Questioned Documents Methods Manual

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1 Introduction

1.1 Safety Considerations

Standard laboratory safety practices apply to all methods described in this manual (see the Laboratory Safety Manual). Additional safety considerations are described in individual methods, as necessary.

1.2 Instrumentation

No critical instrumentation is required, unless specified in the method.

1.3 Minimum Standards and Controls

The following general requirements apply. Additional method specific standards and controls are included in the method sections.

1.3.1 Documentation

Examination documentation and laboratory reports will satisfy the requirements of the BCI Laboratory quality assurance program and the ANAB accreditation program.

Appropriate worksheets will be utilized in examination documentation.

Scanned images, digital images, and work product (developed indented writing, VSC images, etc.) will be stored in LIMS. These will include all the identified writing in average cases or a representative sample in voluminous cases; as well as a representative sample of the known writing used as a basis for the identification to allow for review.

1.3.2 Verification

Verification shall be defined as an independent evaluation of a definitive conclusion by an individual who is currently authorized to perform the testing. Documentation shall be in the form of the verifying examiner's initials, date and the conclusion drawn (i.e. source identification, source exclusion) in the examination documentation.

1.3.2.1 Disputed verifications

Disputed verifications will follow a planned action as established by the laboratory Quality Assurance program and a record of the discrepancy will be recorded

1.3.3 Reporting

All Questioned Document section reports shall meet content and format requirements for reporting of results as specified by BCI laboratory policy and ANAB accreditation standards.

When conclusions are made, the results must be clearly communicated. When no definitive conclusions can be reached, the reason(s) must be clearly communicated. Examples of situations where inconclusive results may be encountered include, but are not limited to:

- Documents evidence of insufficient quality- i.e. non-original documents with poor image detail or hand writing samples which are not comparable
- Documents evidence of insufficient quantity- i.e. questioned writing with limited individual characteristics or hand writing samples which do *not* display the natural variation of the writer
- Non-contemporaneous samples

Comparative conclusions must be properly qualified. Significance of the conclusion will be expressed on the following basis:

1	Source Identification	The observations provide extremely strong support for the proposition that the evidence originated from the same source and the likelihood for the proposition that the evidence arose from a different source is so remote as to be considered a practical impossibility.
2	Support for Same Source	The observations provide more support for the proposition that the evidence originated from the same source rather than different sources; however, there is insufficient support for a Source Identification. The degree of support may range from limited to strong or similar descriptors of the degree of support. Any use of this conclusion shall include a statement of the factor(s) limiting a stronger conclusion.
3	Inconclusive	The observations do not provide a sufficient degree of support for one proposition over the other. Any use of this conclusion shall include a statement of the factor(s) limiting a stronger conclusion.
4	Support for Different Source	

		The observations provide more support for the proposition that the evidence originated from different sources rather than the same source; however, there is insufficient support for a Source Exclusion. The degree of support may range from limited to strong or similar descriptors of the degree of support. Any use of this conclusion shall include a statement of the factor(s) limiting a stronger conclusion.
5	Source Exclusion	The observations provide extremely strong support for the proposition that the evidence originated from a different source and the likelihood for the proposition that the evidence arose from the same source is so remote as to be considered a practical impossibility; or the evidence exhibits fundamentally different characteristics

1.4 References

Applicable references are included at the end of individual sections in this manual. Reference inclusion does not necessarily imply endorsement by the Ohio BCI Laboratory.

Additional reference materials and articles related to the procedures covered in this manual may also be found in the BCI QD reference library. The reference library also includes issues from the Journal of Forensic Science and the ASQDE Journal.

ASQDE National Library and the FBI Library also have extensive reference collections that can be utilized. Listings of materials available for use can be found on their respective web-sites. An extensive bibliography is available.

2 Handwriting and Hand Printing

2.1 Introduction

The basis for all handwriting and hand printing identifications is two-fold:

- No two people write exactly alike. We know this to be true because handwriting is made up of mental, physical, and emotional components which could never be the same between any two people.
- Handwriting is made up of unconscious habit patterns that remain constant within one person's writing for extended periods of time. These habits establish the skill level of the writer and are necessary to allow an individual to write freely and fluently without the conscious, laborious effort required for grade school students who are just learning to write. These habits, which are important to the writer for fluency, are important to the document examiner because if the set of patterns present is sufficient and significant in nature, the uniqueness to one and only one person can be established. It should be noted that a writer cannot exceed his or her skill level; however, one can intentionally write with less skill.

2.2 Instrumentation

A Hand Lens, Microscopes, UV & IR inspection devices are required to complete some examinations.

2.3 Minimum Standards and Controls

2.3.1 Standards

- Known writing must be available in order to identify the writer of a document.
- Examination must consist of a visual comparison of questioned and known samples in order to determine authorship. However, preliminary examinations of questioned documents with no known writings are acceptable in order to determine any of the following: internal consistency between the questioned documents, natural/unnatural writing, if the questioned writing is limited in nature, and what kind of sample would be best for comparative purposes. Multiple questioned items may also be compared to determine if they originated from the same source.
- Other possible examinations may include:
  - Ultraviolet
  - Infrared
  - Infrared luminescence
  - ESDA
- Photographs, photocopies, facsimiles, data stored images, carbon copies and *print outs of* scanned images, are acceptable. However, the best results are

obtained if their sharpness, contrast, and accurate reproduction of detail permit an adequate comparison. Poor quality photocopies and out-of-focus or out-of-scale photographs are examples that are inadequate for conclusive opinions. Electronic signatures are not acceptable known handwriting standards.

- All evidence with submissions to multiple sections that may alter of destroy the integrity of the original evidence should be submitted to the Questioned Documents section first in order to generate a digital image of the item. Items which need to be processed sterile will require the coordination of each assigned section to establish a testing approach for each case.
- A digital image of all evidence with submissions to multiple sections that will alter or destroy the integrity of the original evidence will be created and stored in LIMS. A copy of the image will be sent back to the submitting agency upon request
- Additional samples or items will be requested when appropriate.

2.3.2 Controls

- Known handwriting standards must be checked for internal consistency. If it is suspected that the "known" samples are not all by one person this should be reported to the submitting agency. The suspect can be used for comparison by referring to the writer of a specific section of the "known" samples; i.e. "the writer of the signature on K1".
- Handwriting from the victim(s) should be examined in forgery cases, but this cannot be required because it is beyond the examiner's power to obtain the samples. Handwriting from the victim (s) must be examined for a definite finding of a "simulated forgery".
- The examiner's internal control should be to examine a case on more than one day (or at more than one sitting in one day) to resolve any doubts.
- The questioned writing will be evaluated first to determine if the writing is natural and contains sufficient individual characteristics for comparison.

2.4 Procedure

2.4.1 Direct Comparison

A visual examination of the questioned and/or known writing samples to determine the quality and quantity of the samples will be performed followed by a side-by-side comparison of the unique individual handwriting characteristics contained in the questioned and known writing. These individual characteristics include subconscious handwriting features such as size, spatial relationships, speed, slant, beginning and ending strokes, connecting strokes, line quality, etc. Magnification, if necessary, may be used on cases that include original exhibits. A ~~fingerprint magnifier~~ *hand lens* and stereomicroscope should be utilized. This examination will determine whether

additional methods should be employed. These additional methods could consist of specialized lighting techniques such as ultraviolet or infrared, or ESDA processing.

2.4.2 Special Considerations

Special considerations should be taken during the examination of the following types of writing: simulations, tracings, and disguised writing.

2.4.2.1 Simulations

A simulation is an imitation of a genuine writing; a copying of writing; an attempt to make one's writing look like that of another.
In order to forge a writing with complete success the forger must recognize the significant characteristics of the other person, have the skill to reproduce these characteristics and at the same time eliminate his/her own handwriting characteristics.

Detection factors:

- Poor line quality and rhythm: whereas normal writing is generally freely written, the simulated writing can be characterized by hesitation and uncertainty of movement.
- Beginning and ending strokes: Because the forger is attempting to hide his own characteristics when he simulated another's writing, and is therefore writing slowly and carefully, the beginning and ending strokes are often blunt or thickened rather than tapered.
- Retouching: Because the forger is not totally familiar with the writing, retouching may be seen where he has become unsure of the simulation and has gone back to retouch a mistake and make it look better.
- Tremor: Since the forger cannot produce a simulation quickly, signs of tremor or shakiness in the formation of letters may be apparent.
- Pen lifts: During the simulation of a signature, etc., the forger may find it necessary to stop, thus lifting the writing instrument. While some genuine writing may also display pen lifts, the simulated writing pen lifts are rarely comparable to the originals.

Tracings

A tracing is a drawing of writing. Methods to produce tracings include:

- Transmitted light - This method is accomplished by holding the document bearing the genuine signature to a source of transmitted light, i.e. window. The document which is to bear the tracing is placed on top of the genuine signature and the outline of the genuine signature is traced.
- Projection or overlay - A genuine signature is placed over the document where the forgery is to appear and the signature is traced over heavily with a sharp instrument so that a pressure furrow or groove appears on the **bottom** sheet. The furrow is then drawn in with a writing instrument.

- Carbon paper - Carbon paper may be used in between the document bearing the signature to be traced and the other document. After tracing, ink may be used to cover carbon paper traces.
- Tracing paper - Tracing paper can be placed over the general signature and pressed closely so that the signature shows through clearly. The signature is copied onto the tracing paper with pencil or ink. The back of the tracing paper is given a coat of graphite (i.e., soft pencil). The tracing paper is placed over the document which is to bear the signature and is once more traced and inked in. Any graphite tracings may be erased.

Detection factors discussed in simulation forgeries apply to tracings to some extent. Refer to the detection factors to detect simulations above.

- Traces of carbon paper or graphite may be seen.
- In the case of transmitted light tracings, the indentations beneath the signature may be detected.
- Paper fibers may be disturbed where the forger has attempted to erase graphite guidelines.

Techniques in the detection of tracings include:

- Microscopic examination – traces of graphite not seen with the naked eye.
- Oblique lighting – detects indentations left by transmitted light or overlay tracing.
- Infrared light sources – where carbon paper or graphite deposits are detected under ink, the final ink tracing may "drop out" using an infrared light source so that the original graphite, etc., tracing may be seen in its entirety.

Disguised Writing

- Disguised writing is a deliberate departure from one's normal handwriting habits.
- Disguise can be seen in questioned and/or known writing.
- When disguise is suspected, one must be careful because although the writing may appear distorted, it may not be deliberate.
- In cases where there are small amounts of writing, i.e., questioned entries on checks, the disguise may be consistent. However, it is difficult to maintain a disguise on extended writing and normal handwriting characteristics often begin to appear.

Methods of disguise include:

- Slope or slant
- Alternative capital forms
- Modified or alternative letter forms or design: Block letters, ruler writing, etc.

- Awkward handwriting
- Alteration in letter size
- Changes in letter spacing

2.5 References

1. Hilton, Ordway, Scientific Examination of Questioned Documents, Elsevier: New York, New York, 1982; pp. 14-31.
2. Harrison, Wilson R., Suspect Documents, Nelson-Hall: Chicago, IL, 1981; pp. 28-64.
3. Conway, James, Evidential Documents, Bannerstone House, IL, 1978; pp. 31-73.
4. Osborn, Albert S., Questioned Documents, Patterson Smith, Montclair: New Jersey, 1978, 2nd Edition.
5. Osborn, Albert S., Questioned Document Problems, Patterson Smith, Montclair: New Jersey, 1991, 2nd Edition.
6. Ellen, David, Scientific Examination of Documents, CRC Press – Taylor and Francis, Boca Raton, FL, 2006, 3rd Edition.

