

3 Related Documents

Image Enhancement Worksheet (LAB-QD-22)

Laboratory Information Sheet (LAB-08, LAB-08L)

4 Equipment, Materials, and Reagents

- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, hand-held magnifiers, etc.)
- A light source of sufficient intensity to allow fine detail to be distinguished

5 Standards and Controls

None

6 Procedure

6.1 If Questioned and Known are both pencil marks:

1. Examine pencil marks, both macroscopically and microscopically.
2. Record descriptive information and physical characteristics such as:
 - a) *Relative color*
 - b) *Thickness*
 - c) *Surface and/or texture features*
 - d) *Relative hardness*

6.2 If Questioned or Known is a pencil:

1. Make a mark with the pencil, on paper as similar as possible to the paper that has the questioned pencil mark.
2. Examine pencil marks, both macroscopically and microscopically.
3. Use these comparatively and document characteristics.

7 Interpretation

- A. If no significant differences in the physical properties of the questioned pencil and the known pencil are detected, further analyses are indicated before a conclusion can be determined.



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Questioned Documents
Subject: Examination of Graphite Pencil Evidence

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- B. If significant differences are observed in the physical properties of the questioned pencil mark and the known pencil mark, then the examiner would conclude the questioned pencil is not consistent with the known pencil.

8 Limitations

- A. Amount deposited is pressure dependent
- B. Availability of known paper and pencils
- C. Sample size, condition of evidence, type of sample (e.g. smears and transfer patterns), multi-layered or mixed samples

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"



Revision History

Version #	Effective Date	Brief Description of Change(s)
	09/01/2001	Original Issue
00	12/01/2002	Reissue; Minor Revision
01	09/16/2011	Major Revision – Sections 3-9 Minor Revision – Section 2 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-04-02 was formerly “Examination of Typewritten Carbon Ribbon Evidence” Content was previously in QD-02-04
03	01/10/2019	Minor Revision – Section 9



EXAMINATION AND COMPARISON OF HANDWRITING EVIDENCE

1 Scope

Examination and comparison of handwriting evidence is a technical skill by which a forensic document examiner can reach a determination concerning whether or not two or more handwritten items were written by the same person.

2 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

3 Forms

General/Handwriting Comparison Worksheet (LAB-QD-09)

Handwriting Comparison Worksheet (LAB-QD-20, LAB-QD-20L)

4 Equipment, Materials, and Reagents

- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, hand-held magnifiers, etc.)
- A light source of sufficient intensity to allow fine detail to be distinguished
- Pencil and/or pen

5 Standards and Controls

None

6 Procedure

6.1 Questioned Handwriting Evidence

1. Examine and record physical characteristics of questioned document evidence for type of writing instrument, latent writing impressions, original or reproduction, as applicable.
2. Examine and record handwriting characteristics.
 - a) *Fluidity and natural characteristics*
 - b) *Appearance of distortion and unnatural features*
 - c) *Type of writing*
 - d) *Identifying characteristics*
3. Assess frequency of occurrence of observed characteristics in population (i.e. individuality) and record as appropriate.
4. Assess range of variation and record as appropriate.
5. Assess simulation potential of questioned writing and record as appropriate.

6.2 Known Handwriting Evidence

1. Examine document for legal requirements and integrity (i.e., admitted to by suspect, witnessed, or business record).



2. Examine and record handwriting characteristics
 - a) *Fluidity and natural characteristics*
 - b) *Appearance of distortion and unnatural features*
 - c) *Type of writing*
 - d) *Identifying characteristics*
3. Assess frequency of occurrence of observed characteristics in population (i.e. individuality) and record as appropriate.
4. Assess range of variation and record as appropriate.
5. Determine if additional known handwriting evidence is necessary.

6.3 Comparison

1. Compare observed characteristics of questioned and known writing
 - a) *A '+' or '-' symbol may be used to demonstrate the similarity or dissimilarity between handwriting characteristics*
2. Determine the degree of agreement between questioned and known characteristics

