DPAA LABORATORY MANUAL

Title Page Last Revised: 5 February 2015
(Current and Updated Version Located on the DPAA Intranet)

Laboratory Mission: ***To recover and identify U.S. personnel who never returned from Harm's Way. To perform humanitarian service.***

Laboratory Vision Statement: ***To be the "Center of Excellence" for the Search, Recovery, and Identification of America's missing from her wars. To conduct all functions required to care for our past, present, and future fallen comrades, and to bring closure to our nation's families. To ensure there is never again an unknown as the result of America's Wars.***

"There's no more effective way of creating bitter enemies of the Army than by failing to do everything we can possibly do in a time of bereavement, nor is there a more effective way of making friends for the Army than by showing we are personally interested in every casualty which occurs."

General of the Army
George C. Marshall
Army Chief of Staff
1944

DPAA Laboratory Manual

(Current and Updated Version Located on DPAA Intranet)
Last Revised: 5 February 2015
Citation: DPAA Laboratory Manual, Part II Cover Page

PART I: GENERAL CIL PROCEDURES

Part I of the DPAA Laboratory Manual deals with general CIL procedures. These are common procedures that must be understood, to a varying extent, by the CIL Staff, visitors, and contractors to fulfill the below intents and purposes. As such, all personnel requiring competency training will be required to certify in Part I. The spirit, purpose and intent of the procedures outlined in Part I are as follows:

- To establish safe working conditions that protects personnel, the public, and government and personal property.
- To maintain the security of evidence, case files, and government and personal property.
- To define the working environment through commonly shared and understood policies between Laboratory Management and the remainder of the CIL Staff.
- To serve as baseline procedures from which other procedures may be written.
- To instill a knowledge base in, and to communicate the Scientific Director's intent to, the CIL Staff so they can function at maximum efficiency with minimum supervision and guidance.
- To outline general casework procedures, serving as a training tool for new CIL employees, and as an overview for non-scientific CIL Staff, and individuals external to the CIL.
- To fulfill, in part, select ASCLD-LAB accreditation requirements.

SOP 1.0: OVERVIEW OF LABORATORY MANUAL

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 4 April 2017
Citation: DPAA Laboratory Manual, SOP 1.0

0.0 PRINCIPLE, SPIRIT & INTENT: The DPAA-CIL is a professional scientific laboratory employing highly standardized methods and procedures conducive to the production and documentation of scientifically sound casework while maintaining a creative and innovative intellectual atmosphere that is the hallmark of a great laboratory.

1.0 PURPOSE & SCOPE: The DPAA Laboratory Manual (usually referred to as the Laboratory Manual, Lab Manual, or SOPs [standard operating procedures]) provides guidance and sets standards to ensure that CIL forensic casework and identifications are scientifically sound and legally defensible.

The Laboratory Manual is the primary instrument for implementing the quality assurance dogma of:

- Write what you do.
- Do what you write.
- If it is not written down—it did not happen.

The Laboratory Manual documents CIL policies, systems, programs, procedures and instructions to the extent necessary to assure the quality of its test results. It is the CIL's primary documentation and is communicated to, understood by, available to, and implemented by the appropriate personnel **(A4.2.1)**.

Select provisions of the Laboratory Manual may apply to agencies external to the CIL (see below). Some SOPs (e.g. SOP 1.1 [CIL Work Environment] and SOP 1.6 [General Casework Procedures]) are general primers about the CIL and its operations and are thus written, in part, with an external audience in mind.

The Laboratory Manual establishes uniformity and standardization of evidence recovery and analysis; however, other topics supporting these goals are also addressed, such as the work environment (management practices, personnel policies, etc.), non-analytical general CIL procedures (security, safety, administration, etc.), logistics, and surety (quality assurance).

This Laboratory Manual covers all operations carried out in the CIL's permanent facilities, at sites away from its permanent facilities, or in associated temporary or mobile facilities **(A4.1.3)**.

2.0 HIERARCY OF DOCUMENTATION: The Laboratory Manual is the second tier (Tier 2) in a three tiered documentation system used by the CIL **(A4.2.5)**. All three tiers of documentation fall under the CIL document control program outlined in the DPAA Laboratory Manual, SOP 4.0 (CIL Surety).

Tier 1 consists of regulatory documents from a variety of organizations external to the CIL which are used to define the CIL as an institution and/or regulate CIL operations. Select provisions of Tier 1 documentation are reflected in the contents of the Laboratory Manual. Tier 1 documents relevant to the CIL include, but are not limited to:

- Legislative statutes or regulations (e.g., Title X United States Code).
- Department of Defense Directives and Instructions (DODDs and DODIs).
- Other Federal Agency statutes (e.g., OSHA and EPA regulations, ATF Guidelines)
- SOPs, policy statements, standards, or other normative documents from the parent agency or organization (e.g., DPAA SOP).
- Accreditation manuals (e.g., ISO/IEC 17025) and their supplemental documentation by respective accrediting bodies.
- User's manuals for field and trace evidence equipment and any devices or systems that impact on CIL surety (e.g., refrigeration units).

Tier 3 consists of subordinate documentation. Subordinate documentation is documentation that is adopted or generated by the CIL based on the content of the Laboratory Manual, and provides a framework for documenting and controlling CIL operations. Tier 3 subordinate documentation adopted or generated by the CIL includes, but is not limited to:

- Blank forms and report templates.
- Miscellaneous internal guides and procedures (these are often designed for and distributed to external agencies)
- Methods and test procedures adopted from textbooks, scientific journals or other external sources.
- Data sets and tables.
- Equipment user manuals.
- Drawings and sketches (e.g. CIL floor plans).
- Audit checklists.
- Training manuals and guides.

- Performance check, calibration, and maintenance documentation (e.g., essential equipment lists, performance check schedules, etc).
- Blank proficiency and competency tests and answer keys.
- Management review checklists.
- Subcontractor lists.

3.0 ISSUANCE: The current controlled and official Laboratory Manual is located on the DPAA network **(A4.2.1)**. Other copies, or portions there of, existing in hard copy or electronic format are considered uncontrolled and no longer formally issued. Uncontrolled copies are to be avoided, however, they may sometimes be needed (e.g., when staff are in training or deployed to a remote setting). Uncontrolled copies should be discarded after use.

4.0 VERSIONS: Given the nature of the CIL's document control system (see DPAA Laboratory Manual, SOP 4.0, CIL Surety) individual CIL SOP versions are identified by their revision date in the header (see below). As such, the Laboratory Manual, as a whole, is not subject to any type of version or revision numbering system or scheme. Such systems became obsolete when the document control system of the CIL first went into effect.

5.0 ORGANIZATION, FORMAT & CONTROL:

5.1 **General Organization:** The Laboratory Manual is comprised of four parts, each part consisting of SOPs of similar topics and a fifth section comprised of appendices. The organization of the Laboratory Manual should in no way convey precedence. In other words, an annex should not be assumed to be unimportant since it is not included in the body of the SOP. Likewise, a particular SOP is not more important than another simply because it is presented first. **No part of the Laboratory Manual is more or less significant than another.**

5.2 **Format:** The parts and SOPs contained in the Laboratory Manual are organized around a similar format to facilitate ease of use. Some variation in formatting is required to present content unique to a specific SOP. In addition, while some of the information found in the Laboratory Manual is not technically "procedural" (e.g., CIL Safety Program, Work Environment), the format is adhered to for the purpose of stylistic continuity.

Each SOP is internally paginated rather than the entire manual being sequentially paginated. Longer and more-detailed SOPs (e.g., Evidence Management & Security, Recovery Scene Processing) may have a table of contents.

5.3 **Header & Document Control:** Each SOP includes a header that provides document control information, including a revision date, and approved citation. The header includes:

- **Full Title:** The title identifies the SOP and provides information on the scope and purpose of the procedures described.
- **Location of Updated & Current Version:** This provides the user with information on the location of the most-current version, which is posted on the DPAA network. Should the user have any reason to believe that an uncontrolled version is not current, the electronic version acts as the base-line document.
- **Revision Date:** The last revision date for the current version is listed. This date should match that in Appendix 5.5 (Revisions) of this manual.
- **Citation:** This area provides the approved citation and ensures uniformity in how the Laboratory Manual is referenced.

5.4 **Conformance Monitoring & Controls:** For ease in accreditation, conformance control, and monitoring, any contents throughout the Laboratory Manual that directly support criteria listed in accreditation documents are marked by the criterion number in bold and further contained in parentheses (e.g., **A4.1.3, SA5.2.1.1**) in the appropriate place in the text. Letter-number prefixes key the criterion to its accreditation document. Prefixes are as follows:

- A = ISO/IEC 17025 (General Requirements for the Accreditation of Forensic Science and Testing and Calibration Laboratories)
- SA = ANAB ASCLD-LAB ISO/IEC 17025: 2005 Forensic Science Testing and Laboratories Accreditation Requirements. An example of a criterion from this document would be (**SA4.1.7**) indicating that ISO 17025 Criterion 4.1.7 was being supplemented by ANAB ASCLD-LAB.

The sections of the Laboratory Manual bearing these markings are listed in (and thus further indexed to) Electronic Conformance Files maintained by Quality Assurance.

6.0 DEFINITIONS & TERMINOLOGY: Terms, nomenclature, acronyms/abbreviations, and jargon specific to an SOP may be defined in that SOP. There is also a Glossary (Appendix 5.1) at the end of this manual.

External to DPAA and within the non-CIL DPAA sections and staff, terminology regarding the CIL may be used that is infrequently used in the CIL and, therefore, is not systemically reflected in the Laboratory Manual. For example, the preponderant

term used by the Laboratory Staff (and reflected in the Laboratory Manual) is the "CIL" while those external to the CIL may use the DPAA approved term of "Laboratory." Similarly, the CIL Staff use the term "Laboratory Director" rather than the DPAA designated position of "Laboratory Chief." Such dichotomy exists for practical, historical, and accreditation purposes. The alternate terminology is only used to address internal CIL business.

7.0 REVISIONS: The following pertain to revisions:

7.1 **Revision Procedure:** Anyone can suggest revisions to the Laboratory Manual **(A4.1.5k, A4.12.1)**. The revision procedure is as follows:

1) Changes are proposed to, and evaluated by, Laboratory Management and/or the Lead Quality Manager, as appropriate **(A4.2.1, A4.2.3)**.

2) Change(s) are approved or disapproved by the Laboratory Management or the Lead Quality Manager, as appropriate. Approved changes are categorized by a revision class. These are:

- **Class I**: Revisions are stylistic in nature or to correct typographical errors and do not affect the substance of the SOP or the integrity of the resulting work.
- **Class II**: Revisions are substantive in nature and may affect the integrity of the resulting work. The CIL Staff will familiarize themselves with the revision(s).
- **Class III**: Revisions are of a major substantive nature and affect the integrity of the resulting work. A Class III revision may require all CIL Staff to sign an acknowledgment that they have read the revised SOP.

3) The Lead Quality Manager makes the relevant changes. The electronic version is locked. Only the Science Director, Laboratory Director, and Lead Quality Manager or his designees have access to make changes in accordance with document control procedures outlined in DPAA Laboratory Manual, SOP 4.0 (CIL Surety).

4) Further, the Lead Quality Manager **(A4.3.3.4)**:

- Posts a summary of the revision(s) in DPAA Laboratory Manual, Appendix 5.5 (Revisions) located on the DPAA network **(A4.3.3.2)**. Minor changes, such as typos and grammar, need not be recorded provided they do not substantively change the document.
- Notifies the CIL Staff of the change via email
- Immediately removes the obsolete document from the network **(A4.3.2.2c)**.
- Marks the document as obsolete, superseded (or similar language), usually in red, in a header at the top of the page(s) **(A4.3.2.2d)**.
- Coverts the document to a permanent type of electronic file (e.g., PDF).
- Moves the unalterable file to the appropriate archive folder on the DPAA network. Archiving allows cases to be reviewed against the standards used at the time the case was resolved.
- Changes subordinate documents to reflect change(s), if necessary, e.g.,:

    - Training Manual.
    - Audit Checklists.
    - Competency Test Questions.
    - Forms.
    - Other applicable documents.

7.2 **Continuity of Operations:** In most instances, a Class I or II SOP revision should not affect relevant field or case work that is recently completed or already in progress. For productivity and surety considerations, work in progress is usually allowed to be completed under the provisions of the former SOP version and recently finished work remains in good standing.

Individuals performing remote operations use the version of the Laboratory Manual in effect on their departure date.

In the event of a Class III change, Laboratory Management decides, on a case-by-case basis, to finish, or let stand, relevant work under the former SOP.

Normally, minor changes in documentation subordinate to the Laboratory Manual (e.g., forms, report templates, training guide), not predicated by an SOP change, have no bearing on field or case work already in progress.

7.3 **Temporary Conditions:** Occasionally, temporary conditions may occur in the CIL that may require SOP revisions. Examples of temporary conditions include, but are not limited to:

- Construction, repair, and/or renovation of facilities.
- Modernization or repair of equipment.
- Interim changes in personnel or organizational structure.
- Trial or preliminary testing procedures or methods short of validation.
- Discovery of non-conforming work.

- Conditions, restrictions or moratoriums imposed during internal or external audits or investigations.

When temporary conditions exist that significantly alter the usual SOP practices and procedures, Laboratory Management evaluates the complexity and duration of the situation, as well as any other applicable factors, and determine if a temporary SOP revision is warranted. Usually, temporary situations projected **in excess of 30 days duration** result in SOP revisions, as appropriate.

8.0 USER COMPLIANCE & USE OF THE LABORATORY MANUAL: The Laboratory Manual facilitates the standardization of forensic testing and the uniformity of CIL procedures to ensure that the highest level of professionalism is achieved and maintained and that procedural compliance can be determined.

8.1 **Principle, Spirit & Intent:** All members of the CIL Staff must understand the principle, spirit & intent of the individual SOPs as well as the procedural details relevant to them. The principle, spirit and intent allow the CIL Staff to make decisions relevant to CIL operations in the event:

- A contingency is not covered by the Laboratory Manual.
- Conflicting or equivocal guidance exists in the Laboratory Manual.
- Guidance from Laboratory Management is unavailable.
- Provisions set forth in the Laboratory Manual are inappropriate or impractical for the situation at hand (e.g., they may be culturally offensive to the local inhabitants), requiring deviation from set procedures (see below).

8.2 **Specified & Implied Requirements:** There are two types of requirements in the Laboratory Manual, specified and implied.

Specified requirements are those that are directly stated and clearly communicated in the Laboratory Manual (e.g., an inventory of calipers is maintained).

The Laboratory Manual cannot proffer specified requirements to address every contingency that may occur in the CIL. Likewise, it cannot endlessly caveat, explain, or discuss in detail every specified requirement that is presented. In both instances the Laboratory Manual would become too lengthy and unwieldy if it attempted to do so.
Accordingly, implied requirements exist within and external to the Laboratory Manual, but within the overall context of CIL operations. Implied requirements are not directly communicated but rather are deduced or derived from other sources. These sources include but are not limited to:

- Principle, Spirit and Intent statements.
- Notes, examples, and generalized statements in SOPs.
- Accreditation standards (e.g., ISO/IEC 17025) and other Tier 1 documents.
- Subordinate documentation (e.g., blank fields on a form implies that the data are required, if available).
- Original publications dealing with test methods.
- Written management directives and guidance.
- Common sense.

In that "common sense" is a relativistic concept, the "common sense test" must be used judiciously. In general, the common sense test is passed when most reasonable people would agree about the implications involved.

Consider the above example of the specified requirement: "an inventory of calipers is maintained." This requirement also has implications to most reasonable persons. Not only is the inventory maintained, but it is implied that the inventory is up-to-date, accurate, and documented. Otherwise, as common sense would dictate, "What is the point?"

Implied requirements may be used for compliance monitoring (e.g., audit, peer review) and other situations (e.g., disciplinary matters). In such instances the implications must be fully justified and explained to the point that they clearly pertain to the situation at hand.

Individuals should consult Laboratory Management, as needed, in order to obtain guidance and assistance pertaining to implied requirements.

8.3 **Wording & Compliance:** There is some wording in the Laboratory Manual which is designed to manage compliance with respect to external accreditation agencies. Words or wording like "should, could, may, typically, usually, highly recommended," etc. may caveat specified requirements. Such wording allows the CIL Staff to show compliance with specific requirements and criteria during external assessments where 100% compliance may be overly difficult, not always realistic or possible to achieve, or where complete standardization or consistency may be difficult.

When specified requirements are worded in such a manner, the wording is not to be construed as a license or justification to ignore any criteria, provisions, or requirements, fail to make the best effort at

compliance, and/or refuse to maintain the standard to achieve compliance. Accordingly, with respect to CIL operations and activity, the CIL Staff are expected to comply with such caveated requirement(s) to the best of their ability and strive to ensure the highest quality of work is performed at all times in accordance with the principle, spirit, and intent of the SOP at hand.

8.4 **Deviation from the Laboratory Manual:** The Laboratory Manual establishes guidelines for reaching the CIL's mission goals and is not intended to be a procedural straightjacket that hampers productivity. As with any complex scientific endeavor, the recovery and identification of human remains involve circumstances that—from time to time—necessitate deviation from the published standard. This is acceptable, provided that it is understood that **deviation from the approved standards is the exception rather than the norm.**

The procedures and guidelines detailed in the Laboratory Manual are for use on typical CIL cases. In atypical cases, the staff member should obtain prior approval from Laboratory Management to deviate from the standard (**A4.1.5a**). Should this prove impractical, the staff member is expected to exercise professional judgment in a manner designed to best uphold the principle, spirit & intent of the procedures and guidelines and to minimize any adverse impact that may arise from such deviation. This holds especially true in field situations where contact with Laboratory Management may be impractical or impossible. Laboratory Management evaluates requests to deviate from the standard using, but not limited to, the following criteria:

- Does the deviation from the standard violate the CIL Code of Ethical Conduct?
- Does the deviation adversely impact the physical integrity or value of the evidence collected?
- Is deviation from the standard appropriate to perform the task, mission, or test?
- Is the proposed deviation the best alternative to the standard?
- Is the technique or procedure substituted for the standard, or deviation from the standard, based on sound scientific principles?
- Can the deviation adversely impact the ethical integrity or professional reputation of the CIL or its staff?

Laboratory Management directs, as appropriate, that approved deviations from the standard be documented in the applicable case documentation (**A5.4.1**). For instances where a member of the CIL Staff made a unilateral decision to significantly deviate from the Laboratory Manual without any guidance from Laboratory Management, the Procedural Compliance Committee (PCC) convenes in accordance with DPAA Laboratory Manual, SOP 4.0 (CIL Surety) to investigate and evaluate the decision.

8.5 **Application to External Agencies:** In general, the Laboratory Manual has limited applications to agencies external to the CIL. Agencies external to the CIL where applicability may exist to some degree include, but are not limited to:

- DPAA Recovery and Investigative Teams.
- DPAA Regional Directorates.
- DPAA Forensic Imaging Center.
- Consult Case Customers (e.g., Honolulu Medical Examiner).
- Agencies or external laboratories accepting work subcontracted by the CIL.
- Independent consultants or reviewers of evidence.

In instances where applicability extends to external agencies, Laboratory Management ensures that mutual use documents and procedures adhere to the CIL Quality Management System. Laboratory Management is responsible to communicate changes in SOPs and subordinate documentation to all relevant external agencies, as applicable and practical.

SOP 1.1: CIL WORK ENVIRONMENT

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 10 March 2015
Citation: DPAA Laboratory Manual, SOP 1.1

0.0 PRINCIPLE, SPIRIT & INTENT: *A safe, productive, and creative work environment is maintained at all times. The staff fosters a culture of high ethical standards and scientific integrity.*

1.0 PURPOSE & SCOPE: This SOP outlines the work environment, history, organization, mission, goals, management structure and practices, duties of key personnel, commonly used terminology and other general information about the Defense POW/MIA Accounting Agency Laboratory (DPAA Laboratory).

Note: External to DPAA and within the non-CIL DPAA sections and staff, the term used is "Laboratory." For practical and historical purposes, within the Laboratory, the Laboratory Staff may use the term "CIL" or "Central Identification Laboratory." CIL is the preponderant term used throughout the DPAA Laboratory Manual.

As appropriate, select provisions of this SOP apply to operations carried out in the CIL's permanent facilities, at sites away from its permanent facilities, or in associated temporary or mobile facilities **(A4.1.3)**. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 MISSION STATEMENTS & OBJECTIVES:

2.1 **The DPAA Mission Statement:** The Defense POW/MIA Accounting Agency (DPAA) conducts global search, recovery, and laboratory operations to identify unaccounted for Americans from past conflicts in order to support the Department of Defenses (DoD) personnel accounting efforts.

2.2 **Laboratory Mission Statement:** The mission of the CIL is to search for, recover, and identify U.S. personnel missing from past military conflicts.

To this end, the CIL attains the highest level of scientific competence and integrity possible and maintains a level of ethical standing that is beyond reproach. The CIL is dedicated to maintaining itself as a leader in this profession. In order to achieve its mission, the CIL maintains its accreditation by the American Society of Crime Laboratory Directors-Laboratory Accreditation Board (ASCLD-LAB).

2.3 **Condensed CIL Mission Statement:** To recover and identify U.S. personnel who never returned from harm's way. To perform humanitarian service.

2.4 **CIL Objectives:** The CIL has three primary objectives:

1) The recovery and identification of U.S. military personnel, certain American civilian personnel, and certain allied personnel unaccounted for from World War II, the Korean War, the Vietnam War, and other conflicts and contingencies.

2) To serve as a national forensic resource.

3) To advance research and development in the area of forensic science as it relates to the recovery and identification of human remains.

2.5 **CIL Functions:** The primary functions of the CIL are to:

- Direct scientifically sound recoveries for missing U.S. service members and other mission-related U.S. personnel.
- Provide scientifically sound tests of human remains and non-biological material evidence.
- Establish identifications of individuals under the CIL's jurisdiction.
- Conduct research in forensic science methods and techniques.
- Support humanitarian missions in support of homeland defense, current-day mishaps, and national and international mass disasters.
- Provide forensic support to foreign governments and international organizations as directed.
- Provide forensic support to law enforcement and investigative agencies.
- Collaborate with national and international scientific and forensic organizations to advance the field.

2.6 **CIL Customers:** A CIL customer is any agency or organization, external to the CIL, for which the CIL has agreed to, or been directed to, perform casework in its accredited disciplines. Customers fall into three categories:

- Customers related to the CIL's primary mission (to search for, recovery of, and identification of U.S. personnel missing from past military conflicts). The CIL's customer, as such, is the DoD represented by the DPAA Director, the respective Service Secretaries, and the Undersecretary of Defense for Policy. As part of the Defense Forensics Enterprise, the CIL must also view the Undersecretary of Defense for Acquisition, Technology, and Logistics as a customer. In practical terms, however, the DoD customer is represented by the Casualty and Mortuary Offices of the individual Armed Services branches and, to a lesser extent, the Casualty Offices of the State Department and the Central Intelligence Agency.
- The CIL also performs limited consultation for organizations and agencies unconnected with the primary mission. This consultation is medico-legal in nature and is undertaken when it is deemed to be in the best interests of the DPAA. More detail on consult case customers can be found in DPAA Laboratory Manual, SOP 1.8 (Consult Case Management). Typical consultation case customers include, but are not limited to:
    - Local law-enforcement or medical-legal agencies (e.g., Honolulu Medical Examiner, Honolulu Police Department)
    - Federal law-enforcement agencies (e.g., FBI, NCIS, USACID, AFOSI,)
    - Federal disaster-management agencies (e.g., NTSB, FEMA, DMORT, OAFME).
    - State law-enforcement agencies
    - Other federal agencies engaged in law-enforcement activities (e.g., National Parks Service, US Fish & Wildlife Service).
- CIL LSIs (see below) produce various reports for the DPAA R&A Section.

3.0 HISTORY: The U.S. Army established Identification Laboratories during World War II, and they continued operations in Korea and Vietnam. Additional roots of the DPAA stem from two U.S. Army mortuaries that operated in South Vietnam during the Vietnam War. Upon closure of the mortuaries in 1972 and 1973, the U.S. Army established the Central Identification Laboratory, Thailand (CIL-THAI).

When the South Vietnamese government fell in 1975, the Laboratory was relocated to the U.S., and in May 1976 the U.S. Army Central Identification Laboratory, Hawaii (USACILHI or CILHI) was established. With its relocation, CILHI's mission expanded from identification of only those American service members killed in Indochina to identification of American service members from past wars, including World War II, Korean War, and the Cold War. Over the years, the Laboratory also expanded in facilities and personnel.

Effective 30 September 2003 the CILHI was deactivated. On 1 October 2003 the Joint POW/MIA Accounting Command (JPAC) was activated with the Laboratory being designated the Central Identification Laboratory (CIL or JPAC-CIL).

On 30 January 2015, various organizations within the DoD accounting community, including JPAC, were merged into a the newly created Defense POW/MIA Accounting Agency (DPAA).

4.0 CHAIN OF COMMAND: The CIL is a publicly funded laboratory. The U.S. Government, Department of Defense and the DPAA are entities that are legally responsible for the CIL **(A4.1.1, F5.1.1)**.

DPAA, the CIL's parent organization, is a Defense Agency under the Office of the Secretary of Defense (OSD), consisting of military personnel from all branches of the military, OSD civilian personnel, other civilian personnel, and civilian contractors.

DPAA is located in two principle regions: DPAA East, located primarily in the Washington, DC area, and DPAA West located largely in Hawaii.

The CIL is a discrete sub-organization of the DPAA and directly subordinate to the DPAA Director. Figure 1 shows the CIL's placement in the military hierarchy and its parent organization **(4.1.5e, F5.1.2, F5.2.2, F5.2.3, SF(12)5.2.3 F-8, SF(12)5.2.3 F-9)**:

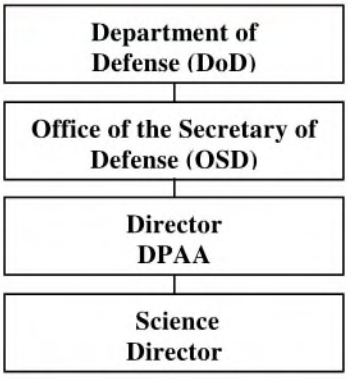

Figure 1. The CIL's placement within the Department of Defense.

Key subordinate sections of the DPAA (not shown in Figure 1) include **(A4.1.5e, F5.2.1, SF(12)5.2.2 F-7)**:

4.1 **Office of the Director:** Refers to the command structure of the DPAA. A high ranking government civil servant directs the DPAA. The Deputy Director

is a general or flag level military officer. The DPAA Chief of Staff is usually a high ranking civil servant.

4.2 **Laboratory [Central Identification Laboratory (CIL)]:** Refers to the Laboratories and their staff, discussed below in detail. External to DPAA and within the DPAA, the term used is "Laboratory." As such, separate Laboratory facilities at the different locations are referred to as:

- LAB-HQ (Hickam Field, HI).
- LAB-PH (Pearl Harbor Naval Station, HI).
- LAB-OF (Offutt AFB, Nebraska).
- LAB-WP (the former Life Sciences Equipment Laboratory (LSEL) at Wright Patterson AFB, OH).

For practical and historical purposes, within the Laboratory, the staff may use the term "CIL" which stands for Central Identification Laboratory. Internally, separate CIL Facilities at the different locations are referred to as:

- CIL-HQ (Hickam Field, HI).
- CIL-PH (Pearl Harbor Naval Station, HI).
- CIL-OF (Offutt AFB, Nebraska).
- CIL-WP (the former Life Sciences Equipment Laboratory (LSEL) at Wright Patterson AFB, OH).

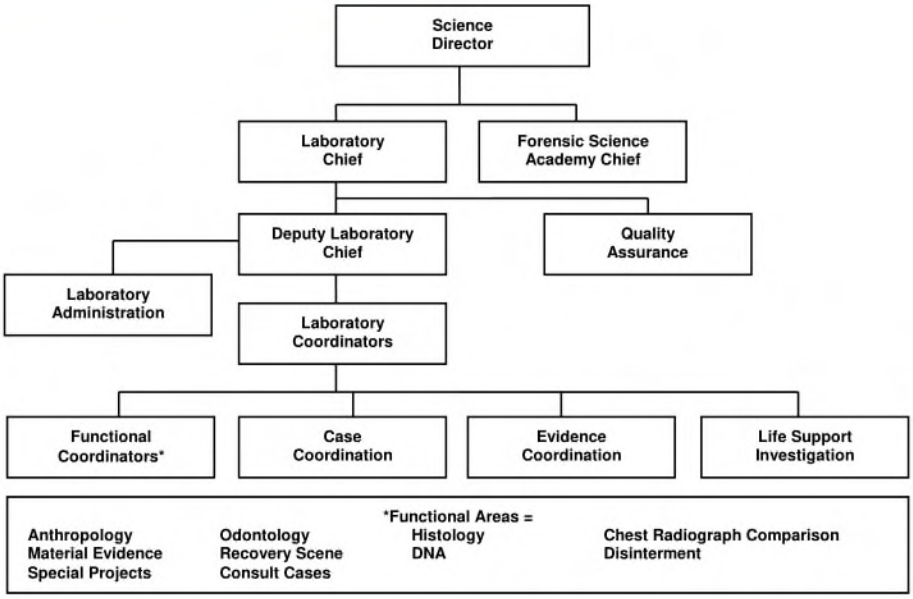

Figure 2. CIL-HQ & CIL-PH internal organization at Joint Base Pearl Harbor-Hickam.

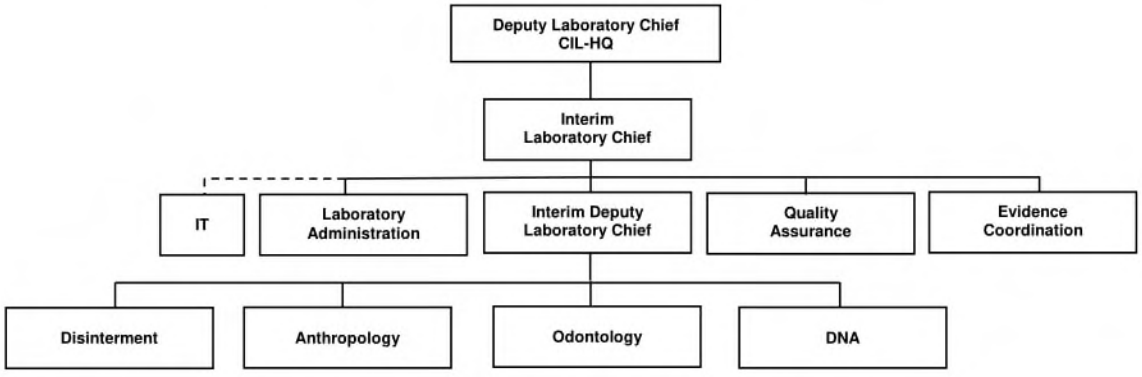

Figure 3. CIL-OF internal organization.

4.3 **Personnel & Administration (Formerly J-1):** Administration is charged with general personnel and administrative issues.

4.4 **Research & Analysis (R&A):** R&A is charged with archiving personnel, medical, and mortuary files for personnel lost in past conflicts. R&A also archives resolved CIL case files and conducts background research.

4.5 **Operations Division (Formerly J-3):** The Operations Division is charged with planning and implementing recovery missions for personnel lost in past conflicts. It oversees Task Elements in Hawaii, Laos, Vietnam, and Thailand. The Hawaii Task Element contains the Forensic Imaging Center (FIC) and the Medical Section (see below).

4.6 **Resource Management (Formerly J-4):** Resource Management is charged with supply and logistic issues. The Facilities Section and Security Section are charged with general building and security issues, respectively.

4.7 **Plans, Policy & Strategy (Formerly J-5):** Plans, Policy & Strategy conducts external coordination, negotiates agreements, and formulates policy for the DPAA.

4.8 **Information Technology (Formerly J-6):** Information Technology is charged with maintaining computer hardware and software necessary for the operation of the DPAA.

4.9 **External Communications Division (Formerly External Relations):** The External Communications Division is charged with public relations between the DPAA, the local governments, and the public at large, including family groups. It oversees the Public Affairs Office and handles congressional inquiries.

4.10 **Medical Section:** DPAA medical personnel are charged with maintaining the health and deployment readiness of DPAA personnel, especially regarding remote operations. The medical section handles immunizations, preventive medicine, and environmental safety on behalf of the DPAA. It is typically led by a physician.

5.0 CIL ORGANIZATION: The CIL is a Federal forensic laboratory system comprised of permanent laboratory facilities in Hawaii (CIL-HQ and CIL-PH), Nebraska (CIL-OF), and Ohio (CIL-WP) (see above). The CIL-OF facility was formerly known as the JPAC CONUS Annex (JCA).

The laboratory system is controlled by senior management at CIL-HQ. The CIL internal organization is reflected in Figures 2 & 3 **(F5.1.3, F5.2.2, SF(12)5.2.2 F-7, F5.2.3, SF(12)5.2.3 F-8, SF(12)5.2.3 F-9, SF(12)5.2.5 F-10)**.

In addition to CIL personnel, CIL locations may also have other JPAC personnel stationed in its facilities on a permanent or long term basis (e.g., historians at CIL-HQ, Information Technology personnel at CIL-OF). These personnel (deemed "embedded" personnel) are assigned to support the CIL and are and are subject to both limited command and control (C2) and administrative control (ADCON) by the Laboratory Director controlling the facility. The duties and responsibilities of embedded personnel or staff, their parent DPAA sections, and the CIL, to each other, are described below.

6.0 CIL PERSONNEL: The CIL utilizes personnel who are employed by, or under contract to, the DPAA. Where contracted and additional technical and key support personnel are used, the CIL ensures that they are supervised, competent, and that they work in accordance with the DPAA Laboratory Manual **(A5.2.3)**.

Regardless of the source of the employee, the CIL maintains a sufficient number of personnel with the required competencies, including, where needed, the ability to make professional judgments, and to perform the type, range and volume of its spectrum of operations **(F6.1.2, SF(12)6.1.2 F-15)**.

Regarding the CIL personnel listed in Figures 2 & 3, the following section **(A4.2.1, F5.2.2, SF(12)5.2.2 F-7, F5.2.3 SF(12)5.2.3 F-8. F6.1.4)**:

- Defines the organization and management structure of the CIL **(A4.1.5e)**.
- Defines the authority and resources of managerial and technical personnel needed to carry out their duties **(A4.1.5a)**.
- Describes the relationships between quality management, technical operations and support services **(A4.1.5e)**.
- Specifies the roles, responsibilities, authority, and interrelationships of all personnel who manage, perform or verify work, especially as it affects the quality of tests **(A4.1.5f)**.

Roles and duties may be further defined in terms of specialized areas in various SOPs of the DPAA Laboratory Manual.

The CIL maintains current and expanded duty descriptions for managerial, technical and key support personnel involved in tests in the staff member's personnel and training files **(A5.2.4, F5.2.7, SF(12)6.1.1 F-12)**. Duty descriptions typically include education, expertise, qualifications and experience required and responsibilities with respect to:

- Planning and performing tests.
- Evaluation of test results.
- Reporting opinions and interpretations.
- Method modification and validation of new methods.
- Managerial duties.

6.1 **Primary Duty Positions:** The following are the primary CIL duty positions as detailed in individual job descriptions.

6.1.1 **Science Director:** Formerly called the Scientific Director, this position is typically occupied by a uniformed Medical Examiner from one of the services, usually holding the military pay grade of O-6. The Science Director has overall responsibility for the CIL and the CIL Staff. Specifically, the Science Director:

- Maintains the scientific integrity of the CIL and the DPAA mission, and advises the DPAA Director on these issues.
- Directs all CIL operations at the executive level.
- Establishes all identifications within the CIL's jurisdiction.
- Coordinates and maintains contact with outside agencies or individuals serving as consultants.
- Approves CIL case dispositions.
- Rates the CIL-HQ Laboratory Director.

6.1.2 **Laboratory Chief (Laboratory Director), CIL-HQ:** External to DPAA and within the non-CIL DPAA sections and staff, the term used is "Laboratory Chief." For practical and accreditation purposes, within the CIL, the Laboratory Staff may use the term "Laboratory Director." Laboratory Director is the preponderant term used throughout the DPAA Laboratory Manual.

The CIL-HQ Laboratory Director **(SA4.1.4.1, SA4.1.4.1.1, A4.2.6, F6.1.8)**:

- Acts as Science Director in his absence **(A4.1.5j)**.
- Supervises the daily operation of the CIL system **(A4.1.5g)**.
- Coordinates with outside agencies.
- Coordinates with other DPAA directorates and sections.
- Manages the hiring of CIL Staff members.
- Chairs the Peer Review Oversight Committee (PROC), Procedural Compliance Committee (PCC), and oversees other disciplinary matters.
- Rates select CIL Staff including the CIL-HQ Deputy Laboratory Director and Lead Quality Coordinator.
- Oversees the development of the CIL system budget and approves expenditures.

6.1.3 **Deputy Laboratory Director (CIL-HQ):** External to DPAA and within the non-CIL DPAA sections and staff, the term used is "Deputy Laboratory Chief." For practical and accreditation purposes, within the CIL, the Laboratory Staff may use the term "Deputy Laboratory Director." Deputy Laboratory Director is the preponderant term used throughout the DPAA Laboratory Manual.

The Deputy Laboratory Director:

- Acts as CIL-HQ Laboratory Director in his absence.
- Acts as the FSA Director in his absence.
- Approves RLs for mission deployments and assigns them to respective sites.
- Approves/disapproves most administrative requests (e.g., leave, compensatory time) for select CIL Staff.
- Assists in developing standard operating procedures for the Laboratory Manual.
- Coordinates with senior-level personnel from other DPAA sections.
- Rates select CIL Staff including the CIL-OF Laboratory Director, CIL-HQ Laboratory Administrator and Laboratory Managers.
- Acts as functional area coordinator in the absence of individual Laboratory Managers.
- Approves travel plans and other CIL expenditures.

6.1.4 **Forensic Science Academy Chief (FSA Director):** External to DPAA and within the non-CIL DPAA sections and staff, the term used is "FSA Chief." For practical and accreditation purposes, within the CIL, the Laboratory Staff may use the term "FSA Director." FSA Director is the preponderant term used throughout the DPAA Laboratory Manual

The FSA Director:

- Supervises the daily operation of the FSA.
- Coordinates with outside agencies.
- In consultation with the DPAA Director and DPAA Science Director, develops MOUs and MOAs with professional institutions and organizations.
- Selects Fellows for admission.

- Serves as Professor of Forensic Anthropology.
- Develops training management documentation to support training for Fellows and other visiting scientists and personnel.
- Rates and supervises FSA staff.
- Approves leave, compensatory time, etc. for FSA staff.
- Develops, reviews, and assists with research projects aimed at improving the recovery and identification of remains and material evidence.

6.1.5 **Laboratory Chief (Laboratory Director), CIL-OF):** External to DPAA and within the non-CIL DPAA sections and staff, the term used is "Laboratory Chief." For practical and accreditation purposes, within the CIL, the Laboratory Staff may use the term "Laboratory Director." Laboratory Director is the preponderant term used throughout the DPAA Laboratory Manual

The CIL-OF Laboratory Director:

- Serves as the senior manager at the CIL-OF facility.
- Rates the CIL-OF DNA Technician, Quality Coordinator, and Case Coordinator.
- Rates and supervises the CIL-OF Evidence Coordinator and the subsequent assignment and delegation of duties regarding evidence management and security.
- Rates and supervises the CIL-OF Laboratory Administrator and the subsequent assignment and delegation of duties regarding case file management.
- Grants facility access and security permissions to CIL-OF staff in accordance with DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security).
- Performs training tasks and activities normally handled by the Forensic Science Academy (FSA).
- Accepts or declines consult cases according to CIL policies and procedures.
- Coordinates with Offutt AFB officials as senior DPAA on-site official.
- Safety manager of the facility.

For the sake of efficiency, the Science Director and the CIL-HQ Laboratory Director may delegate some of his duties found throughout this Laboratory Manual to the Laboratory Director at CIL-OF regarding management of that operation.

6.1.6 **Deputy Laboratory Director, CIL-OF:** The CIL-OF Deputy Laboratory Director:

- Rates the Laboratory Managers.
- Makes decisions regarding the formulation and administration of proficiency tests.
- Manages DNA sampling and decision making regarding DNA issues.
- Supervises and rates the forensic anthropologists.

