Personal Identification

1 Scope

This document describes guidelines for the comparison of antemortem and postmortem skeletal information, and assessing other skeletal features that may support or provide lead value or support a personal identification by Anthropology Examiners within the Trace Evidence Unit (TEU).

2 Equipment/Materials/Reagents

- Digital radiography unit (NorthStar X-5000 x-radiography unit or Kubtek radiography unit or equivalent)
- Personal protective equipment (e.g., lab coat, gloves, eye protection)
- Digital camera (Nikon D70 or equivalent)
- Light box
- Stereobinocular microscope, magnification range from 0.5x to at least 40x

3 Standards and Controls

Not applicable.

4 Sampling

Not applicable.

5 Procedure

The Forensic Anthropological Examinations Procedure will be followed. Examiners may facilitate the identification process through the comparison of antemortem and postmortem skeletal information and looking for consistencies and inconsistencies that support or refute whether they originated from the same individual. Examiners may also assess the skeletal for features that may provide lead value or support a personal identification. One or more of the following approaches may be used.

5.1 Identification Comparison

An identification comparison is the direct comparison of antemortem skeletal information, typically in the form of radiologic images (e.g., radiographs, computed tomography (CT) scans, other medical imaging modalities) with postmortem information (typically radiologic images)

obtained from the skeletal remains. When antemortem radiographs are provided for comparison, the examiner will produce postmortem radiographs that simulate the antemortem radiographs in scope and projection following the Chemistry Unit, Metallurgy Digital Radiography Procedure or other instrument-specific procedures. Depending on whether the submitted radiographs are film or digital, the comparison may be performed using a computer screen or light box. Antemortem radiographs or CT scans can also be compared to postmortem CT scans. The forensic anthropologist will then compare the two images, looking for consistencies and inconsistencies in bone morphology, trabecular patterns, frontal sinuses, dental features, etc. Identification comparisons must be verified (see Section 5.4). Identification comparisons may result in one of the following conclusions:

5.1.1 Inclusion (i.e., included): An examiner's conclusion that the questioned skeletal information could have originated from the same individual as the known skeletal information, or from another individual with the same skeletal features.

The basis for an 'inclusion' conclusion is an examiner's decision that there is sufficient agreement between the features of the questioned and known skeletal information, with no unexplainable differences, to conclude that the skeletal information could have originated from the same individual or from another individual with the same skeletal features.

The strength of the agreement, based on relevant databases or published frequencies of shared skeletal feature(s), shall be reported, if known. If the frequency of the shared feature(s) is not known, the examiner shall disclose that the number of individuals who may also share the feature(s) is unknown.

5.1.2 Exclusion (i.e., excluded): An examiner's conclusion that the questioned and known skeletal information could not have originated from the same individual.

The basis for an 'exclusion' conclusion is an examiner's decision that the questioned and known skeletal information exhibit sufficient differences in skeletal features such that the questioned skeletal information could not have originated from the same individual as the known skeletal information.

5.1.3 Inconclusive: An examiner's conclusion that no determination can be reached as to whether the questioned and known skeletal information could have originated from the same individual.

The basis for an 'inconclusive' conclusion is an examiner's decision that there is insufficient quantity and/or quality of skeletal features in the known and/or questioned skeletal information to determine whether the skeletal information could have originated from the same individual or from another individual with the same skeletal features.

5.2 Skeletal Information That May Support an Identification

Other information obtained from the skeleton may provide lead value or support an identification, but does not involve the direct comparison of antemortem and postmortem skeletal information. This information will be recorded in the notes and reported as appropriate.

5.2.1 Surgical Implants

When surgical implants (e.g., surgical implements, artifacts, appliances, devices) are present with or within the remains, all information (e.g., lot number, serial number, stamp/symbol of the manufacturer) present on the device will be noted and reported. The information can be compared with industry repositories or historical records to determine the likely location and/or time period of use. In cases where the device appears in radiologic images, the device may be included as part of an identification comparison (see Section 5.1).

5.2.2 Biological Profile

Biological information estimated from the skeletal remains such as age, sex, ancestry, and stature may be assessed to determine whether it is consistent with recorded information or databases of missing persons (see Estimation of Biological Profile Procedure).

5.2.3 Charts and Notes

Written or charted medical and/or dental records that contain recorded features or patterns may be assessed to determine whether they are consistent with the skeletal remains.

5.2.4 Injuries, Anomalies, Pathological Conditions, and Lesions

When injuries, anomalies or pathological conditions are identified on the skeletal remains, they may be assessed to determine whether they are consistent with antemortem records or information. Most of these conditions can be observed macroscopically, and in some cases may be aided by the use of a stereobinocular microscope or radiographic examination. In cases where the condition is documented/captured in radiologic images, it may be included as part of an identification comparison (see Section 5.1).

5.2.5 Repetitive Mechanical Stress

Stresses and strain on an area of the skeleton from repetitive mechanical stress over time may leave marks on the skeleton in the form of: over-developed tubercles, crests, processes, and fossae; bowing or other changes in the diaphyses or articular facets; degenerative changes; or lesions. Often, asymmetries in robusticity, length, and density of paired bones may be indicative of such activity. Overexposure to some chemicals may leave marks on bone (e.g., spurring at the bone tendon interface as a result of fluorine toxicity or fluorosis). Facets, grooves, notches, fractures, premature wear, and lesions may be apparent in the dentition.