7 Interpretation

- A. Assess the identifying/eliminating potential based on the degree of agreement of characteristics between questioned and known writing and weight applied to characteristics.
- B. Degree of agreement of characteristics between questioned and known writing and weight applied to characteristics is based upon education, training and experience of the analyst.
- C. Results of testing procedures relevant to Questioned Document Handwriting cases are interpretive and can vary as outlined in SWGDOC Standard Terminology for Expressing Conclusions of Forensic Document Examiners. Reports may be written in accordance with SWGDOC guidelines which express degrees of certainty. The verifying analyst must concur with the level of identification (inconclusive through identification) or elimination (inconclusive through elimination).
- D. The analyst can give one of the following opinions:
 1. **Identification:** This is the highest degree of confidence expressed in handwriting comparisons. The analyst has no reservations and is certain, based on evidence contained in handwriting, that the known writer actually wrote the writing in question.
 2. **Strong probability:** The evidence is very persuasive, yet some critical feature or quality is missing so that an identification is not in order. The analyst is virtually certain that the questioned and known writings were written by the same person.
 3. **Indications:** A body of writing has few features which are of significance for handwriting comparisons purposes, but those features are in agreement with another body of writing. Additional limiting wording may be added to clearly state that this opinion is far short of *identification*.



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4. **Inconclusive:** This is the zero point on the confidence scale. It is used when there are significant limiting factors or the evidence does not provide a basis for identification or elimination.
5. **Indications did not:** This carries the same confidence as *indications*, a very weak opinion. Additional limiting wording may be added to clearly state that this opinion is far short of *elimination*.
6. **Strong probability did not:** This carries the same confidence as *strong probability*. The analyst is virtually certain that the questioned and known writings were not written by the same person.
7. **Elimination:** This, like *identification*, is the highest degree of confidence expressed in handwriting comparisons. The analyst denotes no doubt and is certain that the questioned and known writings were not written by the same individual.

8 Limitations

- A. Inadequate and/or lack of comparable known writing (unnatural writing, limited comparable letter forms, lack of contemporaneousness, etc.)
- B. Physical quality of questioned and/or known writing (not original writing, smeared or faded writing, condition of evidence, etc.)
- C. High simulation potential of questioned writing

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard Terminology for Expressing Conclusions of Forensic Document Examiners"

SWGDOC, "Standard for Examination of Handwritten Items"



Revision History

Version #	Effective Date	Brief Description of Change(s)
	09/01/2001	Original Issue
00	12/01/2002	Reissue; Minor Revision
01	09/16/2011	Major revision – Title, Sections 3, 4, 5, 6, 8 and 9 Minor revision – Section 2 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-05-01 was formerly “Mechanical Printing Analysis” Content was previously in QD-03-01
03	01/10/2019	Minor Revision – Section 9



IDENTIFICATION AND ANALYSIS OF CONVENTIONAL AND DIGITAL PRINT PROCESSES

1 Scope

The following examination allows the examiner to determine the print process of the submitted documents. The examiner may also determine whether or not two or more documents were produced by the same printing unit. This examination is commonly used in authentication of documents.

2 Related Documents

Image Enhancement Worksheet (LAB-QD-22)

Laboratory Information Sheet (LAB-08/LAB-08L)

3 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

4 Equipment, Materials, and Reagents

- Video Spectral Comparator (VSC)
- MiScope
- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, hand-held magnifiers, etc.)
- A light source of sufficient intensity to allow fine detail to be distinguished

5 Standards, Controls, and Calibration

Reference the print process standards as applicable.

6 Procedure

6.1 Macroscopically and microscopically examine the questioned and/or known documents.

- A. Relate the observed characteristics to a Conventional or Digital Print Process which may include, but are not limited to the following:
 1. Conventional Printing: Screen Printing, Letterpress, Lithography, and Gravure
 2. Digital Printing: electrography, Inkjet, and Thermography
- B. Note class and individual characteristics of the questioned and/or known documents. This may include, but is not limited to the following:
 1. Paper type (coated or uncoated)
 2. Paper size
 3. Paper feed mechanism
 4. Copy enlargement or compression
 5. Print defects
- C. Compare the characteristics of the questioned and known documents.



6.2 Examine the physical characteristics of the submitted printing unit.

- A. Note the following, if applicable:
 - 1. Brand
 - 2. Model
 - 3. Serial Number
- B. If the printing unit is functional, prepare known exemplars labeled with case number, initials, and date.
- C. Note class and individual characteristics of the known exemplars.
- D. Compare the known exemplars with the questioned documents.

7 Interpretation

7.1 Print Process Identification

The examiner determines the type(s) of print process used to produce the document based on macroscopic characteristics, microscopic characteristics, medium, and/or process of medium.