6.1.7 **Laboratory Managers:** Laboratory Managers, formerly known as Laboratory Coordinators, are responsible for the daily operation of the CIL and supervision of the CIL Staff to include technical operations under various functional areas (see below) **(A4.1.5g, A4.1.5h, A4.2.6, F5.2.5, F6.1.6)**. Other duties include, but are not limited to:

- Coordinating assignments delegated to the scientific staff by the Science Director and Laboratory Director.
- Evaluating cases for identification potential.
- Directing and tracking analytical work and case development.
- Conducting management review of reports.
- Tracking assigned tasks to ensure timeliness.
- Assigning cases for peer review.
- Assigning cases for case file coordination (CFC).
- Managing case review by external consultants.
- Serving as a member of the Peer Review Oversight Committee (PROC) and Procedural Compliance Committee (PCC).
- Reviewing cases for scientific integrity as deemed necessary by the Science Director and Laboratory Director.
- Approving/disapproving most administrative requests (e.g., leave, compensatory time) for select CIL Staff.
- Developing standard operating procedures for the Laboratory Manual.
- Coordinating with other DPAA sections.
- Rating select CIL Staff.
- Assuming leadership of the CIL in the absence of Top Management. In their absence, leadership is assumed by the most senior Laboratory Manager present, based on date of appointment as a Laboratory Manager. In the absence of Top Management, duties include, but are not limited to **(A4.1.5j)**:

    - Prioritizing activities and assignment of cases.
    - Attending staff and other meetings.
    - Approving some administrative requests.

6.1.8 **Lead Quality Coordinator:** The Lead Quality Coordinator (or simply the Quality Coordinator) has overall responsibility for maintaining quality assurance (surety) in the CIL system and related accreditations. The Lead Quality Coordinator has direct access to the highest level of management at

which decisions are made on CIL policy or resources **(A4.1.5g, A4.1.5i, A4.2.6, F5.2.1, F6.1.6)**.

The Lead Quality Coordinator may have one or more assistants or alternates at each CIL location who may act in his/her absence and/or be delegated quality assurance tasks accordingly. Specific duties of the Lead Quality Coordinator include, but are not limited to:

- Ensuring the processes and procedures needed for the surety program are established, implemented and maintained **(F8.2.3a).**
- Reporting to Top Management on the performance of the surety program and any need for improvement **(F8.2.3b).**
- Leads the CIL Quality Assurance (QA) Staff.
- In concert with the Forensic Science Academy, plans and coordinates internal training and maintains training records.
- Coordinates and posts changes to the Laboratory Manual and ancillary documentation.
- Serves as the Security Manager of the CIL, monitoring the physical security of the CIL and the security of evidence.
- Supervises the performance checks and maintenance of test equipment.
- Oversees the competency program, proficiency test program, and Library operations.
- Monitors and follows up on corrective action taken on CIL employees regarding training and quality assurance issues (e.g., remedial training, PIPs).
- Supervises the Audit Program of CIL operations and ensures CIL SOP compliance.
- Serves as technical advisor to the Procedural Compliance Committee.
- Acts as external point of contact for matters pertaining to surety.
- Monitors the safety and work environment of the CIL. Serves as CIL Assistant Safety Officer.

6.1.9 **Forensic Odontologist:** Forensic Odontologist (or simply, Odontologist) refers to a dentist employed to examine and analyze dental remains and oral and maxillofacial evidence. Other duties include:

- Interpreting data resulting from tests.
- Conducting dental database searches.
- Performing or supervising the photography or imaging of casework.
- Performing Case File Coordination.

A Senior Odontologist may be recognized as a Laboratory Manager and as the functional area coordinator for odontology. The Senior Odontologist also supervises and rates Evidence Coordinators.

Forensic odontologists are required to possess a dental or medical degree relevant to their hired position **(SA5.2.6.1.1)**.

6.1.10 **Forensic Anthropologist:** Forensic anthropologist (or simply, anthropologist) refers to a physical anthropologist employed to examine, analyze, and interpret non-dental biological and material evidence. Duties may include, but are not limited to:

- Interpreting data resulting from tests.
- Conducting evidence database searches.
- Performing or supervising the photography or imaging of casework.
- Serving as recovery leader (RL) on recovery and recovery scene operations and author of search and recovery reports, reports of investigations, detailed reports of investigations, and detailed reports of excavation (Note: some forensic anthropologists may not deploy to recovery scenes).
- Make field determinations on recovered materials (e.g., osseous/non-osseous, human/non-human), as appropriate, provided they are competency certified in DPAA Laboratory Manual, SOPs 3.3 (Taphonomic Effects & Evidence Conservation) and 3.4 (Determining Biological Profiles).
- Performing Case File Coordination.
- Performing special projects.

Forensic anthropologists, including those performing recovery and recovery scene operations, are normally required to possess a graduate degree in physical anthropology **(SA5.2.6.1.1, SA5.2.6.1.4, SA5.2.6.1.5)**.

6.1.11 **Forensic Archaeologist:** Forensic archaeologist refers to an archaeologist employed to examine material evidence and to serve as a RL on recovery scene operations and site investigations. Duties may include, but are not limited to:

- Interpreting data resulting from tests.
- Conducting evidence database searches.
- Performing or supervising the photography or imaging of casework.
- Serving as RL on recovery and recovery scene operations and author of search and recovery reports, reports of investigations, detailed reports of investigations, and detailed reports of excavation.
- Make field determinations on recovered materials (e.g., osseous/non-osseous, human/non-human), as appropriate, provided they are competency certified in DPAA Laboratory Manual, SOPs 3.3 (Taphonomic Effects & Evidence Conservation) and 3.4 (Determining Biological Profiles).

- Performing Case File Coordination.
- Performing special projects.

Forensic archaeologists, including those performing recovery and recovery scene operations, are normally required to possess a graduate degree in physical anthropology **(SA5.2.6.1.1, SA5.2.6.1.4, SA5.2.6.1.5)**.

6.1.12 **Historian:** Historians conduct primary and secondary source research associated with casework involving unidentified remains from past conflicts. The primary focus is on the disinterment and identification "unknowns" buried in military cemeteries in the U.S. and abroad. Historians develop casualty case background information and analyze information regarding the provenance of unknown/unidentified remains. Duties may include, but are not limited to:

- Identifying and collecting primary sources from archival facilities.
- Identifying and collecting secondary sources.
- Creating memoranda regarding the history of an assigned subject and geographical area.
- Developing lists of American casualties possibly associated with unidentified remains.
- Developing other case information.
- Working with scientific staff to develop disinterment requests and other reports.
- Reviewing memos generated by other historians.
- Performing special historical projects as assigned by CIL management.

Historians are required to possess a graduate degree in history and/or demonstrate they have made significant progress toward a PhD.

6.1.13 **Disinterment Personnel & Disinterment Cell**: Disinterment personnel are historians, anthropologists, and odontologists that research, analyze, and generate Disinterment MFRs (in accordance with DPAA Laboratory Manual SOP 1.6 (General Casework Procedures). The Disinterment Cell is comprised of a Project Manager who supervises and manages historians, anthropologists, photographers and research assistants. Additionally the Disinterment Cell may be augmented by CIL odontologists and other anthropologists on a part time or project specific basis.

6.1.14 **DNA Personnel:** DNA personnel perform various aspects of DNA casework (e.g., sample preparation, data basing, administration, and tracking, FRS and comparisons) **(A4.1.5g, A4.1.5h, F5.2.5)**. Persons who sample remains for DNA are technicians while those who do not conduct sampling are support staff (see below). Duties for DNA personnel include:

- Assignment and supervision of the collection and mailing of DNA samples and other DNA related duties.
- Supervising the maintenance of the DNA log.
- Acting as approval authority regarding sampling of cases based on the recommendations by the scientific staff.
- Providing recommendations to Laboratory Management regarding case prioritization based on DNA results.

6.1.15 **Evidence Coordinator(s):** The Evidence Coordinators are support personnel whose duties include, but are not limited to:

- Oversight of the processing, labeling, boxing, and storage of all evidence coming into or leaving the CIL.
- Acting as evidence couriers.
- Maintenance of the access devices to the evidence storage areas.
- Maintenance of the Tracking and Automated Inventory Log (TRAIL) system.
- Signing out of evidence from the compact shelving and recording their assignment to analytical tables.
- Overseeing the maintenance and housekeeping of the analytical areas.
- Conducting preliminary assessments.

Evidence management and security operations in the CIL are managed by a Lead Evidence Coordinator. The Lead Evidence Coordinator oversees the Alternate Evidence Coordinators (see below). All Evidence Coordinators are rated by the Senior Odontologist.

The Science Director may perform evidence coordinator duties and also appoints Alternate Evidence Coordinators. The Alternate Evidence Coordinator may be a permanent or an additional duty and involves assisting the Lead Evidence Coordinator in the completion of his/her daily duties and to function as the Lead Evidence Coordinator when the primary is absent.

6.1.16 **CIL Support Coordinator:** The Support Coordinator is the logistician for the CIL. As such, the Support Coordinator is responsible for the daily functioning of the CIL facilities and ensuring that the CIL Staff have the routine resources needed to do their jobs. Daily and routine supervision of the Support Coordinator is accomplished by the Laboratory Administrator. There is usually a Support Coordinator at each CIL location. The Support

Coordinator at CIL-HQ is the lead for support coordination in the CIL.

6.1.17 **Laboratory Administration:** Laboratory Administration, supervised by the Laboratory Administrator, are support personnel whose duties include:

- Routine administrative tasks (processing purchase requests, travel paperwork).
- Managing the case file system within the CIL.
- Assisting the Evidence Coordinator in the accessioning of all evidence received at the CIL according to chain of custody guidelines.
- Supervising the dissemination of finalized case files to the appropriate agencies.
- Coordinating shipment of remains.
- DNA data entry.

6.1.18 **Life-Support Investigators (LSI):** LSIs are technical personnel who specialize in the field and laboratory examination and identification of life support and aircraft wreckage evidence **(A4.1.5h, F5.2.5)**.

LSIs are either permanently assigned to the DPAA, or are assigned on a temporary basis as augmentees. Augmentees are not considered transient personnel as defined below.

During select remote operations, LSIs provide guidance regarding:

- The type, model and serial number of the aircraft associated with the excavation site.
- Identifying the presence or absence of aircrews.
- Guiding the recovery team to areas most likely to yield human remains.

Additional guidance on LSIs in the field, to include augmentees, can be found in DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing).

The LSI role in trace evidence testing in the laboratory is discussed in DPAA Laboratory Manual, SOP 3.6 (Material Evidence Analysis).

6.1.19 **Forensic Science Academy**: The Forensic Science Academy (FSA) serves as a scientific training center of excellence in forensic anthropology, archaeology, and odontology. Its goals and functions include, but are not limited to **(A4.1.5h, F5.2.5)** :

- Serving as the primary recruiting and retention tool for all DPAA scientists through the training of Academy Fellows.
- Serving as the primary scientific training and testing section for all aspects related to competency and proficiency testing of DPAA staff.
- As funding allows, developing, refining, and evaluating scientific methods and techniques leading to increased and improved recoveries and identifications of the missing.
- Training of select staff, visiting scientists, and foreign nationals on an as-needed basis.
- Providing forensic anthropology, archaeology and odontology training to U.S. and foreign medicolegal specialists.

The FSA is headed by the FSA Director, discussed above. In the absence of the FSA Director, the Deputy Laboratory Director (CIL-HQ) assumes responsibility for the FSA.

6.1.20 **Case Coordinator:** Not to be confused with the Case File Coordinator (see below), the Case Coordinator tracks the status of individual cases nearing resolution and coordinates with other members of Laboratory Management to ensure smooth and timely case progression. Other duties include:

- Monitors consult cases for compliance with DPAA Laboratory Manual, SOP 1.8 (Consult Case Management).
- In conjunction with Case File Coordinators, assists with, or perform select aspects of, Case File Coordination.
- Responding to external and internal queries regarding DNA studies involving CIL casework.
- Assembles and performs surety checks on JFR and FFR documentation in accordance with DPAA Laboratory Manual, SOP 2.2 (Forensic Reviews).

Daily and routine supervision of the Case Coordinator is accomplished by the Laboratory Director.

6.2 **Collective Terms:** The following are collective terms used in this manual regarding personnel:

6.2.1 **Top Management:** Refers to the Science Director, FSA Director, Laboratory Directors in Hawaii and Nebraska, and the Deputy Laboratory Director in Hawaii. Top Management is also the same as Key Management or Senior Management **(SA4.1.8).**

6.2.2 **Laboratory Management:** Refers to the Science Director, Laboratory Director, Deputy Laboratory Director, FSA Director, and Laboratory Managers.

6.2.3 **CIL Staff:** Refers to all personnel under the direction of the Science Director including anthropologists, odontologists, FSA personnel, historians, LSIs, support and technical staff (see below). CIL staff who are GS employees are also required to maintain a Secret or higher security clearance.

6.2.4 **Scientific Staff:** Refers to anthropologists, archaeologists, and odontologists. The educational requirements for the members of the scientific staff are a master's degree or doctorate in anthropology, and/or a dental or medical sciences degree in a field relevant to their hired position **(A5.2.1, SA5.2.6.1.1, SA5.2.6.1.4, F6.1.1)**. Scientific staff are proficiency tested.

Scientific staff have appropriate qualifications, training, experience and a satisfactory knowledge of the requirements of the analyses and investigations they perform. Scientific staff also have relevant knowledge of **(F6.1.3)**:

- The procurement of the items undergoing analysis or inspection.
- Operation of scientific processes.
- Delivery of services to the customer.
- The technology used **(SF(12)6.1.3 F-17).**
- Where deficiencies may occur in any of the above items or activities.

The scientific staff have the ability to make professional judgments as to conformity with general requirements using examination results and to report thereon **(SF(12)6.1.3 F-16).**

6.2.5 **Analyst:** Refers to a member of the Scientific Staff. An analyst is an individual who conducts and/or directs field operations, the testing of evidence, interprets data, formulates conclusions, and signs test reports.

6.2.6 **Technician or Technical Staff:** Refers to LSIs, SEM operators, and select DNA personnel (see above). Technical Staff members have educational degrees and/or specialized education commensurate with their duties **(5.2.1, SA5.2.6.1.5, F6.1.1)**. Technical Staff may be proficiency tested and may sign some types of test reports.

Technical staff have appropriate qualifications, training, experience and a satisfactory knowledge of the requirements of the analyses and investigations they perform. Technical staff also have relevant knowledge of **(F6.1.3)**:

- The procurement of the items undergoing analysis or inspection.
- Operation of scientific processes.
- Delivery of services to the customer.
- The technology used **(SF(12)6.1.3 F-17).**
- Where deficiencies may occur in any of the above items or activities.

The technical staff have the ability to make professional judgments as to conformity with general requirements using examination results and to report thereon **(SF(12)6.1.3 F-16).**

6.2.7 **Support Staff:** Refers to the Evidence Coordinators, personnel in Laboratory Administration, researchers, historians, photographers, and Case Coordinators. Support Staff have educational degrees and/or specialized education commensurate with their duties. Support staff are not proficiency tested.

6.2.8 **Supervisory Staff:** CIL Staff recognized by Navy Human Resources to have formal supervisory oversight over CIL Staff. The Supervisory Staff is comprised of:

- Science Director.
- Laboratory Director.
- Deputy Laboratory Director.
- Laboratory Managers.
- Laboratory Administrator.

Other CIL Staff may have informal supervisory responsibility in the performance of their duties (e.g., the Intern Coordinator); however, the above individuals formally evaluate employees, approve personnel actions, and initiate disciplinary actions.

6.3 **Additional Duties:** All CIL Staff have a clause in their job description allowing Laboratory Management to assign additional duties as required for the smooth functioning of the CIL. These duties may not appear on the official (external) CIL tables of organization. Significant additional duties assigned to select individuals in the CIL include, but are not limited to:

6.3.1 **Case File Coordinator(s):** Anthropologists and odontologists may be designated Case File Coordinators by Laboratory Management. The role of the Case File Coordinator is to collect, collate, and organize all relevant enclosures, including summaries, supporting documentation such as radiographs, photographs and negatives, and results of tests, ensuring that all are properly placed into the case file. The Case File Coordinator conducts the first peer review of the case file (not individual

reports), coordinate revisions of non-substantive changes (e.g., typographical errors), and direct substantive changes, if needed, to a Laboratory Manager.

6.3.2 **Miscellaneous:** There are many miscellaneous additional duties, which are detailed in the respective areas of this SOP. Among them are:

- Committee Members.
- Intern Coordinator.
- Safety Officer **(SA4.1.7, SF(12)5.2.7 F-11)**.
- Librarian.
- Key Control Custodian.
- Audit Team Member.
- ORISE Coordinator.
- Evidence Courier.

6.4 **Permanent Staff & ORISE Fellows:** Regardless of duty position, the above CIL Staff are paid personnel who fall into two categories: 1) permanent employees (government civil servants and military personnel) and 2) non-permanent research fellows from the Oak Ridge Institute of Science and Education (ORISE). The purpose of the CIL's ORISE Program is to offer professional experience and training to recent graduates and educators. A member of the permanent CIL Staff serves as ORISE Coordinator as an additional duty and advises the Top Management on issues pertaining to the ORISE Program and addresses routine matters related to it.

ORISE fellows are considered term appointees paid for by appropriated funds. Although there are some differences in how ORISE fellows are administratively handled, they are subject to all of the provisions of the Laboratory Manual unless otherwise stated. Laboratory Management treats both categories as equally and consistently as possible, striving for seamless integration in all aspects of CIL operations **(A5.2.3)**. Consequently, the term "employee" as used in this manual collectively refers to both categories of CIL Staff.

6.5 **Embedded Personnel:** Embedded personnel are defined and discussed above. Duties and responsibilities for "embedded" personnel or staff, their parent sections, and the CIL to each other are as follows:

Embedded personnel have duties and responsibilities to the CIL. These include but are not limited to:

- Work within, and support, the CIL Quality Assurance Program and accreditation requirements specified in the DPAA Laboratory Manual, ISO 17025, the ASCLD-LAB Supplement to ISO 17025, and any other pertinent accreditation documents **(A5.2.3)**.
- Work within security and safety protocols as defined by the DPAA CIL Laboratory Manual and subordinate documentation.
- Support the DPAA mission as it pertains to the CIL role in that mission.
- Support the DPAA mission as it pertains to their individual section's role in that mission.
- Ensure open and transparent communication between the CIL and parent sections at DPAA.

The CIL has duties and responsibilities regarding embedded personnel. These include but are not limited to:

- Ensure a safe, secure, and positive work environment.
- Maintain time and attendance records.
- Assist with authorized travel requirements.
- Allocate resources, as appropriate, to facilitate the training of embedded personnel in order to meet requirements and responsibilities incumbent on the parent section.
- Provide local guidance on CIL requirements as they pertain to the CIL's mission and basic needs pertinent to the embedded staff's area of expertise.
- Provide input, as appropriate, into embedded employee performance evaluations and appraisals. Note: although the respective Laboratory Director has administrative control over embedded personnel he/she does not complete their performance evaluations. That oversight is maintained by subject matter experts and supervisors in the parent section.

The parent section has duties and responsibilities regarding embedded personnel. These include but are not limited to:

- Maintain quality control over embedded employee work products.
- Provide direct oversight in maintaining and evaluating embedded employee performance.
- Ensure that embedded employees have the requisite resources to meet mission requirements.

Embedded personnel have duties and responsibilities to their parent section. These include but are not limited to:

- Meet all training requirements.
- Maintain professional standards and credentials as defined in statutes, regulations, instructions, and policies.
- Advise on budgeting and equipment requirements for their sections and the CIL as a whole.

Parent sections have duties and responsibilities regarding the CIL. These include but are not limited to:

- Notify the CIL of embedded employee performance issues.
- Meet specialized equipment requirements needed to support the CIL mission.
- Ensure that embedded employees receive requisite training.
- Ensure open and transparent communication between the CIL and the parent section.

Additionally, some duties performed by embedded personnel do not directly support the CIL but support DPAA's mission as a whole. Open communication between the CIL and the parent section is required to ensure that wider mission support is balanced and does not adversely affect the CIL mission.

6.6 **Transient Personnel:** Interns, volunteers, visiting scientists, and other non-paid, transient personnel are on hand at any given time at the CIL. These personnel are generally not considered employees. Exceptions include some programs (e.g., safety, equal opportunity) as dictated by external agencies (e.g., OSHA, EEOC). Interns and other transient personnel are discussed in the DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education).

6.7 **External Consultants:** The CIL maintains a pool of contracted external forensic consultants that act as advisors to the Science Director. The consultants are board certified in their respective disciplines and are nationally or internationally prominent. Each are provided access to the Laboratory Manual and are expected to be thoroughly familiar with CIL field and casework procedures and acceptable scientific standards **(A5.2.3)**. The duties of the consultants include, but are not limited to:

- Review proposed identification of remains.
- Review scientific methods used in ascertaining proposed identifications.
- Periodically travel to the DPAA and perform on site evaluation of facilities and audits of forensic procedures of cases in progress.
- Propose new methods, procedures, and research initiatives, as appropriate.
- Provide written reports of the above activities, as appropriate.

7.0 SCIENTIFIC INTEGRITY OF THE CIL: The identification of the remains of missing individuals is a long and complex process that must meet defensible legal standards at every step. The high levels of scrutiny to which this process is subjected, and the potential implications for the reputation of the organization following a single disputed identification, demands that the scientific integrity of the CIL must be beyond reproach.

To this end, the CIL adheres to DODI 3200.20 regarding the Scientific and Engineering Integrity demanded by the Federal Government. Additionally, CIL Staff are expected to adhere to the CIL Code of Ethical Conduct (see Annex A of this SOP). Scientific integrity is defined as strict adherence to the scientific method with transparency and accountability for all actions. Scientific integrity requires sound and accepted methods and high ethical standards regardless of the nature of the work.

The CIL, under the direction of Top Management **(F4.1.5)**, insulates the recovery and identification process from undue external influences, including political and command influences (GAO 1992:Appendix 1, pp 55-56) to the fullest extent possible and is formally separated from the direct control of military command **(F4.1.1, F4.1.2, A4.1.4, A4.1.5b, F5.2.1, F5.2.2, F5.2.4, F6.1.12)**.

The Science Director, by the nature of his position, education, experience, and authority is charged with overall accountability for safeguarding the scientific integrity of the entire test process, to include site investigation, recovery, and analysis. The Science Director uses multiple lines of evidence [see DPAA Laboratory Manual, SOP 1.6 (General Case Procedures)] to establish identifications.

The day-to-day responsibility for maintaining scientific integrity falls to the scientific and technical staff whose work is proven to be demonstrably reliable and unbiased **(A4.1.5k, F6.1.4)**. There are several aspects to scientific integrity at the analytical level:

- Evidence is managed and secured in accordance with standard procedure and accounted for through proper chain of custody.
- Only trained personnel with proper qualifications and valid, regularly updated competency and proficiency assessments, who adhere to the CIL Code of Ethical Conduct are involved in the scientific process.
- Honesty, accuracy, and thoroughness characterize all phases of the data collection, recording, test, and peer review processes. These processes operate, and are perceived to operate, in an objective fashion free from command, managerial, and political influence or bias **(A4.1.5b, F5.2.1)**. Specifically:

  - All data are systematically collected and recorded in a thoroughly prescribed manner.
  - Test processes are open and transparent with complete documentation of methods and results.
  - Tests are based on methods considered reliable by the relevant scientific community and meet the current legal standards of general acceptability.
  - Test procedures are internally consistent and constructed to meet stated minimum data standards.
  - Limitations of tests and test conclusions are recognized and described.
  - Conclusions are substantiated by the results of tests and other observations.
  - Results are disseminated, whether or not they confirm the preconceived expectations.

- Conflicts of interest are avoided **(F4.1.1, F4.1.2, A4.1.4, F5.2.1, F5.2.4)**.
- All scientific procedures are monitored by a quality assurance program comprised of multiple and cross-validating quality assurance measures.
- Written findings, conclusions and other official information are publically released only after appropriate management review and approval.

Scientific integrity in the context of the search, recovery, and identification of missing individuals is inextricably dependent on the integrity of all phases of the decision-making and test processes. Once the documentary record begins, nearly all activities, decisions, and interpretations have the potential to impact the scientific integrity of the recovery and identification processes **(A4.1.5k, F6.1.4)**.

8.0 FACILITIES: The CIL is a laboratory system consisting of :

- CIL Headquarters (CIL-HQ): Formerly known as CIL-45, CIL-HQ comprises the eastern half of Building 45 on Hickam Field, a section of Joint Base Pearl Harbor-Hickam (abbreviated JBPHH), Hawaii commencing with Room 122.
- CIL Pearl Harbor (CIL-PH): Formerly known as CIL-220, CIL-PH is a laboratory annex for CIL-HQ on the second floor of Building 220 on the Pearl Harbor Naval Station, a part of JBPHHH). CIL-PH also houses the Forensic Science Academy (FSA).
- CIL Offutt (CIL-OF): CIL-OF is a facility at Offutt, AFB, Nebraska.
- CIL Wright Patterson (CIL-WP): CIL-WP is a facility at Wright Patterson, AFB in Ohio, comprised of the former Life Sciences Equipment Laboratory (LSEL).

CIL facilities are designed for the production of scientifically sound and legally defensible personal identifications of human remains. At all locations the CIL consists of evidence storage/holding, evidence analysis, office, and common spaces (e.g., Library, Multimedia Room). Examination, evidence holding, secure, or test areas usually refer to areas where evidence is handled and/or tested. Safety and security for these facilities are detailed elsewhere in the Laboratory Manual.

9.0 LOCATION: The full and official mailing address of the CIL in Hawaii is:

Defense POW/MIA Accounting Agency Laboratory
310 Worchester Avenue, Building 45
Joint Base Pearl Harbor-Hickam, Hawaii 96853

In Nebraska the mailing address is:

Defense POW/MIA Accounting Agency Laboratory
106 Peacekeeper Dr., Ste 2N3, Building 301
Offutt Air Force Base, Nebraska 68113-4006

In Ohio the mailing address is:

Defense POW/MIA Accounting Agency Laboratory
2060 Monahan Way
Building 17, Area B
Wright-Patterson Air Force Base, Ohio 45433

Telephone number rosters are published periodically. The CIL can also be accessed on the internet at: www.jpac.pacom.mil.

10.0 MANAGEMENT PRACTICES: The following management practices are in place to maximize the productivity of the CIL without compromising the scientific integrity of its work. The management structure is one of a dual nature comprising a functional area model as well as vertical chains of supervision.

10.1 **Functional Area Management Model:** The CIL implements and maintains a functional area management model appropriate to the scope of its activities **(A4.2.1, F5.2.2, F5.2.3, SF(12)5.2.3 F-8, F6.1.6)**. Due to the nature of CIL operations (e.g., frequent and lengthy deployments, changing priorities, and differing complexities in casework) Laboratory Managers and other key personnel are usually not assigned a permanent pool of CIL Staff to supervise relative to testing operations.

To maintain productivity and flexibility, key personnel instead oversee one or more functional areas, acting as the subject matter expert in that particular discipline. Functional area coordinators

have appropriate technical training and experience in the discipline they supervise **(SA4.1.5.h1).**

In the absence of a functional area coordinator, Top Management appoints a deputy to handle appropriate matters related to that function until such time that the functional area coordinator returns and resumes normal duties **(A4.1.5j, F5.2.6)**.

When needed, personnel are tasked to work in the functional area under the appropriate functional area coordinator **(A4.1.5f, A4.1.5g, A4.1.5h, F5.2.5, F6.1.6)**. Each subordinate is accountable to one and only one immediate supervisor per function **(SA4.1.5.f.1)**. Different functional areas include:

- Search and Recovery Mission Assignment & Scheduling.*§
- Search and Recovery Reporting.§
- Forensic Odontology.§
- Forensic Anthropology.§
- Material Evidence
- Life Support Investigation (LSI).*
- DNA Sampling.§
- DNA Coordination (data management and interpretation, FRS and comparisons, etc).*§
- Disinterments.§
- Health, Safety, and Environmental Protection.
- Evidence Management.
- Surety and Quality Management.
- Facilities Management and Logistics.
- Identification Report Development.*§
- Case File Coordination.*§
- Casework assessment, development, prioritization, assignment, tracking and case closure.
- Overall ORISE Program Management.*§

*Not done at CIL-OF.
§Not done at CIL-WP.

10.2 **Administrative Personnel Management:** Administrative management of personnel is not considered a functional area and relies on traditional vertical supervisory channels of management (depicted in Figure 2). All CIL Staff are monitored, evaluated, counseled, and disciplined by the Supervisory Staff of the CIL (see above).

Typically, supervisors provide feedback on an employee's work, advise them on and monitor their research, and complete counseling and evaluations of their overall performance, as needed. Supervisors also track daily staff activity. For ORISE staff, prior to their anniversary date, each mentor recommends to Laboratory Management that the participant's fellowship be renewed or terminated.

10.3 **Delegation of Authority:** The Deputy Commander for CIL Operations ensures that members of the CIL Staff delegated to positions of authority are empowered to carry out their duties, including the implementation, maintenance and improvement of CIL procedures and methods, to identify the occurrence of departures from these, or from the procedures for performing tests, and to initiate actions to prevent or minimize such departures **(A4.1.5a)**. These CIL Staff include, but are not limited to:

- Laboratory Director
- Deputy Laboratory Director.
- Director, Forensic Science Academy.
- Laboratory Managers.
- DNA Personnel.
- Historians
- Lead Quality Coordinator and QA Assistants.
- Laboratory Administrator.
- Support Coordinator.
- Evidence Coordinators.
- Functional Area Coordinators.
- Persons with additional duties.
- Analytical and technical personnel.

10.4 **Management Reviews:** Laboratory Management periodically reviews of the CIL's operational and testing activities to ensure their continuing suitability and effectiveness, and to introduce necessary changes or improvements **(A4.15.1, F8.5.1.1)**.

Formal management reviews between the Lead Quality Coordinator and Top Management are conducted at least annually (one per calendar year). The management review process is detailed in DPAA Laboratory Manual, SOP 4.0 (CIL Surety) **(SA4.15.1.1, F8.5.1.2, SF(12)8.5.1.2 F-70)**.

10.5 **Changes & Improvements:** Laboratory Management continually attempts to improve the effectiveness of its operations through the use of a variety of policies and procedures, and by implementation of the Surety Program **(A4.10)**.

Laboratory Management ensures that the integrity of CIL operations is maintained when changes and improvements are planned and implemented **(A4.2.7)**.

10.6 **Management Information Systems:** Laboratory Management uses a variety of databases to store, manipulate and retrieve data related to assigning, tracking, and statistical analysis of workloads, case information and turn-around time, productivity, and other vital CIL interests.

Table 1. External Agencies Subject to Informal or Diagonal Communications at the CIL.

Casualty Officers (all Services)	Armed Forces DNA Identification Laboratory (AFDIL)	Universities (in/out of state)
Medical Examiners (U.S.)	Naval Criminal Investigative Service	Veteran's Groups
Homeland Security	Federal/State/Local Law Enforcement Agencies	Office of the Armed Forces Medical Examiner
Army Criminal Investigation Division	Defense Forensic Enterprise, Forensic Executive Committee	FEMA/DMORT
Forensic Consultants	Family Groups	Other Military Services
FBI	Laboratories (in/out of state)	Area Hospitals & Health Clinics

Management information systems assist Laboratory Management to gauge how well the CIL is operating, to develop and monitor long and short-term goals and objectives, and to produce routine and special reports.

10.7 **Internal Communications:** Laboratory Management ensures that appropriate communication processes are established within the CIL and that communication takes place regarding the effectiveness of CIL operations **(A4.1.5k, A4.1.6)**.

The primary means of disseminating internal information is by email. However, the nature of email correspondence inherently suppresses feedback and dialogue. Consequently, periodic staff meetings are held, usually in the form of announcements prior to group training sessions.

Personalized distribution boxes are located in the administrative areas of the facilities for non-electronic distribution, professionally related postal mail, and other similar types of material.

10.8 **Interagency Coordination:** Informal or diagonal channels of communication include, but are not limited to, the external agencies shown in Table1.

Key personnel, or CIL Staff delegated duties accordingly, are given latitude in communicating and coordinating with the above, and potentially other, agencies as a routine part of their duties following approval from the appropriate member of Laboratory Management.

Normally, Laboratory Management gives guidance to individuals on matters they can coordinate with outside agencies versus needing permission from higher authority (e.g., cannot agree to consult on a case for the medical examiner). Agreements to perform services on behalf of the CIL must be approved by Laboratory Management.

11.0 THE WORK ENVIRONMENT: Policies and procedures are established at the DPAA and CIL to foster a work environment that complies with all relevant laws and regulations and is conducive to the fulfillment of the CIL mission (see Annex B of this SOP). The intent is to establish common standards between supervisors and subordinates that:

- Foster a high degree of scientific integrity.
- Allow all CIL supervisors to promote a work environment in which employees can excel with fair and equal opportunity adhering to laws and regulations governing merit-systems principles.
- Enable all CIL supervisors to comply with all DOD, OSD, and DPAA performance management, recognition, and employee development policies, including communicating performance expectations and holding employees responsible for accomplishing them, making them meaningful distinctions among employees based on performance and contributions, fostering and rewarding excellent performance while addressing poor performance and adhering to the performance management due dates.
- Ensure that the CIL Staff is aware of the relevance and importance of their activities and how these affect the CIL mission **(A4.1.5k)**.
- Make clear to each person their duties, responsibilities, and authorities **(F6.1.4).**
- Promote open and constructive dialogue.
- Efficiently allocates resources including workload.
- Allow employees the maximum amount of freedom in which to carry out their assigned tasks.
- Increase the efficiency of the CIL.
- Promote delegation of authority.
- Clearly define expectations.
- Foster creative, constructive, and objective thinking and discussion.
- Promote effective communications in all directions.
- Rewards meritorious performance.

Employees who work in such an environment are generally content (have high morale) and free from undue stress and thus are more loyal, productive, trustworthy, and less apt to make mistakes.

CIL policies supplement those established by the DPAA Director and are tailored to the needs of the CIL. DPAA policies can be accessed through the DPAA website.

11.1 **Sponsorship Program:** All new CIL Staff have a sponsor assigned to assist them with acclimating to the work environment. Sponsorship for new employees is temporary (first month) and generally consists of assisting them with in-processing at their assigned DPAA facility and at the relevant personnel center, getting started with competency training, and answering general questions about CIL policies. An orientation checklist and desk guides are available on the DPAA network to assist sponsors and new employees with acclimating to the unit.

11.2 **Duty Hours:** As a result of the dynamic nature of the work at the DPAA, time zone differences on the mainland, and the commuting problems for Hawaii based staff, the civilian CIL Staff is authorized to work "flex" hours. The guidance, taken from the DPAA policy, is that civilian personnel are required to work eight hours per day, 40 hours per week. Accordingly, the following additional guidance is in effect:

- Normal duty hours of the CIL, as a whole, are from 0630 to 1800 hours daily. During this period, portions of the CIL Staff are usually present and conducting business.
- Staff members are in the CIL and on duty by 0900 on work days.
- Compressed time (e.g., four 10 hour days) is not authorized.
- The work day ends at a minimum of 8.5 hours after arrival at work (8 hours of work, minimum of 30 minutes of lunch and/or breaks—total 8.5 hours).
- Exceptional circumstances may be accommodated by Laboratory Management on a case by case basis, however, exceptions to this policy are expected to be infrequent and temporary.
- Work hours may be influenced by external factors such as severe weather, heightened security, utility problems, etc. JBPHH and Offutt AFB may evoke respective base instructions and directives that deal with such contingencies.

11.3 **Open Door Policy:** The foundation of an organization's performance is the ability and desire of the staff to perform. If ideas are suppressed, an organization becomes stagnant and employees dissatisfied. The scientific nature of forensic work demands that creative, constructive, objective thinking and suggestions be encouraged. To facilitate this, an Open-Door Policy has been adopted by the DPAA Deputy Director and by the CIL leadership (see Annex C of this SOP) **(A4.1.6)**.

11.4 **Grievance Procedures:** It is the right of every employee and customer to present grievances (including complaints about the Surety Program) to supervisors and CIL management for timely and appropriate action. Permanent employees (civil servants) follow the grievance procedures established by the local personnel office **(A4.1.5k, A4.1.6, A4.2.3, A4.8, A4.12.1, SA4.8.1)**.

Although non-Federal personnel such as ORISE fellows and interns do not have a formal grievance procedure, this does not mean that there is no recourse when it comes to presenting grievances.

For the sake of fairness, and the morale and smooth operation of the CIL, the following channels are available to Federal and non-Federal personnel who feel they have been treated unfairly or have other issues related to the working environment at the DPAA:

- **Chain of Command/Support:** Problems should be resolved at the lowest level, whenever possible. Non-Federal personnel should first discuss grievances with their immediate supervisor. For ORISE personnel, problems should first be addressed to the Mentor and/or ORISE program manager. If the issue cannot be resolved at their level, the problem should be elevated to the senior ORISE manager. Refer to the current ORISE General Information Guide for procedures on filing a grievance. For interns, problems should be addressed first to the Intern's Project Manager and then to the CIL Intern Coordinator.
- **Safety Officer & Lead Quality Coordinator:** Complaints dealing with occupational safety and health issues, quality assurance problems, or similar matters may be brought to the attention of the appropriate person responsible for that area **(SA4.8.1)**.
- **Open Door Policies:** Should the grievance involve an immediate supervisor or Laboratory Manager, or other key CIL Staff, the Science Director has an "open door" policy (see Annex C of this SOP). Should the grievance involve the Science Director, or other matters the employee feels uncomfortable discussing with supervisors, the DPAA Director also has a "Commander's Hotline" which is posted on the DPAA website.

- **Chaplain:** Chaplains are trained counselors and are available to discuss workplace problems, especially those dealing with moral or ethical dilemmas. The J-1 can provide contact information.
- **Inspector General (IG):** Grievances that cannot be resolved using the above resources can be taken to the IG. Be advised that the IG first asks whether there was an initial attempt to resolve the problem within the chain of command.

Records are maintained of all complaints and of the investigations and corrective actions taken by the CIL **(A4.8)**.

11.5 **Performance Appraisal Procedures:** All CIL Staff have a performance appraisal at least annually **(A4.1.5k, A4.1.6, F6.1.4)**. Permanent civil service personnel have a formal evaluation by their rater in accordance with the applicable regulations under the current civil service system(s). Performance standards and other information applicable to CIL Staff are provided in Annex D (CIL Personal Performance Standards). Pay increases, incentive awards, corrective action, and similar issues are usually discussed with the employee once the evaluation is completed.

Supervisors evaluate ORISE fellows in a manner that parallels (but is not equivalent to) the civil service system. The evaluation includes a recommendation to Laboratory Management that the participant's fellowship be renewed or terminated. Military personnel are evaluated in accordance with their services' performance rating regulations.

11.6 **Deployment:** The term "deployment" refers to participation in a field recovery mission. Missions typically last from four to six weeks. Anthropologists and archaeologists are ideally expected to deploy a minimum of two missions and a maximum of six missions per year. Archaeologists hired primarily for their archaeological skills may deploy more often on average. Laboratory Managers should expect to deploy on a field recovery mission a minimum of once per year and possibly more as directed. Exceptions to the minimum number or deployments must be approved by the Laboratory Director. Only under unusual circumstances, and with the approval of the Laboratory Director, will an anthropologist be asked to deploy on more than six missions per calendar year. Eligibility for field assignments and the number of deployments depends on a variety of factors including, but not limited to:

- Personnel actions pending or completed.
- Quality of annual evaluations.
- Personnel Improvement Plans (PIP) being performed.
- Competency and proficiency tests passed.
- Operational tempo.
- Unforeseen or unexpected changes in the operation matrix.
- Experience.

Laboratory Management assigns RLs to deployment missions and makes any changes deemed necessary. The schedule is typically developed by a Deployment Committee populated by CIL RLs and overseen by a Laboratory Manager.

RLs are typically matched up with sites based on a combination of experience, skills (e.g., mountaineering or underwater archaeological training) and expertise. RLs whose professional skills or personal performance in the field or the CIL are found to be inadequate or substandard through testing or evaluation may be removed from deployments until such deficiencies are remedied.