5.3 Records

5.3.1 Case Notes

The case notes will thoroughly record all observations of traits determined to be potentially useful for identification, and where appropriate will include diagrams, sketches and photographs, supplemented with written notes.

5.3.2 Reports

5.3.2.1 In cases where no antemortem data was provided, the FBI *Laboratory Report* (7-1, 7-1 LIMS) may indicate features or conditions that the examiner believes may be useful for identification or narrowing the pool of potential candidates. For example: *"The following skeletal conditions were noted and may be useful for personal identification if suitable antemortem records can be located for comparison."* OR *"The skeletal remains include a surgical device marked serial number 99999, manufactured by Company X."*

5.3.2.2 When antemortem records or data are provided and a direct comparison of antemortem and postmortem skeletal information is performed, the *Laboratory Report* will indicate one of the conclusions described in Section 5.1.

5.4 Verification

Identification comparisons involving known (antemortem) and questioned (postmortem) skeletal information (see Section 5.1) will be submitted for verification by a second qualified Anthropology Examiner. The verification will be recorded in Forensic Advantage (FA). If the second examiner does not reach the same conclusion, the disagreement will be addressed under the FBI Laboratory Operations Manual – Practices for Resolution of Scientific or Technical Disagreement.

6 Calculations

Calculations carried out as part of a biological profile will be performed according to appropriate reference data.

Calculations may be carried out in accordance with the prescribed method in the reference literature, or through the use of Fordisc. he source(s) of the formula(e) and calculations used will be recorded in the case notes.

7 Measurement Uncertainty

7.1 The measurement uncertainty with calipers is approximately ± 0.02 mm or better, depending on the caliper used. Refer to instrument manuals for uncertainty for a particular

caliper. This degree of uncertainty of measurement does not significantly affect anthropological conclusions and is not detrimental to the results of anthropological examinations. Measurements with calipers are recorded to the nearest mm.

7.2 The measurement uncertainty with an osteometric board is approximately ± 0.5 mm. This degree of uncertainty of measurement does not significantly affect anthropological conclusions and is not detrimental to the results of anthropological examinations. Measurements with an osteometric board are recorded to the nearest mm.

8 Limitations

Ultimately, the conclusion regarding identification is made by the relevant medicolegal authority.

The conclusions that can be reached from anthropological examinations are dependent on the condition and completeness of the remains, and the availability and quality of antemortem data. Results based on fragmentary or poorly preserved material may be inconclusive.

9 Safety

9.1 While working with physical evidence, Laboratory personnel will wear at least the minimum appropriate protective attire (e.g., laboratory coat, safety glasses, protective gloves).

9.2 Universal precautions will be followed.

9.3 Exposure to biological and radiological hazards may be associated with the examination techniques performed. Safety procedures related to specific instruments or equipment (e.g., wafering saws, X-ray units) will be followed. Refer to the FBI Laboratory Safety Manual for guidance.

10 References

- Digital Radiography Procedure, Chemistry Unit, Metallurgy (current version).
- Ousley SD and Jantz RL. (2005) FORDISC 3.0: Personal Computer Forensic Discriminant Functions. The University of Tennessee, Knoxville, Department of Anthropology.
- Forensic Anthropological Examinations, Trace Evidence Procedures Manual (current version)
- Estimation of Biological Profile, Trace Evidence Procedures Manual (current version)

- FBI Laboratory Safety Manual (current version)
- FBI Laboratory Operations Manual (current version)
- Scientific Working Group for Forensic Anthropology guidelines for Personal Identification (current version).
- Scientific Working Group for Forensic Anthropology guidelines for Identifying and Describing Pathological Conditions, Lesions and Anomalies (current version).
- Department of Justice Uniform Language for Testimony and Reports for the Forensic Anthropology Discipline (current version)

Rev. #	Issue Date	History
3	01/31/19	Updated Section 5.9.2.2 language to provide consistency with Department of Justice Uniform Language for Testimony and Reports for the Forensic Anthropology Discipline Updated Section 5.10 Changed 'forensic anthropologists' to 'anthropology examiners' throughout Changed 'documented' to 'recorded' throughout Added ULTR to references
4	12/16/19	Updated language in Sections 1, 5, 5.1, 5.2.1, 5.2.2, 5.2.3, 5.2.4, 5.3.2.2 Section 5.1 header changed to 'Identification Comparison' from 'Comparative Radiology' Moved conclusion language to Sections 5.1.1 through 5.1.3 Removed sections on Skull Photo Superimposition and Comparative Photograph Updated Section 5.4 to clarify types of examinations that get submitted for verification Changed Anthropology Examiner to 'examiner' in multiple sections outside of Scope.

Approval

Redacted - Signatures on File

Trace Evidence Unit Chief — Date: 12/13/2019

Anthropology Technical Leader — Date: 12/13/2019