EXHIBIT C

Designation: E2331 – 04

Standard Guide for Examination of Altered Documents[1]

This standard is issued under the fixed designation E2331; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This Guide provides procedures for examinations that should be used by forensic document examiners (Guide E444) for examinations involving altered documents.

1.2 These procedures are applicable whether the examination(s) are of questioned and known items, exclusively questioned items, or a single item.

1.3 These procedures include evaluation of the sufficiency of the material available for examination.

1.4 The particular methods employed in a given case will depend upon the nature of the material available for examination.

1.5 This guide may not cover all aspects of unusual or uncommon examinations.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E444 Guide for Scope of Work of Forensic Document Examiners

E1422 Guide for Test Methods for Forensic Writing Ink Comparison

E1732 Terminology Relating to Forensic Science

E2195 Terminology Relating to the Examination of Questioned Documents

E2291 Guide for Indentation Examinations

3. Terminology

3.1 *Definitions*:

3.1.1 For definitions of terms in this guide, refer to Terminologies E1732 and E2195.

3.2 *Definitions:*

3.2.1 *alteration*, *n*—a modification made to a document by physical, chemical or mechanical means including, but not limited to, obliterations, additions, overwritings, or erasures.

3.2.2 *digital image*, *n*—an image that is stored in numerical form.[3]

3.2.3 *digital image processing*, *n*—any activity that transforms a digital image.

3.2.4 *electrostatic detection device (EDD)*, *n*—an instrument that uses electrostatic charge as the mechanism to visualize paper fiber disturbances (for example, indentations, erasures, typewritten material/lift off).

3.2.5 *erasure*, *n*—the area where material has been removed from a document by chemical, abrasive, or other means.

3.2.6 *fluorescence*, *n*—a process by which radiant flux of certain wavelengths is absorbed and reradiated non-thermally at other, usually longer, wavelengths. **E1422**

3.2.7 *infrared (IR)*, *n*—referring to radiant flux having wavelengths longer than the wavelengths of light, usually wavelengths from about 760 nm to about 3 mm. **E1422**

3.2.8 *infrared luminescence (IRL)*, *n*—the emission of radiant energy during a transition from an excited electronic state of an atom, molecule, or ion to a lower electronic state (fluorescence or phosphorescence, or both), where the spectrum of the excitation source is in the ultraviolet (UV) or visible region of the electromagnetic spectrum, or both, and the spectrum of the emitted energy is in the far red or infrared (IR) region of the electromagnetic spectrum. **E1422**

3.2.9 *side lighting*, *n*—illumination from a light source that is at a low angle of incidence, or even parallel, to the surface of the item. Syn., *oblique lighting*.

3.2.10 *transmitted light*, *n*—illumination that passes through a document.

3.2.11 *ultraviolet (UV)*, *n*—referring to radiant flux having wavelengths shorter than the wavelengths of light, usually wavelengths from about 10 to 380 nm. **E1422**

3.2.11.1 *Discussion*—Long-wave UV usually refers to the spectral range of UV-A, with wavelengths from about 315 to 380 nm. Short-wave UV usually refers to the spectral range of UV-C, with wavelengths from 100 to 280 nm.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Scientific Working Group on Imaging Technologies (SWGIT) Definitions and Guidelines for the Use of Imaging Technologies in the Criminal Justice System, Forensic Science Communications, July 2001, Vol 3, Num. 3.

4. Significance and Use

4.1 The procedures outlined here are grounded in the generally accepted body of knowledge and experience in the field of forensic document examination. By following these procedures, a forensic document examiner can reliably reach an opinion concerning whether a document has been altered.

5. Interferences

5.1 Items submitted for examination may have inherent limitations that can interfere with the procedures in this Guide. Limitations should be noted and recorded.

5.2 Limitations can be due to submission of non-original documents, limited comparability, or condition of the items submitted for examination (for example, items that are stained, soiled, water-damaged, charred, or shredded). Such features are taken into account in this Guide.

5.3 The results of prior storage, handling, testing, or chemical processing (for example, for latent prints) may interfere with the ability of the examiner to examine certain characteristics. Whenever possible, document examinations should be conducted prior to any chemical processing. Items should be handled appropriately to avoid compromising subsequent examinations.

6. Equipment and Requirements

6.1 Appropriate light source(s) of sufficient intensity and appropriate type to allow fine detail to be distinguished.

NOTE 1—Natural light, incandescent or fluorescent sources, or fiber optic lighting systems are generally utilized. Transmitted illumination, side lighting, and vertical incident lighting may be useful in a variety of situations.

6.2 Magnification sufficient to allow fine detail to be distinguished.

6.3 The following additional equipment may be used as required:

6.3.1 IR image conversion device or system with appropriate light sources and filters for use in IR and IR luminescence examinations.