Joint Forensic Reviews and Field Forensic Reviews are assigned to senior forensic anthropologists and odontologists by the Laboratory Director, with input from the FSA Director, based on a combination of credentials, experience, and availability.

11.7 **Leave & Authorized Absences:** Active-duty military members submit their respective leave application in accordance with military regulations through their chain of command. Federal employees submit leave forms to their supervisors for approval and then to the Laboratory Administration for processing. Personnel who need to extend their leave beyond that forecasted should notify Laboratory Management. Before departure, personnel should leave contact information with Laboratory Management, as appropriate.

Federal employees have their leave tracked by the J-1 Section while non-federal workers' leave is tracked internally by Laboratory Management and Laboratory Administration. For Federal employees, leave requests should be submitted through SLDCADA and approved prior to taking leave. In emergency or short notice situations, verbal approval from the Supervisor suffices, however, the employee is required to update the time card appropriately at the earliest opportunity.

The types of leave available are as follows:

11.7.1 **Sick Leave:** Military personnel are not charged for sick leave, rather they are assigned to

"quarters" until well enough to return to work or are authorized to be absent to care for family members.

Civilian sick leave may be taken for personal illness, medical/dental appointments or similar care of a family member. Sick leave that extends past 24 duty hours requires a doctor's note. If advance notification is not possible, the leave form should be completed and submitted as soon as possible after returning to work. Sick leave is not be used for purposes intended for regular leave. Violations may result in disciplinary action.

11.7.2 **Regular Leave:** Regular leave is encouraged and is taken with consideration to mission requirements. Point-of-contact information should be left with Laboratory Management when departing on leave away from home for extended periods of time.

11.7.3 **Military Leave:** Members of the reserve components are authorized to be absent for military duties. Copies of orders or similar documentation may be required to be presented prior to taking military leave. Point-of-contact information should be left with Laboratory Management when departing on military leave away from home for extended periods of time.

11.8 **Overtime & Compensatory Time:** Overtime and compensatory ("comp") time is pre-approved by the DPAA Director.

Civilian claims are submitted to Laboratory Administration no later than one pay-period prior to mission departure and must be validated by the employee after returning from a mission. Normally, the claimant verifies claims by reviewing documentation the pay period prior to comp or overtime being paid. Comp time is taken at the earliest opportunity, normally not during the same pay period accrued, but within 90 to 180 days after accrual. Accrual of comp time should be kept to a minimum.

Supervisors make every effort to grant the employee the time off. Laboratory Management can direct employees to use comp time that will soon convert to overtime payment in lieu of using annual leave or travel comp time provided this does not result in the employee losing annual leave. Paid overtime is kept to an absolute minimum and limited to cases of real necessity.

Travel Comp time is also granted in accordance with the Joint Travel Regulations. For field missions, requests are submitted through a designated RL (usually the most senior RL on the mission) within 14 days of travel.

11.9 **Temporary Duty (TDY):** Request for TDY orders are made on the TDY request form and submitted to Laboratory Management for approval.

TDY can either be directed by Laboratory Management (i.e., Directed TDY) or at the request of the CIL Staff member (Permissive TDY). There are personnel management and human resource implications between the two forms of TDY concerning awarding compensatory time, points toward evaluations, etc.

Upon return from TDY the participant files a travel voucher as soon as possible.

11.10 **Special Activities & Events:** CIL Staff are encouraged to participate in the DPAA sponsored organizational activities, work requirements permitting. If the Agency or Laboratory Management does not direct that the event is the individual's place of duty, leave must be taken in accordance with the above guidance.

11.11 **Agency Wellness Program:** Given the nature of the duties in DPAA, it is to the advantage of all CIL Staff to maintain a level of physical fitness commensurate with their duties. As such, all CIL Staff are granted three hours per week of duty time to participate in physical exercise, physical training (PT), or other appropriate wellness activities, mission permitting. Specific guidance is as follows:

- Activities must take place within one of the military base running trails/tracks or facilities.
- The hours must be used one hour blocks on separate days (e.g., you cannot use 1.5 hours on 2 days or 3 hours on one day).
- The hour can be combined with a one hour lunch for a two hour block.
- The hour is total from the time of departure from work until the return time (e.g., if it takes 10 minutes to travel to and from the gym, there is only 40 minutes of exercise time).
- Using the hour at the beginning and end of the work day is at the discretion of the supervisor. Participants are required to report for duty both before and after participation in the activity.
- The activity should be genuine exercise and not include forms of recreating (e.g., scuba diving, laying on the beach, riding a motorcycle).
- Absences may be granted for other wellness activities when such activities enhance individual and/or organizational effectiveness (e.g., smoking cessation classes, nutritional classes, health fairs, health screenings).
- The program is a privilege and may be revoked at any time on an individual basis in the event of mis-

use. Abuses of the program may also result in further disciplinary action.

12.0 SURETY: Select provisions of this SOP are subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

13.0 SAFETY: There are no special safety concerns associated with this SOP. Precautions conducive to a generally safe work environment are listed in various portions of the DPAA Laboratory Manual, and specifically in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

Annex A (CIL Code of Ethical Conduct) (SF(12)6.1.12 F-26)

CODE OF ETHICAL CONDUCT: The mission of the DPAA Central Identification Laboratory demands the highest level of scientific competence possible and an ethical standing that is beyond reproach **(A4.1.5.k, F6.1.4)**. All personnel assigned to the DPAA-CIL are expected to maintain the highest level of personal and professional integrity. Integral to this is the adoption of, and compliance with, the following *Code of Ethical Conduct*:

1. Preamble: The CIL Code of Ethical Conduct is intended as a guideline for solving ethical dilemmas encountered in the course of fulfilling the CIL's mission. Because the recovery and identification of human remains is a complex procedure, often conducted under unique circumstances in remote locales, no code can completely anticipate all of the situations that can arise. For this reason, the CIL Code of Code of Ethical Conduct is a framework that outlines general principles that assists the CIL Staff in making ethical choices.

2. Code of Ethics: In general, members of the CIL will not misrepresent themselves or their work, misappropriate tangible or intellectual property, evade the truth, or conspire to deceive. Specifically, the CIL Staff:

- Refrains from engaging in professional or personal conduct adverse to the best interests of the CIL, the DPAA, and the United States of America. This includes illegal or unethical conduct as well as allowing the use of his/her name and credentials in support of illegal or unethical activity.
- Refrains from engaging in any misrepresentation of education, training, experience, or expertise.
- Refrains from knowingly engaging in any misrepresentation of data upon which expert opinion or conclusion is based. This includes plagiarism, failure to render appropriate credit for work done by others, falsification of data, falsification of the conditions under which data were obtained, and falsification of the results derived from the data.
- Refrains from issuing public statements that appear to represent the position of the CIL, the DPAA, or the Department of Defense without prior approval from the DPAA.
- Avoids involvement in any other activities that diminish confidence in his/her competence, impartiality, independence of judgment, or operational integrity **(A4.1.4, A4.1.5d, F5.2.1, F5.2.4)**.
- Refuses to accept remuneration that in any way influences the results of analytical or investigation activities **(F6.1.11).**
- Honors and complies with the spirit and intent of the Code of Ethical Conduct.
- Reports violations of the Code of Ethical Conduct to their chain of command. Laboratory Management investigates all alleged violations. Investigation procedures vary with the case at hand **(SF(12)4.1.4 F-2)**.

Regarding CIL historians, in general they are guided by two sets of principle standards set by the American Historical Association's *Statement on Standards of Professional Conduct* (2011) and the Society for History in the Federal Government's *Principles and Standards for Federal Historical Programs* (n.d.). Specifically the CIL historians:

- Perform research and writing in accordance with the highest standards of the profession, as elaborated in the above referenced documents, which include (but are not limited to):
  - Honor the integrity of the historical record during the practice of history.
  - Leave a clear trail of research for others to follow.
  - Recognize the need for a critical dialogue.
- Make available for command review all primary and secondary sources collected for research projects.
- Submit work for peer review by other CIL historians to assure historical accuracy.
- Route all work for quality assurance review in compliance with the DPAA Laboratory Manual.
- Credit all sources, with fidelity, used while generating historical products.
- Respect and welcome divergent points of view that challenge the underlying assumptions of their work.
- Participate in the community of historians by attending meetingss, presenting research results, and continuing personal professional education and development.
- Sign as an author on all completed studies to which they contribute.

3. Impartiality & Independence: All CIL field, analytical, administrative, support, and financial activities are undertaken impartially **(F4.1.1, F5.2.1).** CIL Staff at all times remain free from any undue internal and external production, commercial, financial, and other pressures, influences and

conflicts of interest that may adversely affect the quality and integrity of their work and/or compromise their impartiality **(F4.1.2, A4.1.5b, F6.1.12).**

The CIL identifies risks to its impartiality on an ongoing basis including those that arise from its activities, relationships with other organizations, and the relationships of its personnel. However, such relationships do not necessarily present a risk to impartiality **(F4.1.3)**.

Relationships that threaten CIL impartiality can be based on a variety of entities. These include, but are not limited to:

- Ownership.
- Governance.
- Management.
- Finance and budget.
- Contracts.
- Marketing and branding.
- Sales and commissions.
- Interpersonal relationships (either cordial or adversarial).
- Hiring practices.
- Personnel and business referrals.

If a potential or actual risk to impartiality is suspected or identified, all CIL Staff are obligated to report such situations to Laboratory Management. Laboratory Management investigates the situation and, if warranted, takes action to eliminate or mitigate the risk. Such actions include, but are not limited to:

- Reassigning personnel or adjusting duties.
- Amending or canceling contracts.
- Terminating or adjusting business practices with vendors.
- Adjusting budget activities.
- Counseling of, or taking disciplinary action against, personnel.
- Reporting criminal and/or unethical activity to the appropriate agencies.
- Consultation with the J-1 on recruiting and hiring, as necessary.
- Evaluating and adjusting relationships with external agencies or organizations.

Laboratory Management also determines if the individual's past casework or other pertinent endeavors (e.g., audits, peer reviews) were affected or compromised. If this is the case appropriate corrective action is implemented to include recalling casework, if necessary.

4. Activities with Foreign Entities: Activities with foreign entities, not part of official government duties, are regulated by the Foreign Gifts and Decorations Act (FGDA). For DPAA personnel, FGDA is supplemented by Department of Defense Directive (DODD) 1005.13. The CIL extends coverage of these regulations to other CIL Staff (e.g., ORISE) who are receiving compensation from the US Government **(F5.2.1)**.

Generally, a DOD employee may not accept employment, large gifts, or compensation from any foreign government, including any entity which is owned or operated by a foreign government, which may include public research institutions or universities.

There are some exceptions to DODD 1005.13 prohibitions. For example, employees may receive inexpensive gifts valued up to $350 (this amount fluctuates so it is advisable to check with Laboratory Management prior to acceptance).

Additionally, there are some activities (e.g., some awards and scholarships) that may be allowed under DODD 1005.13, but only with prior approval of Laboratory Management and/or higher levels of command.

Consult with Laboratory Management prior to undertaking any activities with foreign entities. Laboratory Management examines the situation and grants approval on a case-by-case basis.

5. Pressures Affecting Individual Judgment: Laboratory Management is attentive to situations which may result in pressures on staff members that may potentially affect or compromise their judgment, impartiality, or ethical behavior **(SF(12)4.1.4 F-1)**. Examples of such situations include those related to ethics and impartiality, listed above, as well as including, but not limited to:

- Difficulties with interpersonal relationships (domestic, familial, as well as in the workplace).
- Personal health issues or those of others.
- Lack of training or expertise for particular duties.
- Promotions or changes in duties.
- Financial problems.
- High visibility casework.
- High workload and excessive travel.
- Dealings with the courts or justice system.
- Educational activity outside the workplace.
- Language difficulties.
- Pending disciplinary actions or other personnel issues in the workplace.

- Changes in lifestyle (e.g., death of a family member, children arriving or leaving home, retirement).

If a possible or actual circumstance pertaining to a compromise of an individual's judgment is suspected or identified, the individual should self report to Laboratory Management. Otherwise, all CIL Staff should report such situations, with due discretion, to Laboratory Management if they become known.

Once notified, Laboratory Management investigates the situation to determine if the individual's judgment has been compromised. If substantiated, Laboratory Management takes actions to mitigate or eliminate the situation causing the problem. With respect to the individual in question, actions may include, but are not limited to:

- Those listed above if the situation involves a compromise of ethics or impartiality.
- Reassigning personnel or adjusting duties or workload.
- Counseling by Laboratory Management, as appropriate.
- Additional training or education.
- Working with J-1 or other agencies, as appropriate, to provide relief and support relevant to the situation at hand.

Laboratory Management also determines if the individual's past casework or other sensitive endeavors (e.g., audits, peer reviews) were affected or compromised. If this is the case appropriate corrective action is implemented to include recalling casework, if necessary.

Provided no misconduct or disciplinary issues are involved, Laboratory Management should make a concerted effort to restore the individual to his/her previous duty status, if possible, once the circumstance that has impacted the individual's judgment has been mitigated or eliminated.

Throughout this process Laboratory Management needs takes appropriate measures to control gossip and rumors **(SF(12)4.1.4 F-2)**.

6. Disciplinary Action: Violations of the Code of Ethical Conduct are investigated by the chain of command in accordance with the above procedures. Substantiated breaches constitute grounds for disciplinary action, including dismissal from employment **(SF(11)5.2.5 F-13)**.

7. Additional Guidance: As a commitment to good professional practice, the CIL Staff also adheres to the *ASCLD-LAB Guiding Principles of Professional Responsibility for Crime Labs and Forensic Scientists*. Each member of the CIL Staff reviews with management these principles at least once per calendar year. A record of the review is maintained **(SA4.2.2.1, SA4.2.2.2, SA5.2.1.3).**

Annex B (Professional Conduct & Demeanor)

Professional Conduct & Demeanor: The mission of the DPAA-CIL is contingent on the staff gaining and maintaining the confidence of the general public. Accordingly, CIL Staff are expected to conduct and comport themselves to the highest professional standards at all times **(A4.1.5k, F6.1.4)**. Professional conduct is manifested in both demeanor and appearance.

These guidelines apply during CIL work hours (i.e., 0630-1800), regardless of an individual's work hours. In other words, personnel who "clock out" at 1500 hours but remain at the CIL doing personal work are expected to maintain the standards outlined in this policy.

Violations and/or actions and attitudes that run counter to the spirit and intent of these guidelines may result in a corrective or disciplinary action.

The following applies to all CIL personnel and their guests:

1. Appearance: Military personnel assigned to the CIL comply with their service's uniform regulations. Civilian personnel assigned to, and working in, the CIL comply with the following guidelines:

- **Clothing in the CIL:** Clothing should be clean, ironed, and serviceable and reflect the status of a professional. CIL Staff should dress in a manner appropriate to brief family members and high-ranking government officials. **Common sense should apply when interpreting these requirements**. Specifically:
  - No casual wear such as jeans (of any color), t-shirts, shorts of any length, or shirts or dresses with large logos or sayings are authorized. Exceptions are polo-style shirts with the DPAA logo, or with the logo of an associated professional, educational, or military organization. Logos that "advertise" a company or commercial product are not authorized.
  - Revealing or provocative clothing (e.g., mini-skirts, overly tight clothing, or shirts showing the midriff or navel) is prohibited.
  - Shoes should be dress, or casual dress, in nature. Heels are not to exceed two inches in height. Females are allowed dress-type sandals or open toed shoes, safety conditions permitting. Athletic shoes are not authorized except by medical direction or if worn with medical scrubs.
  - Males are expected to wear socks and belts.
  - Clothing should also be worn appropriately (e.g., shirt-tails in, except for "aloha" shirts).
  - Medical scrubs may be worn in the CIL; however, if you wear scrubs six hours a day, ensure appropriate dress the other two hours.
  - Dress aloha clothing is authorized on Fridays but otherwise is discouraged.
  - Lab coats should be worn during prolonged stays in examination areas or the FSA, whenever possible and practical.
- **Jewelry:** Jewelry should be appropriate to the working conditions and safety concerns. Excessive jewelry is deemed inappropriate. Jewelry involving body piercing must not be visible except for earrings on females. Earrings must be modest in size, style, and number.
- **Tattoos:** Tattoos visible with normal attire are strongly discouraged and should not be visible during working hours at the DPAA. Visible tattoos of an offensive, obscene, racist or criminal nature are prohibited outright. Acquisition of tattoos that violate the spirit and intent of these guidelines may result in an adverse personnel evaluation and could influence decisions regarding retention or promotion.
- **Grooming:** Individuals are expected to maintain grooming standards commensurate with the status of a professional. Hair should be a natural color (though not necessarily the individual's natural color), and cut or styled in a manner in keeping with the spirit and intent of these guidelines. Beards, mustaches, goatees, etc. should present a neat appearance.
- **Hygiene:** Individuals are expected to maintain hygiene standards commensurate with the status of a professional. Strong soaps, perfumes, or cosmetics that linger in the air are prohibited.
- **Appearance in the Field:** The above guidelines should be followed whenever appropriate and/or possible provided they do not overly detract from comfort, or compromise safety and productivity. Since field situations widely vary, CIL members are expected to use good judgment regarding the above guidelines. The following supplemental guidance applies:
  - Clothing should depict a civilian rather than military appearance. For example, khaki field pants with cargo pockets and/or a "boonie" hat may be acceptable on site, but the same items having a woodland camouflage (i.e., BDU) pattern would not.
  - During duty or while on site, shoes should be closed toed and provide protection commensurate with the job hazards.

- Clothing should not have images, writing, or symbology (e.g., wearing the host nation's flag on the seat of your pants) that is culturally insensitive or offensive to the host nation.
- When meeting with host nation officials, attire should project a neat, professional and dignified appearance (e.g., collared shirt, long pants, closed toed shoes).

2. Demeanor: Demeanor is manifested in words, actions, and attitudes. The CIL Staff strive to create and maintain an open work environment that fosters mutual trust, cooperation and productivity. To this end, military and civilian personnel are expected to exhibit professional demeanor while on duty at the DPAA or while TDY. Actions and activities should be those of a professional. As such, the following provisions are in effect:

- Office doors remain open and windows un-shaded while occupied except under special circumstances (e.g., supervisors meeting with subordinates, examination of classified materials, etc.).
- Personnel should refrain from criticism and comments that are intended as unconstructive. Gossip should be avoided and action taken to dispel rumor and innuendo whenever possible.
- Music and radio programs that may distract or offend other employees are to be contained within offices and not filter out into the common areas. The use of headsets is strongly encouraged when listening to audio entertainment.
- Personnel respect the research data, findings, writings, etc. of their colleagues when such can fairly be considered intellectual property as opposed to a government work product.
- The surreptitious recording of conversations in the CIL is prohibited unless formally authorized and conducted by a government investigative body. Persons who violate this provision may be subject to disciplinary action and/or civil and criminal liabilities.
- **Tobacco use (including smokeless tobacco, chewing tobacco, snuff, and the use of spittoons or "spit cups") is prohibited at all times in the CIL. Tobacco use is confined to outdoor smoking areas well away from entrances into the building.**

Annex C (Open Door Policy)

The DPAA has established an "open-door" policy whereby all personnel have open access to the DPAA Deputy Director for the purpose of resolving problems **(A4.1.6, A4.2.3, A4.12.1)**. No permission is required to meet with the DPAA Deputy Director; however, the DPAA requires that personnel inform their chain of command of their whereabouts, and that **they work within their chain of command to resolve problems prior to meeting with the Deputy Director.** Scheduled appointments are requested.

The maintenance of an "open door" is essential to the smooth and productive functioning of the CIL. Laboratory Management endorses this policy and maintains a similar open-door policy with regard to CIL issues and concerns. No one will be denied an opportunity to meet with the Science Director for any reason. However, CIL Staff—to include interns and fellows—will attempt to resolve issues through the appropriate supervisory framework prior to resorting to open door policies. The supervisory chain is: supervisor (as applicable), Laboratory Manager, Laboratory Director, and then Science Director.

For personnel at CIL-OF and CIL-WP, an electronic open door policy exists. Personnel may meet with the Science Director using electronic means such as telephone, VTC, Skype, or other electronic media. Appointments for electronic communication should be made in advance, usually by email, whenever possible.

Laboratory Managers are required to maintain an "open door" at all times. No appointments are required—though common sense and professional courtesy should prevail.

Annex D (CIL Personnel Performance Standards)

(A4.1.5 a, f, h & k, A4.2.3, A4.2.4, A5.2.2, F5.2.3, F5.2.5, F6.1.4, (SF(12)6.1.6 F-20)

1. CIL Civilian Analyst Point System

a. General Principles: CIL employees are expected to follow the Federal Government's Merit System Principles, as described in 5 USC, §2301(b). Supervisors follow these principles in all decisions regarding personnel matters. Consistent with the Merit System philosophy and in direct compliance with the Performance Management System, Laboratory Management measures the quantity of work performed by each staff member as well as assess the quality of work performed.

Individual ratings depend upon a comparison of the quantity of work with reasonable standards that have been derived through evaluation of average work outputs for staff members performing comparable tasks.

Quality of work product, willingness to be a team player, and efforts to improve one's professional credentials and knowledge are also considered in the annual evaluations.

Supervisors practice the Principles of Constructive Discipline with employees and take appropriate disciplinary actions in cases of employee misconduct (i.e., careless workmanship, refusal to perform assigned work, discourteous conduct, failure to comply with safety practices, etc.).

In addition to the above principles, Laboratory Management utilizes the following principles in employee evaluations:

Principle 1: A point system provides an objective, clear basis for documenting the *quantity* of work performed by each analyst. The basic premise governing the point allocation system is that one work hour is worth one point for the CIL Administrative Critical Element. The assumption is that an individual employee works on average a minimum of five hours per business day on tasks directly linked to this objective. That leaves three hours each business day for Continuing Education and other tasks that do not receive points under this principle (e.g., telephone calls, drafting/answering emails, voucher completions, awards ceremonies).

Principle 2: For analysts, field time and CIL time are linked, in that time spent in the field is time not spent in the CIL. For the purpose of performance evaluations, CIL time is defined as combined analytical and administrative time. Field time is defined as total days in the field (1 day = 1 points) on assigned TDY and includes all normal pre-deployment meetings as well as time spent writing any resultant SARs. Traditional rounding rules apply.

NOTE: The point/hour allocations shown in the table represent "benchmark" allocations based on an "average" task or assignment. Management may alter these default allocations on a case-by-case basis; however, such reallocations should be the exception rather than the rule. Analysts who feel that a point allocation is too low (or high) should address their concerns with the manager making the assignment *prior* to completion of the assignment. In most cases, requests to reallocate points are entertained once the assignment is completed. Unless otherwise stipulated, one hour is the minimum allocated for any activity.

Principle 3: The final rating values are given on a nominal scale of "Acceptable" or "Unacceptable". The value assigned to a given number of points (or range of points) measuring quantity of work (e.g., Critical Element 1) is based primarily (but not exclusively) on statistical assessments of past performance values by CIL personnel. Care is taken to compare employees' performance values to statistics derived from colleagues who performed the same or similar tasks in previous years (e.g., forensic anthropologists compared to one another, archaeologists compared to one another, etc).

Principle 4: Rating criteria are derived from the Department of the Navy, Interim Personnel Appraisal Form. These criteria vary for each employee based on the level of experience of the employee (Entry, Journey, or Expert) and whether or not the individual is Supervisory. Levels of performance rating are given as Acceptable or Unacceptable and are as follows:

Entry Level: Acceptable: With guidance and assistance:

- Accomplished the stated critical element, achieving desired results that were sound, accurate, thorough or documented; met applicable authorities, standards, policies, procedures and guidelines.
- Planned, organized, prioritized and scheduled own work activities to deliver the critical element in a timely and effective manner.
- Demonstrated ability to work well with others.

Entry Level: Unacceptable: Though guidance was provided:

- Failed to achieve all or part of the stated critical element by failing to provide products or services that were sound, accurate, thorough, documented and/or failed to meet applicable authorities, standards, policies, procedures or guidelines.
- Failed to plan, organize, prioritize and schedule own work activities to deliver the critical element in a timely and effective manner; relied on others to redo or complete work assignments.
- Demonstrated poor cooperation or inability to work with others.

Journey: Acceptable:

- Completed the stated critical element by achieving results that met applicable standards, policies, procedures, and guidelines.
- In achieving critical elements and work assignments, adhered to work/project schedules; organized or prioritized own tasks to complete assignments; adjusted own work priorities to achieve desired results.
- Demonstrated ability to work well with others.

Journey: Unacceptable:

- Failed to achieve all or part of the stated critical element.
- Failed to provide products that were sound, accurate, thorough and documented, and regularly failed to meet applicable authorities, standards, policies, procedures and guidelines.
- Failed to plan, organize, prioritize, and schedule own work activities to deliver the critical element in a timely and effective manner; relied on others to frequently assist with or redo work assignments;
- Demonstrated poor cooperation or inability to work with others.

Expert: Acceptable:

- Delivered on each critical element with broad and significant impact that was in alignment with the mission and objectives of the organization as well as applicable authorities, standards, policies, procedures and guidelines anticipating and overcoming significant obstacles.
- Established priorities and coordinated work across projects, programs or people, balancing work demands and anticipating and overcoming obstacles to achieve a timely and positive outcome.
- Demonstrated high standards of professional conduct and represented the organization or work unit effectively.

Expert: Unacceptable:

- Failed to achieve all or part of the stated critical element.
- Failed in the accomplishment of priorities and coordination of work across projects, programs or people; consistently failed to balance work demands resulting in an untimely and unproductive product or event.
- Demonstrated poor cooperation or inability to work with others.

b. Critical Element Descriptions: Critical elements are as follows:

Critical Element 1: Quantity of Work: CIL laboratory and administrative duties may be converted to points in accordance with this annex. CIL laboratory and administrative points are inversely correlated with Field Duties (Critical Element 2). When CIL laboratory and administrative points are plotted on the y axis and Field points are plotted on the x axis, a resulting regression line can be calculated using CIL staff performance in previous years as a reasonable data base. See the below section for determining ratings.

Critical Element 2: Field Duties: CIL forensic anthropologists and archaeologists are required to deploy on DPAA recovery missions (see above). Field duties may be converted to points in accordance with this annex. Field points are inversely correlated with CIL laboratory and CIL administrative points (Critical Element 1). When CIL laboratory and CIL administrative points are plotted on the y-axis and Field points are plotted on the x-axis, a resulting regression line can be calculated using CIL staff performance in previous years as a reasonable data base. See the below section for determining ratings.

Critical Element 3: Continuing Education: Continuing Education points are calculated in accordance with DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education). Point totals result in the following ratings:

≤62 – Unacceptable
63 or higher – Acceptable

The Critical Element score is subject to modification by the non-objective factors: Critical Thinking.

Table 2. Analyst Point Values

Assignment	Points	Rules
FAR-long form	25	Per individual or group
FAR-short form	15	Per individual or group
MER	2	Per item
CIL Portion/Admin Fiat	3	Per report
SAR-Peer Review	15	Per report
FAR Peer Review-long form	10	Per individual
FAR Peer Review-short form	5	Per individual
MER Peer Review	0.5	Per item. MERs containing 1-4 items are worth 1 pt. Points earned above 0.5 are rounded up to the next point.
Histology Preparation (Form 3801)	2	For up to 2 samples 1 additional point for each additional sample
Histology Analysis (Form 3802)	3	For up to 2 samples 1 additional point for each additional sample
Histology Peer Review	1	1 per peer review 1 additional point for each sample over 4 samples
CXR Triage and Scanning	10	Per case
CXR Superimposition	15	Per report
CXR Subsequent Arrays	1	Per 5 individuals
CXR Peer-Review	10	Per report
CIL Portion/Admin Fiat Peer Review	1	Per report
CFC	10	10 per CFC with two additional pts accrued for each additional individual (e.g., 12 individuals plus group earns 16 pts).
Disinterment Memo	10	Per memo for up to 10 associated individuals 1 additional point per associated individual over 10
Disinterment Memo Peer Review	5	Per memo for up to 10 associated individuals 1 additional point per associated individual over 10
Meeting	1	Per meeting assigned by management
Tour	1	Per tour assigned by management
STP Committee	30/15	30 pts for committee chair, 15 points for members (per fiscal year)
Other committees (Safety, PROC, Publication Editorial Board, Computer, Space, Procedural Compliance)	Actual Hours	Points awarded if committee meets. Committee Chair is responsible for coordinating with management to determine point allocations.
Subject Matter Expert (Underwater, mountaineer, GIS, Pathology)	5+ Actual Hours	Subject matter experts are awarded five points per fiscal year and can accrue additional accountable points coordinated with management.
Quality Assurance Project (e.g., SOP review, audit or audit remediation, equipment control)	Variable	See below table
Special Projects	Actual Hours	Analysts tasked by management to complete special projects can accrue accountable points specified by management at the time of assignment. Individual analysts are responsible for documenting and reporting to management gross deviations from the initial points allocated for a specific project in order to adjust the points awarded.

c. Determining Analyst Ratings: An interactive points calculator program exists on the DPAA network in order to assist analysts to manage their points. For analysts, CIL laboratory and administrative points (y-axis) can be graphed relative to Field points (x-axis) and a resulting regression line can be calculated.

The regression model, based on actual performance of CIL analysts, is the best available representation of what CIL analysts are capable of producing in these categories on an annual basis.

Points falling within one standard error of the regression line or higher result in an Acceptable

rating for *both* Critical Elements 1 and 2. Anything below the one standard error is considered an Unacceptable rating. Ratings may be altered by non-objective factors for the different levels of work experience (i.e., Journey, Expert, etc.). Overall ratings may be used to calculate monetary or other rewards at the end of the rating cycle.

d. Communications: Individual analysts are responsible for communicating with functional area managers, their immediate supervisor, and the case coordinator to ensure that they are able to meet their taskings and that point allocations are accurate. It is the analyst's duty to inform Lab Management and their supervisor immediately when it becomes apparent that they cannot complete a tasking in the time requested. It is also the employee's responsibility to communicate with their supervisor when they determine that they have not been assigned sufficient tasks to reach the point values necessary for an acceptable rating.

When an analytical product is assigned (e.g., FAR, MER, Peer Review), an email is sent to the analyst and the case coordinator that outlines the type of assignment, suspense date, and the number of points allotted for the task. This information is entered into a database by the case coordinator.

When a meeting, tour, or special project is assigned, the **analyst** is responsible for emailing the case coordinator (recommend cc immediate supervisor and manager assigning the task) with a description of the assignment and the pre-determined points awarded once the task has been completed. This rule is in effect due to the frequent need of managers to assign tasks verbally rather than via email. When circumstances permit, managers can email a tasking with the prescribed points to an analyst, but the analyst is responsible to ensure that the email is copied or forwarded to the case coordinator for documentation.

Table 3. Odontology Administrative Point Values

Assignment	Points	Rules
CIL SOP Audit	10	Per vertical audit.
Meeting	1	Per meeting assigned by management.
Tour	1	Per tour assigned by management.
Other committees (Safety, PROC, Publication Editorial Board, Computer, Space, Procedural Compliance)	Actual Hours	Points awarded if committee meets. Committee Chair is responsible for coordinating with management to determine point allocations.
Quality Assurance Project (e.g., SOP review, audit or audit remediation, equipment control)	Variable	See below table
Special Projects (preliminary assessment, case reviews, consultations, etc.)	Actual Hours	Analysts tasked by management to complete special projects can accrue accountable points specified by management at the time of assignment. Individual analysts are responsible for documenting and reporting to management gross deviations from the initial points allocated for a specific project in order to adjust the points awarded.

Table 4. Odontology Analytical Point Values

Assignment	Points	Rules
FOR – long form	25	Per report completed.
FOR – short form (includes ME office visits and forensic identification missions)	15	Per report completed.
CIL Portion/Admin Fiat	3	Per report completed.
FOR Peer Review – long form	10	Per report peer reviewed.
FOR Peer Review – short form	5	Per report peer reviewed.
CP/AF Peer Review	1	Per report peer reviewed.
Deployments (JFR, FFR)	Actual Hours	1 point per day deployed.

2. Civilian Odontology Analyst Points System

a. General Principles: The general principles for civilian odontologists are similar to those described above for Civilian Non-Odontologists with the following exceptions:

Principle 1: A point system provides an objective, clear basis for documenting the *quantity* of work performed by each analyst. The basic premise governing the point allocation system is that one work hour is worth one CIL point for the CIL/Administrative Critical Element.

The assumption is that an individual employee works on average a minimum of five hours per business day on tasks directly linked to this Critical Element. That leaves three hours each business day for Continuing Education and other tasks that do not receive points under this system (e.g., telephone calls, drafting/answering emails, voucher completions, awards ceremonies).

Principle 2: Odontology analysts differ from other analysts in the CIL in that there are no significant Field Duties compared to anthropologists and/or archeologists (JFRs are considered analytical in nature). As such, a linear scale of evaluation for each Critical Element is used for civilian odontologists as opposed to the 2-dimensional scale of other CIL analysts. Criteria from Principle 4 above are used to evaluate the level of experience (Entry, Journey, and Expert).

b. Critical Element Descriptions: Critical Elements are as follows:

Critical Element 1: Administrative Duties: CIL administrative duties are converted into points per Table 3. These include typical day-to-day mission oriented activities within the laboratory. Point totals, derived from past productivity of CIL odontologists, result in the following ratings:

≤ 60 - 70 = Unacceptable.
71 or higher = Acceptable.

The rating is subject to modification by the non-objective factors: Critical Thinking, Teamwork and Cooperation, and Resource Management.

Critical Element 2: Analytical Duties: Analytical Duties are converted into points per Table 4. These activities include typical internal analytical casework, as well as mission oriented deployments, temporary duty, or consultative services which are not conducted within the CIL. Point totals, derived from past productivity of CIL odontologists, result in the following ratings:

≤ 450-550 = Unacceptable
551or higher = Acceptable

The rating is subject to modification by the non-objective factors: Critical Thinking, Teamwork and Cooperation, and Resource Management.

Critical Element 3: Continuing Education: Continuing Education points and ratings are calculated in accordance with DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education) and are listed in Table 3. Point totals, derived from past productivity of CIL odontologists, result in the following ratings:

< 40-62 = Unacceptable
63 or higher = Acceptable

The Critical Element score is subject to modification by the non-objective factors: Critical Thinking.

c. Determining Odontology Ratings: Ratings of CIL civilian odontologists within this system are determined by overall point accumulation within specific Critical Elements. Ratings may be altered by non-objective factors for different levels of work experience (i.e., Journey, Expert, etc.).

d. Communications: Individual odontologists are responsible for communicating with functional area managers, their immediate supervisor, and the case coordinator to ensure that point allocations are accurate. However, there is a system in place to document points awarded to individual odontologists.

When an analytical product is assigned (e.g., FOR, JFR, Peer Review), an email is sent to the odontologists and the case coordinator that outlines the type of assignment, suspense date, and the number of points allotted for the task. This information is entered into a database by the case coordinator.

When a meeting, tour, or special project is assigned, the odontologist is responsible for emailing the case coordinator (recommend cc immediate supervisor and manager assigning the task) with a description of the assignment and the pre-determined points awarded once the task has been completed. This rule is in effect due to the frequent need of managers to assign tasks verbally rather than via email. When circumstances permit, managers can email a tasking with the prescribed points to an odontologist, but the odontologist is responsible to ensure that the email is

copied or forwarded to the case coordinator for documentation.

3. Historian Point System

a. General Principles: The general principles for historians are similar to those described above for Journey and Expert Analysts with the following exceptions:

Principle 1: A point system provides an objective, clear basis for documenting the *quantity* of work performed by each analyst. The basic premise governing the point allocation system is that one work hour is worth one CIL point for the CIL Administrative Critical Element.

The assumption is that an individual employee works on average a minimum of five hours per business day on tasks directly linked to this Critical Element. That leaves three hours each business day for Continuing Education and other tasks that do not receive points under this system (e.g., telephone calls, drafting/answering emails, voucher completions, awards ceremonies).

Principle 2: There are no significant Field Duties compared to anthropologists and/or archeologists. As such, a linear scale of evaluation for Critical Elements is used for historians as opposed to the 2-dimensional scale for CIL analysts. Criteria from Principle 4 above are used to evaluate the level of experience (Entry, Journey, and Expert).

b. Critical Element Descriptions: Critical Elements are as follows:

Critical Element 1: Unresolved Casualty Case Development: Historians:

- Consult professional sources and other researchers to gather suitable information and conduct research for casualty resolutions.
- Review products and provide professional-level editing of research products and documents prepared for casualty resolution. Typical projects include development of casualty case backgrounds, compiling lists of plausible candidates for identification, and researching the loss incidents in specific geographic regions/areas of large losses.
- Develop guides and give recommendations by using published and unpublished documentary resources that relate to specific topics and/or detailed descriptions of archival holdings.
- Analyze data from cartographic sources that concerns casualties in 20th century military conflicts.
- Prepare position and professional papers that support historical and analytical arguments that are presented/briefed to all levels of government, foreign and domestic, military and civilian staff, USG officials, DPAA field teams, family members of missing U.S. service personnel, and the American public.

Critical Element 2: Historical Research Projects: Historians study and interpret military history of U.S. servicemen and civilians who are still unaccounted for as a result of these past conflicts. Historians are expected to possess a good understanding of military historiography with special emphasis on combat operations. These products require an understanding of the geography of battle and the ability to organize and assess the validity of data taken from numerous databases as well as from primary and secondary historical sources. All papers and products must successfully pass a review process prior to release to outside agencies.

Critical Element 3: Research and Source Development: In order to verify or gather further information, historians are required to travel both within the United States and overseas, to various archival storage facilities to research combat operations and the status and locations of prisoners of war. Historians develop research plans to collect primary source material beneficial to the task of the DPAA. Projects are executed in such a way that their end result can be represented in report form. Casualty analysis of all these resources as needed to carry out these duties as a historian and must maintain familiarity with forensic sciences, computer databases, spreadsheets, and geospatial software programs. Historians also maintain, update, and correct all relevant databases on an on-going basis.

Critical Elements 1-3 are converted into points per Table 5. Point totals, derived from past productivity of CIL historians, result in the following ratings:

$\leq$ 1000 = Unacceptable.
1001 or higher = Acceptable.

The rating is subject to modification by the non-objective factors: Critical Thinking, Teamwork and Cooperation, and Resource Management.

Critical Element 4: Continuing Education: CE points and ratings are calculated in accordance with DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education). Point totals, derived from past productivity of CIL historians, result in the following ratings:

- < 60 = Unacceptable
- 61 or higher = Acceptable

The Critical Element score is subject to modification by the non-objective factors: Critical Thinking. In addition, staff are not penalized if adequate funding is not available to support travel for C.E.

c. Determining Historian Ratings: Ratings of CIL historians within this system are determined by overall point accumulation within specific Critical Elements. Ratings may be altered by non-objective factors for different levels of work experience (i.e., Journey, Expert, etc.).

d. Communications: Individual historians are responsible for communicating with functional area managers and their immediate supervisor to ensure that point allocations are accurate.

Table 5. Historian Point Values

Assignment	Points	Rules	Notes
Disinterment MFR (Initial)	15	Initial MFR Completed (Section 1-4 and accepted by the DPM or designee).	These are single cases developed from the historians' functional area.
Disinterment MFR (Completion)	10+n	Per MFR Completed (All sections completed and ready to submit to Science Director).	The goal is for each historian to complete a minimum of 12 successful disinterment MFRs per year.
Group Disinterment MFR (Completion)	25+h	Per Group Disinterment MFR Completed (All sections completed and ready to submit to Science Director).	Management assigns cases, suspense dates, and points awarded (based on DPM or designee approval).
Historical Narrative	50 points	Per memo completed in final form.	No Disinterment MFRs will be submitted for functional areas without a completed historical narrative.
Narrative Close out	25 points	Per area close out MFR in completed form.	Each historian will produce an area close out MFR upon completion of his/her functional area. The MFR will include obstacles encountered, cases worked, and cases suspended.
Research	5 points a day	Research points are awarded for Historical Narrative research only. Suspense date for completed narrative is assigned by the DPM or designee. Not to exceed 5 points per day, subject to approval by DPM or designee.	Approval for research points is dependent upon historian discussing research activity with DPM's designee. Research activity will continue beyond Historical Narrative completion date. Although no formal are awarded for this activity, the value of disinterment MFRs reflects this additional required work.
Archive TDY	5 points a day / 1 point a day processing	5 points per archive day, 1 point for processing per day for the first two weeks after the TDY is completed.	
Peer Review	Actual Hours	Suspense date for completed review and points awarded will be set by the DPM or designee.	Actual hours will be based on a successful review and meeting the suspense date.
Request for Information	3 points	Suspense date for the completed RFI will be set by the DPM or designee.	No research hours are awarded for RFIs; points are allotted when completed and accepted by the DPM or designee. Three points is an averaged number and does not represent the actual time put into each response. Some may take half an hour while others may take 5 hours.

