A. PURPOSE: To define a method by which hair evidence will be collected, identified and compared.

B. RESPONSIBILITY:

Forensic Science Examiner who has successfully completed hair examiner training in accordance with the Trace Section Training Manual (SOP-TR-01).

A Hair Examiner from another ASCLAD accredited laboratory may act as the co-signor or confirmatory examiner for hair examinations.

The Director or Supervisor may act as the co-signor of a report which includes hair identifications or hair comparisons after a hair examiner has technically reviewed the case and/ or confirmed its findings.

C. SAFETY

The appropriate measures for the proper handling of biohazard materials, sharps instruments and chemicals will be used according to the Connecticut State Forensic Science Laboratory Safety Manual.

D. PROCEDURE: Set up

1. The examiner will use his / her discretion to assess the probative value of the evidence; as well as, determine the types and extent of the examinations conducted.

2. The examiner may deem it necessary to vary from the set hair protocol based on the evidence submitted. If a variation in the hair procedure is necessary, the submitting agency will be notified.

3. Many variables are encountered in Forensic hair identification and Forensic hair comparisons in forensic casework. The following outline will be used as a guide for the examiner.

E. PROCEDURE: Collection

1. Trace evidence may be transferred from other sections of the Laboratory to the Trace Section for further examination. Examinations may include hair identifications and hair comparisons.
2. Trace material may be collected from an item of evidence during examination within the Trace Section using a forceps, tape lift, scraping or other suitable collection technique based on the type of evidence submitted to the laboratory. The examiner will document the method of collection in the case file. (See also SOP-TR-05 Examination of Evidence)

F. PROCEDURE: Hair mounting

1. Mounting media such as Polymount or other appropriate hair mounding media may be used to mount hairs.
2. Hairs which will be compared will be mounted in the same mounting media.
3. The appropriate glass microscope slide and cover slip will be used based on the length and morphology of the hair evidence and parameters of the microscope.
4. Known and questioned hair(s) will not be mounted on the same slide.
5. Only one hair sample for mounting will opened at a time

G. PROCEDURE: Hair Identification

1. The examiner will identify a piece of trace material as a hair or identify it as other trace material.
2. The examiner will determine if the hair is “animal” or “human”.
    a. The examiner will document observations which support the conclusions that a hair is “animal” or “human”.

       Examples of this documentation may include descriptions of roots features, color features, cortex features, pigment features, cuticle(scale) features, tip features, medulla features or gross morphological features. The examiner will use their knowledge, training and experience to identify these features.
3. Hairs identifications will be documented on the appropriate Quality Record Worksheet.
4. When possible the somatic body area and racial origin will be determined and documented on the appropriate Quality Record Worksheet.
5. The presence or absence of tissue will be documented on the appropriate Quality Record Worksheet.

6. Other hair characteristics observed, will be documented on the appropriate Quality Record Worksheet. Other hair characteristics may include but is not limited to: nature of removal, artificial treatment, appearance, damage and length.
7. The examiner will determine when a hair is not suitable for microscopic hair comparisons.

H. PROCEDURE: Hair Comparisons

1. Only head hair and pubic hair are suitable for comparison purposes. Hair examinations may be limited by the time elapsed between the incident and the collected of the known sample, and the suitability of the questioned and known hairs.

2. Twenty-five (25) full-length pulled head hairs which represent the entire area of the head (front, top, back, left side, right side), when available, may generally be considered an adequate known sample for the head region.

3. Twenty (20) full length pulled pubic hairs which represent the entire areas of the pubic region, when available, may generally be considered an adequate known sample for the pubic region.

4. If a known sample is not available from an individual, other sources of hair (ex. hairbrush) may be submitted to the laboratory for use as a known sample. The examiner will determine if the use of this "known sample" is suitable.

5. The examiner may deem that a known hair sample is not suitable for comparison based on the following characteristics but not limited to: length, condition, number or appearance.

6. A representative sample of the known hairs provided may be used for hair comparisons. The examiner will determine the appropriate number of hairs to use as a known sample.

7. Questioned and known hairs may be first compared macroscopically. If significant differences are noted by the examiner, the samples may be deemed dissimilar and a microscopic examination does not need to be conducted.

8. After conducting a macroscopic comparison, the examiner will perform a microscopic comparison of questioned and known hair(s). A minimum total magnification of 40X will be used. A comparison microscope will be used. The examiner will assess the microscopic hair characteristics present in the known sample and determine if the questioned hair(s) exhibits similar or dissimilar characteristics. The examiner will document their results on the

appropriate Quality Record Worksheet(s). These worksheet(s) shall remain in the case jacket.

