

TES01 - Guidelines for Trace Evidence Examination

Scope

- This document describes guidelines for the handling of physical evidence submitted to the Trace Evidence Unit.
- The nature and extent of handling will be determined by the type of evidence submitted and by the requested examinations of the contributor, with emphasis on protection from contamination, loss, and/or deleterious change.
- Guidelines for the microscopic analyses and comparison of hairs, textile fibers, and textile related examinations can be found in the discipline-specific protocols.

Safety Precautions

- While working with physical evidence, Laboratory personnel will wear appropriate protective attire (at a minimum, a laboratory coat, gloves, and hair net).
- Universal precautions will be followed.
- No specific hazards are associated with the microscopic examination techniques performed.
- Refer to the materials safety data sheet (MSDS) for guidelines regarding the use of a specific chemical.

Materials Required

- Stereobinocular microscope, magnification range from 0.5x to at least 40x
- Comparison microscope, magnification range from 40x to 600x
- Polarized light microscope, magnification range from 40x to 400x
- Permount mounting medium
- Xylene substitute, or reagent grade xylene
- Glass microscope slides and coverslips
- Kraft paper
- 3M Lint Rollers
- 3M lint 3.5 inch x 6 inch sheets
- PVC document envelopes
- Pillboxes
- Forceps
- Spatula
- Scissors
- Lux-o-lamp
- Single-use vacuum filters

Standards and Controls

Not applicable.

Procedure

1 Inventory and Description of Evidence

Evidence received by the Metropolitan Police Department Crime Laboratory (MPDCL) of the Metropolitan Police Department (MPD) is typically delivered by Mobile Crime Unit employees and received by MPDCL employees. The Evidence Operations Center (EOC) chain of custody form is signed by Laboratory personnel and a new chain of custody form is created to be retained in the MPDCL file.

- 1.1** The Trace Evidence Unit personnel will review the request for examinations contained within the incoming communication and if additional information is required will contact the Mobile Crime Unit or other individuals connected with the case (crime scene personnel, investigators, or Assistant United States Attorneys).
- 1.2** Multiple examination requests on submitted items of evidence require that testing be conducted in proper sequence to optimize results and to minimize loss, cross-transfer, contamination and degradation.

2 Procedures to be Used When Evidence Processing Includes Items Submitted from a Combination of Suspect(s), Victim(s), and Crime Scene(s)

- 2.1** To protect against contamination, items of evidence submitted from the victim, suspect, and/or crime scene will be processed in a different room or on a different date.
- 2.2** Items should be processed in the following order: questioned samples (i.e. from crime scene) then known samples (i.e. victim or suspect).
- 2.3** Between processing of items from different locations/individuals, the examiner will change their laboratory coat and change protective gloves and hair net.

3 Processing Physical Evidence

- 3.1** Before evidence is processed, the processing area floor will be thoroughly cleaned.
- 3.2** The processing table and utensils will be cleaned between items using at a minimum a spray cleaner such as Cavicide or bleach and a lint free wipe.

3.3 Each item of evidence will be processed over clean paper that is placed on the surface of the table.

3.4 Accessory lighting, special lighting techniques, and magnification may be used as needed.

3.5 The item of evidence will be described regarding type, color, size, and style, and carefully examined to determine its condition including damage, stains, etc. The item will be marked with the laboratory number, specimen item number and initials of the processor.

3.6 If an item of evidence needs to be subdivided, a decimal system will be used. e.g. Item 1 Pants becomes:

Item 1	Pants
Item 1.1	Belt

3.7 Visible debris will be picked off of the item and preserved in a separate container or placed on tape. A visual examination will always precede recovery of trace evidence prior to using some other recovery procedure.

3.8 In addition, trace material can be recovered using a scraping technique, using various types of tape or by vacuuming depending on the item being processed. If scraping is used the item of evidence will be either hung on an adjustable rack above a table or manually handled, depending on the size of the item. If tape is used to collect trace evidence, the specific type of tape used will depend on the item being processed. Smaller items such as knives, gloves, etc. may be examined at an examination table using a lux-o-lamp or stereobinocular microscope or examined in a hood using a stereobinocular microscope. If vacuuming is used, a special vacuum with a filter trap that is designed for recovering trace evidence will be used

3.9 If scraping is used, the adjustable rack to which the item is attached will be adjusted to allow the item to hang just above the surface of the table.

3.10 The item will be gently scraped to remove trace evidence that is adhering to the surface of the item.

3.11 Debris removed from the inside of items may be separated from outside debris, as warranted by the circumstances of the case.

3.12 Items recovered from pockets of submitted clothing may be placed in a container and appropriately marked with Laboratory case number, item number and processor's initials.

- 3.13** Debris removed from an item may be either collected in a pillbox or on tape or other suitable container, or directly mounted on a glass microscope slide following the procedures outlined below. The receptacle will be appropriately marked with the Laboratory case number, item number and initials of the processor.
- 3.14** If necessary, a known sample of fabric will be removed and placed in a small transparent plastic zip lock bag, appropriately marked with the Laboratory case number, item number and initials of the processor. If necessary, the location of the sample site will be documented via photographs, descriptions or other equivalent means in the case notes.
- 3.15** A clean sheet of paper will be used for the processing of each item of physical evidence unless case circumstances indicate otherwise.
- 3.16** After the item of evidence has been processed, it will be returned to its original container and sealed.
- 3.17** After all items have been processed, they will be properly stored in a secure evidence cabinet, refrigerator, safe or evidence room.
- 3.18** All evidence packages and/or boxes stored in any cabinet, refrigerator, safe or evidence room must be under proper seal. The Laboratory case number should be clearly visible.