Assignment	Points	Rules	Notes
CARIS Record Update	0.5 per record	0.5 point per record update/change.	Half a point is an averaged number and does not represent the actual time put into each update. Some may take a few minutes while others may take an hour.
Quality Assurance Project (e.g., SOP review, audit or audit remediation, equipment control)	Variable	See below table	
Special Projects	Actual Hours	Historians tasked by management to complete special projects can accrue points specified by management at the time of assignment.	It is incumbent on the historian to update regarding the progress of special projects, on a continuing basis, the DPM or designee.
Meetings	Actual Hours	Per Meeting assigned by management for specified discussions, special presentations, or guest speakers.	This does not include weekly staff meetings, disinterment cell meetings, or other general meetings.

Table 6. Point Values for Quality Assurance Personnel

Assignment	Points	Rules
QA Programs (Security, Proficiency Test, Interns, Training, Document Control, etc.)		
Primary Manager/Lead	8	Per program plus actual hours performed not connected to any of the other assignments listed in this table
Primary for Administration & Implementation	10	Per program plus actual hours performed not connected to any of the other assignments listed in this table
Specific Program Allocations		
Document Control	.25	Per document put under control
Equipment & Supporting Materials		
• Accession major equipment item	5	Per item destined for inventory
• Accession supporting item (e.g., anatomical specimen, package of photo scales)	.5	Per unit destined for inventory
• Major repair/servicing (e.g., x-ray unit)	2	Per unit on inventory or destined for inventory, up to 8 items
• Coordinate external calibration	3	Per unit on inventory or destined for inventory, up to 5 items
• Internal performance checks	10	Per trimester for items on inventories
• Inventory & maintain anatomical collection	50	Per year or for 12 monthly 10% inventories
Security		
• Safety/Security tour	.5	Per tour not connected with competency training of new personnel
• Investigation	1	Per hour of performance
• Corrective action	1	Per hour of performance
• Badge or other roster scrub	1	Per hour of performance
Case Notes Review		
• FAR/CXR/CHR (e.g., K-208)	.75	Per case
• SAR	1.0	Per case
• MER/FOR/SSR	.50	Per case
• LSR/Histology/CIL Portion/Admin Fiat/Assist CFC	.25	Per case
Training, Training Coordination & In-processing		
• Primary Manager/Lead	2	Per new person competency trained (including interns)

Assignment	Points	Rules
• Primary for Administration & Implementation	4	Per new person competency trained (including interns)
SOPs, Desk Guides & Major QA Documents		
• Major Class II & III research, draft, re-write/edit	1	Per hour of performance
• Minor Class II changes	1	Per change
• Review/edit major document (e.g., Field Book)	1	Per hour of performance
Forms design, draft, editing, etc.	1	Per hour of performance
Audits		
• Basic vertical audit	10	Per audit. Add 3 points if lead auditor for a team audit
• Audit corrective action	1	Per hour of performance
• Audit management, coordination & reporting	5	Per vertical audit
Accreditation		
• 4 year accreditation assessment/on-site visit	50	
• Prepare assessment application	15	
• Surveillance on-site visit	25	Includes preparation of the application
• Prepare annual accreditation report	20	Not connected to an on-site visit
• Corrective actions	1	Per hour of performance not connected to any of the other assignments listed in this table (e.g., SOP changes)
• Other related action (e.g., assessment prep)	1	Per hour of performance
QA Reports		
• Annual Report to the Director	30	
• Management Review with Top Management	10	
• Request for Information (RFI) (e.g., MILCON, • PACT, IG, EO)	1	Per hour of performance
QA Checks of Goods & Services	1	Per hour of performance
OSAC participation		
• Meeting	40	Per meeting
• Non-meeting activity	1	Per hour of performance
Consultant Management	8	Per consultant per year. Includes contracts.
Contract Management/Participation	4	Per contact plus 1 point for each hour of performance
Misc Quality Assurance Assignments, Programs Management, Special Projects, Other*	1	Per hour of performance

*Assignments from other point tables (e.g., meetings, committees) apply to QA personnel, as appropriate

4. Quality Assurance (QA) Point System

a. General Principles: The general principles for QA personnel are as follows:

Principle 1: A point system provides an objective, clear basis for documenting the *quantity* of work performed by each person in QA. The basic premise governing the point allocation system is that one work hour is worth one CIL point for QA Critical Elements 1 & 2.

The assumption is that an individual employee works on average a minimum of five hours per business day on tasks directly linked to Critical Elements 1 & 2. That leaves three hours each business day for Continuing Education and other tasks that do not receive points under this system (e.g., telephone calls, voucher completions, all-hands training, ceremonies).

Principle 2: There are no significant Field Duties compared to anthropologists and/or archeologists. As such, a linear scale of evaluation for Critical Elements is used for QA personnel as opposed to the 2-dimensional scale for CIL analysts.

b. Critical Element Descriptions: Critical Elements are as follows:

Critical Element 1: QA Duties: QA personnel perform routine QA duties related to a number of QA programs including, but not limited to:

- Providing QA reviews of documents related to all aspect of CIL operations, as appropriate. Typical

activities include review of case notes, assistance in preparing subject specific forms and desk guides, editing annexes for audit reports, etc.
- Corrective actions resulting from audits, investigations, management reviews, and other QA measures or stemming from other aspects of CIL operations.
- Document control.
- Routine facility repair and work orders.
- Training new personnel or conducting remedial training of other personnel, as appropriate.
- Checks of goods and services.
- Coordinating consultant activities and payment.

In addition, the duties of QA personnel may periodically execute less routine activities including, but not limited to:

- Consulting professional subject matter experts to gather suitable information needed to conduct quality assurance in the CIL.
- Developing SOPs and providing recommendations on protocols using accepted QA standards such as ISO 17025, SWG best practices, etc.
- Analyzing data from various sources that indicate the quality of various operations in the CIL.
- Conducting internal audits or monitoring external auditors.
- Activities related to accreditation assessment including interfacing with accreditation agencies.
- Conducting training of all types
- Assisting in preparing and administering proficiency tests.
- Conducting investigations of all types.
- Accessioning, maintaining, performance checking, and calibrating equipment, supporting materials, and laboratory standards.

Critical Element 2: Program Management & Support: Program Management is a significant component of QA. While QA duties are the daily or periodic implementation of numerous interconnected programs and measures, some programs have significant management requirements above and beyond periodic implementation (e.g., auditing, measurement traceability, physical security, safety, proficiency tests, training management).

Programs are also managed by QA that may not have an immediate or short-term impact on the quality of CIL operations but are relevant to future or long term operations and/or on-going sustainment of the QA system (e.g., MILCON and other facilities planning, work environment, certifying external laboratories to receive CIL subcontracted or outsourced work, assisting in validation studies).

Some programs are managed by QA since QA has a significant amount of involvement in the program (e.g., internship program, work environment, contracting of external consultants).

QA also supports other programs, activities, and initiatives both in the CIL and externally that involve the CIL (e.g., records control with NARA, DPAA automation, external investigation and studies). Regarding these programs, QA personnel are often tasked to research and answer related requests for information (RFI's). The prepared information may be presented or briefed to all levels of government, foreign and domestic, military and civilian staff, and USG officials. QA presence may be directed by Laboratory Management at related meetings, visitor tours, working groups, and committees. As such, point values from other tables in this annex may apply. When so, they are included in this critical element.

Critical Elements 1& 2 are converted into points per Table 6. Point totals, derived from past productivity of CIL QA personnel, result in the following ratings:

≤ 1150 = Unacceptable
1151 or higher = Acceptable

The rating is subject to modification by the non-objective factors: Critical Thinking, Teamwork and Cooperation, and Resource Management. As well, point totals may be adjusted downward by Laboratory Management to compensate for hiring freezes, reduced operations tempo, or other situations which may result in a diminished amount of points available to QA personnel during a rating period.

Critical Element 3: Continuing Education: CE points and ratings are calculated in accordance with DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education). Point totals, derived from past productivity of QA personnel, result in the following ratings:

- < 70 = Unacceptable
- 71 or higher = Acceptable

The Critical Element scores are subject to modification by the non-objective factors: Critical Thinking. Additionally, QA personnel are not penalized if adequate funding is not available to support travel for CE.

c. Determining QA Personnel Ratings: Overall ratings of QA personnel within this system are determined by total point accumulation within the Critical Elements. Ratings may also be altered by other circumstances noted above.

d. Communications: QA personnel are responsible for communicating with functional area managers and their immediate supervisor to ensure that point allocations are accurate.

5. CIL Supervisory Point System

a. General Principles: The general principles for CIL Supervisors are similar to those described above for Civilian Non-Odontologists with the following exceptions:

Principle 1: A point system provides an objective, clear basis for documenting the *quantity* of work performed by each analyst. The basic premise governing the point allocation system is that one work hour is worth one point for the CIL Supervision & Administrative Critical Element.

It is assumed that an individual employee works on average a minimum of five hours per business day on tasks directly linked to this Critical Element. That leaves three hours each business day for Continuing Education and other tasks that do not receive points under this system (e.g., telephone calls, drafting/answering emails, voucher completions, awards ceremonies).

Principle 2: Supervisory/administrative time and Field/CIL time are linked, in that time spent in the field or doing casework is time not spent in the CIL. For the purpose of evaluations, supervisory time (Critical Element 1) is defined as combined supervisory and administrative time (Table 7). Field/CIL time (Critical Element 2) is defined as combined field (days TDY = total points) and CIL time (using Table 2).

Principle 3: Rating criteria are derived from the Department of the Navy, Interim Personnel Appraisal Form. These criteria vary for each employee based on the experience level of the employee (Entry, Journey, or Expert) and whether or not the individual is Supervisory. For the CIL, all Supervisory positions are considered expert level. Performance ratings are given as Acceptable or Unacceptable and are as follows:

Supervisory: Acceptable:

- Achieved expected results by effectively carrying out established supervisory responsibilities.
- Demonstrated adequate EEO and Affirmative Action awareness in areas of supervision and leadership.
- Supported use of Alternative Dispute Resolution to resolve conduct and performance concerns at the lowest level and early timeframe to ensure the workplace provided a harmonious climate.
- Instituted measures to foster productivity and safety.
- Provided timely performance feedback at a minimum of two times during the performance cycle; took appropriate corrective action to address instances of inappropriate conduct and/or unacceptable performance.

Supervisory: Unacceptable:

- Failed in the accomplishment of priorities and coordination across projects, programs, and people; consistently failed to balance work demands of employees resulting in untimely or unproductive products or events.
- Failed to demonstrate adequate EEO and Affirmative Action awareness in areas of supervision and leadership.
- Failed to support the use of Alternative Dispute Resolution to resolve conduct and performance concerns to ensure the workplace provides a harmonious climate.
- Failed to provide timely performance feedback as required during the rating cycle or to take appropriate corrective action to address instances of inappropriate conduct and/or unacceptable performance.

b. Critical Element Descriptions: Critical elements are as follows:

Critical Element 1: CIL Supervision & CIL Administrative Duties: CIL Supervision and CIL Administrative duties may be converted to points in accordance with this Annex using the supervisory point values. CIL Supervision and CIL Administrative points are inversely correlated with Field/CIL Analytical points (see Critical Element 2, below). The following principles serve as the critical component of the supervisory Critical Element:

- All CIL supervisors promote a work environment in which employees can excel with fair and equal opportunity adhering to laws and regulations governing merit-systems principles.
- CIL supervisors comply with all DOD, OSD, and DPAA performance management, recognition and employee development policies, including communicating performance expectations and holding employees responsible for accomplishing them, making them meaningful distinctions among employees based on performance and contributions, fostering and rewarding excellent performance while addressing poor performance,

and adhering to the performance management due dates.
- "Leadership" is a non-objective factor for this critical element.

When CIL Supervision and CIL Administrative points are plotted on the y-axis and Field/Lab Analytical points are plotted on the x-axis, a resulting regression line can be calculated using CIL Supervisor performance in previous years as a reasonable data base. See the below section for determining ratings.

Critical Element 2: Field/CIL Analytical Duties: CIL forensic anthropologists and archaeologists, including Laboratory Managers, are required to deploy as detailed above.

Field/CIL Analytical duties may be converted to points in accordance with this annex. Field/CIL Analytical points are inversely correlated with CIL Supervision and CIL Administrative points (Critical Element 1). When CIL Supervision and CIL Administrative points are plotted on the y-axis and Field/CIL Analytical points are plotted on the x-axis, a resulting regression line can be calculated using CIL Supervisor performance in previous years as a reasonable data base. See the below section for determining ratings.

Critical Element 3: Continuing Education: Continuing Education points are calculated in accordance with DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education). Point totals result in the following ratings:

- <50 hours = Unacceptable
- 51or higher = Acceptable

The rating is subject to modification by the non-objective factors: Critical Thinking.

c. Determining Ratings: An interactive points calculator program exists on the DPAA network in order to assist analysts to manage their points. Supervisory/Admin points (y-axis) can be graphed relative to Field/CIL Analytical points (x-axis) and a resulting regression line can be calculated. The regression model, based on actual performance of CIL Supervisors, is the best available representation of what CIL supervisors are capable of producing in these Critical Elements on an annual basis.

Points falling within one standard error of the regression line or higher result in an Acceptable rating for **both** Critical Elements 1 and 2. Anything below the one standard error is considered an Unacceptable rating. Ratings may be altered by non-objective factors for the different levels of work experience (i.e., Journey, Expert, etc.). Overall ratings may be used to calculate monetary or other rewards at the end of the rating cycle.

Table 7. Supervisory Point Allocation

Assignment	Points	Rules
Employee Supervision	10	Per supervised individual (1 point per intern)
New Employee Supervision	20	Per supervised individual in that person's first year
Employee Supervision	Variable	Billable hours (subject to supervisor approval)
Directed TDY	5	Per day
Case Management Review	1	Per case
New Case Review	1	Per case
One-Year Case Review	1	Per case
Case Assignment	1	Per case
CFC	5	5 pts per CFC with one additional point accrued for each additional individual.
Prof/Comp Test	1	Per individual tested
Special Projects	Variable	Billable hours (subject to supervisor approval)
Quality Assurance Project (e.g., SOP review, audit or audit remediation, equipment control)	Variable	See above table
Other Duties	Variable	Billable hours (subject to supervisor approval) or hours derived from Analyst's Table

6. Non-Objective Factors: Further characteristics of acceptable and unacceptable behavior can apply. (see General Principles above). These are defined as follows:

The non-objective factors that apply most directly to CIL analysts—Critical Thinking, Cooperation and Teamwork, and Resource Management—are grounded in the governing principle of quality assurance, i.e., that **the integrity of the CIL's procedures, policies, recoveries and analytical work must remain above reproach at all times** (DPAA Laboratory Manual, SOP 4.0). Specifically, the non-objective factors are a means by which the quality assurance goals are realized. Per the DPAA Laboratory Manual, SOP 4.0, these goals include:

- Ensuring a safe, productive, and fair work environment.
- Ensuring the accuracy of the data generated by the test process.
- Ensuring uniformity and accountability in all records and testing procedures.
- Providing guidelines to employees so they know what is expected of them.
- Ensuring a safe workplace.
- Ensuring the use of documented and valid materials and procedures.
- Monitoring personnel and equipment performance.
- Eliminating non-conforming materials or work.
- Documenting corrective actions taken.
- Facilitating feedback to Laboratory Management on performance standards.
- Ensuring that CIL personnel performing tests have the appropriate level of qualification and training.
- Ensuring that CIL personnel are competent in the selection and performance of the tests required for the completion of their work.
- Facilitating the preparation and/or verification of all control materials, standards and reference collection items used.
- Enabling the measurement of performance quality with known standards and to be able to act on any inconsistencies encountered.

a. Critical Thinking: Critical Thinking is at the core of every CIL analyst's job, and is closely correlated with Resource Management. Critical Thinking is defined as the ability to:

- Recognize issues, problems, opportunities, or emerging trends.
- Collect data necessary and appropriate for identifying or addressing issues and problems.
- Analyze and integrate relevant information or data to draw sound conclusions.
- Identify and evaluate alternative solutions to problems or issues.
- Make sound and timely decisions or recommendations.
- Identify and utilize innovative or creative methods to accomplish work.

Accordingly, CIL analysts are expected to:

- Identify information necessary to define and understand complex issues.
- Collect necessary information.
- Efficiently and effectively analyze and integrate complex data to identify emerging patterns or trends and draw reasonable, logical conclusions.
- Identify and evaluate alternative solutions to complex problems or issues that affect own or others' work.
- Make timely and logical recommendations or decisions in a variety of complex situations that affect the work unit; seeks supervisory assistance for unusual situations.
- Review current work processes, and identifies innovative or creative ways to improve efficiency or effectiveness.

Examples of how to meet these expectations include, but are not limited to:

- Making timely and accurate decisions in the field.
- Making timely and accurate decisions in the CIL.
- Maintaining an awareness of the changing environment in which you are operating and be prepared to adapt as necessary.
- Maintaining an understanding of the "Big Picture."
- Maintaining an understanding of CIL SOPs and the underlying quality assurance principles.
- Initiating new ideas, methods and strategies to achieve the mission.
- Offering viable solutions to problems and situations.
- Critically assessing self and others (e.g., peer reviews).
- Recognizing problems and developing solutions to correct problems—not passing the problem on
- Recognizing the need to seek guidance when analyst cannot find a suitable solution.
- Staying current in anthropological and other relevant methods and techniques that impact the DPAA's mission.
- Implementing appropriate methods of analysis.

b. Cooperation and Teamwork: Cooperation and Teamwork is critical to the smooth and productive

operation of the CIL. Cooperation and Teamwork are defined as the ability to:

- Develop and maintain effective working relationships with others.
- Respect and value individual differences and diversity by treating everyone fairly and professionally.
- Contribute to organizational or institutional knowledge by sharing information with others.
- Contribute to a positive team atmosphere that fosters cooperation, trust, and group identity.
- Collaborate effectively with others to resolve disagreements or conflicts in a positive and constructive manner.

Accordingly, CIL analysts are expected to:

- Contribute to achieving work unit goals by working collaboratively and flexibly with others and building effective partnerships across units.
- Treat everyone fairly and professionally, respecting and valuing individual differences and diversity.
- Share relevant knowledge and information with others.
- Contribute to a positive team atmosphere that fosters cooperation, trust, and group identity.
- Handle challenging work-related disagreements or conflicts and resolve them in a positive and constructive manner.
- Develop options to resolve disagreements or conflicts that require resolution at a higher level.

Examples of how to meet these expectations include, but are not limited to:

- Freely sharing all information with those individuals who have a legitimate need for that information—including coworkers and management.
- Working to minimize gossip, rumor, and innuendo.
- Comporting yourself in such a manner as to improve the workplace environment for all.
- Shoulder your fair share of CIL assignments.
- Giving suggestions.
- Reporting situations of concern or that impact on the mission.
- Accepting criticism.
- Welcoming/embracing new ideas and change.
- Being assertive.
- Accepting responsibility for one's actions and outcome.

c. Resource Management: Resource Management is the responsibility of all CIL Staff, and is closely correlated with Critical Thinking. Each member of the CIL is a resource; therefore, it is incumbent upon all analysts not only to effectively manage their own time and abilities but also to not engage in any activities that adversely affect the time of colleagues. Resource Management is defined as the ability to:

- Maintain an awareness of available resources and the process for acquiring needed resources.
- Identify and advocate for resources required to accomplish work activities or projects.
- Make effective and efficient use of available resources.
- Safeguard available resources to prevent fraud, waste, and abuse.
- Promote workplace safety and security.

Accordingly, CIL analysts are expected to:

- Demonstrate knowledge of the resources available to the work unit and the processes to acquire them.
- Identify and advocate for resources necessary to support and contribute to mission requirements.
- Use resources in an efficient and effective manner that safeguards against fraud, waste, and abuse.
- Promote workplace safety and security by demonstrating correct behaviors.

Examples of how to meet these expectations include, but are not limited to:

- Completing all assignments within the allotted time and to a professional level, such that review and rewrite time is minimized.
- Adequately preparing for assignments in the field so that time spent is minimized and effort is maximized.
- Adapting to, and overcoming, problems that arise rather than cease productive work.
- Minimizing the use of DPAA-CIL resources (including time) for personal gain when doing so runs counter to the best interests of the CIL.
- Completing all pending CIL assignments prior to deployment.
- Completing all field reports prior to returning to the CIL.

d. Leadership (Supervisory Staff Only): Leadership is exercised by supervisors on all levels. Leadership skills of importance in this non-objective factor may vary in degree between first line, midlevel, and Top Management positions, but usually include the ability to:

- Promote a safe working environment for all staff members.

- Promote a fair work environment where equal opportunity exists to excel in the performance of job duties.
- Promote accepted standards of conduct, complying with all laws, regulations, DPAA instructions, etc.
- Promote compliance with all DOD, OSD, and DPAA performance management, recognition, and employee development policies.
- Promote effective communication between supervisors and employees, to include ensuring that performance expectations are clearly understood.
- Promote effective communication between the CIL and the DPAA Director, as well as with the other Directorates.
- Promote a merit-systems approach to management in which excellent performance is rewarded and poor performance is addressed.
- Promote the scientific integrity of the CIL and the DPAA mission.
- Promote continuous improvement in CIL processes and procedures through careful study and effective communication of results.

Accordingly, CIL Supervisory Staff are expected to:

- Communicate the expectations and requirements of work in the CIL to their subordinates in a timely and unambiguous fashion. This includes ensuring that they all staff members are familiar with the DPAA Laboratory Manual.
- Ensure that all pertinent laws, regulations, DPAA instructions, the DPAA Laboratory Manual, CIL policies, and CIL instructions are complied with.
- Reward excellent performance and address poor performance in an effective, timely fashion.
- Ensure that the CIL meets the requirements of the FQS and ASCLD/LAB International Accreditation Programs.
- Ensure that the CIL Laboratory Manual is appropriately written and implemented given the DPAA mission, the standards established by the Science Director, and the special challenges faced by staff members.
- Ensure that the CIL Staff, as appropriate, maintains scientific proficiency through continuing education.
- Ensure that the DPAA Director is advised on issues relating to CIL operations.
- Ensure that the scientific integrity of the accounting mission is maintained.
- Ensure the safest possible working conditions for CIL staff and related personnel performing their duties.

Examples of how to meet these expectations include, but are not limited to:

- Meet regularly with subordinates to communicate performance expectations.
- Meet the timelines for submission of personnel evaluation documentation as directed by the DPAA Director.
- Address subordinates concerns or ideas about process improvements.
- Communicate readily and in a professional manner with the DPAA Director and other Directorates.
- Communicate all concerns relating to problems, challenges, alleged misuse of resources, alleged equal opportunity and sexual harassment violations, proposed process improvements, etc. to Top Management in a timely fashion.
- Conduct careful, thoughtful reviews of analytical reports and communicate critical comments to the authors in a professional, constructive manner.
- Address problems with, and write revisions to, the CIL Laboratory Manual as directed by Top Management.
- Support the continuing education of the CIL Staff, as appropriate, through encouragement, assistance in obtaining required resources, etc.
- Conduct management studies aimed at process improvement and communicate the results to Top Management in a timely fashion.

SOP 1.2: CIL PHYSICAL SECURITY

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 15 March 2017
Citation: DPAA Laboratory Manual, SOP 1.2

0.0 PRINCIPLE, SPIRIT & INTENT: *Effective security of evidence and case file materials is maintained at all times* **(SA5.8.4.2).**

1.0 PURPOSE & SCOPE: This SOP comprises the CIL Physical Security Plan and details physical security, as appropriate, for the CIL in:

- Building 4077, Hickam Field (i.e., CIL-HQ).
- Forensic Science Academy (FSA) located on the second floor of Building 220 on the Pearl Harbor Naval Base (i.e., CIL-PH).
- Building 301 at Offutt AFB, Nebraska (i.e., CIL-OF).
- The CIL Laboratory at Wright Patterson AFB, Dayton, OH (i.e., CIL WP).

Physical security ensures the integrity of evidence and case files, and thus the validity, accuracy and legal defensibility of CIL practices and test results **(SA5.3.4.1)**.

The intent of this SOP is to ensure that the overall security of the CIL* is maintained by limiting and controlling access only to persons with appropriate need as determined by the Laboratory Director.

*Note: The term "CIL" used in this SOP is a collective term referring to CIL facilities in CIL-HQ, CIL-PH, CIL-OF, and CIL-WP. Use of the term CIL, rather than CIL-HQ, CIL-PH, CIL-OF and/or CIL-WP, indicates that the stated SOP provision(s) applies to facilities at all locations.

These procedures pertain to all CIL Staff and those who have a frequent need to access the areas covered by this SOP. Additionally, all of the general security provisions in the SOP apply to both CIL-HQ and CIL-PH unless otherwise stated or are obviously inappropriate. Specific security guidance for CIL-PH is found in Annex A (Physical Security of CIL-PH) of this SOP. Similarly guidance unique to CIL-OF is found in Annex B (Physical Security of CIL-OF) of this SOP. Annex C present security guidance applicable to CIL space in Building 17 at Wright Patterson AFB (CIL-WP. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit intent will be met **(A5.3.4)**.

2.0 GENERAL: This SOP supplements DPAA security guidance. The DPAA Security Section is the proponent for security as directed by the DPAA Director and the Laboratory Director and thus conducts day-to-day management.

The proponent for the CIL Physical Security Program is the CIL-HQ Quality Assurance Section. The Lead Quality Coordinator is also the overall Security Manager for the CIL.

Evidence storage areas, in particular, are secured to prevent theft or interference and offer limited, controlled access. The storage conditions are such as to prevent loss, deterioration and contamination and to maintain the integrity and identity of the evidence. The above applies before and after scientific testing is performed **(SA5.3.4.1f, SF5.3.4F-17, SF5.3.4F-20a, SF5.3.4F-20b)**.

Generally, CIL security is based on the barrier concept. The degree of security of any given part of the CIL and its contents depends on how many barriers protect it. Barriers can be tangible (e.g., locked doors, monitored entry ways) or intangible (e.g., badge issue procedures, disinterested persons performing security functions). The latter are also considered checks and balances regarding the overall security posture of the CIL.

Additionally, CIL security is dependent on documenting who has accessed the CIL. Through out this SOP, different electronic and written measures that record those who access the CIL are described. In short, **a record must be kept of everyone who enters the CIL Examination Areas and File Rooms** for whatever reason and no matter how short the time **(SF5.3.4F-19c)**.

3.0 SECURITY PROCEDURES: The following procedures enhance the security of the CIL and the activities conducted there.

3.1 **Background Checks & Security Clearances:** Typically, CIL Staff have a background check as a result of their security clearance investigation. Classified information is only accessible to permanent CIL Staff with the commensurate security clearance and a need to know in accordance with applicable DoD regulations.

3.2 **Access Devices**: CIL access devices (badges, security codes, keypad combinations, PINs, metal keys, and field credentials) are issued in accordance

with military regulations. The Laboratory Director determines access privileges (discussed in detail below) for each member of the DPAA and other appropriate individuals, determines the CIL access devices needed, and approves their issue in writing. Documentation is maintained by Quality Assurance. These tasks are usually delegated by the Laboratory Director at CIL-HQ to the Laboratory Director at CIL-OF and CIL-WP **(SA5.3.4.1c, SA5.3.4.1d)**. A detailed explanation of each type of access device in use by the CIL is discussed below.

Users have overall responsibility for the accountability and custody of their access devices and must turn them in upon terminating employment or at the direction of the Laboratory Director.

The most common practice for individual CIL Staff to maintain the accountability and custody of their access devices while in the workplace is to keep them on your person. Typically, CAC cards (when not in use), CIL badges, and metal keys are suspended from lanyards worn around the neck or from clips or similar devices affixed to clothing.

Storage of some devices (e.g., field badges, large rings of keys) in a desk or cabinet is permissible provided the container is secured when the owner of the devices is absent and the container is only accessible by the owner of the access devices. CIL Staff must use sound professional judgment when securing access devices, especially when they are away from the workplace.

In the event access devices are suspected to be compromised or lost, the user immediately reports the incident to Laboratory Management. Security codes, keypad combinations, and PINs are changed immediately should compromise be suspected. Lost or potentially compromised keys may result in rekeying of locks.

The Laboratory Director, or his designated alternate, with advice from the DPAA Security Section and the Lead Quality Coordinator, has the sole authority to determine if a compromise of access devices has occurred.

Regardless of the access device suspected to be compromised, until a secure area's security posture is restored, the use of any affected space may be suspended (e.g., evidence moved to a confirmed secure area) or work-arounds pertinent to the area in question may be put into place.
The following access devices are used in the CIL. With the exception CAC Cards, all are internally authorized, managed, and controlled by the DPAA Security Section or the CIL.

3.2.1 **Common Access Control (CAC) Cards:** Common access control (CAC) cards are military photographic identification cards issued to military personnel, their family members, and civilians who work for the military. CAC cards are used to control access to military bases, select facilities on military bases, and military related benefits (e.g., health care). CAC cards do not allow the user to physically access the CIL. This is accomplished by CIL identification badges (see below). The CAC card is used by most CIL personnel to gain entry onto the military bases and to access the DPAA network and its information systems (see below).

Interns and volunteers are issued a similar device called a VOLAC (Volunteer Access Card). It is identical in appearance to a CAC except that it does not display a photograph of the intern or volunteer. The VOLAC is not used for base access; rather it allows the holder to access select DoD computer networks and information systems.

3.2.2 **Alarm Codes:** The alarm code activates and deactivates the CIL alarm systems. The alarm code may or may not be unique to the individual. The code is issued during in-processing at CIL-OF and CIL-WP to select CIL Staff needing access to the alarmed areas. Individuals who receive alarm code must successfully demonstrate their use as part of competency training.

3.2.3 **Keypads, Padlock Combinations & PINs:** Doors in the CIL may be secured with mechanical keypad ("cipher") locks. Likewise, security containers (e.g. evidence transport containers) may be secured with combination padlocks. Keypad and padlock combinations are changed as deemed necessary by Laboratory Management.

Electronic card readers may also be equipped with a keypad. The PIN (personal identification number) associated with such keypads is initially the badge card number. The holder has the option of requesting to the DPAA Security Manager that the PIN be changed once the badge is issued or in the event of potential compromise.

The combination of electronic card readers and PINs forms a tandem system. The individual enters their PIN followed by passing their badge over the card reader in order to gain access.

CIL access does not rely on tandem keypad/card reader systems. The card reader is the essential component. Electronic keypads that are part of a

tandem system do not have to be operational for security to be maintained provided the card reader is operational and functions as intended.

3.2.4 **Metal Keys:** The CIL Key Control Custodian issues, secures, and accounts for CIL metal keys in accordance with applicable DoD regulations. **(SA5.3.4.1f)**.

Immediately report lost keys to the Key Control Custodian, Quality Assurance, or Laboratory Management, as appropriate.

Any and all master keys for the CIL offices, common areas, and furniture are issued to, and under the control of, a designated user. Designated users secure their master keys at all times. Designated users are identified by the Laboratory Director and are generally comprised of Laboratory Managers, Quality Assurance personnel, and the Key Control Custodian and his/her alternate. Excess master keys are not stored in a key-box or similar common holding device. Rather, they are issued to the Key Control Custodian who secures them from unauthorized access.

3.2.5 **DPAA Identification Badges:** The DPAA Security Section issues combination magnetic key cards and DPAA identification badges to all DPAA personnel.

DPAA identification badges include CIL badges (herein referred to simply as "badges") issued to CIL Staff and non-CIL Staff having access to the CIL. Badges must be worn while in the CIL and are only used by the person to whom it is issued. **Badges should be worn at or above the waist and should be visible at all times**.

The DPAA Security Section maintains a log of the badge number and name of the individual accepting the card. Quality Assurance, in consultation with the DPAA Security Section, periodically reviews issue logs of CIL badges issued to CIL and non-CIL Staff for consistency and accuracy. Lost CIL badges are reported immediately to Laboratory Management, and/or Quality Assurance.

Besides serving as a photo ID offering a visual verification of authorized access, CIL badges are programmed to perform three security functions:

1) To control access to secure areas of the CIL (e.g., evidence storage areas, examination areas) during specific time periods.

2) To track daily access and movement of individuals around the CIL. Passing the spare badge over the card reader provides a precise time of entry and exit into and from the accessed areas. As such, individuals' movements around the CIL are automatically monitored when they swipe their badges over the card readers. Quality Assurance, with assistance from the DPAA Security Section, may periodically audit the record of these activities for individual compliance. Non-compliant individuals may receive disciplinary action (see below).

3) To provide internal chains of custody. Badges contain a bar code that allows select individuals to check out case files and evidence (tracking the internal custody of these items).

3.2.6 **Spare Badges:** Numbered spare badges of varying access levels are available in order to meet a number of contingencies, often involving access to secure areas (e.g., the File Room, evidence storage and/or Examination Areas).

In general, in CIL-HQ there are two types of spare badges. The first allows unescorted access into the Examination Areas. These badges are normally coded 2-1-2, are stored in the Lead Quality Coordinator Office, and are used in the following situations:

- CIL Staff who arrive at work without their badge. These persons are required to sign in and out of the respective Visitor Log for the day using the below procedures. Once signed in, the individual receives a spare badge with the appropriate access codes. The intent of spare badges in such instances is to avoid loss of productivity by allowing the user to access appropriate areas for completing work assignments.
- CIL Staff who have had the safety/security training for CIL access, and who are waiting for the DPAA Security Section to make their individual badge, utilize a spare badge with the appropriate access code using the above procedures until their permanent badge is ready.
- CIL Staff whose badges become inoperative during the course of a work day and are waiting on their badge to be repaired or a new badge to be made.

The second type of spare badge does not allow the holder unescorted access to the secure areas. In CIL-HQ, these badges are on a wall rack mounted at the security station in the Examination Area in a drawer near the alarm panel adjacent to Door 307B. These badges are normally coded 0-0-0 or 2-0-0 and are used in the following situations:

- For CIL-HQ, non-CIL DPAA personnel who need escorted access to secure areas but do not have their DPAA badges. These individuals are admitted into the secure area with their escort or monitor and then sign in and out of the Visitor Log using the below procedures (see below).
- Any individuals who do not have a DPAA or CIL badge and who require escorted or monitored entry into the secure areas.

Visiting scientists, and other non-DPAA individuals working in the CIL, and/or those who are familiar with CIL security procedures (e.g., former CIL employees), may be issued either type of spare badge for access, as appropriate, if approved by Laboratory Management (see below). Such individuals may or may not require escort in select areas. If entering an Examination Area, all guidance in this SOP applies, as appropriate,

Spare badges do not contain a user photo or a functional bar code. As such, they cannot be used for:

- Checking out casefiles.
- Checking out evidence.
- Accessing evidence storage areas (when issued to an Evidence Coordinator).

Spare badges are normally issued by Quality Assurance, the Evidence Coordinator, or by Laboratory Management who document their issue by annotating the spare badge number in the Visitor Logs.

The spare badge is returned to the issuer upon the departure of the user from the CIL at the end of their workday, shift, or extended work period if greater than one day. Spare badges are secured hen not in use.

Spare badges are maintained at all CIL permanent facilities. They are interchangeable between all facilities and should function at all locations.

3.2.7 **Field Credentials:** Field investigator credentials (a metal badge or "shield"), used in conjunction with the CAC card, are issued to select CIL Staff. These credentials prove active affiliation with the CIL while its personnel are working at crime scenes and engaged in other legitimate activities warranting its use, such as transporting and escorting evidence. Display of the shield at crime scenes is at the discretion of the agency in charge.

Field Investigator credentials are issued to the holder after becoming competency certified in trace evidence and/or recovery scene processing, as applicable. Gold colored shields are normally issued to odontologists, Laboratory Management, and other personnel designated by the Laboratory Director. All other CIL Staff are typically issued silver colored shields.

DPAA consultants may be issued consultant shields at the discretion of the Laboratory Director, regardless of their competency certification or status, for use when conducting official DPAA business.

Quality Assurance maintains overall accountability of all field credentials. Shields are traceable, by number, to whom they are issued. Un-issued shields are secured from pilferage or unauthorized use. Unauthorized use or misuse of field credentials by the CIL Staff constitutes an ethics violation and is dealt with accordingly.

Field credentials must be returned to Laboratory Management upon termination of employment. Under certain circumstances (e.g., retirement, exceptional service), the holder may be allowed to retain their shield. In such instances, the shield number is retired from service and an annotation made in the accountability records.

3.3 **Information Systems Security:** All computer systems at the DPAA are protected in accordance with Federal and DoD regulations to prevent unauthorized access to, or amendment of, electronic files and records. Like measures protect the integrity and confidentiality of data entry or collection, data storage, data transmission and data processing. Transmission of test results by telephone, telex, facsimile or other electronic or electromagnetic means is similarly protected, as appropriate. The Information Technology (IT) Section has overall responsibility for information system security at the DPAA and maintains the appropriate references for such **(A4.1.5c, A4.13.1.4, A5.4.7.2b, A5.10.7)**.

Classified material is not processed on automated information systems located in the CIL unless the devices have been certified by the DPAA Security Section for classified use.

Once approved by the Laboratory Management, individual access to DPAA information systems is via the CAC or VOLAC cards (described above). The CAC/VOLAC card system of accessing DPAA information systems is an extension of a DoD wide program of information security.

CAC/VOLAC cards are inserted into computers in order to allow the user to access their individual DPAA network accounts. During non-duty hours

CAC/VOLAC cards should be removed from the computer and secured by the user.

During duty hours it is left to the discretion of the CAC/VOLAC holders whether or not to remove their CAC/VOLAC cards from their computer during short absences away from their desks. The user should remove their CAC/VOLAC during prolonged absences (in excess of one hour) or close and lock their office door if the CAC/VOLAC card is left in the computer.

3.4 **General CIL-HQ Security:**

3.4.1 **Space/Area/Room Door Numbers:** Regardless of the type of space/area/room, doors in CIL-HQ are numbered according to the following protocol based on the door and space designations indicated in the official architectural floor plans used in the concept and design of Building 4077. Specifically:

- For rooms that are accessed by a single door, the door has a single numerical designation which usually matches the room number (e.g., an office--367).
- For spaces/areas/rooms accessed by multiple doors, the doors have a numerical designation that also matches the room/area/space number, followed by a letter suffix (e.g., 307A, 307B).

3.4.2 **General Arrangement of CIL-HQ Space:** The majority of the CIL-HQ in Building 4077 is located on the Third Floor and is secured accordingly.

The general arrangement of the CIL-HQ spaces on the Third Floor are rectangular North and South Wings separated by a parallel rectangular Main Corridor (Spaces 305 & 319) that runs almost the entire length of the Third Floor. Other spaces satellite the North and South Wings and/or the Main Corridor either in horizontal or vertical space. These include:

- Family Viewing Room (Room 304).
- Evidence Receiving & Transfer Station (Room 121).
- Archaeological Research Laboratory and Archaeological Storage (Rooms 342 and 319-1, respectively).
- Research and Training Room (Room 301) and the adjacent outdoor balcony (Balcony 302).

Space groupings are important to understanding the CIL Physical Security Program. Significant space groupings and arrangements include:

3.4.2.1 **Main Corridor:** The Main Corridor on the Third Floor (Space 305 and 319) runs east-west and separates the North and South Wings. Although the Main Corridor is inside the CIL Security Perimeter (see below), it is administrative in nature.

Despite its administrative nature, general access to the Main Corridor by non-CIL DPAA personnel is limited in order to control unauthorized photography, unplanned and disruptive tours, and as an extra barrier which safeguards against unauthorized persons entering the Examination Areas through open doors. Select non-CIL DPAA staff may have access to the Main Corridor (e.g., DPAA facilities personnel). During chain of custody transfers, Space 319 is cleared of visitors and extraneous personnel.