3 Decipherments, Alterations and Obliterations

3.1 Introduction

The term decipherment in this context refers to determining the original content of a document which has been altered, obliterated, erased or otherwise changed. Both destructive and nondestructive tests are available. The submitting agency should be contacted in many cases to provide guidance on the exact nature of the required decipherment. Procedural strategy will depend on the type of request.

3.2 Related Procedures

Stabilization and Preservation

3.3 Instrumentation

A Hand Lens, Microscopes, UV & IR inspection devices are required to complete some of the examinations.

3.4 Minimum Standards and Controls

3.4.1 Standards

Any and all of the following techniques may be employed:

- Oblique light
- Transmitted light
- Ultraviolet
- Infrared
- Infrared Luminescence
- ~~Digital photography~~
- ~~High intensity light source~~

All of the above should be attempted before negative results can be reported. All of the above should be attempted before any destructive testing is attempted. Destructive tests include physical abrasion and the use of solvents.

3.4.2 Controls

Images generated during analysis will be stored as notes in LIMS and can be sent back to the submitting agency as a sub-item of the parent item if the images are of value to the investigating agency. The images will be stored in the LIMS image vault as a permanent record for that case.

3.5 Procedure

Standard non-destructive techniques will be exhausted before employing destructive tests. The examiner can discontinue the examination at any step which produces

satisfactory results. A brief explanation of the specialized lighting techniques which are normally used follows.

- Ultraviolet - This consists of examinations by UV of the document under both long (366nm) and short (254nm) wavelengths. Ultraviolet examination can reveal alterations and inconsistencies on a document by the fluorescence or non-fluorescence of inks or background chemicals in the paper. It can aid in decipherment problems and counterfeiting cases as well.
- Infrared and Infrared Luminescence - This can be divided into two techniques: reflected and infrared luminescence. Use of an image converter allows for the examination of documents by infrared illumination even though the naked eye cannot see in the infrared portions of the electromagnetic spectrum. Infrared examinations are most useful in discriminating between different inks and dyes. Two inks which appear the same under normal illumination may appear entirely different when the infrared radiation coming from the surface is visualized.

3.5.1 Standard techniques

Non-destructive techniques
Visual examination:

- Magnification when appropriate
- Lighting techniques
  - Oblique
  - Transmitted
- Ultra-Violet
- Infra-Red
  - Reflected
  - Luminescence
- Color filters as appropriate

Standard optional techniques:

- ESDA - Many obliterating materials render ESDA processing useless. The examiner needs to use ESDA processing only when it is appropriate. In erasure cases, ESDA may clarify or highlight the area erased even if it does not reveal the contents of the erasure.
- Physical - Liquids which approximate the refractive index of paper fibers may be added to the back of a document to make the paper transparent (Examples petroleum ether, xylene substitute, water). Spot tests must be performed on a non-critical area of the document to ensure the liquid is non-destructive. Follow the safety requirements of the liquid chosen.

Liquid nitrogen enhances IR luminescence, makes paper more transparent, and neutralizes the adhesive bond of glues.

NOTE – Removal of a layer of correction material (such as **White**-Out®) by physical means which can be accomplished without damage to the underlying document and writing will not be considered **a** destructive test unless there is writing or other evidence on top of the correction material.

Destructive techniques
Typically these consist of the application of chemical solvents to obliterated writing in an attempt to dissolve the obliterating material while leaving the original entry in place. "Destructive" therefore applies to the present condition of the document. Since the document has already been altered by the obliterating material, this type of processing can be thought of as restorative rather than destructive. However, care and judgment must be exercised to ensure that anything applied to the document does minimal harm to the original. If there is any doubt, consult with the attorney who is handling the case. The probative value of the evidence should determine the processing steps.

Dequenching of luminescence frequently occurs as a result of the application of solvents. If the obliterating material is not removed by the first solvent application, the document should be checked for UV and IR luminescence before continuing with additional solvents. This should be repeated between subsequent steps.

Recording the exhibit between steps will ensure a record of the condition of the document at each stage.

3.5.2 Non-standard techniques

Non-standard documents or obliterating materials may require non-standard investigation.
Any non-destructive examination may be utilized at any time based upon examiner discretion.

Before utilizing any unconventional destructive techniques, consider the following hierarchy.

Procedure for hypothetical unknown:
(Never move down the list without just cause)

1. Preserve the exhibit as submitted.
2. Preserve the evidence on the exhibit.
3. Preserve the evidence of greatest probative value.
4. Risk the evidence only as a last resort and with the informed consent of the submitting agency.

3.6 References

1. Hilton, Ordway, Scientific Examination of Questioned Documents, Elsevier: New York, New York, 1982; pp. 95-134.
2. Osborn, Albert S., Questioned Documents, Patterson Smith, Montclair: New Jersey, 1978, 2nd Edition.
3. Harrison, Wilson R., Suspect Documents, Nelson-Hall: Chicago, Il., 1981; pp. 110-114.
4. Waggoner, Lee and Spradlin, William, “Obliterated Writing – An Unconventional Approach”, Journal of Forensic Sciences, 1983, 28 (3), pgs. 686-691.
5. Waggoner, Lee, “Examination of Correction Fluid Obliterations”, Journal of Forensic Sciences, 1987, 32(2), pgs.539-542
6. Shmitz, P.L., “Alterations, Erasures, and Authenticity of Documents”, Presentation at Georgetown University, Washington, D.C. 1974

4 Recovering Indented Writing

4.1 Introduction

Preliminary examination may be conducted with oblique lighting; however, ESDA (Electrostatic Detection Apparatus) is the standard procedure because it is more sensitive to most impressions than visual examinations.

4.2 Related Procedures

Latent fingerprint processing

4.3 Safety Considerations

The ESDA contains a high voltage transformer. Standard precautions for working around high voltage must be observed. Consult the equipment manual before attempting to service the equipment. To date, we are unaware of any reports of specific risks associated with ESDA.

4.4 Preparations

The powerful static charge developed by ESDA will lift particles of pencil writing off the page lowering the contrast. This is ordinarily minor, but can on occasion be significant. A photocopy of documents written in pencil will be made before processing.

4.5 Instrumentation

ESDA – the equipment has no adjustments or calibrations – it is either functional or non-functional. To verify that the ESDA is functional prior to using the ESDA for casework a test sheet (control document) will be created. This test sheet will contain the case number, date, and the examiners initials. The test sheet will be placed on the ESDA and the indented writing developed to determine the ESDA is functioning properly. The developed indented writing will be preserved with an adhesive plastic film. A record of the successful test page development will be recorded in the case record. An image of the developed indented writing will be preserved in LIMS.

4.6 Minimum Standards and Controls

4.6.1 Standards

- ESDA processing is the standard.
- Oblique light and photography techniques are optional.

4.6.2 Controls

In the case of positive results, copies of ESDA sheets will be maintained as a permanent record in LIMS. The developed indented writing of evidential value will be sent back to the submitting agency. Negative results do not have to be maintained.

4.6.3 Miscellaneous

Examiners should attempt to recover indented writing from anonymous letters and similar documents where a source determination is needed whether or not this examination is requested by the submitting agency.

Documents which have been wet are not suitable for ESDA development. *Documents which are excessively dirty or wrinkled are generally not suitable for ESDA development.* Examiner judgment will be exercised when exhibits appear to be unsuitable for processing.

ESDA examination will be considered at the submitting agency's request on items such as envelopes or greeting cards where the uneven surfaces or excessive thickness make results unlikely. ESDA processing is not required on standard Document Section cases such as check forgeries since the source is not in question. Examiners must use judgment to determine if there are unusual aspects to any particular case which indicate ESDA processing.

NOTE- Solvents used for latent print development *or to develop a DNA profile* may prevent the development of ESDA images.

ESDA processing, when possible, should be done before fingerprint processing. Caution: there are some reports that excessive ESDA processing has a detrimental effect on the development of fingerprints.

Caution: Gloves should be worn when processing a document as the ESDA will develop fresh fingerprints.

4.7 Procedure

The operation manual provides a detailed guide to operating the equipment. The following is a brief description of the operations involved in a routine document examination. Run a control document using the following procedures.

1. Place the document on the vacuum bed of the ESDA².
2. Turn the vacuum on.
3. Cover the document with the plastic film, smoothing out all the creases.
4. Charge the surface using the corona unit.
5. Develop the *indented writing* ~~ESDA~~ by pouring graphite pellets over the plastic with the bed tilted slightly or by gently wiping the plastic with a toner pad. The aerosol hood may be used to apply toner spray to the plastic film with the ESDA².
6. If the control is positive preserve the developed image with adhesive plastic and proceed with processing the evidence items. If the control is negative, place the document in the humidity chamber containing warm tap water for 1-2 minutes and

then retest for indented writing. If the control is still negative, refer to the ESDA² manuals for maintenance and troubleshooting.

7. Place the questioned document on the vacuum bed of the ESDA² and repeat steps 3 thru 6.
8. If an image develops, cover the image with the adhesive plastic film and preserve an image of the developed indented writing in LIMS.
9. If no image develops, humidify the document.
10. Repeat steps 3 thru 6, and if an image develops cover the image with the adhesive plastic film and preserve an image of the developed indented writing in LIMS.
11. If no image develops, the procedure may be repeated as necessary.

4.8 References

1. Ellen, D.M., Foster, D.J. and Morantz, D.J., "The use of Electrostatic Imaging in the Detection of Indented Impressions", Forensic Science International, 1980, 15, 53-60.
2. Noblett, Michael and James, Elizabeth, "Optimum Conditions for Examination of Documents Using an Electrostatic Detection Apparatus (ESDA) Device to Visualize Indented Writings", Journal of Forensic Sciences, 28(3), July 1983, 697-712.
3. ESDA² Operations Manual.

5 Stabilization and Preservation

5.1 Introduction

There are a number of types of unstable evidential documents which must be preserved prior to any other procedures. These would include items that are charred, aged, water soaked, buried, laundered, etc. Most are so rare that they will be considered non-standard. Consult the reference section for information concerning procedures for non-standard examinations.

Charred document cases are uncommon, but submitted with more frequency than the other types. Therefore, a standard procedure will be set forth for them.

5.2 Related Procedures:

Decipherment

5.3 Minimum Standards and Controls

5.3.1 Standards

To prevent or retard deterioration by treatment of the document

5.3.2 Controls

Environmental conditions should be taken into account especially with regards to light, temperature, and humidity. When possible, documents that are fragile should be stored in the dark at low temperatures.

5.4 Procedure

Polyester encapsulation is one procedure for burned or delicate documents. It supports the damaged documents between two pieces of polyester which are then sealed around the edges. An article written by Special Agent Mary E. Switaj of the F.B.I. outlining such a procedure can be found in the BCI reference library. Packing with cotton is another method to protect damaged documents.

5.5 References

1. Hilton, Ordway, Scientific Examination of Questioned Documents, Elsevier: New York, New York, 1982.
2. Kelly, Jan Seaman, Lindblom, Brian, Scientific Examination of Questioned Documents, CRC Press – Taylor and Francis, Boca Raton, FL, 2006.