9. **Confirmation of hair comparisons:**

A. If an examiner determines a questioned hair to be similar to a known hair sample, all of the relevant slides should be given to a second qualified hair examiner.
B. The second hair examiner should conduct an independent examination of the known and questioned hairs.
C. If the same conclusion is reached, the second examiner should initial the appropriate Quality Record Worksheet(s) indicating that the comparison has been verified. The results may then be reported to the submitting agency.
D. If the second examiner does not reach the same conclusion, either a third qualified examiner should be consulted (Section Supervisor or designee) or, no association will be reported.

10. **Requests from other laboratories**:

On the occasions when hair evidence that have been previously associated By A Non-Connecticut Forensic Science Laboratory Examiner the following will apply:

A. Hairs that have been determined to be similar to a known hair sample by a non-Connecticut Forensic Science Laboratory (non-CTFSL) examiner must be examined by a qualified hair examiner in the Trace Unit.
B. If the hair examiner agrees with the conclusion of the non-CTFSL examiner, a second qualified hair examiner will confirm the association as outlined above.
C. If the examiner disagrees with the conclusion of the non-CTFSL examiner, a second qualified hair examiner will verify the non-association. Generally, no mt-DNA will be conducted.

I. PROCEDURE: DNA ANALYSIS

Questioned hairs that have been determined to exhibit microscopic characteristics similar to the known hair sample, or other hairs deemed appropriate, may be submitted for DNA analysis. The Trace examiner may consult with an examiner from the DNA Section regarding the hairs' suitability for DNA analysis. Generally, a hair with a tissue tag will be forwarded for nuclear DNA analysis while hair roots without tissue tags, or hairs with no roots will be forwarded for mitochondrial DNA analysis.

J. PROCEDURE: Hair Samples Retained at the Laboratory

1. Hair evidence may be stored in a manner that preserved the integrity of the evidence . Examples of this include but is not limited to: paper folds, between glass microscope slides (with or without mounting media) or on a gel lifter. The examiner will determine the appropriate method based on the evidence. A combination of the previously listed methods may be used.

2. Trace evidence from each case will be contained in an envelope(s). The envelope(s) will be sealed. The examiner's initials will be placed across the seal.

K. PROCEDURE: Report Writing

1. The examiner will generate a report based on the results of their examination.
2. Based on the examination the results may include:

   Animal or human

   Human Body region : head, pubic or body

   Racial-type: Caucasian, Negroid or Mongoloid

   Presence of tissue-like material

   Means of removal

   Artificial treatment

   Other observed characteristics
3. When reporting that an animal hair is present the examiner may include the species of the animal if that determination is probative to the investigation.
4. The results of a hair comparison are used to draw a conclusion. Generally, three conclusions will be made including but no limited to:

   A. The questioned hair exhibits similar characteristics (no significant differences) to the known sample.

   B. The questioned hair exhibits dissimilar characteristics to the known sample.

   C. The questioned hair exhibits both similarities and differences to the known sample.
5. Examples of report statements may include:

Submission #001 was a sheet.

A. Human Caucasian-type pubic hairs were located on submission #001.
B. These hairs exhibited microscopic characteristics similar to submission #002 (known pubic hair from the suspect). Thus, based upon the known hair sample submitted, the source of submission #002 cannot be excluded as being the source of the hair located in submission #001.

OR

Submission #001 was a sheet.
A. Human Caucasian-type pubic hairs were located on submission #001.
B. These hairs exhibited microscopic characteristics dissimilar to submission #002 (known pubic hair from the suspect). Thus, based upon the known hair sample received, the source of submission #002 can be excluded as being the source of the hair located on submission #001.

OR

Submission #001 was a sheet.
A. A Human Caucasian-type head hair was located on submission #001.
B. This hair exhibited both similarities and differences to submission #002. Thus, based upon the known sample received, no conclusion can be reached as to the possible origin of this hair.

4. On the occasion that "unusual" circumstances are present during a hair examinations, the examiner will consult with their co-signor and determine appropriate language for the report.

5. Upon determining a questioned hair is similar to a known sample the following statement will be included in the report:

"It is to be noted that microscopic hair comparisons do not serve as a positive means of identification.".

6. When hairs are forwards for DNA analysis the following statement will be included in the report:

"The probative value of microscopic hair examinations may be affected by DNA analysis"

L. REFERENCES:

Rhode Island State Crime Laboratory – Trace Evidence Procedures Manual

Boston Police Department Crime Laboratory: Trace Evidence Section Procedures

Hicks, J. Microscopy of Hairs: A Practical Guide and Manual, FBI Laboratory, 1977.

***A bibliography of hair related articles will be available in the Trace Section for reference to the examiners.**