3.4.2.2 **South Wing** The South Wing is comprised of administrative areas including, but not limited to:

- Offices (Rooms 361-367 & 369-373).
- Cubicle Area (Area 360).
- Laboratory Administration (Rooms 347, 348 and other internal areas).
- Various storage areas.

The South Wing also includes common areas such as bathrooms, hallways, break areas, balconies, the CIL Library, and conference spaces.

There are spaces in the South Wing that are secured with card readers. These spaces are accessed by a limited number of individuals for specific purposes **(SA5.3.4.1c).** These spaces include, but are not limited to:

- Laboratory Administration (Rooms 347, 347-1 and 347-2) with further limited/controlled access for the security of case files and other sensitive documentation **(SA5.3.4.1c)**.
- Offices (Rooms 361-367 & 369-373).
- Various storage areas.

Doors from the Main Corridor that lead into the South Wing include:

- Door 303A that allows access to a corridor (Space 303) leading to Door 303B that opens in front of the Reception Desk in the Cubicle Area (Area 360). Door 303B is the primary access point into the South wing by non-CIL DPAA personnel. Door 303B is secured with a card reader 24/7. It can be opened from 0700-1800 on duty days by non-CIL DPAA personnel equipped with a DPAA badge.
- Door 352 opening into a Corridor (Space 352) leading into various areas of the CIL.

- Door 343 opening into a corridor (Space 343) which leads to Laboratory Administration.

3.4.2.3 **North Wing:** The North Wing is largely comprised of the CIL-HQ Examination (analytical or test) Areas which are further secured by restricting access.

The Examination Areas in the North Wing are monitored during vacant hours by the DPAA Charge of Quarters (CQ). Instructions for the CQ are developed by the CIL in conjunction with other DPAA Sections and implemented, as appropriate **(SA5.3.4.1e)**.

The Locker Rooms in the North Wing (Rooms 340 & 341), and the rest rooms within, are not considered part of the Examination Areas.

There are specialty spaces in the Examination Areas that are further secured with card readers. These spaces are accessed by a limited number of individuals for specific purposes **(SA5.3.4.1c, SF5.3.4F-20a).** These spaces include, but are not limited to:

- Evidence Compact Shelving (Room 323).
- X-Ray Room (Room 311).

Doors at various locations allow access into the Examination Areas of the North Wing. Specifically:

- Door 306 into the Tarawa Project examination area (Room 306).
- Doors 307A & 307B into the Main Skeletal Analysis Laboratory (Room 307).
- Door 320A into the Evidence Transfer Area (Room 320).
- Door 326A into the Autopsy Room Transfer Area (Room 326).
- Door 338A into the Airlock (Room 338) which leads to the Material Evidence/Life Support examination area (Room 337).
- Doors 340A & 341-1A in the interior of the Male and Female Locker Rooms, respectively.

All of these doors use a magnetic badge reader to grant access to authorized personnel using the preprogrammed badges, discussed above.

The electronic alarm panel is located immediately inside Door 307B which leads from the Main Corridor (Space 305) into the Examination Area adjacent to Door 307B. The alarm is not used since after-hours monitoring is conducted by the DPAA CQ **(SA5.3.4.1b)**.

3.4.2.4 **Evidence Receiving & Transfer Complex:** The Evidence Receiving & Transfer Complex is an area comprised of the following:

- Evidence Receiving & Transfer Station (Room 121) on the First Floor.
- First Floor Vestibule (Room 119) that connects the Evidence Receiving & Transfer Station to Elevator C.
- Elevator C.

The intent of the Evidence Receiving & Transfer Complex is to allow for chain of custody transfers of evidence while at the same time precluding the need to take visitors to the Third Floor.

Use of Elevator C is discussed below. Use of the Evidence Receiving & Transfer Complex during chain of custody transfers is detailed in the respective section, below.

Door 121C is equipped with a card reader and leads from the exterior of Building 4077 into Room 121. Door 121C is the only door in the CIL that leads to the exterior of Building 4077. In turn, Room 121 empties out through Door 121B into a vestibule (Room 119) that connects to Elevator C. Room 119 is shared space. For example, it may also be used by other DPAA sections to access Elevator C (through Door 119B) in order to conduct official business on the Second and Third Floors.

3.4.2.5 **Tour/Visitor/Waiting Area (Room 300):** The Tour/Visitor/Waiting Area is not CIL space (it is controlled by the Public Affairs Section); however it is relevant to the CIL-HQ security. The Tour/Visitor/Waiting Area lies outside of the below CIL-HQ security perimeter. As such, it can be accessed by DPAA staff on an as needed basis via Elevators A&B and the East Stairwell (S301). The intent of the Tour/Visitor Waiting/Area is to:

- Increase the transparency of CIL-HQ operations by allowing a relaxed atmosphere where staff, visitors, and tour groups can observe select CIL forensic activities. Individuals in the Tour/Visitor/Waiting Area have direct line-of-site into the portions of the Examination Areas where various scientific tests are performed.
- Provide a relaxed area where visitors with official business with the CIL-HQ can wait until they are met by a CIL escort.
- Serve as a break area for non-CIL Staff and visitors who may be using the adjacent Research and Training Room (Room 301).

3.4.2.6 **Family Viewing Room (Room 304):** The Family Viewing Room is located on the Third Floor,

south of the Main Corridor (Space 305), in a cupola suspended over the courtyard between the North and South Wings of Building 4077.
The intent of the Family Viewing Room is to provide a private and relaxed space for families of the missing who are visiting DPAA.

The Family Viewing Room is situated in such a manner as to support families who may wish to view the remains and material evidence associated with their loss, while minimizing the risk to said evidence.

The Family Viewing Room can be accessed by all CIL Staff. Select non-CIL DPAA Staff (e.g., Outreach and Communications) may also access the Family Viewing Room on a mission required basis.

Families are met in the Tour/Visitor/Waiting Area and escorted into the Family Viewing Room through Doors 300B and 304B. Evidence is brought into the Family Viewing Room through Door 304A. Door 304C allows for transit between the Family Viewing Room and the Cubicle Area (Area 360) in the South Wing. Doors 304A, B, and C may be used to support contingencies as they occur.

When not in use by the families, the Family Viewing Room is used as a conference room.

3.4.3 **CIL-HQ Security Perimeter:** Mindful of the above CIL space arrangement, the security perimeter of the CIL-HQ is the CIL-HQ space where personnel access is controlled, evidence and/or case files are secured, and movement for all is regulated. As such, the security perimeter of the CIL-HQ in Building 4077 surrounds:

- The Examination Areas.
- The Main Corridor and spaces adjacent to it. Adjacent spaces include, but are not limited to:
    - Locker Rooms (Rooms 340 and 341-1).
    - Archaeology Lab (Room 342).
    - Research and Training Room (301) and the adjacent outdoor balcony (Balcony 302) accessed through Door 302.
- The Evidence Receiving and Transfer Station on the First Floor (Room 121).*
- Elevator C. Elevator C connects the Evidence Receiving and Transfer Station to the Third Floor. Elevator C is within the CIL-HQ security perimeter when it is used to transport evidence to the Third Floor.*
- File Room in Laboratory Administration (Room 347-2).

*Note: The Vestibule (Room 119) connecting the Evidence Receiving and Transfer Station (Room 121) to Elevator C is shared space and, consequently, does not fall within the CIL security perimeter.

There are areas controlled by CIL-HQ that are outside of its security perimeter. Personnel do not have to pass through the CIL-HQ security perimeter to access them. These areas include, but are not limited to:

- Most of the South Wing (see below).
- Select storage containers in the Marshalling Yard of Building 4077.

3.4.4 **Access to the Third Floor:** Elevators and stairwells to the Third Floor of Building 4077 allow entrance into the CIL-HQ. All of these elevators and stairwell doors are equipped with a card reader that permits entry and exit of CIL Staff and other authorized persons to and from the Third Floor **(SA5.3.4.1b)**. Specifically:

- Elevators A&B. These empty out into the Tour/Visitor/Waiting Area (Room 300). Within Room 300 are two secured doors that allow access into the CIL security perimeter by authorized persons with preprogrammed badges (see above). These are:
    - Door 300A which leads to Room 301, the Research and Training Room. The Research and Training Room is within the CIL security perimeter but is made available to support escorted visitor tours and other non-CIL activities. Door 301 leads from the Research and Training Room (Room 301) into the Main Corridor (Space 305). This door cannot be used by non-CIL personnel. Another door, Door 302, leads from the Research and Training Room to an outdoor balcony (Balcony 302). The balcony is available to personnel who are using the Research and Training Room.
    - Door 300B which leads into a small corridor (Space 303). This is the main entry point into the CIL-HQ by non-CIL DPAA personnel and escorted guests (see below), unless otherwise stated in this SOP. It is also the recommended entry point for IT personnel escorting workers to the IDF Closet (Room 368).
- Elevator C is the Evidence Elevator that runs from the First Floor to the Third Floor. Elevator C has a north and south door which opens to its respective direction on the Second and Third Floors. On the First Floor, only the south door opens. Elevator C has two functions:

- The expedient and secure transport of evidence into the CIL-HQ (primary purpose). Chain of custody transfers of evidence are discussed in detail, below. Elevator C is secured at its doors on the First Floor in the Vestibule (Room 119) which is adjacent to the Evidence Receiving and Transfer Station (Room 121). Elevator C is not used for routine pedestrian access into the CIL.
- Transporting heavy and bulky items (e.g., furniture, major end items) or maintenance workers into the CIL-HQ or the Mechanical Complex (Room 346-1). Depending on the destination of the cargo the elevator may open into the Main Corridor (Space 319) (inside of the security perimeter) or the Shipping and Receiving Area (Room 346) (outside of the security perimeter). Delivery of cargo into the security perimeter should be coordinated ahead of time with the appropriate CIL personnel.

- East Stairwell Door (S301). This stairwell leads into the Tour/Visitor/Waiting Area (Room 300) adjacent to Elevators A&B. Its use, and access beyond Room 300, is the same as discussed for Elevators A&B, above.
- Mid Stairwell Door (S302). This stairwell empties into a Corridor (Space 343) near Laboratory Administration. It is highly recommended that DPAA personnel escorting workers to the MDF Closet (Room 345) and Electrical Closet (Room 344) use this stairwell if Elevator C is not used.
- West Stairwell Door (S303). This stairwell empties out into the Main Corridor (Space 319) across from the Locker Rooms (Rooms 340 & 341). It is highly recommended that DPAA personnel escorting workers to the Mechanical Complex (Room 346-1) use this stairwell if Stairwell S302 or Elevator C are not used.

Doors leading to the exterior of CIL-HQ are kept closed and locked when not in use and are not left unattended while propped open **(SA5.3.4.1b)**.

3.5 **CIL Access Levels:** There are variable levels of access into and within the CIL-HQ. The Laboratory Director determines if a person needs access to the CIL-HQ and further determines their level of access to areas within the CIL-HQ security perimeter. Routine decisions regarding access relevant to CIL-OF and CIL-WP may be delegated to the respective Laboratory Director of those facilities.

In general, there are three tiers of Third Floor Security. Specifically, these consist of:

Tier 1: Open access by DPAA personnel to the most of the South Wing and the Tour/Visitor/Waiting Area (Room 300) during prescribed times. Times vary depending on the personnel. For non-CIL DPAA personnel access to the South Wing is usually available from 0700-1800.

Tier 2: Tier 1 access plus access to the Main Corridor, the Family Viewing Room (Room 304), the Research and Training Room (Room 301), and the outer portion of Laboratory Administration (Room 347) during prescribed times. Various configurations of Tier 2 access may be granted to select non-CIL DPAA personnel and contractors.

Tier 2 access for non-CIL personnel is kept to a minimum. DPAA section chiefs email requests for specific Tier 2 access for their personnel to the Laboratory Director. In general, section chiefs, their deputies, and persons needing frequent and routine business (at least 3-5 times per week) in the above Tier 2 areas are allowed access.

Tier 3: Tier 1 and 2 access plus access to the CIL-HQ Examination Areas, the specialty areas (listed above) that satellite the Main Corridor, and the Laboratory Administration File Room (Room 347-2), during the prescribed times. Tier 3 access by non-CIL personnel is discussed in detail, below.

DPAA section chiefs should review their personnel access requirements at least annually and adjust as necessary. Personnel who leave DPAA or transfer to other DPAA sections should be reported by section chiefs to Laboratory Management or CIL Quality Assurance so access devices (see above) can be deactivated and CIL access rosters updated.

CIL Quality Assurance performs periodic audits to ensure individuals having access maintain frequent and routine access. Access is revoked for those in arrears and their leadership notified accordingly.

DPAA section chiefs remain responsible for the actions and conduct of their personnel who access the CIL. The consequences of security violations are discussed below.

3.5.1 **Access Codes:** Access codes further define tiered access on the 3d Floor with respect to the CIL. Access codes are visible on the DPAA identification badges and indicate access to various locations in CIL-HQ. The CIL access code for an individual is displayed as a tri-numeral code after the word "LAB" on the individual's badge (e.g., CIL: 3-2-2). The meanings of the numbered access codes and levels, and some of their general and typically intended uses for CIL-HQ, are as follows **(A5.3.4)**:

3.5.1.1 **Access to CIL-HQ (First Numeral):** The first numeral in the access code (e.g., CIL: **X**-x-x)

designates an individual's access into the CIL through the designated entrances. Routine entry into and exit from the CIL-HQ Third Floor Spaces by most of the CIL Staff is through Elevators A, B, and C; and any of the three stairwells. Non-CIL personnel typically enter and exit only through Elevators A&B and the East Stairwell (S301).

Entry levels of access are as follows:

0=Escorted Access; Escorted Entry and Subsequent Escort. Level 0 may not be shown on the badge.
1=Limited Access 1; Elevators A&B and East Stairwell (S301) Door only (Monday-Friday 0700-1800). Level 1 may not be shown on the badge.
2=Limited Access 2; Elevators A&B, East Stairwell (S301), Mid Stairwell (S302) Door, West Stairwell (S303) Door (Monday-Friday 0700-1800).
3=Full Access; Elevators A&B, East Stairwell (S301), Mid Stairwell (S302) Door, West Stairwell (S303) Door; Evidence Receiving & Transfer Complex Full Time (24 hours/day, 7 days/week).

Level 0 is used to designate non-DPAA visitors to the CIL-HQ who do not have access privileges. Level 0 may or may not appear on the DPAA badge.

Entry is usually through Elevators A&B or the East Stairwell (S301) and escort is subsequently required while in CIL-HQ. Personnel with Level 0 are escorted into non-secure spaces within CIL-HQ by individuals having entry Levels 1, 2, or 3. Further instructions for signing-in and escorting visitors are detailed below.

Level 1 grants access to the South Wing through Doors 300B and 303B. It does not allow access to the Main Corridor, the Family Viewing Room, or Laboratory Administration. Level 1 is typically granted to all non-CIL DPAA personnel. Level 1 may or may not appear on the DPAA badge.

Level 2 typically grants access to competency trained CIL Staff who do not require full time or after-hours access to CIL-HQ (e.g., interns and volunteers) and who have completed the requisite safety and security training for the access required and duties performed.

Level 2 also grants various access to some non-CIL DPAA personnel. Main Corridor access may be granted through one or more doors. Additionally, Level 2 may also include access to the Family Viewing Room by select personnel through various doors. Access to either space is during duty hours only.

Non-DPAA personnel (e.g., consultants, visiting scientists) may also be granted Level 2 when approved by the Laboratory Director. Competency training may be required for such personnel. Non-CIL DPAA personnel do not have to be competency trained beyond having the requisite safety/security briefing.

Personnel typically requiring Level 2 access include, but are not limited to:

- Select persons in the Command Group.
- DPAA section chiefs and their deputies (Operations, Resource Management, etc).
- Select persons from the DPAA Security Section.
- Select persons from the DPAA Information Technology Section.
- Select persons from the DPAA Facilities Management Section.
- Select persons from the DPAA PAO Office.
- Select persons from the DPAA Outreach and Communications Section.
- Select DPAA photographers.
- Select consultants (usually on contract).
- Select visiting scientists.

Level 3 access is granted to competency trained CIL Staff who require full time access to CIL-HQ (e.g., analysts, FSA Fellows, select technical and support personnel, Evidence Coordinators, Quality Assurance, Laboratory Administration).

3.5.1.2 **CIL-HQ File Room Access (Second Numeral):** The second numeral in the access code designates access to various areas in Laboratory Administration. The Outer Area of Laboratory Administration includes the Forward Work Area (Room 347) and the Media and Print Room (Room 348). The Inner Area (Room 347-2) refers to the secure File Room. Entry levels are as follows:

0=Escorted Access Only. Level 0 may not be shown on the badge.
1=Outer Access only (24 hours/day, 7 days/week).
2=Outer Access/Limited Inner Access; Outer Access (24 hours/day, 7 days/week); Limited Inner Access (Monday-Friday 0700-1800).
3=Full Access; Outer and Inner Access (24 hours/day, 7 days/week).

Personnel with Level 0 are escorted in the Outer Area by individuals having Laboratory Administration access Levels 1, 2 or 3. Levels 0 and 1 personnel are escorted into the File Room (Room 347-2) by personnel having Levels 2 or 3. Escorts ensure personnel swipe their badge upon entry into the File Room.

Level 1 is granted to CIL personnel needing access to the outer areas of Laboratory Administration only (i.e., no File Room Access).

Level 2 applies to the non-key CIL Staff. Level 2 may also be granted on a temporary basis to select interns and volunteers who may be performing prolonged special work or projects involving Laboratory Administration (e.g., 100% case file inventory or maintenance) and thus needing limited access to the File Room.

Level 3 is granted to Laboratory Administration, Laboratory Management, other key personnel (e.g., Quality Assurance, Case Coordinators), and other personnel designated by the Laboratory Director who may need full time unescorted access to the File Room.

3.5.1.3 **Access to CIL-HQ Examination Areas (Third Numeral):** The third numeral in the access code designates the level of access into CIL-HQ examination areas where evidence is present. The levels of access are as follows:

0=Escorted Access Only.
1=Monitored Access.
2=All Examination Areas (24 hours/day, 7 days/week).
3= Examination and Evidence Storage Areas (24 hours/day, 7 days/week).

Personnel with Level 0 must have a **definite need** (i.e., official business) in order to enter Examination Areas and are escorted by individuals having access Levels 2 or 3 while in the Examination Areas.

Personnel who may warrant escorted access into examination areas include, but are not limited to:

- PWC and other facilities maintenance personnel.
- Contractors (x-ray machine, mortuary, etc.)
- Law enforcement officials and other persons involved in chain of custody transactions.
- Health and safety personnel.
- DPAA Public Affairs Office personnel.
- IT service providers.
- Select DPAA photographers.
- Journalists and film crews.*
- Select family members, veteran's organizations, VIPs, etc. (see below).*

*Must obtain Laboratory Director's permission prior to entering the Examination Areas. In the absence of the Laboratory Director, a Laboratory Manager may grant permission. Access permissions supporting the routine daily functioning of the CIL-HQ (e.g., facilities maintenance) may be granted by appropriate members of Laboratory Management.

Additional instructions for escorting visitors in examination areas are detailed below.

Level 1 access is normally given to:

- Janitors (see below).
- Interns and volunteers.
- Select visiting scientists.
- Select DPAA photographers.
- Select IT service providers.
- DPAA Security Section personnel.
- DPAA Facilities Section personnel

Personnel with Level 1 must have a **definite need** (i.e., official business) in order to enter Examination Areas and are monitored by individuals having access Levels 2 or 3 while in the Examination Areas.

Monitors and monitoring are discussed below.

CIL Staff granted Level 2 access to Examination Areas include, but are not limited to:

- Scientific Staff.
- Quality Assurance.
- Support Coordinator.
- FSA Fellows.
- Select technical and support personnel.

Non-CIL individuals granted Level 2 access to the Examination Areas includes CIL external consultants and select visiting scientists (as appropriate).

Level 3 access to the evidence storage areas is only granted to the Evidence Coordinator, Alternate Evidence Coordinator(s), select Case Coordinators, and the Science Director. Evidence storage areas are only accessed by personnel in the furtherance of their duties. Access is further detailed in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

Altogether, typical examples of tri-numbered access codes held by various personnel include:

- CIL Scientific Staff: 3-2-2 or 3-3-2.
- Quality Assurance personnel: 3-3-2.
- Laboratory Administration personnel: 3-3-2
- FSA Fellows: 3-2-2.
- Visiting Scientist: 2-1-1 or 2-1-2
- Select DPAA photographers: 2-0-0 or 2-0-1.
- Interns and volunteers: 2-1-1.
- IT service providers: 2-0-0 or 2-0-1.

- Janitor: 2-0-1.
- External consultants: 2-1-2.
- Evidence Coordinator or Alternate: 3-3-3.
- DPAA Facilities personnel: 2-0-1.
- DPAA Security personnel: 2-0-1.
- Visitor, Escort Required: 0-0-0.

3.5.1.4 **Entry into CIL-PH & CIL-OF:** CIL-HQ badge codes are largely compatible with and parallel the access requirements for CIL-PH and CIL-OF. Access codes applicable to CIL-PH are explained in Annex A (Physical Security of CIL-PH). Access codes applicable to CIL-OF are explained in Annex B (Physical Security of CIL-OF).

3.5.1.5 **DPAA Records Room:** A DPAA Records access code also appears on the DPAA badge and is applicable to CIL Staff having access to this area. The levels are as follows:

0=Escorted Access Only.
1=Exterior Door Only (Monday to Friday 0700-1800).
2=Interior and Exterior Door (24 hours/day, 7 days/week).

Access to the Records Room is determined by the Records Custodian or his/her representative. Laboratory Management arranges access to the Records Room, as appropriate, for relevant CIL Staff. CIL Staff comply with all applicable security rules and provisions when present in the Records Room.

3.5.2 **Office & Cubicle Access:** Individuals assigned an office have their badges programmed to enter their office. Laboratory Managers and Quality Assurance have access to all offices and work cubicles. Persons who do not have their badge, or have a valid reason to enter a locked office other than their own, should contact a Laboratory Manager or Quality Assurance in order to obtain entry.

Due to the current badging software, card readers to offices cannot be individually programmed for entry by the occupant. As such, an "Office Group" is created in the badging software. Members of the Office Group have access to all offices on the Third Floor, including their own, if applicable. Some members of Office Group may not have an office but are included since they may need access to offices in the absence of the occupant (e.g., Case Coordinators).

3.5.3 **Janitors:** Contracted janitor services are considered essential to the effective operation of the CIL. The contractor is encouraged to provide continuity in the personnel assigned to maintain the CIL.

Janitors are issued swipe capable badges having badge code 2-0-1. Janitors enter and exit the CIL-HQ Examination Areas as follows:

- Janitors usually enter from Door 320A by contacting the appropriate staff member.
- Janitors who access CIL-HQ Examination Area are required to swipe their badge on the card reader outside of Door 320A along with their monitor prior to entering the Examination Area. Sign in using the Visitor Log is not required if the janitor possesses a swipe capable DPAA badge.
- Janitors exit only through Door 320A. Use of other exits at any time is for emergency use only.

Janitors comply with the above relevant access provisions with the following exceptions:

- Janitors receive instruction in safety, security, and other topics (e.g., what to do if remains are found on the floor).
- Janitors do not have to be monitored while in the administrative and common areas of CIL-HQ during the course of a normal service day.
- When entering and exiting Examination Areas, janitors swipe their badges over the appropriate card readers with their monitors.
- While in the Examination Areas and File Room (Room 347-2) of CIL-HQ janitors are monitored as described below.

3.5.4 **CIL-HQ Visitor Control**: The following procedures apply to visitors in CIL-HQ **(SA5.3.4.1a, SF5.3.4F-19a, SF5.3.4F-19b)**:

3.5.4.1 **Non-DPAA Visitors:** If not already with their escort, non-tour, non-DPAA visitors enter Building 4077 through the main entrance and wait for their escort on the First Floor in the waiting area outside of Elevators A&B.

The visitor then contacts the appropriate DPAA Staff member (i.e., a person with the appropriate access) for escorted access to the CIL-HQ on the Third Floor.

3.5.4.2 **Non-CIL DPAA Staff:** Non-CIL DPAA Staff have access to the Third Floor and may access CIL-HQ areas in accordance with the above guidance. The elevators and stairwells used to access CIL-HQ vary according to the access levels granted (and are reflected via the badge code).

3.5.4.3 **Visitors in the Main Corridor:** Anyone having badge code 2-X-X or higher may escort visitors into the Main Corridor using any doors leading into the Main Corridor. Elevator C is only used for visitor entry when the visit requires its use

(e.g., evidence transfers, transport of furniture or heavy/bulky items). Visitors spending extended time in the Main Corridor (e.g., maintenance contractors) may be monitored. Guidance for escorts/monitors, as appropriate, pertaining to the Main Corridor, is detailed below.

3.5.4.4 **Visitor Access to CIL-HQ Examination Areas:** In general:

- **Visitor access to the Examination Areas should be minimized.**
- Visitors accessing the Examination Areas may be required to provide a DNA sample unless excused by the Laboratory Director. Guidance is found in DPAA Laboratory Manual, SOP 3.7 (Sampling Trace Evidence for DNA).
- Activity within the Examination Areas is concluded in the shortest time practical.

3.5.4.4.1 **Escorts & Monitors:** All visitors accessing the Examination Areas must be escorted or monitored by CIL personnel.

The difference between escorting and monitoring is that the former involves the escort being in close proximity to the visitor and continuously observing their activity. The latter involves the monitor periodically observing personnel and being accessible to visitors should the monitor be needed.

The following provisions apply to escorts and monitors:

- CIL personnel having badge code X-X-2 or higher may escort visitors into the Examination Areas using any doors leading into the Examination Areas, unless otherwise dictated by this SOP.
- Escorts/monitors ensure their charges swipe into and out of Examination Areas.
- Escorts/monitors are responsible for their visitor's sign-in and badging (if applicable) using the below guidance, and their subsequent conduct and safety.
- Escorts and monitors must remain in the Examination Area with their charges. Similarly, visitors must remain with their escort/monitor at all times, as appropriate.
- Regarding monitors, in the interest of productivity, he/she may attend to other matters in the Examination Area provided the activity does not negate the monitoring process.
- VIP's, including family members of the missing, are handled accordingly.

Note: The above provisions for monitoring also apply to the Laboratory Administration File Room (Room 347-2).

- If a visitor in the Examination Area is handed off from one escort/monitor to another, the escort/monitor named in the CIL Visitor Log is responsible for the visitor until the Visitor Log is amended to reflect the new escort/monitor.

Escort/monitors are expected to use good judgment and common sense when handling visitors. For example, when visitor needs to use the restroom, it is not necessary to follow the visitor into the restroom.

Conversely, an escort accompanying a visitor into the Examination Area would be remiss if he/she was not in close proximity to, and closely observing, the visitor, as appropriate.

The Laboratory Director or, in his absence, an appropriate member of Laboratory Management, may waive escort/monitoring requirements and/or safety/security training for select visitors for the Examination Areas on a case-by-case basis. Usually, these persons are already familiar with CIL security procedures (e.g., former staff) and/or, by training or experience (e.g., forensic personnel from other DoD laboratories), and can be reasonably expected to operate in the CIL without compromising safety and security. The waiver is not open ended and is typically associated with a specific event or person (e.g., a visiting scientist's research project) with a duration of five working days or less. Additionally, the waivered individual is not allowed to be alone in the Examination Area. At least one member of the CIL Staff must be present in the Examination Area while the visitor is present. All other provisions of this SOP apply to waivered individuals.

3.5.4.4.2 **Visitor Entry:** Non-routine visitor access into Examination Areas should only be allowed for those with a legitimate need (as listed above) as determined by the Laboratory Director or, in his absence, Laboratory Management. Routine access (e.g., NAVFAC workers, instrument repair technicians, contracted mortuary personnel, or any activity supporting the daily functioning of the CIL) may be granted by Laboratory Management.

Since it is immediately adjacent to the Visitor Log, it is highly recommended that Door 307B be used for non-DPAA visitor entry into, and out of, the Examination Areas.

3.5.4.4.3 **Badging:** Non-CIL DPAA visitors use their DPAA badge when accessing the Examination Areas. A spare badge (badge code 0-0-0 or 2-0-0) is issued to all non-DPAA visitors entering the Examination Areas in accordance with the above guidance. All visitors swipe their badge upon entry into and out of the Examination Areas.

3.5.4.4.4 **Visitor Log & Sign-in:** Non-DPAA visitors are required to sign in and out of the Examination Area at the start and end of each visit, respectively, in the Visitor Log maintained at the Security Station immediately inside Door 307B. Short absences from the Examination Areas (e.g., lunch), where the non-DPAA visitor intends to return, do not require sign-out upon departure (and dropping of the spare badge) and sign-in upon return. The escort/monitor should determine the appropriate length of time. It is the escort's/monitor's responsibility to ensure the Visitor Log is filled out completely and accurately. The following are instructions for completing the Visitor Log:

- Write legibly (printing is preferred).
- A minimum of last names are used in fields where names are required. First and last names are preferred.
- Enter the badge number, if appropriate.
- Ensure proper times are entered.

3.5.4.4.5 **Sign-out & Exit:** Since it is adjacent to the Visitor Log, it is highly recommended that CIL Staff escort non-DPAA visitors out of the Examination Area through Door 307B unless a provisions are otherwise stated in this SOP. Any door can be used for exiting non-CIL DPAA visitors. Any exit can be used in an emergency for any type of visitor.

Leave visitor spare badges at the security station upon sign-out and annotate the Visitor Log with the departure time(s). If a spare badge was used over multiple days, enter the date the visitor leaves along with the sign-out time.

It is the escort's/monitor's responsibility to ensure the Visitor Log is filled out completely and accurately.

3.5.4.5 **Special Instructions for Tours**: Tours are the responsibility of PAO, External Communications, or Plans, Policy & Strategy.

Tours are usually confined to the Tour/Visitor/Waiting Area (Room 300) but may extend into Main Corridor (Space 305 and 319). In either instance the tour participants do not need to sign in to the CIL or undergo any of the below security measures.

For tour groups in the Main Corridor of CIL-HQ, if evidence arrives on Elevator C, the tour group is directed into Space 305 or the Tour/Visitor/Waiting Area until the evidence transits the corridor and is secure in the Examination Area.

More rarely, some groups (e.g., family members, veteran's organizations, VIPs) may be granted access to the Examination Areas. Such access must be approved by the Laboratory Director or, in his absence, Laboratory Management.

The section responsible for the tour compiles, in advance, a roster of those who are to tour the Examination Area. Blank roster forms are available from the CIL. Completed rosters are turned over to the CIL for inclusion into the Visitor Log for that particular day. The rosters are periodically collected and maintained by Quality Assurance.

Tour groups in the Examination Areas must comply with the above provisions and rules for visitor access to the Examination Areas, as appropriate. Compliance includes use of spare badges and submitting DNA samples, when required (see DPAA Laboratory Manual, SOP 3.7 (Sampling Trace Evidence for DNA) for more details).

Tours are prohibited from entering the evidence storage areas unless specifically authorized by the Laboratory Director.

3.5.4.6 **Family Visits Utilizing the Family Viewing Room (Room 304):** Use of the Family Viewing Room is described above. All other provisions of this SOP regarding visitors are in effect, as appropriate. Contingency questions or problems should be addressed with Laboratory Management and/or Quality Assurance.

3.6 **After Hours Procedures:** CIL staff working after hours may encounter the DPAA CQ making Third Floor security checks. CQ security checks occur:

- From 1900 to 0600 hours during weeknights.
- For weekends and holidays, the entire non-duty period beginning at 1900 until 0600 on the next duty day. For example, on a Monday holiday weekend the period for security checks would begin on 1900 on Friday and end on 0600 Tuesday Morning.

The following procedures apply to security checks:

- Checks are done at random times; however no more than three hours should elapse between checks.
- The CQ may enter the Third Floor from any of the elevators or stairwells.
- The CQ enters the Main Corridor and walks its length, observing the secure Laboratory spaces

through the glass partitions (note: not all of the secure spaces can be observed through the glass).
- The CQ may or may not enter the South Wing.
- CIL Staff planning on entering the Examination Area during non-duty hours are highly encouraged to check in and out with the CQ at the Front Desk This establishes facial recognition with the CQ and may preclude challenges during security checks (see below). Alternately, CIL Staff can telephone the CQ. The number is posted at various places around the Examination Area.
- Upon entering the Examination Area, the CIL Staff member adds their name, time in, and date to the white board outside of Door 307B. This provides general situational awareness to the CQ of whom and how many persons are in the Examination Area. CIL Staff departing the Examination Area for the day/evening erase their name from the white board.
- Any personnel observed by the CQ in the Examination Area during non-duty hours *may* be requested to identify themselves—especially if they have not previously checked in with the CQ. Normally, the CQ will knock on the glass to gain the attention of the person. The person then approaches the glass and shows the CQ his/her CIL badge. Laboratory badge codes on the front of the badge ending in 2 or 3 (e.g., X-X-2, X-X-3) indicate an authorized occupant.

3.7 **Individual Security Measures**: The following security measures are taken by individuals to ensure CIL security:

- Office doors should be closed and locked when the occupants anticipate being away from their desk for a lengthy period of time (i.e., in excess of one hour). Analytical notes, case files, and other case work materials are not left out in plain sight when an office is unlocked.
- For individuals occupying cubicles, analytical notes, case files, and other case work materials are prohibited in cubicles. Instead, storage cabinets in the Examination Areas are assigned to analysts to store case materials.
- Access devices should not be left at workstations at any time.
- Access devices should never be loaned to another individual.
- Unknown or unauthorized person encountered in the CIL-HQ Main Corridor and Examination Areas should be challenged as to their business and escorted from the area to their desired destination. Individuals not authorized to be in the area should be escorted from the CIL and the security violation reported to a Laboratory Manager.
- Malfunctioning security equipment (locks, magnetic key card readers, etc.) should be reported to Laboratory Management, Quality Assurance, or the Support Coordinator.
- Doors to the File Room and CIL Examination Areas should be opened and unsecured for the shortest time possible. Doors should not be open for excessive periods of time (e.g., standing in the doorway while talking). The automatic sliding doors leading from the Main Corridor into the Examination Areas are "smart" doors. Based on the length of time they are open determines how long the door will remain open for subsequent passages. As such, standing in an open for a lengthy time may result in the door remaining open for several minutes subsequent to the passage of personnel. This results in an unattended open door and potentially subsequent intruders into the Examination Areas. If an automatic door needs to be propped open, turn the control key located on the door frame to the interior of the Examination Area to "open" to hold the door in the open position.
- Doors to the File Rooms, and the CIL Examination Areas should never be propped open or locked in the open position unless there is active loading and unloading taking place. In such instances, the doors need to be under constant observation.
- Compact evidence shelving and the walk-in refrigerator (Rooms 323 and 324, respectively) in CIL-HQ should never be left open when the Evidence Coordinator or designated alternate cannot maintain visual contact.
- Individuals should not enter the interior area of the compact shelving or the confines of the walk-in refrigerator (Rooms 323 and 324, respectively) in CIL-HQ unless invited to do so by the Evidence Coordinator or designated alternate.
- CIL Staff utilizing a locker in the CIL-HQ or CIL-OF locker room and/or the CIL-PH restrooms must have their name affixed to the locker.
- All security violations must be reported to Laboratory Management or Quality Assurance. Laboratory Management contacts Quality Assurance (usually through email) who logs the violation in the Security Violations & Deficiency Log, conducts investigations, if needed, and tracks corrective actions.

3.8 **CIL-HQ Security During Chain of Custody Transfers**: Security during chain of custody transfers is as follows:

3.8.1 **Utilizing the Evidence Receiving & Transfer Complex:** Large items of evidence normally enter the CIL via the Evidence Receiving & Transfer Complex. Smaller items may also be delivered as

such. Chain of custody transfers are further discussed in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

Note: Evidence in CIL custody is never left unattended in the Evidence Receiving & Transfer Complex. A CIL Staff member must physically maintain custody at all times.

3.8.1.1 **Transfers Involving Non-CIL Couriers:** Security for chain of custody transfers using the Evidence Receiving & Transfer Complex involving non-CIL couriers are as follows:

- Couriers call the CIL Staff (normally an Evidence Coordinator or an alternate) and meet them at the exterior entrance (Door 121C) of the Evidence Receiving & Transfer Station (Room 121) on the First Floor. Room 121 is a secure CIL space. It is the only secure CIL space not on the Third Floor of Building 4077.
- The CIL Staff member arrives outside of Room 121 and escorts evidence couriers into Room 121.
- Evidence couriers initially enter Room 121 with their escort and are signed in (there is a Visitor Log maintained in Room 121). Custody transfer may occur at this point. If this is the case, evidence couriers go no further. This is normally the case for incoming evidence at the CIL. At the conclusion of the transfer of evidence the courier is signed out in the Visitor Log and escorted out of Room 121.
- CIL Staff transporting evidence to the Third Floor subsequently pass through the First Floor Vestibule (Room 119) to Elevator C. Room 119 should be cleared of all extraneous personnel prior to transiting evidence to Elevator C.
- CIL Staff then transport the evidence using Elevator C to the Third Floor Elevator Vestibule (Space 319-2). Elevator C requires the appropriate badge access in order to ascend to, and enter, the Third Floor.
- The Main Corridor (Space 319) is transited by personnel and evidence to Door 320A.
- Evidence is taken into the Evidence Transfer Area (Space 320) for processing. All personnel swipe their badges at Door 320 accordingly.
- If the courier is also ascending to the Third Floor, they are escorted through Room 121, Room 119, and Elevator C up to the Third Floor. Couriers are then allowed to access the Examination Areas (usually the Evidence Transfer Area [Space 320]) in accordance with the visitor access procedures, detailed above.

3.8.1.2 **Transfers Involving CIL Couriers:** Chain of custody transfers involving CIL couriers that utilize the Evidence Receiving & Transfer Complex are arranged and conducted by the courier and the Evidence Coordinator (or alternate) on a case-by-case basis.

3.8.2 **Transfers Not Involving the Evidence Receiving & Transfer Complex:**

3.8.2.1 **Transfers Involving Non-CIL Couriers:** For various reasons, the Evidence Receiving & Transfer Complex may not be used. In such instances couriers may be required to ascend to the Third Floor using the following procedures:

- Couriers are met by their escort on the First Floor and are escorted to the Third Floor.
- Couriers are then allowed to access the Examination Areas (usually the Evidence Transfer Area [Space 320]) in accordance with the above visitor procedures.
- Upon completion of the activity, couriers return their spare badges, sign out, and are escorted back to the First Floor.

Note: Custody transfers for smaller items (e.g., when pelican cases are used) involving non-CIL couriers may or may not use Elevator C.

3.8.2.2 **Transfers Involving CIL Couriers:** When not utilizing the Evidence Receiving & Transfer Complex, CIL couriers may bring evidence in and out of CIL-HQ through any of the Third Floor access points discussed in this SOP. For after-hours transfers, couriers should coordinate with the Evidence Coordinator or alternate. In such instances, couriers need to be mindful of the SOP provisions regarding the CQ.

3.9 **Security of Case Work Materials:** All original case work materials (e.g., case files, field notebooks, analytical notes, draft and final test reports) must be secured and protected from unauthorized access and disclosure. Original case work materials are secured by:

- Returning them to the File Room (Room 347-2) in CIL-HQ.
- Storing them in designated storage cabinets in the Examination Areas (original casework materials are prohibited in cubicles). Copies are permitted in cubicles. Copies are secured in locked cubicle cabinets and containers when not in use.
- Locking them in an office.

Authorized persons may remove documents located in the CIL-HQ File Room (Room 347-2) by checking them out from a File Administrator. DPAA

Laboratory Manual, SOP 1.7 (Case File Management) details checkout procedures. Checked-out materials should not be transferred to another authorized person without having the transaction recorded by a File Administrator.

Case work materials are never given to unauthorized persons. Violations may result in disciplinary action!

Case work materials should be returned to the CIL-HQ File Room (Room 347-2) whenever CIL Staff members anticipate a prolonged absence from the DPAA (e.g., annual leave, compensatory time, TDY).