6 Counterfeit or Fraudulent Documents

6.1 Introduction

This method describes examination techniques designed to determine genuineness or source. This method also covers genuine documents which have been altered to produce fraudulent documents.

6.2 Related Procedures

Paper and Ink analysis
Identification/Comparison of Printing Processes

6.3 Instrumentation

A Hand Lens, Microscopes, UV & IR inspection devices are required to complete some of the examinations.

6.4 Minimum Standards and Controls

6.4.1 Standards

- ~~Microscopic examination~~ *Magnification* required.
- Genuine documents, a reference standard, or reference documents with a detailed description are of value for comparison purposes.

6.4.2 Controls

An inter-comparison of standards provides a control.

6.5 Procedure

A catalog of class characteristics can be produced until differences are discovered which establish an item as counterfeit. If the document is counterfeit, the examiner may attempt to determine the production process of the questioned document. Any or all of the common inspection techniques may be employed; see Counterfeiting Table on next page. Depending upon the significance of the matching characteristics, a lack of differences may or may not establish genuineness through inspection, the analytical techniques discussed in Ink and Paper analysis may need to be employed. Because analytical techniques are typically destructive, approval of the submitting agency should be obtained before proceeding.

6.5.1 Counterfeit Identification Table

The following is a list of printing process characteristics for high quality documents such as stocks and bonds and the common techniques used to counterfeit such documents.

Area of Document	Genuine	Litho Reproduction	Color Reproduction
Black Vignette	Fine sharp detail. No glass. No colors other than black.	Muddied, washed out and flat looking. Lacks line detail. Fine lines are lost and heavy lines blend into one another.	Lack fine detail. Glossy. Slight blue / green coloration in many areas. Closely spaced lines mottled.
Border Tint	Sharp and distinct lines of one color.	Lacks sharpness. Color is dull – lacks the crispness of a genuine.	Areas where fine lines meet are fuzzy and usually contain different colors. Glossy.
Ruled Lines Such As Denominational, Underlay Tints	Uniform in color and intensity.	Ruled lines usually appear broken or not uniformly spaced.	Non-uniform in appearance with secondary colors.
Script	Uniformly black and usually has coarse, raised feel.	Does not have a raised feel.	Thin sections of lines appear as blue or green. Has a slick, raised feel.
Large Solid Areas (Title)	Uniform in color and intensity. No gloss. Raised, coarse feel.	Color uniform. No raised feel.	One edge is usually lighter in appearance with secondary color. Glossy. Raised slick feel.
Title Shading	Distinct black, regularly spaced lines.	Usually has broken lines and lacks definition.	Indistinct lines blended together. Usually blue or green in color.
CUSIP Number	No tactile feel.	No tactile feel.	Has a slick, tactile feel.
Paper	Cream colored smooth surface on face. Rough surface on back.	Variable color, both sides will have the same smoothness.	Variable color. Both sides have same surface smoothness.
Planchettes	Numerous, random placement of four colors.	May have none. If present usually just blue & pink (occasionally yellow). Fibers have never been seen in the blue or orchid planchette simulations. Identical planchette positions on more than one document.	Occasional yellow or blue. Pink is rare & orchid never.
Most Distinguishing Feature	Sharp, clear vignette.	Poor quality or vignette.	Poor quality of vignette. Secondary coloring.
Xerox Rub Test Black Corporate Title	When rubbed with white paper a black smudge is obtained.	When rubbed with white paper a black smudge is obtained.	When rubbed with white paper a blue green smudge is usually obtained.
Intaglio Latent Image	Hidden when viewed face on. Exposed when held up and viewed obliquely.	Cannot be seen.	Cannot be seen.

6.6 References

1. BCI Questioned Document Training Manual.
2. Hilton, Ordway, Scientific Examination of Questioned Documents, Elsevier, New York, New York, 1982.
3. Osborn, Albert S., Questioned Documents, Patterson Smith, Montclair, New Jersey, 1978.
4. James, E.L., “The Classification of Office Copy Machines from Physical Characteristics”, Journal of Forensic Sciences, 32(5), 1987 32(5) 1293-1304.
5. New Zealand Police Printing Process Manual.
6. “Pocket Pal”, International Paper Company, Memphis, TN, 2003,19th Edition.
7. Tweedy, Janis, “Class Characteristics of Counterfeit Protection System Codes of Color Laser Copiers” presented at 2001 MAFS Meeting.
8. *Guides for the United States, Canada, and International I.D Checking are available for reference and are updated on a regular basis.

7 Identification/Comparison of Printing Processes

7.1 Introduction

This method is to be used for the comparison and/or identification or printing processes and can be utilized for the examination of counterfeit or altered documents. As technology advances and documents may now be produced by several processes, caution should be taken in the positive identification of a printing process.

7.2 Related Procedures

Counterfeit or Fraudulent Documents
Decipherments, Alterations, and Obliterations

7.3 Instrumentation

A microscope and/or UV & IR inspection devices are required for the completion of printing process examinations.

7.4 Minimum Standards and Controls

7.4.1 Standards

- ~~Microscopic examination~~ *Magnification* required
- Genuine documents or a reference standard with a detailed description are required for comparison examinations

7.4.2 Controls

Microscopic images from samples with known printing processes will be used as controls.

Images generated during analysis will be stored as notes in LIMS and can be sent back to the submitting agency as a sub-item of the parent item if the images are of value to the investigating agency. The images will be stored in the LIMS image vault as a permanent record for that case.

Transparencies created during analysis will be returned to the submitting agency as a sub-item of the parent items.

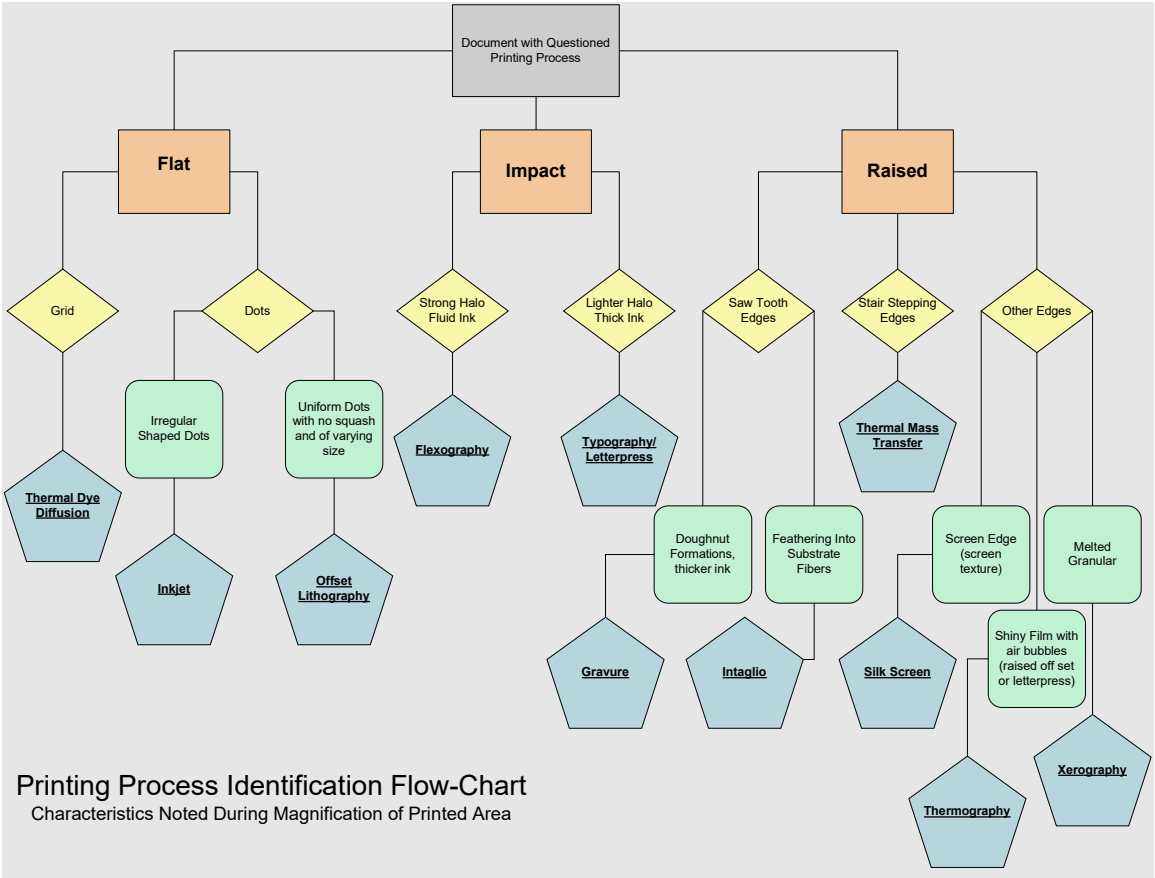
7.5 Procedure

The examination of printing processes involves:

- The identification of individual printing processes
- Establishing an authentic or counterfeit document based on printing processes
- Identifying those processes used to create a document

- Comparison of questioned and known documents to establish similarities and/or differences in printing processes

The questioned and known documents should be viewed under magnification and the characteristics of the printed areas noted. When possible, magnified images of the printed areas should be captured. The noted characteristics and the surface image of the printed material (flat, impact, or raised) can be used to identify the printing process with the assistance of Printing Process Identification Chart and reference materials. Additionally, an evaluation of the substrate and ink may be taken into consideration. If a known document has been submitted, differences in characteristics between it and the questioned item should be documented.



7.6 References

1. New Zealand Police Printing Process Manual
2. Printing Process Identification and Image Analysis for Forensic Document Examiners Notebook
3. Pocket Pal, International Paper

4. Kelly, Jan Seaman, Lindblom, Brian, “Scientific Examination of Questioned Documents,” CRC Taylor & Francis, Boca Raton, FL, 2006
5. BCI Questioned Document Training Manual
6. BCI Printing Process Reference Notebook

8 Impression Evidence

8.1 Introduction

Impression evidence encompasses many different transfers. Any time two objects come into contact; there is the potential for impression evidence. The document section handles any impressions on documents (except those covered by the latent print and Trace Evidence sections.) These include such traditional things as typewriters, check writers and other business machines: and less frequently, notary seals and rubber stamps. Use, as with any instrument, causes wear and damage to the working parts which lead to the appearance of individual defects in the work of every machine.

Regardless of the object which makes the impression, or the object which receives the impression, the case is worked by direct comparison of questioned and known. Changing from machine impressions to stamp impressions does not constitute or indicate a procedural change.

Also included in this section are “impression-like” examinations such as photocopiers and fracture matches.

8.2 Related Procedures

Recovering Indented Writing

8.3 Instrumentation

A Hand Lens, Microscopes, UV & IR inspection devices are required to complete some of the examinations.

8.4 Minimum Standards and Controls

8.4.1 Standards

Known samples are not necessarily required for identification (i.e. Questioned to questioned comparisons are possible if the samples are sufficient). However, standards must be available in order to determine the source of a questioned document.

8.4.2 Controls

Images or copies of the known standards created for comparison purposes will be maintained as a permanent record in LIMS.

8.5 Procedure

- A side by side comparison of the questioned and known samples is the standard procedure for all impression evidence.
- Typewriter ribbons may be examined by removing them from the machine and recording the impressions.