7.2 Comparison of Questioned and Known Documents

- A. The degree of agreement between the questioned and known characteristics and weight applied to the characteristics is at the discretion of the examiner based upon education, training and experience.
- B. If no significant differences are detected in the questioned and known documents, the examiner may conclude that the questioned and known documents could have been produced by the same printing unit.
- C. If sufficient identifying printing characteristics are present in the questioned and known documents, then the examiner may conclude that the questioned and known documents were produced by the same printing unit.
- D. If significant differences are observed in the printing characteristics of the questioned and known documents, then the examiner may conclude that the questioned and known documents may not have been produced by the same printing unit.

7.3 Comparison of Questioned Documents with Known Exemplars from Printing Unit

- A. The degree of agreement between the questioned and known characteristics and weight applied to the characteristics is at the discretion of the examiner based upon education, training and experience.
- B. If no significant differences are detected in the questioned document and the known exemplars, the examiner may conclude that the questioned document could have been produced by the known printing unit.
- C. If sufficient identifying printing characteristics are present in the questioned document and known exemplars, then the examiner may conclude that the questioned document was produced by the known printing unit.
- D. If significant differences are observed in the printing characteristics of the questioned document and the known exemplars, then the examiner may conclude that the questioned document may not have been produced by the known printing unit.



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Questioned Documents

Subject: Identification and Analysis of Conventional/Digital Print Processes

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8 Limitations

- A. Condition of the submitted evidence
- B. Inadequate known documents
- C. Maintenance performed on the printing unit or extended use of the printing unit can impact printing defects

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Examination of Documents Produced with Liquid Ink Jet Technology"

SWGDOC, "Standard for Examination of Documents Produced with Toner Technology"

ASTM F1857, "Standard Terminology Relating to Ink Jet Printers and Images Made Therefrom"

ASTM F1623, "Standard Terminology Relating to Thermal Imaging Products"

ASTM F1457, "Standard Terminology Relating to Laser Printers"

ASTM F909, "Standard Terminology Relating to Printers"

VSC 6000 Video Spectral Comparator Software Manual

Zarbeco MiScope User Manual



Standard Operating Procedures

DRN: QD-06-01

Questioned Documents

Subject: Identification and Analysis of Conventional/Digital Print Processes

Revision History

Version #	Effective Date	Brief Description of Change(s)
	09/01/2001	Original Issue
00	12/01/2002	Reissue; Minor Revision
01	06/12/2007	Minor Revision: Form title: "Photocopier Comparison Analysis" Worksheet
02	09/16/2011	Major Revision – Title, Sections 3 - 9 Minor Revision – Section 2 Advisory Board recommendations
03	12/08/2017	Major Revision – Title and content QD-06-01 was formerly "Photocopier Analysis" Content was previously in QD-05-01
04	01/10/2019	Minor Revision – Section 9



EXAMINATION OF MISCELLANEOUS QUESTIONED DOCUMENT EVIDENCE

1 Scope

Any numerous other aspects of document examination some of which may be apparent to an examiner only upon examination of the evidence in question. Examples include: rubber stamps, seals, checkwriters, document preparation and sequence determination, and other various document examinations.

2 Related Documents

ESDA Worksheet (LAB-QD-21)

Image Enhancement Worksheet (LAB-QD-22)

Laboratory Information Sheet (LAB-08/LAB-08L)

3 Safety

Wear personal protective equipment as applicable. This includes, but is not limited to gloves, lab coat, and eye protection.

Use biohazard precautions, if applicable.

4 Equipment, Materials, and Reagents

- An optical instrument capable of sufficient magnification to allow fine detail to be distinguished (stereomicroscope, hand-held magnifiers, etc.)
- A light source of sufficient intensity to allow fine detail to be distinguished
- Video Spectral Comparator (VSC)
- Electrostatic Detection Apparatus (ESDA)
- MiScope
- Computer
- Image capture device (scanner, digital camera, etc.)
- Computer imaging software (i.e. Adobe Photoshop)

5 Standards, Controls, and Calibration

Positive ESDA control sheet

6 Procedure

Use of any other standard operating procedure(s) to determine appropriate origin and/or authenticity. Procedure for conducting any of these examinations will be at the discretion of the examiner based upon education, training and experience.