3.10 **CIL-HQ Closing Procedures**: When departing work for the day:

- Offices and cubicle containers and cabinets should be secured.
- Computers and other electrical equipment should be turned off or put in the shut-down or logged-off mode.
- Doors to secure areas must be secured.
- Blinds for the glass partitions allowing observation into the Examination Areas must be in the raised position to allow for observation of the Examination Area by the CQ.

3.11 **Security Violations**: Security is everyone's responsibility. Security violations must be reported to Laboratory Management or Quality Assurance. Violations are logged by Quality Assurance in the Security Violations & Deficiency Log and the individual security records for non-CIL DPAA staff having access, if applicable. Investigations and corrective actions are documented accordingly.

For CIL Staff, violations of the security policies may result in the issuance of verbal warnings, followed by formal written counseling statements, disciplinary actions, and negative comments on performance evaluations, depending on the severity of the offense.

If lost keys require a re-keying of locks, the negligent employee could be charged with the cost.

For non-CIL DPAA staff the following table of penalties applies:

- First violation: Verbal or email notification by an appropriate member of Laboratory Management. The individual's chain of command may or may not be notified.
- Second violation within a one year period: Written notification signed by an appropriate member of Laboratory Management. The individual's chain of command is notified.
- Third violation within a one year period: Formal (in writing) notification of temporary suspension or permanent revocation of access, signed by the Laboratory Director. The individual's badge will no longer allow access into the CIL. Suspended individuals may face retraining before access is reinstated. Regardless of suspension or revocation, the individual's chain of command is notified.

For more serious violations and/or abuse of privileges, second and third violation penalties may be awarded despite the previous number of offenses within the annual period. Serious violations and/or abuse of privileges include, but are not limited to:

- Loaning access devices to unauthorized individuals.
- Attempting to access unauthorized areas.
- Loitering in the CIL with no scheduled business with CIL Staff.
- Failing to properly escort visitors.

Additionally, any non-CIL DPAA staff member who display a demeanor or attitude that is contemptuous, dismissive, or disdainful of the CIL security program may have their CIL access revoked by the Laboratory Director. Such individuals cannot be trusted to uphold CIL security provisions. The offender's supervisors may be apprised accordingly. Similar demeanor by CIL Staff is reported to Laboratory Management for corrective action.

4.0 SURETY: Quality Assurance, the Support Coordinator, and Laboratory Managers periodically perform formal and informal security checks and inspections and conduct briefings during staff meetings, as appropriate. Checks and inspections may be during duty hours, after duty hours, and/or on weekends.

The Lead Quality Coordinator, or his representative, audit the provisions of this SOP at least annually in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

An individual designated by the Laboratory Director, usually the Lead Quality Coordinator or his representative, inventories badges at least annually.

5.0 SAFETY: In the event of an emergency (medical, fire, bomb threat, chemical/biohazard contamination, natural disaster, etc.) CIL physical security measures may be waived, as appropriate, to facilitate first responder effectiveness and/or recovery operations.

Such waivers are not unconditional or open ended but are reasonable, appropriate, and tailored to the direness of the situation. Waivers are granted to expedite, in priority:

1) Saving life, limb, and eyesight.
2) Preserving the integrity of evidence.
3) Preserving case files.
4) Preserving the facility and property.

Once the situation stabilizes, Laboratory Management, the Lead Quality Coordinator, the Support Coordinator, and other CIL Staff, re-assert control, as appropriate.

The following safety measures are in effect:

- Never tamper with, disassemble, or try to repair electronic panels or devices.
- Do not tamper with the automatic doors. Do not force the doors open or closed. Report malfunctioning doors to the Safety Officer, Quality Assurance, or Laboratory Management.
- When passing through automatic doors, be careful of loose clothing, long hair, hands, feet, and other objects that could get caught in the mechanism or be pinched between the door and the door frame.
- Staff leaving the building after hours should be cognizant of their surroundings.
- The interior of the walk-in refrigerator (Room 324), the Autopsy Areas (Rooms 326 and 327) and the Maceration Laboratory (Room 330) in CIL-HQ area potentially bio-hazardous area. Appropriate precautions should be taken (see DPAA Laboratory Manual, SOP 1.4, CIL Safety Program).
- In an emergency evacuation, do not egress Building 4077 via the elevators.

Annex A (Physical Security of CIL-PH)

A1.0 PURPOSE & SCOPE: This Annex covers the physical security for CIL-PH located on the second floor of Building 220 on the Pearl Harbor Naval Base. CIL-PH houses the CIL annex and the CIL Forensic Science Academy (FSA) **(SA5.3.4.1a, SF5.3.4F-19a, SF5.3.4F-19b).**

A2.0 SECURITY PROCEDURES: The following procedures ensure the security of CIL-PH and the activities conducted there.

A2.1 **General CIL-PH Security:** CIL-PH is comprised of the following collective areas:

- Analytical/evidence handling/storage areas. Specifically:
  - Material Evidence Laboratory (Room 204) secured with magnetic locks.
  - Evidence Conservation Laboratory (Room 202B).
  - K-208 Laboratory (Room 202), secured with magnetic locks.
  - Secure Evidence Locker (Room 202A) for the temporary holding and consolidation of evidence secured with a magnetic lock and key lock.

- Specialty areas for research, storage, and other functions. Evidence is not allowed in these areas. Specifically:
  - Recovery Scene Work Area (Room 205).
  - Special Projects Laboratory (Room 207).
  - Forensic Science Academy (Rooms 209 and 209A).

- Administrative areas. Evidence is not allowed in these areas. Specifically:
  - Server Room (Room 201).
  - CIL Staff cubicles (Rooms 203 and 208), the former secured with a keypad lock.
  - LSI Office (Room 206.
  - Room 210 (Womens' Rest Room).
  - Room 211 (Mens' Rest Room).

Doors at various locations allow access to the alarmed areas of the CIL-PH. These doors are the:

- North double doors (leads into the secure area of CIL-PH through an unsecure vestibule adjacent to the elevator).
- South single door (leads into the secure area of CIL-PH from a fire escape on the exterior of the building).

All of these doors use a magnetic badge reader to grant access to authorized personnel using preprogrammed badges.

An electronic security alarm panel is located inside the north double doors and can be deactivated by authorized personnel upon entering the alarmed perimeter **(SA5.3.4.1b)**.

The arrangement of CIL-PH is such that the entire operational area of the second floor is located behind alarmed security doors equipped with a card reader. The internal analytical and evidence storage areas of CIL-PH are further secured from access with magnetic locks (see above).

A2.2 **CIL-PH Access:** As with CIL-HQ there are variable levels of access into and within CIL-PH. As such, CIL-HQ badge codes are largely compatible with and parallel CIL-PH access levels to the extent that the two facilities do not need separate numerical badge code systems.

In general, the nature of the internal configuration of CIL-PH impacts on its badge codes. Accordingly, some of the CIL-HQ badge codes used at CIL-PH (e.g., for CIL-HQ File Room access) are not applicable.

Badge codes applicable to CIL-PH are as follows:

A2.2.1 **Entry into CIL-PH (First Numeral):**

0=Monitored Entry, Sign-in, and Subsequent Escort.
1=North Door Only (Monday-Friday 0700-1800).
2=North and South Doors (Monday-Friday 0700-1800).
3= North and South Doors Full Time (24 hours/day, 7 days/week).

Level 0 is used to designate DPAA and non-DPAA visitors to CIL-PH who do not have access privileges. As such, it is displayed on all spare badges designated for visitors (see below) and DPAA badges from other DPAA sections.

Entry is through the north door and sign-in and escort is subsequently required while in CIL-PH. Personnel with Level 0 are escorted by CIL Staff having entry

Levels 1, 2 or 3 to CIL-PH. Further instructions for signing-in and escorting visitors are detailed below.

Level 1 is typically granted to non-CIL DPAA personnel having official business in CIL-PH and who have completed the requisite safety and security training for the access required and duties performed. Personnel typically requiring Level 1 access include, but are not limited to:

- Command Group.
- DPAA section chiefs (R&A, Operations, Resource Management, etc).
- Select persons from the R&A and IT Sections.
- Medics.
- Select DPAA Photographers.
- Other persons with authorized, frequent (at least 3-5 time per week), and routine business in the CIL-PH.

Level 2 is usually granted to competency trained CIL personnel who do not require full time or after-hours access to CIL-PH (e.g., interns and volunteers). Non-CIL personnel (e.g., consultants, visiting scientists) may be granted Level 2 when approved by the Laboratory Director. These personnel are usually competency trained.

Level 3 is granted to competency trained CIL personnel who require full time access to CIL-PH (e.g., analysts, select technical and support personnel, Evidence Coordinator, LSIs, Quality Assurance, Laboratory Administration, FSA Fellows).

Personal security codes for alarm activation and deactivation codes (described above) are only given to select personnel holding Level 3 access and who are required to enter the alarmed area after hours.

A2.2.2 **File Room Access (Second Numeral):** None of the second numerals in the access codes that designate access to the File Room in CIL-HQ apply to CIL-PH.

A2.2.3 **Entry into CIL-PH Examination areas (Third Numeral):** The third numeral in the access code designates the level of access into CIL-PH examination areas where evidence is present. The levels of access are as follows:

0=Escorted Access Only.
1=Not applicable to CIL-PH. Use Level 0.
2=Examination areas.
3= Not applicable to CIL-PH. Use Level 2.

Personnel needing escort into CIL-PH must have a **definite need** (i.e., official business) in order to further enter examination areas. Such personnel are escorted by individuals having access Level 2 into the examination areas.
Personnel who may warrant escorted access into examination areas include, but are not limited to:

- Janitors (see below).
- PWC and other facilities maintenance personnel.
- Contractors.
- Law enforcement officials and other persons involved in CIL case work.
- Health and safety personnel.
- DPAA Public Affairs Office personnel.
- Select interns and volunteers.
- Select visiting scientists.
- IT service providers.
- DPAA Security Section personnel.
- Medics.
- Select DPAA photographers.
- Journalists and film crews.*
- Select family members, veteran's organizations, VIPs, etc. (see below).*

*Must obtain Laboratory Director's or his representative's permission prior to entering the examination areas.

CIL Staff granted Level 2 access to examination/examination areas include, but are not limited to:

- Scientific Staff.
- Quality Assurance.
- Support Coordinator.
- Evidence Coordinator and Alternates.
- Select interns and volunteers.
- FSA Fellows.
- Select technical and support personnel.

Non-CIL individuals granted Level 2 access to the examination/examination areas includes CIL external consultants and select visiting scientists (as appropriate).

All persons utilizing examination areas adhere to the following procedures:

- Swipe their badge on the card readers when entering and exiting examination areas (non-CIL visitors swipe the appropriate spare badge).
- Ensure the door to the examination area is closed and locked after entering and exiting the examination areas.

A2.3 **Janitors:** Janitor support for CIL-PH largely follows the same procedures as CIL-HQ with the following considerations:

- Janitors must enter CIL-PH from the northern door by contacting the appropriate staff member.
- Janitors are required to sign in and out of CIL-PH at the start and end of each business day, respectively, using the procedures for CIL-HQ.
- Janitors are issued a spare badge.
- Janitors exit only through the northern door. Use of other exits at any time is restricted to official or emergency use only.

A2.4 **CIL-PH Visitor Control**: The following procedures apply to visitors in CIL-PH **(SA5.3.4.1a, SF5.3.4F-19a, SF5.3.4F-19b):**

A2.4.1 **Entry:** All visitors are escorted. **Only CIL personnel may escort visitors in CIL-PH.** Visitors enter CIL-PH from the north door by contacting the appropriate staff member (i.e., a person with the appropriate access), if not already with their escort.

All visitors are initially escorted through the north door. The escort immediately proceeds with their visitor(s) to the security station just inside the door and, using the below procedures, sign them into the visitors log, and continue to escort them for the duration of the visit.

A2.4.2 **Escort:** Escorts are responsible for their visitor's sign-in and badging, using the below guidance, and their subsequent conduct and safety. Visitors must remain with their escort at all times when in CIL-PH. Escorts accompanying a visitor into an examination area stay in close proximity to and closely observe the visitor at all times.

VIP's are handled accordingly.

If a visitor is handed off from one escort to another, the escort named in the CIL-PH Visitor Log is responsible for the visitor until the Visitor Log is amended to reflect the new escort.

The Laboratory Director may waive escort requirements and/or safety/security training for select personnel on a case-by-case basis under the same conditions and using the same provisions detailed for CIL-HQ.

A2.4.3 **Badging:** Numbered spare badges are available inside the CIL-PH north door.

A2.4.4 **Visitor Log & Sign-in:** Visitors are required to sign in and out of CIL-PH at the start and end of each visit, respectively, in the Visitor Log maintained by the north doors. Short absences from CIL-PH (e.g., lunch), where the visitor intends to return, do not require sign-out upon departure (and dropping of spare badge) and sign-in upon return. The escort should determine the appropriate length of time. The following are instructions for completing the Visitor Log:

- Write legibly (printing is preferred).
- A minimum of last names are used in fields where names are required.
- Enter badge number, if appropriate.
- Ensure proper times are entered.

A2.4.5 **Visitor Access to CIL-PH Examination areas:** The following procedures apply:

- **Visitor access to examination areas should be minimized.**
- Visitor access should only be allowed for those with a legitimate need as determined by the Laboratory Director or, in his absence, an appropriate member of Laboratory Management.
- Activity within the examination areas is concluded in the shortest time practical. Escorts ensure visitors adhere to all visitor rules, as appropriate, (see below).
- Visitors to examination areas may be required to provide a DNA sample. Guidance is found in DPAA Laboratory Manual, SOP 3.7 (Sampling Trace Evidence for DNA).

A2.4.6 **Exit & Sign-out:** CIL personnel escort visitors out of CIL-PH using the north doors. Use of other exits at any time is restricted to emergency use only. Leave spare badges at the exit upon sign-out and annotate the Visitor Log with the departure time(s).

A2.4.7 **Tours:** In general, tours in CIL-PH should be rare. Tour participants are treated as visitors using the above procedures.

A2.5 **CIL-PH Alarm Procedures:** Unless CIL-PH is occupied by a member of the CIL Staff, CIL-PH must be protected by the alarm system. Occupation is defined as a situation where a CIL Staff member would be able to detect obvious unauthorized intrusions into CIL-PH. As such, the CIL is occupied when

- At least one CIL Staff member is physically located in CIL-PH or,
- Located in the immediate area surrounding CIL-PH for a **brief** amount of time (e.g., being in the vestibule of CIL-PH for 15 minutes and being able

to observe the elevator and stairwell door, taking a brief cell phone call outside the north door, returning to your vehicle to retrieve an item for 5 minutes). Such instances are left to the discretion and good judgment of the CIL Staff member. Further, in such instances the CIL Staff member does not leave non-CIL persons in CIL-PH.

A2.5.1 **Opening Procedures:** CIL-PH personnel enter through the north doors.

The first CIL Staff member having alarm system privileges and needing access to the alarmed areas on any duty day normally deactivate the alarm system for the entire duty day. However, if the staff member is not occupying CIL-PH (as defined above) prior to other staff members' occupation (in other words the staff member is the lone occupant of CIL-PH), the alarm is normally reactivated upon departure using the below procedures. This provision also applies to non-duty hours, weekends, holidays, etc. where lone access may be required.

The first CIL Staff member having an alarm code reporting to work accesses CIL-PH through the north door using the following opening procedures:

A2.5.1.1 **North Door:** This door opens directly into the alarmed portion of CIL-PH. After entering the door, the alarm system must be deactivated within approximately 120 seconds using the staff member's personal security code **(SA5.3.4.1b)**. Once the alarm system is deactivated the staff member should then proceed to:

- Complete the CIL-PH Security Alarm Activation/Deactivation checklist located adjacent to the alarm controls.
- Position the signs on the exterior of the northern double doors to read "ALARM OFF."
- Turn off the foyer light in the vestibule outside of the north doors.
- Check to ensure the doors to the evidence areas in Rooms 202, 204, and 206 are still secured.

A2.5.1.2 **South Door:** This door opens from the exterior of the building into the alarmed area. **CIL Staff are strongly discouraged from entering CIL-PH through the south door as there may not be enough time to reach the alarm panel in order to deactivate the alarm.** If required to initially enter CIL-PH through the south door, the above deactivation procedures are followed **(SA5.3.4.1b)**.

A2.5.1.3 **What to do if the Alarm System is Triggered:** When the alarm system is triggered, the Pearl Harbor Security Police (SP) receive a silent alarm indicating a potential intrusion into the alarmed area of CIL-PH.

When the alarm system is triggered after hours, the following series of events take place.

- The SP calls CIL personnel listed on an after hours call roster and have them report to CIL-PH.
- The SP arrives at CIL-PH and asks that individuals there produce CAC cards for personal identification. The individuals at CIL-PH are matched to an access roster held by the Security Police. Unauthorized individuals are detained. Authorized individuals are held at CIL-PH until the CIL Staff member on the after hours call roster arrives.
- Once the CIL Staff member on the after hours call roster arrives at CIL-PH, he/she re-sets the alarm and authorizes the release of any detained individuals who are authorized access to CIL-PH.
- If the triggering the alarm was accidental or inadvertent, at the earliest opportunity the CIL Security Coordinator and/or Laboratory Management undertakes a root cause analysis in order to prevent future recurrences of such incidents.

A2.5.2 **Closing Procedures**: When departing work for the day:

- Cubicles should be secured. Computers and other electrical equipment should be turned off or put in the shut-down or logged-off mode.
- Turn off appliances such as coffee makers.
- Doors to secure areas must be closed and secure.
- Evidence areas (Rooms 202, 204, and 206) should remain lighted.
- When the last person having alarm privileges leaves CIL-PH, they first verify that all other persons have departed the area before activating the alarm.
- The alarm is then activated **(SA5.3.4.1e)**. Specifically:
    - Complete the CIL-PH Security Alarm Activation/Deactivation checklist located adjacent to the alarm controls.
    - Turn all signs to read "ALARM ON."
    - Arm the alarm system using personal security code.
    - Exit the area through the north double doors within 60 seconds of arming the alarm. **Exiting through the south door is discouraged since the alarm may activate prior to reaching the door.**

- Turn on the foyer light to illuminate the vestibule outside the north doors.

A2.5.3 **Failure of the Alarm System:** The procedures are the same as for CIL-HQ.

A2.6 **Individual Security Measures**: These procedures are largely the same as for CIL-HQ, above. See the provisions listed in the body of this SOP.

A2.7 **CIL-PH Security During Chain of Custody Transfers**: Chain of custody transfers involving accessioning of evidence are not performed at CIL-PH.

A2.8 **Security of Case Files, Field Notes & Analytical Notes:** All case files, field notebooks, and analytical notes must be secured and protected from unauthorized access and disclosure. At the end of each business day, these items must be secured in a locked cabinet or drawer. Given the more open area nature of CIL-PH, case file materials should not be left on desks or other surfaces in plain view. Failure to secure case file materials may result in disciplinary action.

Whenever members of the scientific staff anticipate a prolonged absence from the DPAA (e.g., annual leave, compensatory time, TDY), case files, analytical notes, and other records should be returned to the CIL-HQ File Room (#159/160).

A2.9 **Entering the Secure Evidence Locker:** Procedures for entering the Secure Evidence Locker (Room 202A) are found in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

A3.0 SURETY: Quality Assurance, the Support Coordinator, and Laboratory Managers periodically perform formal and informal security checks and inspections. The Lead Quality Coordinator or his representative audits the provisions of this annex at least annually in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

Completed security records for CIL-PH (e.g., Visitor Logs, Alarm Activation/Deactivation Records) are maintained by the Laboratory Manager at CIL-PH. Such records are transferred for archival to Quality Assurance on a periodic basis.

A4.0 SAFETY: Safety procedures are largely the same as for CIL-HQ, above. See the provisions listed in the body of this SOP.

The following special safety measures are in effect for CIL-PH:

- The fire escape adjacent to the south door should be kept clear at all times. Do not use the landing on the fire escape as a smoking or break area. Do not leave items on the landing as they may block the door preventing its use as a fire exit.
- Do not pile or place objects near the electrical panels in the hallway. Do not open or tamper with the electrical panels.
- Take suitable precautions when negotiating the stairs to avoid falls and injuries.
- Access to light fixtures in the Evidence Locker (Room 202A) requires unlocking and opening trap doors in the cage ceiling. Use caution when opening the trap doors as to avoid pinching of fingers and being struck in the head.

Annex B (Physical Security of CIL-OF)

B1.0 PURPOSE & SCOPE: This annex covers the physical security for CIL-OF located in Building 301 (the "Martin Bomber Building") on Offutt AFB, Nebraska **(SA5.3.4.1a, SF5.3.4F-19a, SF5.3.4F-19b).**

B2.0 SECURITY PROCEDURES: The following procedures pertain to the security of CIL-OF and the activities conducted there.

B2.1 **General CIL-OF Security:** CIL-OF is comprised of the following collective areas:

- Analytical/evidence handling/storage areas (Room 108, see below). This area is protected by an intrusion detection system (IDS, also called the "alarm") (see below).
- Administrative and support areas. These areas are not alarmed. Evidence is not allowed in these areas without a completed chain of custody document and permission from the CIL-OF Laboratory Director.
- Specialty areas for IT operations and functions. This space is not contiguous with the CIL-OF administrative and examination areas. Evidence is not allowed in these areas.

Regardless of the area, most of the doors in the CIL-OF are equipped with locks and card readers that permit routine pedestrian entry and exit of CIL personnel **(SA5.3.4.1b)**. Additionally, doors leading to the exterior of CIL-OF are kept closed and locked when not in use and are not to be left unattended while propped open **(SA5.3.4.1b)**.

All persons accessing secure areas adhere to the following procedures:

- Swipe their badge on the card readers when entering and exiting examination areas (non-CIL visitors swipe the appropriate spare badge).
- Ensure the door to the secure area is closed and locked after entering and exiting the examination areas.

B2.1.1 **Alarmed Area:** Portions of the CIL-OF are monitored during vacant hours by an intrusion detection system **(SA5.3.4.1e)**. The alarmed area comprises the analytical/evidence handling/storage areas where conservation and testing of evidence is performed. Collectively, this area is designated as Room 108.

Non security related doors (8-06A in the South and 8-16B in the North) divide Room 108 into a South, Middle, and North Area (Rooms 108A, 108B and 108C, respectively). Doors 8-06A and 8-16B do not have a security function. Rather, they are used for odor control, noise abatement, fire containment, etc. As such, these doors may be propped open, as appropriate.

The South, Middle, and North portions of Room 108 contain various rooms and analytical specialty areas. The South Area (Room 108A), is the Gross Examination or Gross Analytical Laboratory Room 108A (also called the Identification Laboratory or Remains Floor). Rooms located adjacent to the Gross Examination Laboratory include:

- Consult Case Room (Room 109, Door 8-04A).
- Storage Room (Room 110, Door 8-05A).

The Middle Area (Room 108B) is a general purpose work area and special projects area. Adjacent areas include:

- Material Evidence Lab (Room 111, Door 8-07A).
- X-Ray/Imaging Room (Room 112, Door 8-22A).
- SEM Room (Room 113, Door 8-21A).
- South portion of Evidence Storage Room (Room 116, Door 8-20A). The Evidence Storage Area is accessed by the Evidence Coordinator, Alternate Evidence Coordinator(s), CIL-OF Laboratory Director and the Science Director.
- South portion of Wet Lab (Room 117, Door 8-13A).

The North Area (Room 108C) is the Evidence Transfer Area. Adjacent areas include:

- North portion of Evidence Storage Room (Room 116, Door 8-20B). The Evidence Storage Area is accessed by the Evidence Coordinator, Alternate Evidence Coordinator(s), CIL-OF Laboratory Director and the Science Director.
- North portion of Wet Lab (Room 117, Door 8-13B).
- DNA Sampling Room (Room 118, Door 8-14A).
- Evidence Conservation Room (Room 119, Door 8-15A).
- Photo Room (Room 120, Door 8-17A).
- Evidence Coordinator Office (Room 121, Door 8-18A).
- Biological Refrigerator (Room 122, Door 8-19) secured by a key lock and a magnetic lock). The key lock is not used unless the magnetic lock becomes inoperable. In such instances, the Evidence Coordinator maintains the hard key sets for this area. Alternate Evidence Coordinator(s)

and the CIL-OF Laboratory Director have access to additional key sets.

With the exception of Door 8-16B, all of the above doors use a magnetic badge reader to grant access to authorized personnel using the above preprogrammed badges.

Doors at various locations on the perimeter of Room 108 allow access to the alarmed areas of the CIL-OF. All of these doors are single doors and are equipped with magnetic badge readers unless otherwise noted. These doors are:

- 8-03B (from Family Viewing Room, Room 105).
- 8-03A (from Lobby, Room 100). This door is not for routine traffic. Rather it is for emergency egress only from Room 108A.
- 8-03C (leading from the North-South Corridor into Room 108A).
- 8-08B (leading from the Locker Room Complex into Room 108B).
- 8-16A (double doors leading from the north exterior wall of CIL-OF directly into the Evidence Transfer Area [Room 108C]). These are the only doors that connect the Alarmed Area to the exterior of CIL-OF.

Two electronic security alarm panels control the alarm for entire alarmed area. The first is located inside and adjacent to Door 8-08B in Room 108B. The other is inside and adjacent to Door 8-16A in Room 108C. Authorized personnel can use either panel to deactivate the alarm upon entering the alarmed perimeter **(SA5.3.4.1b)**.

Note: Doors in CIL-OF reflect the numbers on the original construction plans rather than the room number. For areas that are accessed by multiple doors each door may have a subsequent letter suffix (e.g., Door 7-01A, then 7-01B, 7-01C….).

B2.1.2 **Unalarmed Areas**: The remainder of CIL-OF is unalarmed. The below areas marked with an asterisk are unsecure or secured with a device other than a card reader. Unalarmed areas include:

- Lobby/Reception (Room 100, Door 6-10A).
- Laboratory Administration (Room 101, Door 6-02A) containing the Records Room (Room 102, Door 6-04A). An exterior door (6-02B) leads from Laboratory Administration into the West Public Hallway, a corridor shared with the Air Force. This door is used primarily to access Rooms 103 and 104.
- Storage Room (Room 103, Door 6-06A) accessed from the West Public Hallway.
- Outdoor Storage Room (Room 104, Door 6-07A).
- Family Viewing Room (Room 105, Door 8-02A).
- South Conference Room (Adjacent to Laboratory Administration (Room 106, Door 6-01A) containing a Storage Room (Room 107, Door 6-01AA).
- Locker Room Complex consisting of:
  - Female Locker Room (Room 114, Door 8-12A*).
  - Male Locker Room (Room 115, Door 8-11A*).
  - Vestibule with an unsecured door (Door 8-08A*) allowing passage from the North-South Corridor to Room 108B. This door does not have a security function. As such, it can be propped open, as appropriate.
- Utility Closet containing security panels (Room 123, Door 7-12A).
- IDF Closet (Room 124, Door 7-11A).
- Handicapped Rest Room (Room 125, Door 7-09A*).
- Personal Health Room (Room 126, Door 7-08A*).
- Multimedia & Supply Room (Room 127, Door 7-07A*). A door (Door 7-07B*) leads from this room to the adjacent North Conference Room (Room 128).
- North Conference Room (Room 128, Doors 7-06A* and 7-06B*) across from the Cubicle/Office Area (Room 131).
- Janitor Closet (Room 129, Door 7-13A*).
- Break Area/Kitchen (Room 130, Door 7-02A*).
- Open Cubicle Area (Room 131, serviced by Doors 7-01A through 7-01C [East Doors] and 7-01D [South Door]) containing offices:
  - 132 (Door 7-05A*).
  - 133 (Door 7-04A*).
  - 134 (Door 7-03A*).
- Maintenance Room (Room 135, Door 8-24A). Door 8-24A is an exterior door that is accessed from the north wall of CIL-OF. It contains the dry chemical fire suppression system for CIL-OF. A back-up hard key for this area is found in a key box adjacent to the Main Staff Entrance at Door 7-10F.
- IT operations area consisting of:
  - Server Room (Room 136). This area is accessed through an exterior door (Door 8-25A) on the north wall of CIL-OF and internally through the IT Office (Room 137, Door 8-25B).
  - IT Office (Room 137). This area is accessed from Door 8-26A in a shared corridor with the Air Force, from the Server Room (Room 136, Door 8-25B), and from the Help Desk Office (Room 138, Door 8-26B).

  - Help Desk Office (Room 138). This area is accessed from Door 8-27A in a shared corridor with the Air Force, from the IT Office (Room 137, Door 8-26B), and from the Storage Room (Room 139, Door 8-27B).
  - Storage Room (Room 139). This area is accessed from Door 8-28A in a shared corridor with the Air Force, and from the Help Desk Office (Room 138, Door 8-27B).

- Male Restroom in Stairwell (Room 140).*
- Female Restroom in Stairwell (room 141).*

Additionally, there is an unalarmed door (Door 7-10A) in the North-South Corridor immediately north of Room 106. This door controls visitor access, keeping visitors and guests confined to the CIL Public Area (see below).

Regarding exterior doors, the CIL Staff and visitor main entry into CIL-OF are through the double doors (Door 6-10A) on the south wall of CIL-OF leading into the Lobby/Reception Area (Room 100). Another main entrance for the staff is the double doors (Door 7-10F) on the north wall of CIL-OF leading into the North-South Corridor.

Other doors leading from the exterior into CIL-OF, not explained above, include:

- Double doors (Door 6-05A) leading into the West Public Hallway adjacent to Room 103 and Laboratory Administration (Room 101).
- Door 7-10E on the west side of CIL-OF adjacent to the Janitor Closet (Room 129). This door is not an access point into CIL-OF. It leads into a non-CIL corridor and is only used in the event of an emergency evacuation of CIL-OF.
- Double doors (Door 7-10B*) on the west side of the North-South Corridor that lead into an Air Force activity. These doors are bolted on the CIL side and are used by the Air Force on an appointment only basis with the Laboratory Director or his designee.
- Basement door (no door number) at the base of the stairwell leading into the shared tornado shelter. The tornado shelter is not controlled by the CIL-OF.

B2.2 **CIL-OF Access:** There are variable levels of access into and within CIL-OF. As such, the first line of CIL-OF badge codes (see below) are largely compatible with, and parallel the access levels of, other CIL facilities to the extent that CIL facilities do not need separate numerical badge code systems.

In general, the nature of the internal configuration of CIL-OF impacts on its badge codes. A major difference between CIL-OF and CIL-HQ, for example, is that CIL-OF has two additional (and supplemental) lines of badge code, one for its secure Office/Cubicle Area, and another for the secure IT Operational Area.

Badge codes applicable to CIL-OF consist of three lines of code:

B2.2.1 **Perimeter, Laboratory Administration, Examination area Access:** This first line of badge codes consists of three numerals. Access is as follows:

Perimeter Entry into CIL-OF (First Numeral): The first numeral in this line of access code designates the exterior doors in which a person is permitted to enter and exit the CIL-OF. Levels are as follows:

0=Monitored Entry, Sign-in, and Subsequent Escort.
1=South Door (Monday-Friday 0630-1800).
2=South and North Doors (Monday-Friday 0630-1800).
3= All Doors (24 hours/day, 7 days/week).

Level 0 designates DPAA and non-DPAA visitors to CIL-OF who do not have access privileges. As such, it is displayed on all spare badges designated for visitors (see below) and DPAA badges from other DPAA sections.

Entry is through the South Main Entry Door and sign-in and escort is subsequently required while in the CIL-OF. Personnel with Level 0 are escorted by CIL Staff having Levels 1, 2 or 3 to CIL-OF. Further instructions for signing-in and escorting visitors are detailed below.

Level 1 is typically granted to non-CIL DPAA personnel having official business in CIL-OF and who have completed the requisite safety and security training for the access required and duties performed. Personnel typically requiring Level 1 access include, but are not limited to:

- Command Group.
- DPAA section chiefs (R&A, Operations, Resource Management, etc).
- Select persons from the other DPAA sections.
- Other persons with authorized, frequent (at least 3-5 time per week), and routine business in CIL-OF.

Level 2 is usually granted to competency certified CIL personnel who do not require full time or after-

hours access to CIL-OF (e.g., interns and volunteers). Non-CIL personnel (e.g., consultants, visiting scientists) may be granted Level 2 when approved by the CIL-OF Laboratory Director. These personnel are usually competency certified.

Level 3 is granted to competency certified CIL personnel who require full time access to CIL-OF (e.g., analysts, select technical and support personnel, Evidence Coordinator, Quality Assurance, Laboratory Administration).

PINs for alarm activation and deactivation (described below) are only given to select personnel holding Level 3 access and who are required to enter the alarmed area after hours.

Administration/Records Access (Second Numeral): The second numeral in the access code designates access to Laboratory Administration. Levels are as follows:

0=Escorted Access Only.
1=East Door (Monday to Friday 0630-1800).
2= East and West Doors (Monday to Friday 0630-1800).
3= East and West Doors and Records Room (24 hours/day, 7 days/week).

Personnel with Level 0 are escorted by individuals having Laboratory Administration access Levels 1, 2 or 3. Escorts ensure personnel swipe their badge upon entry into Laboratory Administration.

Level 1 is granted to CIL personnel needing access to the Laboratory Administration outer area during duty hours only and applies to select interns/volunteers and staff who may be performing prolonged special work or projects for Laboratory Administration (e.g., reception, collation of case packets) not needing further access to the Records Room.

Level 2 is granted to CIL personnel needing access to the Laboratory Administration during duty hours only. Level 2 also applies to select interns and volunteers, J4 personnel, and staff who may be performing prolonged special work or projects for Laboratory Administration that involve frequent access (e.g., case research, 100% case file inventory).

Level 3 is granted to Laboratory Administration, Laboratory Management, and other personnel designated by the CIL-OF Laboratory Director who need full time unescorted access to the Records Room.

Entry into CIL-OF Examination areas (Third Numeral): The third numeral in the access code designates the level of access into CIL-OF examination areas where evidence is present. The levels of access are as follows:

0=Escorted Access Only.
1=Not used.
2=Examination areas (24 hours/day, 7 days/week).
3=Analytical and Evidence Storage Areas (24 hours/day, 7 days/week).

Personnel needing escort into CIL-OF examination areas must have a **definite need** (i.e., official business) to enter. Such personnel are escorted or monitored by individuals having Levels 2 or 3 into the examination areas.

Personnel who may warrant escorted access into examination areas include, but are not limited to:

- Contractors.
- Facilities maintenance personnel.
- Law enforcement officials, customers, and other persons involved in CIL case work.
- Health and safety personnel.
- Offutt AFB Public Affairs Office personnel.*
- Select interns and volunteers.
- Select visiting scientists.
- Security personnel.
- Journalists and film crews.*
- Select family members, veteran's organizations, VIPs, etc. (see below).*

*Must obtain CIL-OF Laboratory Director's or his representative's permission prior to entering the examination areas.

Personnel assigned to CIL-OF that have completed Modules 1 & 4 competency training, or other appropriate training, and with business in the examination areas may be monitored while there. Such personnel include, but are not limited to:

- Janitors (see below).
- IT service providers and other embedded personnel.
- Facilities maintenance personnel.

CIL Staff granted Level 2 access to examination areas include, but are not limited to:

- Scientific Staff.
- Quality Assurance.
- Support Coordinator.
- Select interns and volunteers.
- Select technical and support personnel.

Non-CIL individuals granted Level 2 access to the examination areas includes CIL external consultants and select visiting scientists (as appropriate).

CIL Staff granted Level 3 access to evidence storage areas and offices include Evidence Coordinators and Alternate Evidence Coordinators

B2.2.2 **Entry into the Office/Cubicle Area:** This line of badge codes is not needed for CIL-HQ and CIL-PH given their office layouts and lack of embedded personnel. There is only one numeral in this line of badge codes. Entry into the secure CIL-OF Office/Cubicle Area is as follows:

0=Escorted Access Only.
1=All doors (Monday to Friday 0630-1800).
2=All doors (24 hours/day, 7 days/week).

Personnel with Level 0 are escorted by individuals having Levels 1 or 2. Escorts ensure personnel swipe their badge (if applicable) upon entry into the secure Office/Cubicle Area.

Level 1 is granted to CIL personnel needing access to the secure Office/Cubicle Area during duty hours only (e.g., Laboratory Administration, embedded IT personnel). Level 1 also applies to select interns/volunteers and staff who may be performing prolonged special work or projects that involve frequent access to this area.

Level 2 is granted to CIL personnel, and other personnel designated by the CIL-OF Laboratory Director, who need full time unescorted access to the secure Office/Cubicle Area.

B2.2.3 **IT Operational Area**: CIL-OF has a contingent of embedded IT personnel who operate in a secure area containing a help desk, office, storage room and a server room. This line of code consists of two numerals. Access is as follows:

IT Administrative Areas: Administrative areas consist of the help desk area and adjacent offices.

Help Desk & Office (First Numeral): Access is tailored to support the daily administrative activities of embedded IT personnel and CIL-OF personnel seeking IT services. Access is as follows:

0=Escorted Access Only.
1=Help Desk Only (Monday to Friday 0630-1800).
2=Offices and Help Desk (24 hours/day, 7 days/week).

Personnel with Level 0 are escorted by embedded IT individuals having Levels 1 or 2. Escorts ensure personnel swipe their badge (if applicable) upon entry into the IT Administrative Areas.

Level 1 is granted to CIL personnel needing access to the Help Desk during duty hours. Level 1 also applies to select interns/volunteers and staff who may need Help Desk Services.

Level 2 is granted to embedded IT personnel, CIL Laboratory Management, and other personnel designated by the CIL-OF Laboratory Director, who need full time unescorted access into this area.

CIL-OF Server Room (Second Numeral): This is a secure area containing the CIL-OF servers and back-up servers for the DPAA. Access to the Server Room is controlled by the IT with facility oversight by the CIL-OF Laboratory Director. CIL Laboratory Management access to the server room is limited to emergency access involving safety and security issues. Access is as follows:

0=Escorted Access Only.
1=Limited Access (Monday to Friday 0630-1800).
2=Full Access (24 hours/day, 7 days/week).

Personnel with Level 0 are escorted by embedded IT individuals or CIL Laboratory Management having Levels 1 or 2. Escorts ensure personnel swipe their badge (if applicable) upon entry into the Server Room.

Level 1 is granted to embedded IT personnel (see below) needing access to the Server Room during duty hours. Level 1 also applies to select interns/volunteers and staff who may performing special projects or work for the IT. In such cases for non-IT personnel this Level is approved by the CIL-OF Laboratory Director in conjunction with IT leadership.

Level 2 is granted to embedded IT personnel, CIL Laboratory Management, and other personnel designated by the CIL-OF Laboratory Director in conjunction with IT leadership, who need full time unescorted access into the Server Room.

B2.3 **Embedded Personnel:** Embedded personnel from the DPAA IT Section are assigned to the CIL. The command and control of embedded personnel is discussed in DPAA Laboratory Manual, SOP 1.1 (CIL Work Environment). Given the nature of the work environment associated with embedded personnel, these individuals may be monitored rather than escorted when their badge codes indicate the latter. In such instances the guidance found in the body of this SOP for monitoring janitors applies.

B2.4 **Janitors:** Janitor support for CIL-OF largely follows the same procedures as CIL-HQ with the following considerations:

- Janitors must enter CIL-OF from the Main Entry Door (Door 6-01A) by contacting the appropriate staff member.
- Janitors are required to sign in and out of CIL-OF at the start and end of each business day, respectively, using the procedures for CIL-HQ.
- Janitors are issued a spare badge.
- Janitors exit only through Door 6-01A. Use of other exits at any time is restricted to official or emergency use only.

B2.5 **CIL-OF Visitor Control**: The following procedures apply to visitors in CIL-OF **(SA5.3.4.1a, SF5.3.4F-19a, SF5.3.4F-19b)**:

B2.5.1 **Entry:** All visitors who enter the CIL-OF beyond the Lobby are escorted. **Only CIL personnel may escort visitors in CIL-OF.** Visitors enter CIL-OF from the Main Entry Door (Door 6-01A) by contacting the appropriate staff member (i.e., a person with the appropriate access), if not already with their escort.

B2.5.2 **Escort:** The CIL-OF consists of public areas and CIL areas**.** All visitors initially enter through the Main Entry Door (Door 6-10A) into the Public Area. During normal duty hours the doors are unlocked. If locked, visitors can contact CIL staff via an intercom located adjacent to the Main Entry Door.