- There are too many potentially novel cases that may arise to attempt to catalog all possible contingencies. The examiner is urged to consult with reference books and materials, other document examiners, and primary sources (manufacturers, printers, etc.), in any cases where procedures are not clearly defined.

8.6 References

1. Conway, James, Evidential Documents, Bannerstone House: Il. 1978
2. Hilton, Ordway, Scientific Examination of Questioned Documents, Elsevier: New York, New York, 1982
3. Harrison, Wilson R., Suspect Documents, Nelson-Hall: Chicago, Il., 1981Osborn, Albert S., Questioned Documents, Patterson Smith: Montclair, New Jersey,1978
4. Osborn A.S. and A.D., Questioned Document Problems, Boyd Printing Co.: Albany, New York, 1944

9 Ink and Paper

9.1 Introduction

The methods for inks and papers which can be performed by the BCI document examiners are basically the same and so they are grouped together.

Numerous chemical analyses are available, but may be outside the capability of the document section.

9.2 Related Procedures

Counterfeit or Fraudulent Documents
Identification/Comparison of Printing Processes

9.3 Instrumentation

A Hand Lens, Microscope, UV and IR inspection devices are required to complete some of the examinations

9.4 Minimum Standards and Controls

9.4.1 Standards

Due to their non-destructive nature, only non-chemical examinations will be considered routine in the Document Section:

- Infrared
- Infrared luminescence
- Ultraviolet
- Visible examinations
- Watermark examinations on paper
- Laser or alternate light source

9.4.2 Controls

Images of evidential value generated during analysis will be sent back to the submitting agency as a sub-item of the parent item. The images will also be stored in the LIMS image vault as a permanent record for that case.

9.5 Procedures

9.5.1 Ink and Paper Differentiation

Non-chemical, non-destructive methods will be applied to inks and papers in an attempt to differentiate them from one another. The methods to be used are:

Visual Examination with Magnifier and Microscope
Differentiate by color, width of line or striations. Care must be taken in that differences may exist because of the type of instrument not because of pressure or speed of writing.

Infrared
Differentiate by visibility, transparency or intensity.

Infrared Luminescence
Differentiate by presence or absence of luminescence, by presence or absence of dark image, or by intensity of luminescence or dark image. Care must be taken in differentiation by luminescence, because an ink that is not normally luminescent may become dequenched, and thereby luminescent by a number of different substances. The luminescence of inks can also be affected by the background or paper. The article "Dequenching of Infrared Luminescence" written by Stephen McKasson outlining one such dequenching technique can be referenced in the BCI QD Reference Library.

Ultraviolet
Differentiate by fluorescence or color.

Visual Examination of Paper
- Measure all dimensions, including thickness of paper
- Examine for watermarks
- Examine tear pattern

All of the above are methods of differentiating inks and papers. Failure to differentiate does not equate to identification.

9.5.2 Ink and Paper Dating

Paper Dating
Generally need the presence of a watermark in order to identify the paper manufacturer.
1. Coded Watermark: Decipher Code
2. Non-Coded Watermark
   - Determine when detectable and reliable design changes occurred.
   - Determine when detectable and reliable chemical or fiber content changes occurred.

Ink dating is not performed by the BCI&I laboratory.

9.5.3 Document Dating

Other Clue Items: Other than ink and paper, one should also analyze:

- Typewriter Characteristics
- Printing Characteristics
- Handwriting Characteristics
- Xerox Characteristics
- Others, e.g., Indented Writing

9.6 References

1. Conway, James, Evidential Documents, Bannerstone house: Il., 1978
2. Hilton, Ordway, Scientific Examination of Questioned Documents, Elsevier: New York, 1982
3. Harrison, Wilson R., Suspect Documents, Nelson-Hall: Chicago, Il., 1981
4. Sensi, C.A. and Cantu, A.A., "Infrared Luminescence: Is It a Valid Method to Differentiate Among Inks?", Journal of Forensic Sciences, 1982, 27(1) pgs.196-199.
5. Gernandt, Mark and Urlaub, John, "An Introduction to the Gel Pen", Journal of Forensic Sciences, 1996, 41(3), pgs. 503-504.
6. Laporte, Gerald et.al., "An Evaluation of Matching Unknown Writing Inks with the United States International Ink Library", Journal of Forensic Sciences 2006, 51(3).
7. Wilson Jeffrey, LaPorte, Gerald, and Cantu, A.A., "Differentiation of Black Gel Inks Using Optical and Chemical Techniques", Journal of Forensic Sciences, 2004, 49(2).

~~10 Quality Assurance Testing~~

~~10.1 Introduction~~

~~The procedures contained in this method were established in accordance with the Quality Control Protocol as part of the quality and security testing provided by BCI to The Ohio State Lottery. The purpose of the procedures is to ensure that instant tickets manufactured for The Ohio State Lottery meet the set quality and security specifications. These procedures additionally may be used for research and development purposes as required by The Ohio State Lottery.~~

~~10.2 Related Procedures:~~

~~Counterfeit or Fraudulent Documents~~
~~Alterations and Obliterations~~

~~10.3 Safety Considerations~~

~~The ESDA contains a high voltage transformer. Standard precautions for working around high voltage must be observed. Consult the equipment manual before attempting to service the equipment. To date, the laboratory is unaware of any reports of specific risks associated with ESDA.~~

~~A various number of hazardous chemicals are used during the testing procedures. Refer to the chemical's specific MSDS for detailed safety considerations.~~

~~Some procedures require the use of heating elements to heat the instant tickets. Exercise caution when handling heated tickets as well as heating equipment to avoid potential for burns.~~

~~10.4 Preparations~~

~~Solvent preparations required for Mix 1 (50:50 Vodka:Ammonia), Mix 2 (50:50 Vodka:Ethanol), and Mix 3 (1% Soapy Water).~~

~~Individual preparations are included with each testing procedure.~~

~~10.5 Instrumentation~~

~~Microscopes, UV and IR inspection devices, ESDA, copy machine, scanner, micrometer, and barcode scanner or verifier.~~

~~10.6 Minimum Standards and Controls~~

~~The minimum standards are provided by The Ohio State Lottery in the form of "game specification" or "working papers," which are individual to each game. A non-tested ticket is used as a control to make a comparison of the quality and security of a tested ticket.~~

~~10.7 Procedures~~

~~The game specifications, materials used, and the number of tickets provided for testing will determine which of the following test procedures will be used. The determination as to which tests to use will therefore be made on a game to game basis. In addition to the below listed tests the average weight of (3) tickets will be recorded as well as the dimensions of the tickets; i.e. length, width, and thickness.~~

~~Capture images of the ability to read the hidden play symbols and place one of these for each test in the report.~~

~~10.7.1 Environmental Conditions~~

~~10.7.2 Elevated Temperature~~

1. ~~Ensure that oven is turned on and temperature dial is set for 6.~~
2. ~~Check temperature of oven by recording reading value of thermometer contained within oven. Oven must be 60ºC ±10°C. Adjust oven appropriately to make any necessary temperature modifications.~~
3. ~~Record ticket serial numbers and time placed in oven.~~
4. ~~Place (2) tickets in oven for 48 hours.~~
5. ~~After 48 hours, remove tickets from oven and record time removed.~~
6. ~~Allow tickets to come to room temperature.~~
7. ~~Remove a portion of the rub-off cover from the tickets using standard removal procedures. Record any difficulties or abnormalities during the removal process. Note any differences in appearance and integrity of tickets.~~
8. ~~Scan front and back of one ticket using imaging software, and place images in the report.~~
9. ~~Place one tested ticket in ticket index.~~

~~10.7.3 High Humidity~~

1. ~~Ensure that the humidity chamber is turned on and the humidity is set to 60%. The humidity in the chamber may vary by ±10%. The ESDA² humidity chamber may also be used if the humidity chamber is out of order.~~
2. ~~Record ticket serial numbers and time placed in humidity chamber.~~
3. ~~Place (2) tickets in the humidity chamber for 48 hours.~~
4. ~~After 48 hours, remove tickets from the chamber and record the time removed.~~
5. ~~Allow the tickets to come to room humidity.~~
6. ~~Remove a portion of the rub-off cover from the tickets using standard removal procedures. Record any difficulties or abnormalities during the removal process. Note any differences in appearance and integrity of tickets.~~

~~7. Scan the front and back of the tickets using imaging software, and place images in the report.~~
~~8. Place tested tickets in ticket index as labeled.~~

~~10.7.4 Intense Cold~~

~~1. Ensure that the freezer is on and that the temperature is between -20°C±10°C.~~
~~2. Record temperature reading value from thermometer digital display.~~
~~3. Record ticket serial numbers and time placed in freezer.~~
~~4. Place (2) tickets in the freezer for 48 hours.~~
~~5. After 48 hours, remove tickets from the freezer and record the time removed.~~
~~6. Allow the tickets to come to room temperature.~~
~~7. Remove a portion of the rub-off cover from the tickets using standard removal procedures. Record any difficulties or abnormalities during the removal process. Note any differences in appearance and integrity of tickets.~~
~~8. Scan front and back of ticket using imaging software, and place images in the report.~~
~~9. Place tested tickets in ticket index.~~

~~10.7.5 Water Immersion~~

~~1. Record the serial numbers of (2) tickets and place them in a glass tray.~~
~~2. Add enough water to the tray to cover the tickets.~~
~~3. Record the initial time the tickets are covered in water.~~
~~4. After 3 hours, remove the tickets from the glass tray and record the time removed.~~
~~5. Allow the tickets to dry.~~
~~6. Remove a portion of the rub-off cover from the tickets using standard removal procedures. Record any difficulties or abnormalities during the removal process. Note and differences in appearance and integrity of tickets.~~
~~7. Scan front and back of one ticket using imaging software, and place images in the report.~~
~~8. Place one of the tested tickets in ticket index.~~

~~10.7.6 Altering Tickets~~

~~10.7.7 Computer Regeneration Techniques~~

~~1. Record the serial number of (2) tickets.~~
~~2. Remove the rub-off cover from the tickets using standard removal procedures.~~
~~3. Place the ticket face down on the scanner and log onto the computer.~~
~~4. Open the PhotoShop program.~~
~~5. Click File→Import → and select the current scanner.~~

6. Adjust the selected area to encompass only the ticket, ensuring the entire ticket is within the selected region.
7. Click Finish. The ticket will then be scanned and automatically opened in PhotoShop.
8. Using the rectangular marquee tool (the select dashed square), select a play symbol to reproduce.
9. Choose the "copy" command under Edit in the menu bar.
10. Select a second play symbol to change.
11. Choose the "paste" command under Edit in the menu bar. This will insert the copied play symbol over the second play symbol.
12. Select→ Edit Copy → Select→ Edit Paste
13. Print the ticket using the "print" command under the File menu.
14. Cut the play symbol section from the printed ticket.
15. Adhere the altered play symbol portion to the original ticket surface.
16. Allow the ticket to dry.
17. Place one of the scanned altered images in the report.
18. Place one of the altered tickets in ticket index.

10.7.8 Copying Techniques

1. Locate a winning ticket.
2. Make at least (2) color copies of the winning ticket.
3. Cut out the playing surface from the copied tickets.
4. Record the serial number of (2) additional tickets.
5. Remove the rub-off cover from the tickets using standard removal procedures.
6. Adhere the cut-out play surface over the exposed play surface of the (2) tickets.
7. Photograph the playing surface of both the original winning ticket and the altered copied tickets, ensuring that evidence of the print process is visible.
8. Insert photo images of play surfaces into report.
9. Scan front and back of the ticket using imaging software, and place images in the report.
10. Place one of the altered tickets into the ticket index.