4 Debris Screening and Slide Preparation - Hairs

- 4.1** Using a stereobinocular microscope, the pillboxes or tape containing debris collected from items of evidence will be examined for the presence of hair evidence.
- 4.2** The debris in the pillbox or on tape will also be examined for the possible presence of other trace evidence of potential value.
- 4.3** Hairs will be carefully removed from the pillbox or the tape and mounted on a clean glass microscope slide using a suitable mounting medium, e.g. Permount.
- 4.4** Hairs may be measured and the length may be recorded on the end of the glass microscope slide and/or placed in the laboratory notes. When mounting several hairs of different lengths on a single slide, the length of the longest hair should be recorded on the slide.
- 4.5** The examination of hairs in pillboxes, on tapings, in vacuum sweepings and in debris packets is facilitated by the use of lux-o-lamp magnifiers and

stereobinocular microscopes. The sampling of the hairs in debris will be directed by “target” hairs that may be derived from known hairs samples or by case circumstances.

4.6 If it is not possible to eliminate certain hairs from being mounted by targeting hairs different from those in a known hair sample or by case circumstances, all hairs that may have value in a case should be mounted. Notes should reflect the hairs that have not been mounted and why. Hairs not mounted would include limb type hairs and very short hair fragments. The number of hairs that are placed on a single slide will depend on examiner preference.

4.7 Forceps will be carefully cleaned between different items/pillboxes.

5 Debris Screening and Slide Preparation - Fibers

5.1 Placing a thin film of solvent (such as xylene) on the surface of the slide will allow fiber samples to adhere temporarily until the mounting medium is applied.

5.2 Using clean forceps, fibers can be removed directly from smaller items, from a pillbox or from tape. The fibers will be placed on the slide and arranged so they can be completely covered by the glass coverslip.

5.3 Excess solvent will be blotted off to avoid run-off of the excess solvent when the mounting medium is applied and to help arrange fibers on the glass microscope slide. Note: The used blotter paper will be checked to make sure that none of the debris is adhering to the blotter paper and will be discarded between slides.

5.4 The screening of pillboxes, tapings, vacuum sweepings and debris packets is facilitated by the use of lux-o-lamp magnifiers and stereobinocular microscopes. The sampling of the debris can be directed by “target” fibers that may be derived from known fiber sample or can be random. The known fiber samples may include carpet samples and fabric samples either submitted separately or collected during the processing of clothing items.

5.5 When a random sampling of questioned debris is desired, a representative sampling of fibers of different colors, shapes and sizes is mounted. Usually fibers other than a color of the item being processed will be selected along with carpet type fibers. The amount of fibers mounted will depend on the amount of debris recovered. If it does not appear that the fiber evidence will provide useful lead information, and no comparisons are possible, no fiber slides need to be prepared and the debris is to be maintained for possible future comparison purposes. The selection of fiber types from the pillboxes, tapings, and vacuum sweepings can be facilitated by noting the color of the target fibers or by viewing the fabric sample in the plastic bags they were placed in at the time of collection. The letters “R/S”

may be placed on the glass microscope slide to indicate that a representative sample of fibers was mounted and that additional fibers are present in the item/pillbox/taping. An estimate of the percentage of recovered fibers that have been mounted may be placed in the laboratory notes. The mounting of the known fabric cuttings should be done after all debris fibers have been mounted to prevent contamination.

- 5.6** When complete yarns are identified in the pillbox debris, they will be thoroughly characterized (i.e., diameter, twist, construction) before being separated and mounted on the glass microscope slide. Only a small portion of a yarn should be cut off the yarn and mounted. Consideration will also be given to physically matching yarns to damaged fabric before mounting fiber samples from the yarn on a slide.

6 Selection and Preparation of Known Fiber Slides

- 6.1** A sample will be selected that represents the range of colors and fiber types present in the fabric.
- 6.2** Damaged areas will be carefully examined to document the colors/types of yarns that may be present on questioned items. Note: If possible, known yarn samples will not be taken from damaged areas because of potential future yarn/fabric matches.
- 6.3** Fiber samples from yarn types present in the fabric will be mounted. Warp yarns and fill yarns may be separately mounted. Sewing thread and button thread fiber samples may also be mounted. In most cases the known fibers will be mounted after the unknown fibers have been mounted.
- 6.4** In addition to the Laboratory case number, the item number, and the initials of the processor, the letters “KN” may be written on the end of the glass microscope slide.

7 Secondary Evidence

Material derived from an item of evidence is designated as secondary evidence. Examples of secondary evidence include (but are not limited to) the following: glass microscope slides, plastic pillboxes, tapings, plastic bags, paper folds, and vacuum canisters. Secondary evidence will be accounted for on a *Secondary Evidence Inventory* form.

8 Changes to Evidence Description

Any changes to the description of the evidence, including subdivided items, shall be added to the *Evidence Listing* form.

Limitations

Not applicable.

Comments

Not applicable

Documentation

The following worksheet(s) shall be generated and managed:

Casework Documentation
<i>Secondary Evidence Inventory</i> <i>Processing Worksheet</i> <i>Evidence Listing</i> <i>Diagram/Photo Worksheets</i>

References

MPD Laboratory Quality Assurance Manual (current revision)

MPD Laboratory Health and Safety Manual (current revision)