The public area consists of the Lobby, South Conference Room, and the North-South Corridor south of the double doors. If visitors remain in the public area they must sign in at Reception. Badging is not necessary at this point.

However, when entering the CIL beyond the public area, visitors must be badged. Escorts are responsible for their visitor's sign-in and badging, using the below guidance, and their subsequent conduct and safety. In such instances, the escort immediately proceeds with their visitor(s) to the reception station just inside the Main Entry Door and, using the below procedures, signs them into the visitors log, and continues to escort them for the duration of the visit.

Visitors must remain with their escort at all times when in CIL-OF. Escorts accompanying a visitor into an examination area stay in close proximity to, and closely observe, the visitor at all times.

VIP's are handled accordingly.

If a visitor is handed off from one escort to another, the escort recorded in the CIL-OF Visitor Log is responsible for the visitor until the Visitor Log is amended to reflect the new escort.

The CIL-OF Laboratory Director may waive escort requirements and/or safety/security training for select personnel on a case-by-case basis under the same conditions and using the same provisions detailed for CIL-HQ.

B2.5.3 **Badging:** Numbered spare badges are available from Reception located directly inside the Main Entry Door adjacent to Laboratory Administration.

B2.5.4 **Visitor Log & Sign-in:** Visitors are required to sign in and out of CIL-OF at the start and end of each visit, respectively, in the Visitor Log maintained by the Main Entry Door. Short absences from CIL-OF (e.g., lunch), where the visitor intends to return, do not require sign-out upon departure (and dropping of spare badge) and sign-in upon return. The escort should determine the appropriate length of time. The following are instructions for completing the Visitor Log:

- Write legibly (printing is preferred).
- A minimum of last names are used in fields where names are required.
- Enter badge number, if appropriate.
- Ensure accurate times are entered.
- When the visitor is issued a spare badge, they surrender a personal form of ID (e.g., driver's license, CAC card). The ID is safeguarded and returned upon surrendering the spare badge at sign-out.

B2.5.5 **Visitor Access to CIL-OF Examination areas:** The following procedures apply:

- **Visitor access to examination areas should be minimized.**
- Visitor access should only be allowed for those with a legitimate need as determined by the CIL-OF Laboratory Director or, in his absence, an appropriate member of the CIL-OF Staff.
- Activity within the examination areas is concluded in the shortest time practical. Escorts ensure visitors adhere to all visitor rules, as appropriate.
- Visitors to examination areas are required to provide a DNA sample. Guidance is found in DPAA Laboratory Manual, SOP 3.7 (Sampling Trace Evidence for DNA).

B2.5.6 **Exit & Sign-Out:** CIL personnel escort visitors out of CIL-OF using the Main Entry Door.

Use of other exits at any time is restricted to emergency use only. Leave spare badges at the exit upon sign-out, return the visitors' personal ID, and annotate the Visitor Log with the departure time(s).

B2.5.7 **Tours:** Tour participants are signed in and treated as visitors using the above procedures.

Two types of tours are conducted at CIL-OF; tours where participants are restricted to the Public Area, and tours that extend further into the CIL Area. Tours are conducted as follows:

B2.5.8 **Public Area Tours:**

- Tour visitors assemble in the Lobby after signing in, with the tour escort assuming responsibility for the group.
- After assembling, tour visitors are briefed on the limits of their access.
- Tour visitors are allowed to view activities in Room 108A through the south and east glass partitions.
- Depending on the size of the group or the nature of the visitors, tour visitors may be brought to the Family Viewing Room (Room 105) or Room 106 (the South Conference Room), for additional briefings and information.

B2.5.9 **Extended CIL Tours:**

- The tour escort meets tour visitors in the Lobby and ensures that all participants are signed in and badged.
- The tour escort briefs tour visitors on the limits of their access while in the CIL-OF.
- Tours typically are limited to the North-South Corridor although the North Conference Room (Room 128) may be used for additional briefings.
- The tour escort serves as the primary escort for the tour during its duration in the CIL Area.
- Upon completion of the tour, the escort ensures that all participants are signed out and badges are returned.
- All tours egress the CIL-OF through the Main Entry Door.

B2.6 **CIL-OF Alarm Procedures:** Unless CIL-OF is occupied by a member of the CIL Staff, CIL-OF must be protected by the alarm system. Occupation is defined as a situation where a CIL Staff member is able to detect obvious unauthorized intrusions into CIL-OF. As such, the CIL is occupied when:

- At least one CIL Staff member is physically located in CIL-OF or,
- Located in the immediate area surrounding CIL-OF for a **brief** amount of time (e.g., outside for 15 minutes and being able to observe the entry door).

Such instances are left to the discretion and good judgment of the CIL Staff member. Further, in such instances the CIL Staff member does not leave non-CIL persons in CIL-OF.

B2.6.1 **Opening Procedures:** The first CIL Staff member having alarm system privileges and needing access to the alarmed areas on any duty day normally deactivates the alarm system for the entire duty day. However, if the staff member is not occupying CIL-OF (as defined above) prior to other staff members' occupation (in other words the staff member is the lone occupant of CIL-OF), the alarm is normally reactivated upon departure using the below procedures. This provision also applies to non-duty hours, weekends, holidays, etc. where lone access may be required.

To deactivate the alarm (i.e., to open the CIL):

- Enter the alarmed area through Door 8-08B (in the Locker Room Vestibule) or Door 8-16A (the evidence transfer doors) if for a chain of custody transaction. The alarm keypad is located on the inside (analysis area side) of the door
- Deactivate the alarm system as follows:
  - The alarm keypad is beeping. Enter your four (4) digit PIN. PIN must be entered within 40 seconds of opening the door to the alarmed area **(SA5.3.4.1b)**.
  - Press "CMD".

Once the alarm is deactivated:

- Complete the CIL-OF Security Alarm Activation/Deactivation checklist located adjacent to the alarm controls.
- Position all alarm indicator signs to "ALARM OFF". There are a total of four (4) signs located on or near the exterior of the doors leading into Room 108:
  - Locker Room Hallway (Door 8-08B).
  - Evidence Receiving Door (Door 8-16A).
  - Family Viewing Room (Door 8-03B) (located on the interior side of the door due to limited access through this door).
  - Door leading from the North-South Corridor into Room 108A (Door 8-03C).

Note: Enter the alarmed area to deactivate the alarm only through the doors having adjacent security

panels. Otherwise, you do not have enough time to reach the panel and input your PIN.

B2.6.2 **What to do if the IDS is Triggered:** When the alarm is triggered, the Offutt Security Police (SP) receive a silent alarm indicating a potential intrusion into the alarmed area of CIL-OF.

When the alarm system is triggered after hours, the following series of events take place.

- The SP calls CIL personnel listed on an after-hours call roster and have them report to CIL-OF.
- The SP arrives at CIL-OF and asks that individuals produce CAC cards for personal identification. The individuals at CIL-OF are matched to an access roster held by the Security Police. Unauthorized individuals are detained. Authorized individuals are held at CIL-OF until the CIL Staff member on the after-hours call roster arrives.
- Once the CIL Staff member on the after-hours call roster arrives at CIL-OF, he/she re-sets the alarm and advises the security personnel that they can release detained individuals who are authorized access to CIL-OF.
- If triggering the alarm was accidental or inadvertent, at the earliest opportunity the CIL-OF Security Coordinator and/or Laboratory Management undertakes a cause analysis in order to prevent future recurrences of such incidents.

B2.6.3 **Closing Procedures**: When departing work for the day:

- Cubicles and offices are secured. Computers and other electrical equipment should be turned off or put in the shut-down or logged-off mode.
- Turn off appliances such as coffee makers.
- Doors to secure areas must be closed and secure.
- Lights in the main North-South Corridor should remain on.
- When the last person having alarm privileges leaves CIL-OF, verify that all other persons have departed the examination area before activating the alarm. Additionally, check secure areas within the examination area for:
    - Doors controlled by card readers are latched closed, as appropriate.
    - Equipment turned off, as appropriate.
    - Any other safety situations that may need addressed.
    - Lights illuminating the south façade are turned off.
- The alarm is then activated (**SA5.3.4.1e**). Specifically:
    - Complete the CIL-OF Security Alarm Activation/Deactivation checklist located adjacent to the alarm controls.
    - Turn all four (4) signs (see above) to read "ALARM ON."
    - Activate the alarm system as follows:
        - Select "CMD".
        - Select "Arm".
    - Exit the examination area through the door closest to the panel within 45 seconds of activating the alarm.

B2.6.4 **Failure of the Alarm System:** The procedures are the same as for CIL-HQ.

B2.7 **Individual Security Measures**: These procedures are largely the same as for CIL-HQ, as appropriate. See the provisions listed in the body of this SOP.

B2.8 **CIL-OF Security During Chain of Custody Transfers**: The double doors on the north wall of Room 108C (Door 8-16A) are used to access the evidence transfer area during chain of custody transfers. These doors may also be used to load and unload large pieces of furniture and equipment.

In addition to the above procedures, the following provisions apply during transfer of custody transactions:

- CIL Staff and other DPAA staff having the appropriate badges, must swipe in and out upon passage through Door 8-16A.
- Non-CIL personnel, such as military and/or mortuary personnel, must initially enter CIL-OF through the Main Entry Door (Door 6-01A), sign in, and be issued a spare badge.
- All non-CIL personnel entering CIL-OF accompanying any evidence must be escorted at all times. After initial sign-in, non-CIL personnel are allowed to enter and leave CIL-OF through Door 8-16A only during the delivery and turnover activity. Upon completion of the activity all personnel must return their spare badges and sign out using the above procedures. Individuals participating in transfers may obtain access prior to the start of the activity.

B2.9 **Security of Case Files, Field Notes & Analytical Notes:** All case files, field notebooks, and analytical notes are secured and protected from unauthorized access and disclosure. At the end of each business day, these items must be secured in a locked cabinet or drawer. Given the open area nature of CIL-OF, case materials should not be left on desks

or other surfaces in plain view. Failure to secure case file materials may result in disciplinary action.

Whenever members of the staff anticipate a prolonged absence from CIL-OF (e.g., annual leave, compensatory time, TDY), case files, analytical notes, and other records should be returned to the CIL-OF Records Room.

B2.10 **Entering the Secure Evidence Room:** Procedures for entering the Secure Evidence Storage Room (Room 116) are found in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

B3.0 SURETY: Quality Assurance, Support Coordinator, and Laboratory Managers periodically perform formal and informal security checks and inspections. The Lead Quality Coordinator or his representative audits the provisions of this Annex at least annually in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

Completed security records for CIL-OF (e.g., Visitor Logs, Alarm Activation/Deactivation Records) are maintained by Quality Assurance at CIL-OF.

B4.0 SAFETY: Safety procedures are largely the same as for CIL-HQ, above. See the provisions listed in the body of this SOP.

Annex C (Physical Security of CIL-WP): To be Written

SOP 1.3: EVIDENCE MANAGEMENT & SECURITY

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 22 May 2017
Citation: DPAA Laboratory Manual, SOP 1.3

CONTENTS

0.0 PRINCIPLE, SPIRIT & INTENT: *Evidence is protected from loss, cross transfer, contamination and/or deleterious change at all times.*

1.0 PURPOSE & SCOPE: This SOP pertains to all evidence recovered by, processed at, handled and analyzed by, and/or stored at the CIL* in Building 4077, JBPHH (i.e., CIL-HQ), the CIL in Building 301 at Offutt AFB, Nebraska (i.e., CIL-OF), and the CIL in Building 17, Area B, at Wright Patterson AFB (i.e., CIL-WP) **(SA5.8.1.1a)**.

*Note: The term "CIL" used in this SOP is a collective term referring to CIL facilities in CIL-HQ, CIL-OF, and CIL-WP. Use of the term CIL, rather than CIL-HQ, CIL-OF, and/or CIL-WP, indicates that the stated SOP provision(s) applies to facilities at all locations.

This SOP describes procedures to transport, secure, conserve, and store evidence so that its loss, cross-transfer, contamination, decomposition, and other deleterious changes are minimized. In addition, this SOP describes procedures for completing and processing chain of custody documents to ensure that evidence can be accounted for and that the CIL has a comprehensive documented history of each evidence transfer. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met **(A5.8.1, SA5.8.1.1, SA5.8.2.1)**.

Additionally, all of the general provisions in this SOP apply to CIL-HQ, CIL-OF, and CIL-WP unless otherwise stated. Specific security guidance for CIL-WP is found in Annex D (Special Instructions for CIL-WP) of this SOP, and those for CIL-OF are found in Annex E (Special Instructions for CIL-OF).

2.0 LOCATION: Evidence is handled by the CIL Staff in the field, usually at recovery scenes, and as

a part of Forensic Reviews. Evidence is then transported to the CIL. Evidence may also be received from external agencies and individuals, including unilateral turnovers by foreign governments, and can thus pass into the custody of the CIL by alternate means.

Evidence handling/storage areas in CIL-HQ include multiple spaces in the Examination Area of the North Wing of Building 4077 which also contains the compact shelving used for most evidence storage **(A5.8.4)**.

Evidence handling/storage areas in CIL-OF are contained in the secured Analytical Area (Room 108) and include **(A5.8.4)**.

- The Identification Laboratory, which contains the Consult Case Room (Room 109).
- Material Evidence Laboratory (Room 111).
- Imaging and X-ray studio (Room 112).
- SEM Room (Room 113) where evidence is analyzed but is not stored.
- Evidence Storage (Room 116), which contains the compact shelving used for most evidence storage.
- Wet Laboratory (Room 117), which contains the DNA Sampling Laboratory (Room 118) and Evidence Conservation Laboratory (Room 119).
- Photo studio (Room 120) where evidence is analyzed but is not stored.
- The walk-in refrigerator (Room 122) (storage only).

Evidence handling/storage areas in CIL-WP include:

- Evidence Storage (Room 206) which contains shelving units for evidence storage.
- Photo studio (Room 106) where evidence is analyzed and photographed but is not stored.
- Material Evidence Laboratory/Life Sciences Equipment Laboratory (Room 125).
- Macroscopy Room (Room 106) where evidence is analyzed but not stored.

Permanent storage of evidence occurs at CIL-HQ, CIL-WP, and CIL-OF.

Additionally, evidence is routinely transferred, using chain of custody procedures, to outside agencies for specialized tests.

3.0 DEFINITIONS & CAVEATS: The following definitions and caveats apply:

3.1 **Evidence:** Evidence is a collective term referring to all biological and artifactual materials falling under the responsibility of the CIL that contribute, or will potentially contribute, to case resolution. Non-biological items (material evidence) or biological evidence (remains) in the field are considered potential evidence when they can be inferred to have temporal, spatial, and/or contextual correlations (i.e. probative value) to a case undergoing testing.

The term "evidence" refers only to materials that are accessioned into the CIL for the purpose of forensic testing. Materials believed to have no probative value to a case undergoing testing are not evidence. Therefore, these materials are exempt from the other provisions of this SOP. Examples of these items include, but are not limited to:

- ID media and/or personal effects for non-casualties unrelated to loss incidents as approved by the Science Director. If kept in CIL testing areas, such items are not stored with evidence and are stored in containers labeled "not evidence" or similar nomenclature. A binder is kept with the items. The binder contains records of these items, including any supporting documentation, photographs of items, custody documents, etc.
- Soils and adherent materials dislodged from evidentiary materials during cleaning and/or conservation. Such materials may be disposed of at the analyst's discretion.
- Exemplars and research materials (see below).

3.2 **Remains:** A collective term for all human or possibly human biological tissue. Remains dealt with by the CIL are typically skeletal and/or dental but may also include soft tissue, hair, blood, bloodstains, and toe/fingernails. The term remains is used interchangeably with biological evidence.

3.3 **Material Evidence:** Material evidence comprises all artifacts that can potentially contribute to case resolution, for example aircraft wreckage with identification markings or serial numbers, personal effects, or military equipment.

3.4 **Exemplars & Reference/Research Materials:** Forensic testing in the CIL frequently requires the comparison of unknown case specimens with known reference/research materials (collectively known as exemplars). Such items include comparative specimens of human and non-human remains and artifacts which are collected and maintained to support case work and research projects.

Exemplars are not evidence as defined above and are exempt from the protocols for evidence management listed in this SOP. Additional information on exemplars can be found in DPAA

Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability).

Exemplars may be moved about the CIL area as needed during tests, but are not stored in the same containers as evidence **(A5.6.3.4)**.

Exemplars are stored for the long term in the areas within the CIL designated for that purpose. Evidence is not stored in these areas. Bags, boxes, or other containers containing exemplars are clearly labeled so as to avoid confusion with containers holding evidence. Individual exemplar specimens are clearly labeled (e.g., "study collection," "comparative specimen" or similar nomenclature) **(A5.6.3.4)**.

3.5 **Custody:** The physical possession or control of evidence. In general, evidence is considered to be under a person's custody if it is:

- In the person's physical possession, usually after signing a prepared chain of custody form.
- In view of the person after taking possession.
- Secured by the person so that no one can tamper with it.
- Secured by the person in an area restricted to authorized personnel.

3.6 **Accessioning:** The process of receiving custody of all potential evidence at the CIL and conducting the necessary procedures to incorporate it into the evidence and casework management systems.

3.7 **Evidence Container:** A container, typically a sealable plastic bag, which is used to hold evidence and is sealed with evidence tape. Smaller bags can be used to package items of evidence within an evidence container; these bags need not be sealed, but must all be labeled in accordance with this SOP.

3.8 **Storage Container:** A container, usually an acid-free box, used to store evidence containers within the evidence storage areas.

3.9 **Transport Container:** A durable, usually hard-sided securable container (i.e., Pelican™ case) used to transport evidence. One or more evidence containers may be packaged in a transport container.

3.10 **Convenience Container:** Evidence which is properly packaged, sealed and labeled (see below) may be placed in unsealed and unmarked containers such as boxes or bags for the purpose of grouping items of evidence or for the convenience of carrying the evidence. In other words, convenience containers do not have to meet the requirements of packaging, sealing and labeling as long as evidence security requirements are otherwise met.

3.11 **Evidence Coordinators:** The duties of the Lead Evidence Coordinator, Evidence Coordinators and alternates are discussed in the DPAA Laboratory Manual, SOP 1.1 (CIL Work Environment).

In the absence of the permanently assigned Evidence Coordinators and alternates, an additional alternate can be designated by the most senior member of Laboratory Management present for duty. Assigning Evidence Coordinators beyond those normally designated is expected to be a rare event, occurring only in the most exceptional circumstances. Access is granted and withdrawn as described below.

3.12 **Access & Access Devices:** Access and access devices are defined and discussed in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security). Provisions from SOP 1.2 are in full effect unless excepted by the Laboratory Director or specific provisions of this SOP.

The Lead Quality Manager is responsible for ensuring the evidence access using the magnetic badge is activated and deactivated only for the time needed. Evidence access is granted and withdrawn immediately upon appointment and termination of evidence duties, respectively.

3.13 **"Box" Verification:** A type of surety measure in which storage containers of evidence (the "box") pertaining to an accession are determined to be present or absent.

3.14 **Inventory:** A type of surety measure in which evidence containers of evidence pertaining to an accession are determined to be present or absent.

3.15 **Survey:** A type of surety measure in which items of evidence in evidence containers pertaining to an accession are determined to be present or absent.

4.0 EVIDENCE HANDLING PROCEDURES: Evidence must be preserved and accounted for at all times. This section presents handling, tracking, security and management procedures, and considerations that maintain the integrity of evidence. This section is presented in a typical chronological sequence of events, from evidence recovery, to storage and testing in the CIL, to its final disposition **(A5.3.3)**.

4.1 **Field & Recovery Scene:** Evidence is often first encountered in a field setting. In general, evidence collected from the field by CIL personnel

is protected from loss, cross transfer, contamination and/or deleterious change during field operations and subsequent transportation to an evidence facility.

Where appropriate, further processing to preserve, evaluate, document, or render evidence safe is accomplished prior to final packaging. Evidence collected from the field is appropriately identified, packaged and entered into an evidence control system as soon as practical **(SA5.8.1.1b & d)**.

The Scientific Recovery Expert (SRE) is responsible for the integrity of all potential evidence recovered in the field.

4.1.1 **Pre-Deployment Planning:** SREs should ensure that sufficient evidence management materials are procured prior to deployment so as to meet all reasonably foreseeable contingencies during the mission. These items include but are not limited to:

- Plastic bags (various sizes).
- Evidence tape (blue).
- Water-resistant interior bag labels.
- Indelible markers.
- Desiccant bags.
- Numbered seals/combination locks.
- Chain of custody forms.
- Transport containers (in coordination with Recovery/Investigation Team members).

4.1.2 **Restrictions on Returning Evidence:** Certain items of potential evidence may not be returnable due to safety considerations (e.g., weapons and ordnance), host government restrictions, operational controls (e.g., Life-Support Investigator requirements), U.S. laws and regulations, or customs prohibitions. In such situations the potential evidence should be documented in the SRE's field notebook and photographed (when possible).

4.1.3 **Field Conservation of Evidence:** Evidence must be protected from contamination, decomposition, and other deleterious change. Reasonable efforts should be made to conserve evidence in the field prior to transport to the CIL. If uncertain how to conserve evidence in the field, the SRE should seek guidance from the CIL **(A5.8.4)**.

4.1.3.1 **Conservation Methods:** Evidence should be dried if possible. If necessary desiccant bags may be used to reduce moisture until the evidence arrives at the CIL. Care should be taken that conservation efforts do not contaminate or further degrade any evidence. For example, small fragments of cloth, paper, flight suit fragments, or other flat materials may be unfolded and placed between two flat sheets of cardboard or other stiff, flat material to dry. Exercise care to ensure that evidence is not contaminated by colors or staining from the supporting materials. Return evidence to the CIL in the supporting materials.

4.1.3.2 **Waterlogged Materials:** There are circumstances where wet evidence should be returned to the CIL in their saturated state. These circumstances are situational and must be assessed on a case-by-case basis. Some waterlogged materials may have to remain in a liquid environment prior to shipping so that they can be conserved at the CIL. These materials should be stored in leak-proof containers in the same liquid medium (water, saltwater, etc.) from which they were recovered. The evidence container should be sealed.

4.1.3.3 **Maintain Security:** In the course of cleaning and drying, the evidence must be secured or kept under surveillance by adequately instructed DPAA personnel. Secured means that the room/container cannot be accessed in the absence of DPAA personnel.

4.2 **Evidence Packaging, Labeling & Sealing:** The SRE ensures items of potential evidence are packaged, labeled, and sealed to ensure that items cannot be confused physically or when referred to in records or other documents **(A5.8.2)**.

4.2.1 **Packaging:** The intent of packaging is to preserve and secure evidence during transport to the CIL. At the first reasonable opportunity evidence not under examination is placed in evidence containers. Remains and material evidence are not placed within the same primary evidence container, but may be placed within the same convenience container. The exceptions are dental prosthetics and appliances, which should be stored with remains. Loose dental remains are bagged separately from the osseous remains and may be transported in the same convenience container.

Material evidence that cannot be readily separated from remains in the field should also be stored with the remains (e.g., bones of the foot inside of a boot). Separately bagged remains and material evidence is generally stored within the same transport container. In exceptional circumstances (e.g., oversized or irregularly shaped items) special containers may have to be built.

4.2.2 **Labeling:** Evidence is identified in such a manner as to ensure that it is uniquely identifiable and traceable to the unique case number. Normally, evidence items are not directly marked.

Instead, the proximal container and internal labels are marked **(A5.8.2)**. Exceptions include evidence related to consult and CHR cases.

Additionally all evidence containers containing evidence stored at the CIL are labeled with the appropriate CIL number. Labeling evidence containers from the field is done in a manner that allows the information on them to survive transport to the CIL in legible condition. Relevant information that is written on the outside of the evidence container should be reproduced on labels inserted into the container. Additional information may be added to either or both external and internal evidence container labels as deemed appropriate. All evidence containers should be labeled with the following information, when available:

- Incident and site number, (e.g., REFNO, MACR).
- Unique mission identifier (Mission number and team, i.e., 02-5L RT-4).
- Excavation unit designation.
- Date.
- Depth or stratagraphic unit from which obtained (if applicable).
- Detailed description of the contents (e.g., possible human remains, one U.S. nickel).
- SRE's initials or name.
- Sequential bag number (e.g., Bag 1 of 3, Bag 2 of 3).
- Other appropriate provenience data.

Some evidence (e.g., remains from exhumations) are not typically bagged and labeled as explained above since these cases arrive in a sealed container, are accessioned directly into the CIL, and immediately undergo preliminary assessment or analysis.

4.2.2.1 **Seal:** The intent of sealing evidence is to prevent loss, cross transfer or contamination while ensuring that attempted entry and unauthorized access can be detected should it occur. Evidence containers should be sealed (usually with evidence tape), and the seal validated by initialing and dating both sides of the evidence tape with indelible marker, ensuring that the writing overlaps both the tape and the container. Packaged evidence which does not bear the initials of the person sealing the evidence container, and the date, is not considered to be properly sealed **(SA5.8.1.1b)**.

4.2.2.2 **Maintain Security:** All evidence not in the process of examination is maintained in a secured, limited-access storage area. The intent of securing evidence is to minimize the possibility of loss or compromise. In base-camp situations, a locked container serves as the primary secure storage device. Containers should be kept in the most secure area of the camp (e.g., in a padlocked tent) **(SA5.8.1.1b)**.

4.3 **Evidence Transport:** Packaging and chain of custody documentation are intended to maintain and document the integrity of evidence during transport.

4.3.1 **Packaging for Transport:** In order to protect evidence during transport, suitable packing material should be used. Transport containers are secured with numbered seals, combination locks, or other secure devices. A container should have sufficient locks or seals to ensure that evidence cannot be accessed without removing them. For example, most pelican cases require two locks/seals.

If seals are used, they should be looped twice through the container before locking the head of the seal. This reduces the overall free length of the seal, thus minimizing the ability to pry open the lid of the transfer case. Seal numbers are noted on the chain of custody form, and a copy of the form should be placed in a sealed ziplock bag affixed to the outside of the transport container **(A5.8.2, SA5.8.1.1b)**.

4.3.2 **Preparation of Chain of Custody Documentation:** The CIL is able to demonstrate that the evidence examined and reported on was that submitted to the CIL. A "chain of custody" record is maintained and reflects all transfers between individuals to the fullest extent possible. The chain of custody form should be initiated prior to the transport of evidence **(SA5.8.1.1d)**.

Chain of custody documentation is prepared in accordance with Annex A (Completion of Chain of Custody Documents) of this SOP.

4.3.3 **Maintain Security:** A locked transport container is the appropriate means of securing evidence while awaiting transport at base camps, hotels, airports, etc., as well as during transport. Evidence is the direct responsibility of the person initiating the chain of custody, or the last person who signed for it.

4.4 **Special Provisions for Evidence Recovered in S.R.V:** Remains recovered in the S.R.V. must be turned over to the VNOSMP and undergo a Joint Forensic Review (JFR) before being repatriated and returned to the U.S.

Evidence sent for review during a JFR should follow the below guidelines **(SA5.8.1.1)**:

1) Evidence containers should be sealed individually and listed individually on the chain-of-custody documents. Evidence containers should not be placed within a sealed convenience container.

2) To avoid accountability problems and confusion at the JFR, SREs should ship remains from each REFNO in a separate transport container (i.e., one REFNO per Pelican case).

3) The use of numbered seals should be avoided. Transport containers should be secured using combination locks, set to the current standard CIL combination.

4) A minimum of four signed copies of the chain-of-custody documents should accompany the evidence to the JFR, sealed in a ziploc bag or document protector on the outside of the transport container.

If material evidence is recovered in conjunction with remains, both the remains and material evidence are documented on the same chain of custody form and turned over to the VNOSMP. The exception is life-support evidence, a subset of material evidence, which is returned to the CIL independent of the JFR.

If only material evidence is recovered, it is transported directly to the CIL and does not undergo the JFR. Participants in JFRs should consult DPAA Laboratory Manual, SOP 2.2 (Forensic Reviews) regarding special and supplementary evidence handling procedures required during the JFR.

4.5 **Receipt of Evidence, Accessioning & Chain of Custody Processing:** Accessioning of evidence at the CIL involves the events and procedures outlined below **(SA5.8.1.1d & e)**. The majority of these procedures fall under the responsibility and supervision of the Lead Evidence Coordinator.

4.5.1 **Arrival of Evidence:** All packages that enter the DPAA containing or suspected of containing evidence should be delivered to an Evidence Coordinator. Should circumstances arise when the evidence cannot be attended to immediately (e.g., Evidence Coordinators are unavailable), it should be placed in a secured area of the CIL (e.g., Evidence Transfer Room [Room 320], or SEM Room [Room 113] in CIL-OF) until it can be accessioned.

During the accessioning process, standard procedures such as assignment of the CIL accession number through CARIS, photography and preliminary assessments are undertaken by a range of CIL Staff under the supervision of an Evidence Coordinator. Handling instructions provided with the item is followed to the fullest extent possible **(A5.8.4)**.

The CIL accession number is hand written on all evidence containers using an indelible marker. Internal labels (e.g., labeled internal plastic bags, DNA tags, sticky labels, etc.) may be used in conjunction with the external hand written CIL accession number label. An Evidence Coordinator retains full physical custody of all evidence prior to establishing a barcode in TRAIL (see below).

4.5.2 **Inspection & Documentation of Packages:** Packages that have been altered, damaged or opened prior to arrival at any CIL location should be photographed to clearly document the condition.

Additionally, a memorandum for record describing the irregularities/problems, including when an item does not conform to the description provided on the accompanying transmittal documentation, should be written and placed with the chain of custody documents, in the case file, and on the DPAA network, as appropriate **(A5.8.3)**.

4.5.3 **Initiating the Accession:** The accession number is assigned based on the next available number in the CARIS database. The new accession number is typically one number higher than what is currently shown in CARIS. The new accession number is immediately created in CARIS to ensure CIL facilities at different locations do not inadvertently assign the same accession number to different cases.

The accessioning process should not be initiated until an accession number is generated through CARIS. In the event CARIS is inoperable and evidence must be immediately accessioned into the CIL, the Evidence Coordinator accessioning the evidence must notify all Evidence Coordinators at all CIL facilities (typically via email) which accession number is assigned to the case. The same Evidence Coordinator verifies that the accession number is correctly assigned in CARIS when service is restored.

All stages of the unpacking of potential evidence are photographed concurrent with the accession initiation. An Evidence Coordinator then initiates the Internal Chain of Custody Log using instructions found in Annex B (Completing the Internal Chain of Custody Log) of this SOP, which documents the accessioning process.

4.5.4 **Documentation:** Chain of custody documentation for all evidence accessioned into the CIL is filed and secured at CIL-HQ or CIL-OF, as appropriate. This documentation includes:

- The Internal Chain of Custody Log.

- Chain of custody forms.
- Accession photos.
- Copies of supporting documentation arriving or associated with the evidence.

4.5.5 **Preliminary Assessments:** Preliminary assessments are used as a tool to aid in the management of casework, and to determine if additional conservation and/or special handling or storage of the evidence is required **(A5.8.4)**. Preliminary assessments are conducted in accordance with Annex C (Preliminary Assessment) of this SOP.

4.5.6 **Creation of a Case File:** At the time of accession, the Evidence Coordinator creates a DPAA active case file. This file contains:

- A CIL accession form.
- Copies of relevant ESR/DRI.
- Photos of the accession.
- Preliminary assessment form(s).
- Original copies of documentation accompanying the evidence.
- Any relevant case memoranda generated upon accessioning the evidence.

Other documentation is subsequently added to the case file in accordance with DPAA Laboratory Manual, SOP 1.7 (Case File Management). A network folder for the accession is also created by an Evidence Coordinator and is used to house digital copies of all relevant documentation, images and reports. The case file is forwarded to a Laboratory Manager (typically the Case Manager) for review before it is sent to Laboratory Administration.

4.5.7 **CARIS:** The Centralized Accounting Repository and Information System (CARIS) database provides a means for associating physical evidence accessions, casualties, loss incidents, sites, sources and disposition. An Evidence Coordinator creates physical evidence entries into the database during accessioning and makes appropriate database associations to casualties, sources, missions, sites, and incidents. An Evidence Coordinator also enters preliminary assessments and manages consolidation and disposition information in CARIS.

4.5.8 **TRAIL:** Internal transfers and tracking of evidence are managed using the Tracking Remains Automated Inventory Log (TRAIL) system. An Evidence Coordinator enters new accessions into the TRAIL database and creates barcode labels, which allow evidence to be tracked within the CIL.

4.5.9 **Labeling of Medico-Legal Evidence:** All accessioned evidence associated with medico-legal cases (e.g., consultation casework performed for a federal, state, or local law enforcement agency) is labeled in such a manner, if practical and permissible (by the customer agency) to minimize the potential for accidental or incidental commingling.

Evidence that cannot be readily labeled must be otherwise identified or secured in such a manner as to minimize the potential for accidental or incidental commingling **(A5.8.2)**. All other evidence (e.g., human remains of U.S. war casualties) is treated in accordance with current U.S. Department of Defense policy.

4.5.10 **Notification of Federal Agencies:** Accessioning evidence requires that other Federal Agencies be notified. The Lead Evidence Coordinator or designated Alternate informs relevant Federal agencies (e.g., the Center for Disease Control (CDC), U.S. Customs) when remains are destined to arrive on Oahu or Nebraska on military or commercial aircraft. A brief email notification is usually sufficient (e.g., skeletal remains from a WWII crash site arriving on island 2 Jan by MILAIR). If remains arrive unexpectedly, after-the-fact notification is required.

4.6 **Storage & Management of Evidence:** The Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) manages evidence for which the CIL has accepted custody and serves as a first line quality inspector for compliance with this SOP. Evidence not immediately assigned to an analyst should be secured within an approved evidence storage area **(A5.8.4)**. The majority of the procedures in this section fall under the responsibility and supervision of the Lead Evidence Coordinator.

4.6.1 **Evidence Security:** The condition and integrity of secured evidence items, or portions concerned, are protected at all times. The Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) has primary control of the evidence, with the Alternate Evidence Coordinator and the Science Director (Laboratory Director at CIL-OF), in that order, functioning as alternates, when necessary.

When not undergoing active testing, most evidence at CIL-HQ and CIL-OF is stored in secured evidence storage rooms. Authorized individuals access shelving in the evidence storage rooms using magnetic swipe cards. Access devices are discussed above and in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security).

When not undergoing active testing, most evidence at CIL-WP is stored in the secured evidence storage room on the second floor of Building 17. Authorized individuals access the second floor using CAC card and then enter a code in combination lock to secure the Cage Room (Room 206). The Material Evidence Laboratory/Life Sciences Equipment Laboratory is accessed by authorized individuals using CAC card.

Walk-in refrigerators at CIL-HQ and CIL-OF are utilized to store perishable evidence. The refrigerators are located within the secured evidence areas and secured by electronic or key locks. For CIL-HQ, the walk-in refrigerator (Space 339) off of Room 337 and the refrigerators in Room 326 next to the Autopsy Room (Room 327) may be used to store perishable evidence. These units are locked when evidence is stored in them.

Portable refrigerator and freezer units at CIL-HQ are used to hold perishable evidence undergoing analysis. Evidence held in these refrigerator units is checked out in TRAIL.

The compact shelving and refrigerator should never be left open when an Evidence Coordinator cannot maintain visual contact with these areas. Individuals should not enter the interior area of the compact shelving or the confines of the refrigerator unless invited to do so by an Evidence Coordinator or alternate.

4.6.2 **Evidence Tracking:** TRAIL is used to document the transfer of evidence from a storage area to an analyst. The location to which the analyst is moving the evidence is also recorded. When responsibility for evidence must be transferred between analysts, the transfer must be documented in TRAIL (**SA5.8.1.1d**).

While evidence is under the control of one analyst, this does not preclude other analysts from working on the evidence cooperatively. For example, when the peer review process starts and the peer reviewer assumes physical custody of the evidence, it is recognized from that point that the evidence is worked on by both the peer reviewer and the analyst.

TRAIL also has a general access provision, which allows Evidence Coordinators to check out evidence for routine matters such as inventory and collections maintenance. A general access notation by TRAIL only shows that the compact shelving was open, individual case numbers are not reflected. Only Evidence Coordinators, and those authorized by them, have general access to evidence, unless otherwise specified by the Science Director.

All evidence leaving the CIL is tracked using a chain of custody form. The procedures for evidence destined for external analysis (e.g., 15th Med, HPD, HMEO) are as follows:

- External analysis must be preapproved by Laboratory Management.
- Prior to transport, the chain of custody form is prepared by the analyst or an Evidence Coordinator
- The form is signed by an Evidence Coordinator thereby releasing the evidence for external analysis.
- The chain of custody form accompanies the evidence.
- All evidence is transported in a secured transport container (e.g., locked pelican case).
- The movement between the CIL and the external agency is tracked electronically by scanning the accession into TRAIL.

This procedure applies to evidence originating at CIL-HQ and CIL-OF.

4.6.3 **Evidence Conservation:** When evidence is accessioned into the CIL additional conservation requirements should be assessed. Evidence should not be put away while wet or moldy. If additional conservation is required, Laboratory Managers assign necessary personnel **(A5.8.2, SA5.8.1.1b & d)**.

4.6.4 **Evidence Storage:** Evidence Coordinators ensure that all evidence not in the process of examination is maintained in a secured, limited-access storage area to prevent theft or interference . The Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) designates an area within the compact shelving for the storage of DNA samples and related DNA evidence.

Evidence storage conditions are such as to prevent loss, deterioration and contamination and to maintain the integrity and identity of the evidence before and after examinations have been performed **(SA5.8.1.1b)**. When items have to be stored or conditioned under specified environmental conditions, these conditions are maintained, monitored and recorded, to the fullest extent possible **(A5.8.4)**.

Any evidence not in the process of examination must be placed in an evidence container to protect it from cross-transfer or contamination. Each container is stored under proper seal and labeled with the CIL number **(SA5.8.1.1b)**. Evidence containers are then placed in storage containers, each having a TRAIL label containing the CIL number, bar code, and case-specific information.

Storage containers are placed in the evidence storage area in chronological order.

4.6.4.1 **Remains Storage:** Each case containing biological evidence is placed within a separate storage container.

4.6.4.2 **Material Evidence Storage:** When material evidence (including life support evidence) from a case is received in the absence of remains, these accessions may be stored collectively by year of receipt. All dental appliances, prosthetics, and artificial dental materials are stored with the remains instead of with material evidence. These types of dental materials are typically assigned initial artifact number(s) (e.g., A-01) and any associated material evidence is assigned subsequent artifact numbers. Material evidence analysts must check with the forensic odontologists and CARIS to determine if dental appliances were recovered prior to assigning individual or lot accession numbers.

4.6.4.3 **Administratively Closed Cases:** After an accession, or portion of an accession, has been administratively closed (i.e., Administrative Fiat or CIL Portion), such evidence may then be chronologically stored within a common box.

4.7 **Consolidation Procedures:** After accessioning evidence, the Lead Evidence Coordinator or designated alternate checks CARIS and notifies Laboratory Management to determine if additional associated evidence requires consolidation. Alternately, testing results may identify a need to consolidate evidence **(A5.8.2)**. Consolidations may be of two types:

- Full: In full consolidations, evidence and case files from two or more cases are fully merged and all case materials are incorporated under one of the pre-existing CIL numbers. In other words, one or more of the CIL numbers is ultimately closed. The following procedures apply to full consolidations:
  - Typically, later CIL numbers are consolidated into earlier numbers; however, exceptions are made when an alternate course of action results in less work and confusion regarding case documentation. Examples include, but are not limited to: non-DNA sampled evidence is consolidated into cases sampled for DNA. For example, evidence from 1991 and 2004 associated (for whatever reason) with a 2000 case already sampled for DNA are accessioned into the 2000 case.
  - All other things being equal, evidence is consolidated into an accession possessing remains recovered by a DPAA Recovery Team. For example, evidence from a unilateral turnover from 1989 may be consolidated into an accession resulting from a 2006 recovery operation.
  - A member of the CIL Staff (typically a laboratory manager) generates a MFR or sends an email to the Lead Evidence Coordinator or designated alternate requesting the consolidation.