10.7.9 Cut and Paste Techniques

1. Record serial numbers of (4) tickets.
2. Remove the rub-off cover from the tickets using standard removal procedures.
3. Cut-out play symbols from the first ticket.
4. Select the play symbols needed to make the additional (2) tickets, winning tickets.
5. Paste the selected play symbols onto the (2) tickets.
6. Scan front and back of ticket using imaging software, and place images in the report.
7. Place one of the altered tickets in the ticket index.

~~10.7.10 Reading Tickets~~

~~10.7.11 Chemical/Solvent Examination and Chemical/Solvent Lifting~~

1. ~~Record the serial numbers of (40) tickets.~~
2. ~~Apply a sufficient amount of each of the following chemicals to the play surfaces and the barcode on the back of the ticket of two tickets: acetone, ammonia 5%, ethanol, Fantastic, hydrogen peroxide 3%, hydrogen peroxide 30%, heptanes, mineral spirits, mix 1: 50:50 vodka: ammonia, mix 2: 50:50 vodka: ethanol, mix 3: 1% soapy water, petroleum ether, 2-propanol, salt water, turpentine, vinegar, vodka, cold water, 60ºC water, water steam.~~
3. ~~Allow the play surface to absorb the chemicals for approximately 1 hr.~~
4. ~~Remove the two tickets and view them using the VSC.~~
5. ~~Capture the image of any swollen play symbols using the VSC camera.~~
6. ~~Insert the ticket in the ticket index.~~
7. ~~Record any fading, bleeding, color change, damage, or no effect that occurs on the ticket component due to the contact with the chemical on the notes page.~~
8. ~~Transfer the information to Appendix II of the report.~~

~~10.7.12 Chemical Thermal Examination~~

1. ~~Record the serial numbers of (10) tickets.~~
2. ~~Add minute droplets of the following solvents to the rub-off cover, directly over the hidden play symbols (2 tickets per solvent): vodka, water, mix 1: 50:50 vodka: ammonia, mix 2: 50:50 vodka: ethanol, and mix 3: 1% soapy water.~~
3. ~~Place the tickets on a heated griddle face-up and allow the solvents to distill through the cover.~~
4. ~~Examine the tickets and determine if the play symbols can be read through the rub-off cover. Record results.~~
5. ~~Record the serial number of (10) additional tickets.~~
6. ~~Apply papers saturated with the above solvents to the rub-off cover. (2 tickets per solvent)~~
7. ~~Place tickets with papers in an oven bag and in the oven at 60ºC ± 10°C for 1 hr.~~
8. ~~Record the time.~~
9. ~~Remove the tickets and record the time. Allow them to come to room temperature.~~
10. ~~View the tickets using VSC with IR light source.~~
11. ~~Note any ability to read hidden play symbols.~~
12. ~~Record serial number of (4) additional tickets.~~
13. ~~Apply papers saturated with vodka and mix 2 to rub-off cover. (2 tickets per solvent)~~
14. ~~Place tickets between two glass plates and place glass plates in oven for 1hr.~~
15. ~~Record the time.~~
16. ~~Remove the tickets and record the time. View them using VSC with IR light source.~~

~~17. Note any ability to read hidden play symbols on the notes page.~~
~~18. Record serial number of (4) additional tickets.~~
~~19. Apply papers saturated with vodka and mix 2 to rub-off cover. (2 tickets per solvent)~~
~~20. Place tickets between two glass plates at room temperature for 24 hours.~~
~~21. Record the time.~~
~~22. Remove the tickets and record the time. View them using VSC with IR light source.~~
~~23. Note any ability to read hidden play symbols.~~

~~10.7.13 Copy Machine Examination~~

1. ~~Record the serial number of (2) tickets.~~
2. ~~Place the tickets on a color-copying machine.~~
3. ~~Make color copies of the tickets with varying contrast.~~
4. ~~Note any ability to read the tickets.~~
5. ~~Place tickets in oven at 60ºC ± 10°C for 1 hr.~~
6. ~~Record the time.~~
7. ~~Remove tickets and allow them to come to room temperature and again make color copies of the tickets with varying contrast.~~
8. ~~Note any ability to read the hidden play symbols.~~

~~10.7.14 Delamination/Chemical Examination~~

1. ~~Record the serial numbers of (10) tickets.~~
2. ~~Separate the tickets into their individual layers.~~
3. ~~Apply the following solvents behind the hidden play symbols (2 tickets per solvent): vodka, water, mix 1, mix 2, and mix 3.~~
4. ~~Attempt to read the hidden play symbols and note any ability to do so.~~

~~10.7.15 Electrostatic Examination~~

1. ~~Record the serial numbers of (2) tickets.~~
2. ~~Place the tickets on the ESDA and turn on the vacuum. (do not ESDA foil tickets)~~
3. ~~Pull the plastic over the tickets.~~
4. ~~Wave the corona above the tickets to create a charge.~~
5. ~~Pour the developer over the tickets making sure to cover the play area.~~
6. ~~Place the sheet of contact paper onto the plastic to preserve any development.~~
7. ~~Review the contact sheet to locate any play symbols that were developed.~~
8. ~~Note any ability to read the play symbols.~~

~~10.7.16 Fluorescence Examination~~

~~1. Record the serial numbers of (2) tickets.~~
~~2. Turn on the VSC and open its operating program.~~
~~3. Place the tickets individually into the VSC.~~
~~4. View the tickets using both the short-wave and long-wave UV sources.~~
~~5. Note any ability to read the play symbols.~~
~~6. View the tickets in the visible range.~~
~~7. Note any ability to read the play symbols.~~

~~10.7.17 Infrared Camera Examination~~

~~1. Record the serial numbers of (2) tickets.~~
~~2. Turn on the VSC and open its operating program.~~
~~3. Place the tickets individually into the VSC.~~
~~4. View the tickets using the IR source and its various wavelengths.~~
~~5. Note any ability to read the play symbols.~~

~~10.7.18 Ink Migration~~

~~1. Record the serial numbers of (10) tickets.~~
~~2. Apply papers treated with the following solvents to the rub-off cover (2 tickets per solvent): vodka, water, mix 1, mix 2, and mix 3.~~
~~3. Remove the papers from the face of the tickets and note any ink migration.~~
~~4. Record the serial numbers of (10) tickets.~~
~~5. Apply papers treated with the above solvents to the rub-off cover (2 tickets per solvent).~~
~~6. Heat the tickets and papers with a hot iron.~~
~~7. Remove the treated papers and note any ink migration.~~

~~10.7.19 Mechanical Examination~~

~~1. Record the serial numbers of (2) tickets.~~
~~2. Scrape away small sections of the rub-off cover in order to reveal the hidden play symbols.~~
~~3. Record the play symbols that were readable in the notebook.~~
~~4. Note the difficulty in the process and any obvious evidence of tampering the remains.~~

~~10.7.20 Mechanical Lifting~~

1. ~~Record the serial numbers of (2) tickets.~~
2. ~~Attempt to remove the rub-off cover using a scalpel.~~
3. ~~Note any ability to remove the cover in one piece or the ability to read the hidden play symbols through the back of the play area.~~
4. ~~Record the serial numbers of (8) tickets.~~
5. ~~Cut out the play areas of (2) tickets and attach these tickets over the other (2) tickets as a frame.~~
6. ~~Spray the tickets with 2-3 coats of Kamar Varnish.~~
7. ~~Place a square cut-out from a water-soluble plastic bag over the play area.~~
8. ~~Place the ticket face down on a griddle at 250-300ºC for 1 minute.~~
9. ~~Remove the ticket from the griddle. Pull back the plastic bag and attempt to remove the rub-off cover.~~
10. ~~Replace the plastic bag and rub-off cover if it is lifted.~~
11. ~~Place the ticket face down on the griddle to re-adhere the rub-off cover.~~
12. ~~Lightly wash the water-soluble bag with water to dissolve it.~~
13. ~~Repeat procedure with remaining tickets using Matte Varnish.~~
14. ~~Record the difficulty and any obvious evidence remaining on the ticket.~~

~~10.7.21 Microscopic Examination~~

1. ~~Record the serial numbers of (2) tickets.~~
2. ~~View the tickets under a microscope varying the angles of the lighting.~~
3. ~~Note any ability to read the play symbols.~~

~~10.7.22 Polarized/Filtered Light Examination~~

1. ~~Record the serial numbers of (2) tickets.~~
2. ~~View the tickets under the polarized light microscope Note any ability to read the play symbols.~~

~~10.7.23 Tape Examination/Lifting~~

1. ~~Record the serial numbers of (2) tickets.~~
2. ~~Apply tape to the play area.~~
3. ~~Attempt to read any protruding hidden play symbols.~~
4. ~~Record results.~~
5. ~~Remove the tape from the rub-off cover in an attempt to lift it.~~
6. ~~Note any ability to lift the rub-off cover or read the play symbols.~~

~~10.7.24 Thermal Examination~~

1. ~~Record the serial numbers of (2) tickets.~~
2. ~~Heat the front and back of both tickets on the griddle.~~
3. ~~Attempt to remove the rub-off cover. Record any results.~~
4. ~~View the heated tickets under a microscope.~~
5. ~~Note any ability to read the hidden play symbols.~~
6. ~~Pre-treat the tickets with moisture saturated papers for 15 minutes.~~
7. ~~Microwave the tickets for no more than 10 seconds. (do not microwave foil tickets)~~
8. ~~Examine the tickets and record the ability to read any of the hidden play symbols.~~

~~10.7.25 Vapor Phase Examination~~

1. ~~Record the serial numbers of (4) tickets. (Perform test on foil tickets only)~~
2. ~~Fill a desiccators with about 50 ml of chloroform and another desiccator with about 50ml of petroleum ether.~~
3. ~~Place two tickets each on the shelf of each desiccator.~~
4. ~~Allow the tickets to sit in the vapor for 1 hour. Record the time.~~
5. ~~Remove the tickets and record the time.~~
6. ~~Examine the tickets under cross lighting to detect any swelling play symbols.~~
7. ~~Note any ability to remove the cover and swelling play symbols.~~

~~10.7.26 Barcode Print Quality~~

~~First record the serial number for the ticket tested.~~

~~To test Interleaved 2 of 5 barcode~~

1. ~~Open SVS software~~
2. ~~Click "New Scan"~~
3. ~~Press "PWR" on handheld device to turn scanner on~~
4. ~~Place ticket in front of scanner and click "Target" to line up laser with barcode~~
5. ~~Click "Autoscan"~~
6. ~~Click "Start" – wait for it to finish all 10 scans~~
    a. ~~Click "Hide" when done~~
7. ~~Click "Print" on Toolbar (NOTE: This is not the picture of the printer)~~
    a. ~~Print "Statistics"~~
    b. ~~Print "Current Report"~~
8. ~~Click "Profile"~~
    a. ~~Click "Profile" button on the right side of box (this will take a few seconds)~~
    b. ~~Click "Print" button when scan is done~~

~~c. Click "Hide" when done~~

~~9. Use yellow "Scan" button on handheld device to scan one more time~~
~~10. Press the number "9" (Detail)~~
~~11. Enter 42mm in the first line~~
~~12. Press "Enter"~~
~~13. Record "Ratio" from main screen of hand held device~~
~~14. Press "Print" (also labeled as the down arrow)~~
~~a. F1 setting should be CSV~~
~~b. Press "Enter" to send to SVS software~~
~~15. Click "Print" on Toolbar (NOTE: This is not the picture of the printer)~~
~~a. Make sure the last scan is highlighted~~
~~b. Print "Element Detail Report"~~
~~16. Click "File" on Toolbar~~
~~a. Save As~~
~~b. Save in Labshare → Lottery QA → Scans → "Game #" → "barcode"~~

~~To test PDF 417 barcode~~

~~1. Open SVS software~~
~~2. Click "New Scan"~~
~~3. Place ticket in front of scanner and click "Target" to line up laser with barcode~~
~~4. Click "Scan"~~
~~a. Start laser at top of barcode, slowly move laser down to bottom of barcode, then back up to top~~
~~b. Keep going up and down until it finishes the scan~~
~~5. Repeat steps 2 thru 4 until 10 scans are completed~~
~~6. Click "Print" on Toolbar (NOTE: This is not the picture of the printer)~~
~~a. Print "Statistics"~~
~~b. Print "Current Report"~~
~~7. Click "Profile"~~
~~a. Click "Profile" button on the right side of box~~
~~b. Click "Print" button when scan is done~~
~~c. Click "Hide" when done~~
~~8. Click "File" on Toolbar~~
~~a. Save As~~
~~b. Save in Labshare → Lottery QA → Scans → "Game #" → "pdf"~~

11 Reporting

All Questioned Document section reports shall meet content and format requirements for reporting of results as specified by BCI laboratory policy and ANAB accreditation standards.