6.3.2 UV lamps or view box, with both long and short wavelength lamps.

6.3.3 Imaging or other equipment for recording observations.

6.3.4 Measuring devices (for example, typewriter grids, magnifiers with reticule patterns, or appropriate software).

6.3.5 Electrostatic detection device.

6.3.6 Other equipment as appropriate.

6.4 Sufficient time and facilities to complete all applicable procedures.

7. Procedure

All procedures shall be performed when applicable and noted when appropriate. These procedures need not be performed in the order given.

7.1 Examinations performed, relevant observations, and results shall be documented.

7.2 At various points in these procedures, a determination that a particular feature is not present or that an item is lacking in quality or comparability may indicate that the examiner should discontinue the procedure(s). It is at the discretion of the examiner to discontinue the procedure at that point and report accordingly or to continue with the applicable procedures to the extent possible. The reasons for such a decision shall be documented.

7.3 Examine the document for the presence of characteristics indicative of alterations. These can include, but are not limited to, the following:

NOTE 2—Care must be taken in the evaluation of the following characteristics that may occur in the normal preparation, handling, and storage of the document.

7.3.1 Overwriting,

7.3.2 Characteristics of multiple writing instruments,

7.3.3 Crowded or awkward placement of writing and/or printed text,

7.3.4 Paper fiber disturbance,

7.3.5 Use of different fonts, sizes, and/or styles,

7.3.6 Area(s) of discoloration,

7.3.7 Presence of an obscuring substance,

7.3.8 Smearing,

7.3.9 Uneven margins,

7.3.10 Different printing processes,

7.3.11 Irregular spacing and alignment, both vertical and horizontal,

7.3.12 Differences in fastening and binding mark,

7.3.13 Inconsistent handwriting features,

7.3.14 Unusual sequence of line intersections contrary to what may be claimed, and

7.3.15 Variations in paper characteristics.

NON-DESTRUCTIVE EXAMINATIONS

7.4 Non-destructive procedures shall be performed when applicable and need not be performed in the order given.

7.5 Examine the document macroscopically, or microscopically, or both.

7.6 Examine the document using various lighting techniques, such as side lighting (see Guide E2291), and transmitted lighting.

7.7 Examine the document using visualizing techniques such as UV, RIR, and IRL (see Guide E1422).

7.8 Make appropriate measurements.

7.9 Process the document using an EDD.

7.10 Examine the document with appropriate imaging techniques, such as photography or digital image processing.

7.11 Analyze, compare, and evaluate the findings.

7.12 Determine the need for destructive examinations. If unnecessary, discontinue examinations, reach a conclusion(s), and report accordingly.

DESTRUCTIVE EXAMINATIONS

7.13 Destructive examination techniques damage or otherwise change the document. They should be performed only after non-destructive methods have been exhausted.

7.13.1 The use of destructive examination methods may interfere with the potential for other types of forensic examinations (for example, chemical ink or latent print examinations).

7.13.2 Consultation with the submitter is advisable prior to destructive testing.

7.13.3 Prior to using these techniques, the item(s) should be appropriately documented.

7.13.4 These destructive techniques need not be performed in the order given.

7.14 Where an obscuring substance is present, use a solvent (for example, petroleum ether, liquid fluorocarbons) to make the paper translucent for visualization of any obscured entry(s).

NOTE 3—Prolonged exposure to solvents may affect the obscuring substance.

7.15 To remove an obscuring substance from the document(s), use of a solvent such as methanol or ethanol may be appropriate.

NOTE 4—Some solvents may dissolve ink or toner.

7.16 Physically remove (for example, abrade, scrape, or peel) the obscuring substance from the document.

7.17 For chemical ink examinations refer to Guide E1422.

NOTE 5—Chemical ink examinations may be conducted by other forensic specialists.

7.18 Analyze, compare, and evaluate the findings.

7.19 Reach a conclusion(s), and report accordingly.

8. Report

8.1 Conclusion(s), or opinion(s), or other finding(s) resulting from the procedures in this guide may be reached once sufficient examinations have been conducted.

8.2 The bases and reasons for the conclusion(s), opinion(s), or finding(s) should be included in the examiner's documentation and may also appear in the report.

8.3 Once examinations and evaluations have been completed, reports may include one or more of the following types of conclusion(s), opinion(s), and other finding(s):

8.3.1 Whether alterations were observed.

8.3.2 Whether any of the altered entries were decipherable.

8.3.3 The text or description of altered entries.

8.3.3.1 Method or sequence of alterations.

8.3.4 Images of alterations and original entries.

8.3.5 Other information about the alterations.

9. Keywords

9.1 alterations; erasures; forensic sciences; insertions; obliterations; overwriting; questioned documents