6.1 Rubber Stamp Examination

- A. Perform microscopic/macroscopic examination to identify class, individual, or random features of rubber stamp
- B. Examine rubber stamp for defects
- C. Classification of defects found on/in rubber stamp



- D. Observation of characteristics of stamp (including but not limited to):
 - 1. Absorption of ink into paper fibers
 - 2. Squeegee effect or feathering of ink
 - 3. Saturation of ink
 - 4. Lack of impression or indentation
 - 5. Absence of debris around stamp image
- E. Comparison
 - 1. Stamp numerous known sources on a similar material as the questioned (as closely as possible try to create the questioned document)
 - 2. Overlay images of the questioned and known stamp to determine if they are in agreement or conduct a side by side examination of the questioned and known stamp

6.2 Checkwriter Examination

- A. Perform microscopic/macroscopic examination to identify class or individual features of checkwriter
- B. Determination of manufacturer
- C. Determination of model
- D. Examine checkwriter for defects and/or alterations
- E. Obtain standards for comparison if checkwriter is not available
- F. Comparison

6.3 Seal Examination

- A. Perform microscopic/macroscopic examination of seal to identify class or individual features
- B. Determination of the engraving process of the seal can be made by the examination of the die and counter used to produce seal impression
- C. Comparison
 - 1. Examination of the seal on the reverse side of the document can reveal details more clearly
 - 2. Create comparison impressions and evaluate the authenticity of the document in question

6.4 Document Preparation and Sequence Determination

- A. Perform microscopic/macroscopic examination of paper to identify class or individual features
- B. Determine if there is any evidence of documents being bound, including but not limited to; staples, folds or creases.
- C. Determine if there is any evidence of perforations or punched holes
- D. If evidence is a multi-page document, determine if there have been any additions or substitutions



6.5 Other Document Examinations

- A. Perform microscopic/macroscopic examination of evidence to identify class or individual features
- B. Any various techniques utilizing previously discussed forensic document examinations

7 Interpretation

The detection and/or visualization of miscellaneous examinations are accomplished through observation by the examiner. Reports may include one or more of the following types of conclusion(s) and other finding(s):

- A. Whether characteristics were observed
- B. Interpretation of information
- C. Method of document preparation
- D. Images depicting information recovered

8 Limitations

- A. Condition of evidence
- B. Necessary authorization of submitting officer to perform some examinations
- C. Improper handling of evidence

9 Literature and Supporting Documentation

SWGDOC, "Standard for Scope of Work of Forensic Document Examiners"

SWGDOC, "Standard for Non-destructive Examination of Paper"

SWGDOC, "Standard for Use of Image Capture and Storage Technology in Forensic Document Examination"

SWGDOC, "Standard for Examination of Rubber Stamp Impressions"

SWGDOC, "Standard for Examination of Dry Seal Impressions"

SWGDOC, "Standard for Examination of Mechanical Checkwriter Impressions"

SWGDOC, "Standard for Preservation of Liquid Soaked Documents"

VSC 6000 Video Spectral Comparator Software Manual

Zarbeco MiScope User Manual



Revision History

Version #	Effective Date	Brief Description of Change(s)
	09/01/2001	Original Issue
00	12/01/2002	Reissue; Minor Revision
01	09/16/2011	Major revision – Sections 3 - 9 Advisory Board recommendations
02	12/08/2017	Major Revision – Title and content QD-07-01 was formerly “Charred Documents”
03	01/10/2019	Major Revision – Section 9



TEXAS DEPARTMENT OF PUBLIC SAFETY
CRIME LABORATORY

Handwriting Comparison Worksheet

LAB-QD-20L Rev.02 (04/2014) p.1 Issued by: QAC

Lab Case # _____

Examiner _____

Date Started _____

Date Completed _____

Page ____ of ____

Verified by _____

Date Verified _____

Subject(s) _____

Index to Handwriting Characteristics

- 1) **ANG** - angularity 2) **BLC** – baseline conformation 3) **B/P** – ballpoint pen 4) **B/S** – beginning stroke 5) **C/S** – connecting stroke 6) **D/S** – drag stroke 7) **DLB** – deliberation 8) **EMB** – embellishment
- 9) **E/S** – extraneous stroke 10) **H/P** – height proportion 11) **H/Sp** – horizontal spacing 12) **L/F** – letter form 13) **Lp** – loop 14) **L/Q** – line quality 15) **N.B/P** – non-ballpoint 16) **O/CR** – open/closed retrace
- 17) **O.H/P** – overall height proportion 18) **P/L** – penlift 19) **PLMT** – placement 20) **PMS**-penmanship 21) **ROT** – rotation 22) **SL** – slant 23) **S/D** – stroke direction 24) **T/S** – terminal stroke
- 25) **WIF** – writing instrument failure 26) **X** – intersection 27) **UC/LC** – combination 28) **Tic** 29) **LO** – Letter/letter portion omission 30) **LR** – Letter/letter portion redundancy 31) **FV** – form variation 32) **PRS** - pressure

Item	Character	Questioned	Q Source	Known	K Source