Reports will communicate findings for all submitted items or detail which items were not tested, any sub-items created and their relevant findings, and the disposition of the evidence.

11.1 Standard Terminology for Handwriting and Hand Printing Examinations

Source Identification – this is the highest degree of confidence expressed in handwriting comparisons. The observations provide extremely strong support for the proposition that the evidence originated from the same source and the likelihood for the proposition that the evidence arose from a different source is so remote as to be considered a practical impossibility**.**

Support for Same Source- the evidence contained in the handwriting supports that the questioned and known writing have been written by the same individual; however, it falls short of the Source Identification confidence. Any use of this conclusion shall include a statement of the factor(s) limiting a stronger conclusion:

- The evidence contained in the handwriting points rather strongly toward the questioned and known writings having been written by the same individual; however, it falls short of the "virtually certain" degree of confidence. (formerly known as "**Probably Written By"**)
- The evidence contained in the handwriting suggests that two or more handwritten items may have been written by the same individual based on similarities between some of the features and the skill level of the writer; however, there are few significant similarities and limiting factors are present. This is a "weak" opinion used show the examiner has a leaning toward a writer as opposed to a no opinion. (formerly known as "**Indications May Have Been Written By (evidence to suggest)"**)

Inconclusive- the evidence does not provide a sufficient degree of support for one proposition over the other. It is used when there are significantly limiting factors, such as disguise in the questioned and/or known writing or a lack of comparable writing and the examiner does not have even a leaning one way or another (formerly known as "**No conclusion/opinion (totally inconclusive, indeterminable)"**). Any use of this conclusion shall include a statement of the factor(s) limiting a conclusion.

Support for Different Source- The observations provide more support for the proposition that the evidence originated from different sources rather than the same source; however, there is insufficient support for a Source Exclusion. The degree of support may range from limited to strong or similar descriptors of the degree of support. Any use of this conclusion shall include a statement of the factor(s) limiting a stronger conclusion.

- The evidence contained in the handwriting suggests that two or more handwritten items may not have been written by the same individual based on differences between some of the features and/or the skill level of the writer; however, there are few significant differences and limiting factors are present. This is a "weak" opinion used show the examiner has a leaning away from a writer as opposed to a no opinion. Limiting words or phrases shall be used when this opinion is reported (formerly known as **Indications May Not have Been Written By**–). Any use of this conclusion shall include a statement of the factor(s) limiting a stronger conclusion:

- The evidence points rather strongly against the questioned and known writings having been written by the same individual, but, as in the probably range, the evidence is not quite up to the Source Exclusion confidence (formerly known as **Probably Not Written By**)

Source Exclusion– this, like the conclusion of Source Identification, is the highest degree of confidence expressed in handwriting comparisons. The observations provide extremely strong support for the proposition that the evidence originated from a different source and the likelihood for the proposition that the evidence arose from the same source is so remote as to be considered a practical impossibility; or the evidence exhibits fundamentally different characteristics.

11.2 Report Wording Examples

The following are examples of wording that may be used in Questioned Documents reports. This wording is not required and does not represent all report wording options.

11.2.1 Handwriting and Hand Printing Comparisons

Inconclusive opinions (all opinions except Source Identifications or Source Exclusions) shall have language explaining the limiting factors or additional items necessary for examination for each case. Examples of wording on limiting factors are located in section 12.2.9 Limitations.

Source Identification

Source Identification- The questioned writing in item #1 to the known handwriting samples in item #2.

Source Identification- The questioned maker's signatures on the listed checks in items #2 and #3 to the known handwriting samples attributed to John Doe in items #1 and #4.

Source Identification- The questioned check in item #2 to the known handwriting samples in item #1. Excluded from this conclusion is the "memo" portion of the check.

Source Identification- The listed portions of the questioned writing in items #1, #2, #3, and #4 to the known handwriting samples in item #6.

Source Identification- The questioned notes in items #1, #2, #3, and #4 to an unknown individual writer.

The writer of item/s #_____ wrote the _____ on item/s _____ (Source Identification).

The submitted _____ in item/s #___ was/were written by the person who wrote the _____ sample/s in item/s # submitted as being that/those of _____. (Source Identification).

_____,the writer of item #_____, wrote the endorsement "_____" on item # _____ (Source Identification).

Support for Same Source
*Wording should convey that there is strong or weak support for same source.

Support for Same Source- Substantial similarities between the questioned writing on item #1 and the known writing samples in item #2.

Support for Same Source- Strong evidential support for the same source on the questioned notes in items #1, #2, #3, and #4 to an unknown individual writer.

Support for Same Source- Limited similarities between the questioned writing on item #1 and the known writing samples in item #2.

Support for Same Source- Weak evidential support for same source on the questioned notes in items #1, #2, #3, and #4 to an unknown individual writer.

Substantial similarities were noted between the questioned and known writing

*When possible observations shall be written corresponding to an inconclusive; however, the observations and limitations may be the same on some reports.

Inconclusive- Insufficient similarities or differences were noted between the questioned writing in Item # ___and the samples in item #____ for a conclusion to be offered.

Inconclusive- No conclusion can be offered as to the writer of item #____due to ____(insert what is of insufficient quality or quantity).

Inconclusive- Pictorial similarities were noted between the sample in item #____ and the endorsement on item #_____; however, due to __(insert what is of insufficient quality or quantity)_____no conclusion can be offered.

Inconclusive- The questioned signature is pictorially similar the samples of _____ and may be an attempt to imitate his/her handwriting habits. This signature does not reflect the natural handwriting habits of the other submitted writers; therefore, no conclusions can be offered regarding the questioned signature and the other submitted writers.

Inconclusive- The signature in item #___contains insufficient individual characteristics for a conclusion to be offered.

Inconclusive- No **conclusion** can be offered as to the writer of the numbers in the log book in item #____. Numbers contain limited identifiable individual characteristics.

Support for Different Source

*Wording should convey that there is strong or weak support for different source.

Support for Different Source- Substantial dissimilarities between the questioned writing on item #1 and the known writing samples in item #2.

Support for Different Source- Strong evidential support for more than one writer on the questioned notes in items #1, #2, #3, and #4.

Support for Different Source- Limited dissimilarities between the questioned writing on item #1 and the known writing samples in item #2.

Support for Different Source- Weak evidential support for more than one writer on the questioned notes in items #1, #2, #3, and #4.

Support for Different Source- Pictorial similarities coupled with discrepancies in the details were noted between the questioned maker's signature(s) on the checks in item(s) #_____ and the samples attributed to _____ in item #_____. There is weak evidential support that or the limited dissimilarities indicate that the writer of the samples attributed to _____may not have signed his/her name and that these signatures may be an attempt to copy his/her handwriting habits.

Support for Different Source- The questioned signatures in the name of _____ contain some general pictorial similarities as well as substantial differences to the samples in item #___. There is strong evidential support that the questioned signatures in this name came from different sources.

Source Exclusion

The below listed questioned signatures were not written by the writer of Item #____ (Source Exclusion).

Source Exclusion- The questioned writing in item #1 to the known handwriting samples in item #2.

Source Exclusion- The questioned maker's signatures on the listed checks in items #2 and #3 to the known handwriting samples attributed to John Doe in items #1 and #4.

Source Exclusion- The questioned check in item #2 to the known handwriting samples in item #1. Exempt from this conclusion is the "memo" portion of the check.

Source Exclusion- The listed portions of the questioned writing in items #1, #2, #3, and #4 to the known handwriting samples in item #6.

Source Exclusion- The writer of the samples attributed to _____does not possess the skill level necessary to execute the questioned signatures.

Source Exclusion- The remainder of the submitted writers to the questioned entries on item #1. Therefore, the other submitted writers can be eliminated. *This language can only be used when a writer is identified as having written questioned entries.

Limitations

Additional directly comparable samples from the subject would be of value.

Additional requested and non-requested samples from the submitted writer(s) would be of value.

Please submit the originals or high quality images/copies of item #___.

No further conclusions can be offered due to the limited amount individual characteristics present in the questioned writing.

Due to the line quality of the questioned writing no further conclusions can be offered.

Additional contemporaneous samples from the subject/victim would be of value.

Suggested samples should include_____(insert type of writing which is directly comparable to the questioned writing) as well as non-requested writing.

This examination was limited by _(insert what is of insufficient quality or quantity)_____.

The copy quality of the questioned writing precludes further conclusions. Please submit the originals of item #____ or high-quality images/copies.

Some characteristics indicative of unnatural and/or disguised writing are present in the questioned writing; therefore, a more conclusive opinion may not be possible.

The sample in item #____ contains elements characteristic of unnatural/drawn writing. Additional non-requested and requested samples would be of value.

The questioned signature is scrawled and/or abbreviated. No further conclusions can be offered regarding the submitted writer and the questioned signature.

Inconclusive- Due to the lack of comparable print/cursive sample, no conclusions can be offered regarding the writer of Item #____ and the checks in item #_____.

The questioned information was drawn/unnaturally written; therefore, no conclusions can be offered as to the writer.

The requested known writing was written with more care and less speed than the questioned writing. This “best effort” exemplar writing is not directly comparable to questioned writing.

This signature is overwritten and the details cannot be examined without the original document.

The signatures in question contain elements characteristic of unnatural writing; however, the source of the unnatural writing cannot be determined. Unnaturalness in writing can be attributed to the conditions under which someone signs a document or can be due to disguised writing. Should the unnatural writing be due to an attempt to imitate the signature style of another person a source identification to the actual writer ~~it~~ may not be possible. This act disguises the true and natural handwriting characteristics of an individual.

Pictorial similarities between the questioned signature on Item # and the known signatures of _____, in addition to the poor line quality and retouching in the questioned signature are indications that the questioned signature was written in an attempt to simulate the signature of _____. The act of simulation usually suppresses a writer's characteristics to an extent that precludes source identification.

The act of simulating another's writing often masks the writer's natural handwriting habits to the extent that a source identification to a writer may not be possible.

Imitating the handwriting habits of another creates a drawn signature which does not retain many natural handwriting characteristics.

These signatures do not reflect the natural handwriting of _____; therefore, no further conclusions can~~not~~ be offered.

The writer of item #____ cannot be excluded as a source**.** Source Exclusions are based on skill level and/or require a significant amount and wide range of known sample as well as sufficient copy quality. Additional requested and non-requested writing may be of value. Should the originals or high quality images/copies of item #___ exist, please, submit them for comparison.

A Source Exclusion of the writer of item #3 as the writer of the questioned signatures in his/her name is not possible due to the pictorial similarities to his/her exemplars as well as the lack of the original questioned documents.

Details which are instrumental in determining if a signature is an attempt to copy the handwriting habits of another writer are missing from the submitted copies. No further conclusions can be offered without the submission of the original documents.

Preliminary Examinations

Initial examination of the questioned Item #___ revealed that …

Item #____ was examined for naturalness and revealed …

Should known samples be obtained please submit them along with all other previously submitted items.

The questioned check in Item #__ was examined and appears to have been naturally written. Samples from any future suspects filling in checks similar to the ones in question in cursive would be best for comparative purposes.

Miscellaneous Comments
Given that the submitted documents are true and accurate copies of the original documents,

The _____ signature on item # is a tracing of the signature of _____on item # and is not and authentic signature. Because of the drawn nature of a tracing it cannot be determined who wrote the signature. (Inconclusive)

The _____ endorsement displayed characteristics of a tracing. A tracing is a drawing of the true signature and as such does not display the normal handwriting characteristics of the writer. For this reason, neither writer can be associated with the questioned endorsement. (Inconclusive)

Comparison of the requested and non-requested specimens indicates that the requested writing is disguised and/or unnaturally written.

The checks submitted as known writing of _____ were examined as a group; the handwriting on checks numbered _____ is not consistent with the handwriting on the other submitted checks. Therefore, these checks were not included in the examination of _____.

It cannot be determined which of the two overlapping signatures was written first.

The single known signature does not provide a basis for a comprehensive handwriting comparison.

Please note that repetitions of the actual questioned entries are important in handwriting comparisons. For this reason, ten to fifteen repetitions on each of the questioned endorsements on individual slips of paper and five to ten check forms filled out with the identical entries as the questioned documents should be submitted for comparison. The general handwriting forms are often of great value. However, their main purpose is to get a general picture of the writing.

No discernible handwriting could be found on the questioned exhibit.

Due to the large number of questioned exhibits, this examination focused on the _____ in question per the submission sheet comments and/or our conversation.

The signatures should be written on credit card receipt forms or individual slips of paper marked with rectangles similar in size and shape to the signature spaces on the questioned documents.

11.2.2 Documents Examinations (Non Handwriting/Hand Printing Examinations)

Due to the wide variety and types of examinations performed in Questioned Documents, only the most common types of examinations report wording are listed. *The Standard Terminology for Handwriting and Hand Printing Examinations is not required language for most Questioned Document conclusions.*

Indented Writing/ESDA Examinations

Instrumental examination was performed using an electrostatic detection device on the notebook in item #___ and revealed the presence of indented writing on page ___. The developed indented writing includes portions of writing from the previous page of the notebook including _____.

Instrumental examination was performed using an electrostatic detection device on the letter in item #____ and revealed the presence of indented writing. Visual examination of the indented writing revealed what appears to be _____. The interpretations regarding the indented writing are not conclusive.

The letter in item #___ was processed for indented writing using an electrostatic detection device with positive results; however, the readable portions are consistent with the writing on the submitted envelope.

Source Identification- The threatening note in item #1 came from the notebook submitted in item #2. The developed indented writing, the paper, and the tear pattern link the note to the notebook.

Item #___ was processed using an electrostatic detection device for indented writing; however, none was developed.

No readable indented writing was developed using an electrostatic detection device.

Ink and Paper Examinations

More than one ink is present on the overwritten portions of the check. One ink was used to write the amount of _____ and another was used to write the amount of____.

The paper in item # was examined instrumentally with various light sources. This revealed that multiple types of paper were used.

The paper in item # was examined instrumentally with various light sources. The other papers in item # could not be differentiated from one another.

The ink in item # was examined instrumentally with various light sources. The forms in item # revealed more than one ink.

Inconclusive- Neither the paper nor the inks in the submitted letters can be differentiated from each other using various light sources. However, this does not preclude that the paper and inks may have come from different sources.

Inconclusive- The paper in items # were examined instrumentally with various light sources and could not be differentiated. It should be noted that the inability to differentiate papers does not mean that the paper came from the same ream of paper. The paper is commercially available and may be indistinguishable from other similar products.

Printing Process Examinations

Source Exclusion- The printing process used on the envelopes is different than that used on the threatening notes; therefore, at least two printing devices were used to create the envelopes and notes. A yellow dot pattern is present on the notes which can be used to identify the color copier used to generate them. BCI cannot interpret the dot pattern; however, you may seek assistance from the United States Secret Service.

The letters in the submitted items were visually and instrumentally examined. The instrumental examination utilized various light sources. The text of the letters in both items could not be differentiated. They consisted of the same font style, size, line spacing, and were all printed using an inkjet printer. While the documents could not be differentiated that does not preclude that they may have come from a different source. The font style is a common commercially available font and is standard on most word processing programs.

The submitted items were visually and instrumentally examined. The instrumental examination utilized various light sources. The printing process used to create item # is consistent with the printing process used to create the other submitted documents.

Differences in quality were noted; however, these differences could be attributed to the processes used to create the documents, defects in the printer which could be repaired, or multiple devices being used.

A printer defect was noted on pages __ and __ of item # . These pages contain rows of text with a line running through them. This defect was not located on the other pages of the document.

Alterations and Obliterations

The questioned overtime cards are copies of the original overtime card; however, the dates have been altered. An abrasive technique was used to remove the date from the original overtime card.

Instrumental examination of the obliterated writing using various light sources revealed the original entry. The entry is the name _____.

Portions of the obliterated signature were recovered. The readable portions are inconsistent with the name of the subject (Support for Same Source).

Examination of the obliterated writing revealed what appears to be a five digit sequence of numbers. The sequence appears to be_____. The interpretations regarding the sequence of numbers are far from conclusive.

The documents in item # have been altered and are not genuine documents. The following signatures were placed on these documents using a cut and paste method:

Examination of the staple holes revealed that the first and last pages of the document contained one set of staple holes while the pages located on the middle contain two sets of staple holes. The first and last pages were not part of the original document based on the staple holes. It should be noted that it cannot be determined when the original document was altered.

Counterfeit Document Examinations

Examination of the currency revealed that the money is genuine based on the printing processes, paper, and security features.

The currency in item # is not authentic. The paper, printing process, and security features are not consistent with genuine money.

The Permanent Resident Card does not contain the printing processes or security features consistent with legitimately produced identification documents. In addition, the issuing agency and symbol on the card are not consistent with those issued that year. The Permanent Resident Card is not an authentic document.

The passport in Item # contains the printing processes, security features, and type of paper consistent with legitimately produced identification documents. There is strong evidential support that Item # is an authentic document.

Miscellaneous Comparisons

There is strong evidential support that the notary stamp on item # came from the stamp used on item # . were noted between the stamped impressions. However, it cannot be conclusively determined that the stamped impressions came from the same source.

The typewriter ribbon was removed from the typewriter and unspooled. The information on the ribbon matches the text from the submitted note.

Examination of the typewriter ribbon revealed that it is a multi-pass ribbon. These types of ribbons are struck multiple times by the typeface. Therefore, the ribbon could not be read. The memory on the typewriter was also checked and found to contain no stored documents.

Support for Same Source - Comparison of the submitted letters and envelopes with the known standards created on the submitted typewriter revealed the same type of font and size as well as on matching individual characteristic. These findings provide weak or strong support that the letters and envelopes were made by the submitted typewriter; however, there were insufficient individual characteristics for the purposes of a source identification.

A positive fracture match was noted between the questioned note and the paper remnants remaining in the notepad (Support for Same Source).

Comparison of the torn paper remnants in the notebook with the note revealed a matching individual tear configuration. Based on these findings the note was once a part of the notebook (Source Identification).

11.2.3 Disposition of Evidence

All items will be returned to the department.

12 Instrument Maintenance and Procedures

~~12.1 Balance and Calibration Maintenance~~

~~12.1.1 Routine Inspection~~

~~There will be a routine inspection (i.e. calibration check) on the balance once every month. If it is moved or overloaded a calibration check will be performed. The calibration check should be performed using weights that approximate the normal weighing range. Electronic balances with internal calibration will be calibrated according the manufacturer's instructions.~~

~~To check the calibration of the balance:~~

1. ~~Make sure that the balance is level and there is no debris on it.~~
2. ~~Use calibrated NIST weights. Be sure to record the serial number for the NIST weights.~~
3. ~~Tare the balance.~~
4. ~~Place a weight on the balance and record both the nominal and actual value.~~
5. ~~Take the weight off the balance and tare again.~~
6. ~~Place a weight on the balance and record both the nominal and actual value.~~
7. ~~Take the weight off the balance.~~
8. ~~If the difference between the nominal and actual values is significant, greater than the linearity/accuracy of the balance (+/- value as stated in the manual), do not use the balance until it is repaired and passes the calibration check.~~

~~12.1.2 Maintenance~~

~~All pertinent information will be recorded in a maintenance log. The documentation should include the following information, if available: make, model, and serial number of the balance, nature of the defect, how and when the defect was discovered, action taken in response to the defect, comments on the type of maintenance performed, date, and scientist's initials.~~

~~12.1.3 Cleaning~~

~~The balance should be cleaned of any debris and level.~~

~~**12.1.4 Calibration**~~

~~The balance should be calibrated annually by a certified agency. Documentation will be retained when a balance is calibrated.~~

12.2 ESDA² Procedure

12.2.1 Maintenance

The vacuum bed should be kept clean and free of debris. Occasionally, additional toner may need to be added to the cascade developer.

12.2.2 Verification

The ESDA² has no adjustments or calibrations- it is either functional or non-functional. Prior to using the ESDA² for casework, a test sheet will be created for each case using the following procedure to ensure that the ESDA² is functioning properly.

1. Check the monitor lights on the equipment to ensure that the circuits are functional.
2. Check for a strong ozone odor when the corona unit is turned on. The corona wire releases a strong ozone smell when functioning.
3. Create a test sheet containing indented writings that include the case number, date, and the examiners initials.
4. Process the test sheet following the normal ESDA² procedures (see below). If the control is positive, proceed with processing the evidence items. If the control is negative, place the document in the humidity chamber containing warm tap water for 1-2 minutes and then retest for indented writing. If the control is still negative, refer to the ESDA² manual for maintenance and troubleshooting.
5. The date of the positive control will be recorded in the examination notes and images of the test sheet and resulting ESDA² transparency will be kept in LIMS. If the control is positive, proceed with processing the evidence items.

The Electrostatic Detection Apparatus (ESDA²) is used for the visualization of indented writing and erasures. The ESDA² tends to be more sensitive to most impressions than a visual examination conducted with oblique lighting. The following is a brief description of the procedures used in a routine document examination. For further information, refer to the manufacturer's manual.

Run a control document using the following procedures.

1. Place the document on the vacuum bed of the ESDA~~2~~.
2. Turn the vacuum on.
3. Cover the document with the plastic film, smoothing out all the creases.
4. Charge the surface using the corona unit.
5. Develop the ESDA by pouring graphite pellets over the plastic with the bed tilted slightly, by gently wiping the plastic with a toner pad, or by placing the aerosol hood on the ESDA and applying toner spray.
6. If the control is positive preserve the developed image with adhesive plastic.

Caution: Gloves should be worn when processing a document as the ESDA~~2~~ will develop fresh fingerprints.

12.2.3 References

Foster + Freeman Operating Instructions

~~12.3 Micrometer~~

~~12.3.1 Maintenance~~

~~Maintenance of this instrument must be conducted by an outside vendor other than changing the batteries or basic cleaning of the instrument. The instrument may be wiped off with a soft cloth or tissue paper.~~

~~Caution: Do not use sprays or oils to clean the instrument.~~

~~12.3.2 Calibration~~

~~The micrometer will be calibrated semiannually using standard measuring blocks.~~

12.4 VSC 6000 Procedure

12.4.1 Maintenance

The outside of the VSC 6000 Main Unit, Document Platen, and Translight Panel should be cleaned as necessary to remove any accumulation of dust.

12.4.2 Lamps

The lamp life can be viewed by selecting from the menu bar Tools → Administrator Setup→Lamp Maintenance. This displays the location and Hours Used/Hours Remaining for each of the light sources. A notification will be displayed each time the VSC is started if a lamp is beyond its rated life. For lamp replacement instructions see VSC Hardware Manual pgs. 03-1 thru 03-6. The VSC software should not be running and the VSC unit should be switched off and unplugged during the replacement of a light source. Most light sources consist of a pair of lamps; therefore, both lamps should be replaced whenever one fails and it is recommended that they be replaced in sequence. The Hours Used for the replaced lamp(s) should be reset to zero upon replacement by clicking the corresponding lamp name in the replace column of the Lamp Maintenance table and then clicking OK.

12.4.3 Other

Any additional maintenance should be referred to Foster + Freeman.

12.5 Calibration/Verification

12.5.1 Calibration

Regular calibration is not necessary, unless significant modifications are made to the instrument. If recalibration of the spectrometer is necessary, Foster + Freeman should be contacted.

12.5.2 Verification

This verification procedure will be performed on a monthly basis to ensure that the spectrometer is within the calibration limits. Resultant wavelengths will be recorded in the VSC 6000 Monthly Verification Log. Should the verification results fall outside the calibration limits, Foster + Freeman should be contacted for maintenance and the instrument will not be used until the issue has been resolved. The procedure for verification is as follows:

Turn on the VSC unit by selecting the VSC Suite operating program from the desktop.

1. A login screen will appear; select " Default" for both the user profile and working folder. This will open the main screen view for the VSC software.
2. From the illumination panel on the right side of the main screen, select the transmitted light as the light source.
3. Select the " Plot Spectrum" icon from the bottom center of the " 1Camera (Live)" screen.

When prompted, adjust the camera magnification to a magnification in the 15x-30x range. Then click OK. When prompted, ensure that the platen is clear and click OK to collect the white reference.

4. When prompted to position a sample, place the BG36 Filter in the center of the document platen and click OK.
5. View the spectrum in the preview window. Once, the spectrum appears to have equilibrated, select the " Copy Graph to Spectrum Screen" icon to the top left of the preview window.
6. When prompted, enter the date collected to be used as the caption for the spectrum and click OK.
7. Select the "View Spectrum Screen" icon to the left of the preview window, which opens the spectrum screen.
8. Select the collected spectrum, (labeled with date entered) from the spectrum details table.
9. From the spectrum toolbar click the "Save" icon and select "Save All" and save the file in the verifications folder using the date collected for the file name.
10. Next click the " data to clipboard" icon from the spectrum toolbar.
11. Minimize the spectrum screen and open WordPad program from the startup programs.
12. Paste data into WordPad.
13. Save WordPad document in the verifications folder using the date collected for the file name.
14. Review data looking at the peak at 550nm and the trough at 875nm. Values must be ±8nm to meet verification.
15. Record values in the VSC 6000 Monthly Verification Log. Highlight the peak and trough values and save the Verification Data under the date collected.
16. Return to the VSC software by selecting the VSC icon from the program bar at the bottom of the desktop.
17. Close the VSC spectrum screen and return to the main screen by selecting the VSC icon at the far left of the spectrum toolbar.
18. Click "Finished" at the bottom of the "1Camera(Live)" screen to exit the spectrometer settings.

12.5.3 References

Foster + Freeman VSC6000 Video Spectral Comparator User Manuals
Schott BG36 Filter Measuring Report

~~12.6 Xaminer Elite Verifier Procedures~~

~~12.6.1 Maintenance~~

~~The view and alignment windows should be cleaned with a soft cloth if necessary. Any additional maintenance will be referred to authorized vendors such as Stratix.~~

~~12.6.2 Verification~~

~~The Xaminer Elite Verifier system will be verified monthly in the laboratory and as necessary by an authorized outside vendor.~~

~~The Xaminer Elite Verifier system must be connected to the Stratix Verification Software (SVS) during verification. The Xaminer Calibration Check Routine Card (Serial #XE6845) will be used to assist in the verification of the instrument. Only use the tools supplied in the package or certified replacements for verification. The reflectance reference page is a precision standard that is made of photographic materials. To ensure proper verification the reflectance page will be replaced if it becomes dirty or physically damaged.~~

1. ~~Press "PWR" on the Xaminer Elite verifier.~~
2. ~~Press the number "5" also labeled as "CALIB CK" on scanner.~~
3. ~~Press the "BK SP" also labeled as "Beam" on verifier to line up the laser with the barcode on Calibration Check Routine Card (Serial #XE6845).~~
4. ~~Press the number "1" to start verification scan.~~
5. ~~If the verification passes then the scanner will read "Successful".~~
6. ~~Press "Enter" to return to the home screen.~~
7. ~~Record the verification in the Stratix Xaminer Elite Verifier Calibration Log.~~
8. ~~If the unit cannot be verified, contact an authorized vendor such as Stratix.~~

~~The official verification log will be the handwritten log maintained in the Documents Equipment Notebook.~~

~~12.6.3 Procedure~~

~~The Xaminer Elite verifier is used to check to quality of the barcodes printed on the Ohio Lottery scratch-off tickets provided to BCI for Quality Assurance testing. The Xaminer is used to test the quality of the Interleaved 2 of 5 and the PDF 417 barcodes. The following is a brief description of the procedures used to test both types of barcodes. For further information, please refer to the manufacturer's instructions.~~

~~Interleaved 2 of 5~~

1. ~~Open SVS software~~

7. ~~Click "New Scan"~~
8. ~~Press "PWR" on handheld device to turn scanner on~~
9. ~~Place ticket in front of scanner and click "Target" to line up laser with barcode~~
10. ~~Click "Autoscan"~~

~~11. Click "Start" – wait for it to finish all 10 scans~~
- ~~Click "Hide" when done~~

~~12. Click "Print" on Toolbar (NOTE: This is not the picture of the printer)~~
- ~~Print "Statistics"~~
- ~~Print "Current Report"~~

~~13. Click "Profile"~~
- ~~Click "Profile" button on the right side of box (this will take a few seconds)~~
- ~~Click "Print" button when scan is done~~
- ~~Click "Hide" when done~~

~~14. Use yellow "Scan" button on handheld device to scan one more time~~
~~15. Press the number "9" (Detail)~~
~~16. Enter 42mm in the first line (enter 4 2 0 0 0)~~
~~17. Press "Enter"~~
~~18. Record "Ratio" from main screen of hand held device~~
~~19. Press "Print" (also labeled as the down arrow)~~
- ~~F1 setting should be CSV~~
- ~~Press "Enter" to send to SVS software~~

~~20. Click "Print" on Toolbar (NOTE: This is not the picture of the printer)~~
- ~~Make sure the last scan is highlighted~~
- ~~Print "Element Detail Report"~~

~~21. Click "File" on Toolbar~~
- ~~Save As~~
- ~~Save in Labshare Lottery QA Scans "Game #" "barcode"~~

~~PDF 417~~

1. ~~Open SVS software~~
2. ~~Click "New Scan"~~
3. ~~Place ticket in front of scanner and click "Target" to line up laser with barcode~~
4. ~~Click "Scan"~~
    a. ~~Start laser at top of barcode, slowly move laser down to bottom of barcode, then back up to top~~
    b. ~~Keep going up and down until it finishes the scan~~
5. ~~Repeat steps 2 thru 4 until 10 scans are completed~~
6. ~~Click "Print" on Toolbar (NOTE: This is not the picture of the printer)~~
    a. ~~Print "Statistics"~~
    b. ~~Print "Current Report"~~
7. ~~Click "Profile"~~
    a. ~~Click "Profile" button on the right side of box~~
    b. ~~Click "Print" button when scan is done~~
    c. ~~Click "Hide" when done~~
8. ~~Click "File" on Toolbar~~
    a. ~~Save As~~
    b. ~~Save in *AGO Network*~~

~~**12.6.4 References**~~

~~Stratix Xaminer Elite Users Guide~~

Appendix I: Approved Abbreviations

PACKAGING

Blk = Black
Brn =Brown
Bx = Box
Cello = Cellophane
Cl = Clear
Cont = Containing
Contr = Container
Env = Envelope
Ev = Evidence
HS = Heat Sealed
Lg = Large
Man = Manila
Mkd = Marked
Pap = Paper
PB = Paper Bag
Pkg = Package
Pkt = Packet
Pl = Plastic
Rec'd = Received
Sld = Sealed
Sm = Small
Sub = Submitted, Submission
Un-sld = Unsealed
Wht = White
BPB = Brown Paper Bag

EXAMINATION

Amt = Amount
B = Back
B/t = Between
BTW = Between
Cks = Checks
Cont'd = continued
Dev = Developed
Diff =Different, Differences
F = Front
HP = Hand Printing
HW = Handwriting
ID = Identification
IW = Indented Writing
Ind = Individual
Insuff = Insufficient
K = Known
MHBWB = May Have Benn Written By
MNHBWB = May Not Have Benn Written By
NB = Notebook
NC = Not Comparable
Neg., (-) = Negative
N/O = No Opinion
NWB = Not Written By
Nonreq = Non-requested
PNWB = Probably Not Written By
PWB = Probably Written By
Pc = Piece
Pg = Page
Pgs = Pages
Pos, (+) = Positive
Q, Quest = Questioned
QD = Questioned Document
Req = Requested
Sim = Similarities
Sig = ~~Significant,~~ *Signature*
~~Sign = Significant~~
Std = Standard
Subst = Substantial
Unk = Unknown
V = Very
W/ = With
WB = Written By
W/O = Without

INSTRUMENT

ESDA = Electrostatic Detection Apparatus
VSC = Video Spectral Comparator
IR = Infrared
Vis = Visible
Trans = Transmitted
UV – Ultra-Violet

LOCATION

MPR QD D# -Main Property Room Questioned Documents Drawer #
LP – Latent Print
ER – Evidence Receiving
QD D#- Questioned Documents Drawer #
FB – Forensic Biology
CHEM - Chemistry