- Partial: In partial consolidations, evidence and case files are not totally closed and combined. This type of consolidation is the same as partially cross leveling evidence from one case to another and is not subject to the above consolidation procedures. The partial consolidation process is as follows:
  - The element(s) to be consolidated is identified, tracked, and its container labeled using a "G" sub-accession designator based on the original CIL number (e.g., CIL 2001-100-G-01 → CIL 2001-100-G-02). The G-02 number acts as an identifier to track the element that is now split out from the original accession.
  - Photographs of the element(s) to be consolidated are taken in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging), labeled with the appropriate sub-accession numbers, and embedded in the analyst's consolidation MFR (see below).
  - The element is moved to the appropriate accession and consolidated (e.g., CIL 2001-100-G-02 → CIL 2004-020-G-01).
  - The analyst generates an MFR which includes a checklist of consolidation tasks.

Regardless of the type, consolidations are finalized by an Evidence Coordinator using the following procedures:

- Completes the case consolidation record form found on the DPAA network.
- Files all MFRs in the appropriate network folders, and consolidates the corresponding network folders.
- Consolidates the evidence, ensuring all evidence containers are relabeled with the new CIL number.
- Updates TRAIL and CARIS to reflect the change.
- Notifies Laboratory Administration who then files the consolidation documentation in the master case files, updates the Accession Log, and forwards a copy of the completed consolidation memo to DPAA Records in accordance with DPAA Laboratory Manual, SOP 1.7 (Case File Management).

Special instructions for consolidating large assemblages of commingled human remains (CHR) are found in DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).

4.8 **Evidence Testing in the CIL:** Measures are taken to secure unattended evidence which is in the process of being examined **(A5.8.4, SA5.8.1.1c)**. Analysts comply with the following:

4.8.1 **Treatment & Handling of Evidence:** Evidence should be handled commensurate with its overall condition, potential perishability and any hazards it poses.

Smoking, eating and drinking should not be conducted in close proximity to evidence in the field or in the CIL as to cause potential damage or deleterious change. **Food and drinks are never consumed at work benches or while working on evidence.**

Persons having **administrative** work stations or offices in analytical areas (e.g., Evidence Coordinator's offices) are allowed to consume food and drink at their administrative work stations or offices. These persons may transit analytical areas while transporting food and drink directly to their administrative work stations provided that doing so does not pose a risk to the evidence and they are not consuming the items during transit. All other individuals are prohibited from bringing food and drinks into analytical areas.

4.8.2 **Internal Chain of Custody:** Several procedures are used to track and control the internal location and custody of evidence being tested **(SA5.8.1.1d)**.

4.8.2.1 **TRAIL:** The analyst must check out all evidence to be examined. An Evidence Coordinator may check out evidence for testing to any scientific staff member by logging each evidence transaction through TRAIL. Transfer records are maintained for all changes in custody, including temporary transfer of all or part of an accession. TRAIL records the **(SA5.8.1.1e)**:

- Accession number.
- Person assuming control of the evidence.
- Portion of evidence checked out for testing (e.g., skeletal, dental, material evidence) **(SA5.8.1.1d)**.
- Reason for obtaining the portion of evidence (e.g., testing, DNA sampling).
- Date and time.
- Destination of the evidence (e.g., specific table, specific analytical area)

Upon return of the evidence to the evidence storage area, an Evidence Coordinator logs in the evidence through TRAIL which also documents the return date and time.

4.8.2.2 **Table Placement:** Two types of tables exist for examining evidence.

The first are used for short-term testing, examination, or maintenance of evidence (i.e., "60 minute tables," although this terminology should in no way convey a time limit for the use of such tables). Evidence use on short term tables is not open ended. Short term tables are only found in the Evidence Transfer Room (Room 320) at CIL-HQ. Typically no evidence is left on these tables overnight.

The second types of tables are analytical tables used for the long-term testing of evidence. Analytical tables should not abut a wall. All tables should be placed in such a way as to minimize the risk of loss or commingling of evidence.

4.8.2.3 **Evidence Placement on Tables:** By convention, biological evidence should be placed on analytical tables in anatomical position, when feasible, with the foot end toward the U.S. flags in accordance with military tradition.

Normally, only one case is allowed at any given time on an analytical table. Multiple cases may be allowed under the following circumstances:

- Remains that are being assessed or otherwise undergoing work pertaining to DNA management, including preparation for shipment/transport.
- Resolution of commingling during formal testing.
- Consolidation of evidence during formal testing.
- Exceptional circumstances where permission has been granted from Laboratory Management or the Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate).

During the above activities, the analyst should take the necessary precautions (e.g., tagging, marking [when appropriate], grouping or other spatial segregation) to ensure that evidence provenience is not inadvertently and irrevocably compromised. Spatial segregation may be delineated and maintained by evidence tape or similar material, or grouping evidence, as appropriate, in petri dishes, trays, or similar devices.

Multiple cases are allowed on a short term table under the following circumstances:

- Routine matters under the supervision of an Evidence Coordinator, such as inventory and collections maintenance.
- Evidence containers are not being removed from the storage containers.
- Remains that are being assessed or otherwise undergoing work pertaining to DNA management, including preparation for shipment/transport.
- Chain of custody transactions under the supervision of an Evidence Coordinator.
- Consolidation of evidence containers into the same storage container as allowed by provisions elsewhere in this SOP.
- Exceptional circumstances where permission has been granted from Laboratory Management or the Lead Evidence Coordinator.

Typically, the handling of multiple cases on a short term table differs from that of an analytical table in that the evidence containers are not unsealed and the evidence remains secure. In such circumstances an Evidence Coordinator and the person handling the evidence containers ensure they are placed into the proper storage containers prior to being returned to the compact shelving or other secure storage.

In the rare instances when evidence containers must be opened, an Evidence Coordinator and the person handling the evidence take the same precautions, noted above with the analytical tables, to ensure that evidence provenience is not inadvertently and irrevocably compromised

4.8.2.4 **Evidence Placement on Other Surfaces:** Evidence placed on surfaces other than tables (e.g., counter tops, carts drying racks) in secure areas (see below) and left unattended should be placed on trays, or similar devices, as appropriate, and securely labeled with the case number (and provenience information, if appropriate).

4.8.3 **Evidence Handling & Security:**

4.8.3.1 **Secure Areas:** All testing must be conducted in a secure area. Evidence not in a secure area must be under the control of a member of the CIL Staff or an individual designated by the Science Director.

Additional instructions for secure testing areas for CIL-WP and CIL-OF are found in Annex D (Special Instructions for CIL-WP) and Annex E (Special Instructions for CIL-OF), respectively.

For all locations, evidence is not taken from the CIL unless accompanied by proper chain of custody documentation.

For all locations, **evidence is not allowed in offices or cubicles, unless the evidence is sealed and under a completed chain of custody.** Taking evidence into offices and cubicles in order to complete a chain of custody is not acceptable. **Unauthorized presence of evidence in offices and cubicles may result in disciplinary action.** The exception is the Lead Evidence Coordinator's Office (Room 322) and the Evidence Coordinator Office at CIL-OF (Room 121). **Sealed** evidence is allowed in both rooms for short-term reviews and check-out and check-in. Evidence is not left in either room overnight.

4.8.3.2 **Opening & Sealing Evidence:** The following are general guidelines for the proper opening and sealing of evidence undergoing testing in the CIL. These procedures are not absolute but should be followed to the fullest possible extent. Failure to adhere to these guidelines may result in the analyst repackaging and resealing evidence. For exceptions to these guidelines, the Lead Evidence Coordinator or Science Director should be consulted.

4.8.3.2.1 **Opening Evidence Containers:** To facilitate resealing, cut bags along a seam. The tape seals more securely when it is wrapped around the bag edge. Make straight cuts only as long as needed to remove/replace items in the bag.

The evidence must be re-bagged if any of the previous seals are damaged and/or if evidence tape needs to overlap another seal in order to secure the evidence (the tape must NEVER completely overlap another seal). All information written on the original bag must be transferred to the new bag and the original empty bag with the previous seals is placed in the box. Bags with validated seals should not be thrown away by any analyst. The Lead Evidence Coordinator has the final oversight regarding re-bagging.

4.8.3.2.2 **Maintain Provenience:** Evidence may arrive at the CIL in small bags, each labeled with different provenience information. These bags cannot be opened and resealed multiple times as the bag area does not allow for it. As such, multiple small bags of evidence can be placed unsealed (i.e., no evidence tape) into a larger evidence container that is ultimately sealed with evidence tape. Information on the larger bags is transferred and maintained as appropriate (see below).

4.8.3.2.3 **Sealing Evidence Containers:** Generally, biological material sealed with red evidence tape has been through a complete testing

and peer review and an Evidence Coordinator has conducted a final inventory of the remains using a photograph of the final layout. If an evidence container that has been inventoried and sealed by an Evidence Coordinator is opened, a memorandum for record is generated detailing the circumstances. An Evidence Coordinator then re-inventories the remains using the final layout photograph, reseals or re-bags the evidence, and returns it to secure storage, as appropriate **(SA5.8.1.1b)**.

If the red taped evidence containers are opened by or under the supervision of an Evidence Coordinator, a memorandum for record is still generated; however a full re-inventory of the remains is not required.

Material evidence that has been through testing and peer review is typically sealed with red evidence tape by the analyst. Evidence Coordinators and other analysts involved with the case (e.g., peer reviewer) may also seal the material evidence in red evidence tape. Material evidence lacking probative value that has been reviewed for non-evidentiary status by a Laboratory Manager are typically sealed in yellow tape and labeled appropriately.

Approved CIL Portions and Administrative Fiats may be sealed in red evidence tape by the analyst per guidance from the Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate).

Blue evidence tape is used in all other circumstances. Do not mix tape colors on bags. In the event that a specific color becomes temporarily unavailable, tape colors can be used interchangeably.

For all evidence, all seals must be validated, and all evidence containers must be labeled with the CIL number in accordance with this SOP.

4.8.3.2.4 **Transferring & Maintaining Documentation:** Throughout the testing process, documentation affixed to the evidence containers should be maintained until no longer needed. The analyst may delete information as testing progresses. For example, provenience information may be dropped when materials from different proveniences conjoin and are reassembled (the analytical notes should record this) or when the analyst segregates remains from different proveniences into discrete individuals. If new containers are used, relevant information on the previous evidence containers must be transferred to the outside of the new containers **(A5.8.2)**.

4.8.3.3 **Timeliness of Testing:** The nature of testing at the CIL requires a balance between the secure storage of evidence and its protection from deleterious change. To minimize the degradation stemming from repeated handling, evidence undergoing testing is not checked in during short pauses in the testing process. Consequently, evidence may be kept on analysis tables for the duration of the active testing.

However, the examination process is not open-ended and is based upon a justifiable expectation of frequent examination **(SA5.8.1.1b)**. Evidence should remain checked out of an evidence storage area for the shortest time required to complete the testing. Laboratory Management and the Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) monitors the test areas to ensure that evidence is being analyzed in a timely manner.

On a weekly basis, an Evidence Coordinator reports cases undergoing testing for more than 30 days (i.e., 30 Day Report). Special projects accessions (e.g., Tarawa) undergoing testing in their specific rooms or areas are typically not listed in the 30 Day Report.

These reports are sent to Laboratory Management, CIL Staff, and the Science Director, at which time it may be determined that the evidence be returned to the storage areas. Requests to retain evidence past 30 consecutive days must be approved by the Science Director for CIL-HQ and the Laboratory Director for CIL-OF.

Analysts check in evidence before deploying or departing the CIL for long periods of time. If the testing is incomplete (e.g., reports are not yet written, the case is awaiting DNA results), the analyst is responsible for repackaging the evidence in accordance with this SOP to facilitate testing upon return.

4.8.4 **Transportation of Evidence:**

4.8.4.1 **Local Transportation of Already Accessioned Evidence:** Occasionally, accessioned evidence must leave the CIL for transport locally to non-CIL testing facilities (e.g., Optometry Clinic, University Laboratories) or to transportation terminals (e.g., airports, cargo shipment points).

Note: Transportation of evidence between CIL facilities (e.g., CIL-HQ to CIL-OF) is also discussed in Annex D (Special Instructions for CIL-WP) and Annex E (Special Instructions for CIL-OF).

Local transportation of already accessioned evidence back and forth between a CIL facility and

external entities is done using a courier model. Evidence slated for such movement (in either direction) is transported using the following procedures:

4.8.4.1.1 **Couriers:** The Courier can be any member of the CIL Staff competency certified in this SOP. In many instances, the CIL analyst assigned to work the case(s) being transported may be the courier.

4.8.4.1.2 **Courier Documentation:** The primary document involved in transporting evidence is the CIL chain of custody form which serves as courier orders. The intent of the courier orders is threefold:

- To document Laboratory Management's authorization for the movement of evidence.
- To provide a means for documenting evidence before its departure and upon arrival in order to detect loss, cross-transfer, contamination, and/or deleterious change.
- To serve as a means of identifying to proper authorities, upon demand, that the Courier is acting in an official capacity and that the evidence in his/her custody rightfully belongs to the US Government.

Evidence is not transported until the chain of custody form is properly completed in accordance with this SOP. Once the chain of custody form is completed, an Evidence Coordinator updates TRAIL.

4.8.4.1.3 **Transporting Evidence:** The intent is that evidence is transported between the CIL facility and external locations in the shortest time and in the most expedient manner possible, without causing loss, cross-transfer, and/or deleterious change to the evidence. As such, the packaging, labeling, sealing, and security of the evidence being transported adheres to the same provisions in this SOP as evidence being transported from the field with the following exceptions and/or additional provisions:

- Couriers, or at least one vehicle occupant, should be equipped with a cell phone.
- During transport of evidence, couriers have in their possession their:
    - Common Access Control Card (CAC).
    - Field credentials (if issued).
    - Completed chain of custody form.
    - Valid Driver's License (if operating the transport vehicle).
- Hard transport cases, (e.g., Pelican case) or similar containers should be used to transport evidence. Evidence should be suitably packed, cushioned, and secured in the locked container, and the container secured from excessive movement and crushing once in the vehicle.
- The loading and unloading of large shipments of evidence (beyond what the Courier can carry in one trip from the vehicle to the secure area) is monitored at all times. For large shipments, the Courier or his/her designee or should remain with the vehicle while others are loading or unloading. The intent is to not leave the evidence unattended; evidence should be under observation and control at all times.
- Evidence may be transported in a privately owned vehicle (POV), provided the vehicle meets all of the requirements for safe operation on Joint Base Pearl Harbor-Hickam.
- When evidence is transported in any vehicle, it is secured in the passenger compartment of the vehicle or the trunk space. Evidence is not transported in the bed of a pickup truck or similar open air cargo bin. When transported in a convertible ("drop top") vehicle, the top is always in the 'up' position. Evidence transported in jeeps, or similarly open vehicles (e.g., having a top but no doors or back), is secured to prevent it from being blown out of or from sliding out of the vehicle.
- Evidence is never left unattended in a vehicle. The Courier remains with the evidence unless there are compelling safety reasons for not doing so (e.g., vehicle fire, accident with injuries).
- During transport, the Courier proceeds directly between the origin and destination. The Courier does not stop to eat, run errands, or conduct any other business between the two locations even if other persons are present in the vehicle.
- In the event transport is interrupted (e.g., the Courier is stopped by base police, the vehicle breaks down, an accident occurs), the Courier immediately informs Laboratory Management. At that point the Courier should request instructions and/or relief, as appropriate.
- Should situations involving base security or the police happen to arise during transport, the Courier presents his/her CAC card, field credentials, and completed chain of custody form. In addition, the Courier is authorized to show the evidence to the authorities in order to achieve resolution. Evidence seals remain intact and are not broken. Good judgment, tact, and professionalism should be practiced by the Courier in such situations.

4.8.4.1.4 **Arrival at Destination:** Upon arrival at the destination, the evidence is immediately off-loaded to a secure area. Once the evidence is in a secure area, all custodial parties verify the evidence shipment by inspecting, inventorying, and

documenting all arriving evidence using the arrival procedures specified in the body of this SOP.

When all custodial parties are satisfied as to the completeness and condition of the shipment, each signs the chain of custody documentation in the respective sections in accordance with the provisions of this SOP.

In the event there is a problem(s) and the evidence cannot be verified, the courier immediately notifies Laboratory Management and the Lead Evidence Coordinator.

Custodial parties should not 'verify' evidence if its integrity is in any way suspect. Typical problems which may lead to non-verification of evidence include, but are not limited to:`

- Unsealed evidence.
- Unauthenticated evidence.
- Discrepancies in inventory or descriptions of the evidence to include CIL #s.
- Damaged evidence.
- Courier not in possession of a properly completed chain of custody documentation.
- Unauthorized courier.
- Any other reason where the integrity of the evidence may be suspect.

4.8.4.1.5 **Disposition of Documentation:** Disposition of chain of custody documentation involving local transport of already accessioned evidence in and out of the CIL is in accordance with the relevant provisions of this SOP.

4.8.4.2 **Transporting Evidence Via Commercial Courier:** Transportation of evidence between CIL-HQ, CIL-OF, and CIL-WP is typically done using FEDEX or other commercial couriers with tracking capability. The tracking paperwork on both ends becomes part of the chain of custody records. Evidence and case documents/reports are not transported in the same shipment container. Photographs of biological evidence and personal effects or potential personal effects are taken before shipment and upon arrival. Photography of other evidence is at the discretion of Laboratory Management and/or the Evidence Coordinator. When photographs are taken, evidence is usually still sealed in the evidence container.

Occasionally, entities external to the CIL are required to ship evidence to the CIL. In such instances the provisions in this SOP for handling and shipping evidence should be followed. The appropriate CIL staff make themselves available to external parties to advise and assist them in shipping evidence to the CIL. In order to simplify this process, guidelines for external parties wishing to ship evidence to the CIL have been compiled from this SOP and supplemented. These appear in Annex F (Guidelines for Shipping Evidence to the DPAA Laboratory) to this SOP.

4.8.5 **Post Testing Procedures:** The following procedures apply **(SA5.8.1.1b)**:

4.8.5.1 **Remains:** When a case has been peer reviewed, an Evidence Coordinator conducts the inventory and repackage the remains in new evidence containers sealed with red evidence tape before returning them to the evidence storage area. Inventory photographs are scanned into the network case file and the hard copy is filed in the case file in Laboratory Administration.

4.8.5.2 **Material Evidence:** When a material evidence case has been through peer review, the analyst is responsible for repackaging and sealing all evidence in accordance with this SOP. The analyst then brings the evidence to an Evidence Coordinator for check-in and storage. The item name, as it appears in the test report must be on the interior and exterior labels along with the original provenience information. Additionally, the CIL number including the material evidence number (e.g., CIL 2004-123-A-01) must be written on the outside of the evidence container.

4.8.5.3 **Sample Residues:** Samples from human remains sent out for specialized analysis (e.g., DNA sequencing, isotopic analysis) to outside agencies may have residual material(s) (i.e., not consumed) returned to the CIL. In such a contingency the following considerations apply, largely driven by case disposition status **(SA5.8.1.1g)**:

- Chain of custody forms and other relevant documentation are processed by the Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) or designated Alternate Evidence Coordinator accordingly. A MFR is also generated for sample residues returned from AFDIL or outside agency. The MFR notes the sample residues returned and their location within evidence storage.
- For cases that have not been released for final disposition, sample residues in their sealed containers are returned to the secured compact shelving, in their respective evidence box containing the source element from which they were taken.

- If the source element or identified individual were released for final disposition, the sample residue(s) are brought to the attention of the Science Director, who typically approves the sample residue for Type II CIL Portion status (see DPAA Laboratory Manual, SOP 1.6, General Casework Procedures for more details on CIL portions). Alternatively, sample residue(s) from identified elements can be retained in the appropriate accession as group remains.
- Sample residues, originating from consult cases already returned to the customer, are returned to the customer agency under the respective case number.
- Teeth fragments returned from AFDIL are typically restored by an odontologist regardless of case disposition status.

4.9 **Final Disposition of Evidence:** The following procedures apply **(SA5.8.1.1g)**:

4.9.1 **Identified Remains:** Identified remains are released to the respective casualty or mortuary affairs representatives or service casualty office for final disposition as directed by the person authorized to direct disposition (PADD).

The Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) collects all relevant disposition paperwork from the respective casualty office (e.g., copy of the ID Acknowledgement signed by the PADD, disposition instructions, itineraries) and schedules the release of remains. A chain of custody form documents the transfer of evidence and is filed in the master case file. An Evidence Coordinator updates CARIS and TRAIL accordingly.

Laboratory Administration is notified once all identified remains have been shipped, and transfers the case file to DPAA Records in accordance with DPAA Laboratory Manual, SOP 1.7 (Case File Management).

4.9.2 **Material Evidence:**

4.9.2.1 **Return to Next of Kin (NOK):** In most cases, personal effects associated with identified individuals are returned to the NOK. Each service has specific criteria. When a request for artifacts is received from the casualty officer, an Evidence Coordinator generates a chain of custody form recording the transfer of material evidence to the respective casualty office for return to the NOK. Chain of custody forms, along with all other paperwork relevant to artifact shipment, are stored in both the chain of custody binders secured in the CIL and the master case file.

At the request of the NOK, and at the discretion of the Science Director, additional items related to the identified individual that are not considered to be personal effects may be released to the respective casualty or mortuary affairs representatives for return to the NOK. Such items may include military equipment that can be associated with a recovered individual. Items that are not turned over to the NOK include, but are not limited to:

- Dangerous items.
- Biologically contaminated items.
- Items that may cause duress or embarrassment.

4.9.2.2 **Retention by the CIL:** Any item of material evidence that does not require disposal may be retained by the CIL for the purpose of establishing study collections to facilitate training and future identifications.

4.9.2.3 **Disposal:** Certain categories of material evidence not meeting any of the above criteria may be destroyed and/or disposed of by the CIL. A third party, not directly responsible for the storage or disposition of material evidence, witnesses the destruction and disposal of all material evidence. A MFR is written detailing the method of destruction and the items destroyed. Where no specific threat exists through casual destruction and disposal, this may be accomplished without special precautions. Exceptions include:

- Any items of ordnance needing disposal through the appropriate Explosive Ordnance Disposal (EOD) agency.
- Potential biologically hazardous materials disposed of through an appropriate hospital facility in accordance with DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).
- Other items posing a minimal contamination threat may be relieved of this danger through standard chemical disinfection, followed by standard disposal.

4.9.3 **Administratively Closed Cases:** Administrative closure of cases is covered in DPAA Laboratory Manual, SOP 1.6 (General Casework Procedures).

4.9.3.1 **CIL Portions:** A CIL portion is generally evidence that is determined to have no probative value. An expanded discussion of CIL portions is found in DPAA Laboratory Manual, SOP 1.6 (General Case Work Procedures).

Types I, II, and III CIL portions are typically stored chronologically in separate containers. (Note: material evidence Admin Fiats are stored

chronologically and separately from biological CIL portions.) Type I CIL portions are retained indefinitely and may be reactivated if new information or new technology becomes available. All CIL portions may be transferred into the custody of the appropriate service upon their request.

4.9.3.2 **Management Review & Administrative Fiat:** Material (usually non-human) that is of no evidentiary value may be administratively eliminated with the approval of Laboratory Management. A formal memorandum for administrative fiat may or may not be required. In the event an administrative fiat memorandum is not prepared a management review of the pertinent items is documented in accordance with DPAA Laboratory Manual, SOP 1.6 (General Casework Procedures).

Materials selected for discard are bagged, sealed with yellow tape, and marked "Non-Evidence--Discard" or similar wording by the analyst and the Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) notified accordingly. In the event yellow tape is not present, red or blue tape may be used provided it is marked as specified above.

Approved administrative fiats are sealed in red tape and stored chronologically in the administrative fiat storage area. For items eliminated via management review (sealed in yellow tape), the Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) typically retains the non-evidentiary material in the accession box until the case is closed out. At that time the material is formally discarded. The exception is large amounts of material evidence that may need to be discarded as soon as the documentation is prepared.

4.9.3.3 **Miscellaneous Guidance for Administratively Closed Cases:** In the event the evidence containers for CIL portions and administrative fiats have to be reopened, follow the opening and sealing procedures in this SOP. Additionally, since CIL portions and administrative fiats are closed cases, the MFR authorizing opening is not needed. Instead, authorization to open the evidence is obtained by Laboratory Management via email. Further, a short note containing the opening individual's name and initials, date opened, and date sealed, is added to the evidence bag prior to resealing it with red tape. For example:

> 01 Oct 2012: Bag opened by Bill Smith to measure femur. Resealed: 3 Oct 2012. BS

4.10 **Miscellaneous Evidence Security Instructions:** No SOP can anticipate all security problems that may occur with evidence. Vigilance by all is required to anticipate and prevent security problems that may compromise the integrity of evidence.

4.10.1 **Housekeeping:** Janitors are given training by Quality Assurance prior to being allowed to work in evidence areas. Janitors are monitored (usually by an Evidence Coordinator) while working in evidence areas. Any CIL employee allowed Unrestricted Access to evidence areas may monitor the janitors. Monitors should ensure that janitors:

- Do not move or bump analytical tables.
- Do not handle evidence.
- Sweep rather than vacuum the floor. Floor sweepings are checked for evidence by a monitor prior to being discarded.
- Do not create any other situations potentially compromising to evidence.

Additional instructions for janitors working in secure areas in can be found in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security).

4.10.2 **Tidiness of Evidence Areas:** All personnel working in evidence areas are expected to clean up after themselves. Evidence Coordinators monitors the evidence areas for cleanliness and tidiness. The Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) reports serious or recurring problems to Laboratory Management or the Lead Quality Manager (or the Quality Manager at CIL-OF, as appropriate).

4.10.3 **Emergency Evacuation of Evidence:** Impending or existing conditions (e.g., prolonged power outage, or impending natural disasters), may require the emergency evacuation of evidence. On order from the Science Director or his designee, CIL personnel may take expedient action to effect the emergency evacuation and storage of evidence from the CIL. Under the direction of a competent authority, such action may include, but is not limited to:

- Consolidating evidence into various storage containers/boxes in order to reduce transportable volume.
- Transportation of evidence in non-government vehicles.
- Foregoing chain of custody documentation in favor of expedient inventories.
- Storing evidence in alternate facilities having lesser physical security than the CIL.

In the event such actions are taken, all efforts are made to comply with the provisions of this SOP as soon as possible and practical.

5.0 INDEPENDENT REVIEW OF EVIDENCE: In the past, DOD granted the families of identified individuals the right to have the evidence reviewed by a forensic consultant of their choice. This program is no longer available.

6.0 SURETY: Daily evidence management and security is an ongoing process involving everyone at the CIL. Non-routine surety measures are listed below.

6.1 **Inventories, Verifications & Surveys:** See above for the definitions of inventory, verification, and survey.

The following verifications are in effect.

- Monthly 10-20% box verification: Each month, typically 10-20% of the evidence boxes are verified. If the Front Office resources are unavailable, verifications are conducted quarterly.
- Semi-annual: Twice annually, at approximately six month intervals there is a100% box verification. The 10-20% verification may or may not occur in the month having the 100% verification.

The following protocols are in effect regarding verifications, inventories, and surveys:

- The auditors are disinterested and normally appointed by the Front Office.
- Auditing is done in the presence of CIL Evidence Coordinator(s).
- Verifications, inventories, and surveys pertain to both CIL-HQ and CIL-OF.
- Verifications, inventories, and surveys are subject to funding and availability of personnel.
- Formal and informal reports may be issued to the DPAA Deputy Director, as appropriate and necessary.
- Evidence may be periodically verified, inventoried or surveyed on order from Laboratory Management in response to various contingencies in order to verify its security and accountability. For example, a 100% box verification being done whenever someone with full access to the evidence (e.g. Alternate Evidence Coordinators, Science Directors) leaves the CIL.
- Failure to account for evidence during an inventory or verification may initiate a complete (100%) evidence survey for all accessions.

6.2 **Unaccounted-For Evidence:** Unaccounted-for evidence is any accessioned evidence that falls out of the control or the accountability of the CIL evidence management system. Unaccounted-for evidence consists of two categories:

1) inadvertently placed evidence.
2) evidence that is missing altogether.

Unaccounted-for evidence is reported to Laboratory Management at the first available opportunity.

Note: Recommend checking with the Lead Evidence Coordinator (or the Evidence Coordinator at CIL-OF, as appropriate) concerning the evidence in question prior to reporting it as unaccounted-for.

6.2.1 **Inadvertent Placement of Evidence:** All personnel remain alert for the inadvertent placement of evidence and related problems. Adherence to the provisions in this SOP should minimize the inadvertent placement of evidence. Evidence items that seem out-of-place, do not have a CIL number associated with them, or otherwise appear to be out of the control of the evidence management system, are immediately reported to the Lead Evidence Coordinator, Lead Quality Manager, or Laboratory Management (or the Evidence Coordinator or Quality Manager at CIL-OF, as appropriate)

Preventive action is taken to preclude and detect inadvertent placement of evidence (e.g., using chairs with open backs that cannot trap or conceal dropped evidence) **(A4.12)**.

In the event inadvertently placed evidence is discovered, Laboratory Management directs that the appropriate CIL analytical techniques and evidence management and control procedures, as well as all relevant documentation, be used in an attempt to restore accountability of the items.

In the event evidence cannot be re-associated to a case, Laboratory Management decides on the appropriate disposition of the item, usually by designating it a CIL portion.

Regardless of the outcome, corrective action procedures outlined in DPAA Laboratory Manual, SOP 4.0 (CIL Surety) is implemented to correct any procedural or personnel deficiencies that contributed to the inadvertent placement of the evidence and to reduce the likelihood of recurrence.

6.2.2 **Missing Evidence:** Loss of evidence is potentially more serious than inadvertent placement.

6.2.2.1 **Laboratory Management Response:** Laboratory Management initiates action to account for missing evidence. The type and scale of this response are situation dependent. Should Laboratory Management be unable to account for evidence in a timely manner (typically within 3-5 working days), the Science Director is notified.

6.2.2.2 **Science Director Response:** The Science Director determines subsequent courses of action which may include launching formal investigations.

6.2.2.3 **Investigations:** Should initial action fail to account for missing evidence, the Science Director may authorize an investigation. As such, the Science Director appoints, in writing, a senior member of the CIL Staff as an investigation officer (IO). The IO has no previous or known involvement with the relevant evidence.

The Science Director may also request that the DPAA appoint a neutral IO. This may be someone not on the CIL Staff or external to the DPAA (e.g., Navy NCIS). The IO is granted full authority to interview anyone having relevant information, to examine any and all case file notes and associated accession documents, and to physically search all areas of the CIL, including offices. The IO issues a final written report to the Science Director detailing:

- The steps taken to resolve the issue, including those interviewed and the areas searched.
- The results of the investigation.
- Recommendations to correct procedural or personnel deficiencies uncovered during the course of the investigation.

6.2.2.4 **Corrective Action:** Regardless of the circumstances, response(s) taken, and ultimate outcome of the incident, the Science Director implements corrective action procedures in accordance with DPAA Laboratory Manual, SOP 4.0 (CIL Surety) so as to correct any procedural or personnel deficiencies that contributed to the incident and to reduce the likelihood of recurrence.

6.3 **Verification of Identified Remains:** Once an identification is made and prior to the CIL notifying the Service Casualty Office, Laboratory Management appoints a member of the staff, usually the Case Coordinator, to determine if there are any lingering evidence issues. Such issues may include, but are not limited to:

- The existence and status of any additional portions.
- Any DNA residue on hand.
- Existence and disposition of any histological specimens.

6.4 **Audits:** The provisions of this SOP are subject to audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

7.0 SAFETY: Do not bring back any type of firearms. Importation of firearms into the U.S. requires approval from the Bureau of Alcohol, Tobacco, and Firearms (BATF)--a lengthy and paperwork intensive process.

After first ensuring the firearm is determined to be safe by EOD, make every effort to photo document firearms in the field, and then leave them with responsible local officials. If a firearm has evidentiary value, such as having identifying names, initials, or serial numbers, expose the markings and photo document extensively. If removable parts (e.g., data plates, monogrammed pistol grips) have evidentiary value, remove these and return them to the CIL.

Ordnance, including small arms ammunition, should never be returned to the CIL. Photo document as necessary. A definition of ordnance and examples of what does and does not constitute ordnance is found in DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing).

The interiors of walk-in refrigerators are potentially bio-hazardous areas. Appropriate precautions should be taken (see DPAA Laboratory Manual, SOP 1.4, CIL Safety Program).

Annex A (Completion of Chain of Custody Documents) (SA5.8.1.1a-e)

A1.0 GENERAL: A chain of custody form (Figures 1 & 2) is used to document evidence and its transfer from one individual to another. A chain of custody form is initiated for each instance that evidence is received or recovered. A chain of custody form is also used each time evidence leaves the CIL. Specifically:

- For evidence recovered during a DPAA mission, it is the responsibility of the SRE or LSI to fill out the chain of custody documentation prior to returning to the CIL. When electronically preparing the form, multiple copies should be printed in the event that copy machines become unavailable.
- One copy of the chain of custody form (typically the original form) is to be secured on the outside of the locked/secured transport container (e.g., Pelican™ case), preferably in a plastic ziplock bag. Individuals surrendering custody of evidence should ensure that they retain a copy of the chain of custody form with the signature of the individual receiving the evidence. The original chain of custody form should be kept and transported together with the evidence.
- Evidence recovered by U.S. personnel should never be consolidated with evidence unilaterally turned over, even if they are thought to pertain to the same site, incident, or case. Evidence from different sources must be stored separately, labeled clearly, and listed on separate chain of custody forms.
- If multiple recovery scenes are processed during a single mission, a separate chain of custody form should be maintained for each recovery scene processed.

A2.0 INITIATING A CHAIN OF CUSTODY FORM: Complete the blocks as follows:

- "**Unique Mission Identifier**": Located in the upper right hand corner, this is the mission and recovery/investigation team (e.g., "04-1L RT-4") and is used only for evidence recovered/received during DPAA missions.
- "**Accessioned as CIL**": For evidence recovered/received during a DPAA mission, this space is filled in by the Evidence Coordinator during the accessioning process. For evidence being transferred from the CIL, this space is for the CIL number.
- **"Evidence Obtained From":** For evidence recovered during a DPAA mission, this would be "DPAA Recovery" or "DPAA Investigation". For evidence received as a unilateral turnover, this space would be for the source's name and address. For evidence that is being transferred from the CIL, this space would be for the CIL address.
- **"Evidence Transferred To":** For evidence recovered during a DPAA mission, this would be the DPAA/CIL address: 590 Moffett Street, Bldg 4077, JBPHH, HI 96853 or 106 Peacekeeper Drive, Bldg D, Offutt AFB, NE 68113. For evidence leaving the CIL, this would be the name and address of the intended final destination.
- **"Obtained by":** Name of the person initiating the chain of custody. For example, for evidence recovered/received during a DPAA mission, this would be the SRE or LSI.
- **"Date obtained":** For evidence recovered during a DPAA mission, this would be the dates of excavation/investigation (e.g., 15 Mar –12 Apr 2004) or a single date in the case of a unilateral turnover.
- **"Seal Number(s)":** Document seal numbers for evidence secured in a sealed transport container using numbered seals. If combination locks are used, leave this space blank or write "N/A." Do not write lock combinations on the chain of custody form.
- **"Village/District/Province":** Specific location from which evidence was obtained (i.e., "Vicinity of Tan Long Village, Huong Ha District, Quang Tri Province"). This space is mainly used for evidence recovered/received during DPAA missions.
- **"Associated Incident":** Loss incident or possible loss incident association (e.g., REFNO, MACR, BUNO). If incident is unknown, provide site number (e.g., "PP-00013").
- **"Grid Coordinates":** Enter site grid coordinates with full MGRS and datum. This space is only for evidence recovered/received during DPAA missions.
- **"Conflict":** Enter associated or possibly associated conflict (e.g., SEA, Korea, WWII).
- **"Country":** Country from which the evidence was obtained (e.g., SRV, LPDR, DPRK).
- **"Item Number":** Enter the sequential evidence container number (1,2,3…).
- **"Bag/Container Label and Description":** List evidence containers, provenience information from bag label, and a list of contents.

Evidence containers are listed individually on the chain of custody form. Several bags of evidence may be placed (sealed or unsealed), in a large **sealed** bag, which serves as the primary evidence container. This primary evidence container is then listed on the chain of custody form with provenience information, the

number of containers sealed within, and a brief or detailed description of contents (follow the example in Figure 1 or 2). The intent is that all evidence containers are accounted for on the chain of custody form and their provenience information documented and preserved.

The wording on evidence container labels should be consistent with the wording used on the chain of custody form. Where quotation marks are used on the form, they should contain a verbatim transcription of the labeling on the evidence container."

Add a terminus statement below the last entry e.g.:

(-------NOTHING FOLLOWS-------)

The intent is to ensure that items cannot be added or changed after transfer of evidence without notice.

A3.0 ANNOTATING CHANGES IN CUSTODY: Follow the below procedures:

The individual surrendering custody fills out the **"Item Numbers," "Date,"** and **"Reason for Transfer"** blocks, then prints and signs their name in the **"Transferred from"** block.

The individual assuming custody of the items prints and signs their name in the **"Transferred to"** block (See Figure 1). This action is repeated for every transfer of custody.

- If items are sealed in a pelican case using numbered seals, the seal numbers are documented in the **"Seal Number(s)"** block.
- To transfer custody of the sealed transport case to another individual, the individual transferring custody prints and signs their name in the **"Transferred from"** blocks, and the individual assuming custody prints and signs their name in the **"Transferred to"** blocks (See Figure 2).
- If items are signed over to a courier service (e.g., FedEx), the tracking number may be placed in the **"Transferred to"** signature block, and the name of the courier company may be placed in the **"Transferred to Print Name"** box.
- If the seals must be cut prior to receipt at the CIL, the broken seal numbers noted in the **"Seal Number(s)"** block must be crossed out with a single line, initialed and dated by the individual who cut the seals. The original broken seals are placed in the pelican case and the new seal numbers are documented in or near the "**Seal Number(s)"** block. If switching to locks instead of new numbered seals, a note in or near the "**Seal Number(s)"** block would be used to track the change in securing the pelican case (e.g., switch to locks, combo locks used, locks used).

Figure 1. Sample DPAA Chain of Custody Form

Defense POW/MIA Accounting Agency
Laboratory
Chain of Custody

Unique Mission Identifier 10-5VM RT-3
CIL _____

Evidence Obtained From: DPAA Excavation	**Evidence transferred to:** DPAA-Lab 590 Moffett Street, Bldg 4077 JBPHH, HI 96853
Obtained By: Dr. Leia Organa Solo	**Date Obtained:** 2-23 May 2010
Seal Number(s): N/A (if used)	**Village/District/Province or Equivalent:** Quang Tri City, Hai Long District, Quang Tri Province
Associated Incident/Site: REFNO 1234	**Grid Coordinate:** Q YD 12345 67890 (WGS84) (Full MGRS and datum)
Conflict: SEA / **Country: S.R.V.**	

Item Number	Bag/Container Label and Description Provide Terminus Statement Following Last Entry, e.g., "Nothing Follows," Number all evidence bags / containers
1	One sealed plastic bag labeled "REFNO 1234, 10-5VM RT-3, 500N/504E, 16 May 2010, 10cmbs, Possible human remains, LO, Bag 1 of 3" containing possible human remains.
2	One sealed plastic bag labeled "REFNO 1234, 10-5VM RT-3, 508N/516E, 18 May 2010, Possible human remains, LO, Bags 2 of 3" containing possible human remains.
3	One sealed plastic bag labeled "REFNO 1234, 10-5VM RT-3, 505N/515E, 18 May 2010, Possible osseous remains, LO, Bags 3 of 3" containing possible osseous remains.
4	One sealed plastic bag labeled "REFNO 1234, 10-5VM RT-3, 508N/504E, 18 May 2010, found on surface, ID tag for SMITH, LO, Bag 1 of 1" containing one ID Tag.
	**********NOTHING FOLLOWS**********

DPAA COC SAMPLE FORM

Item(s)	Transferred from:	Transferred to:	Date	Reason for Transfer
1 – 4	SIGNATURE *Leia Organa Solo* PRINT NAME Dr. Leia Organa	SIGNATURE *Ngoc Le* PRINT NAME Ngoc Le	23 May 2010	Transfer to VNOSMP to await JFR.
1 – 4	SIGNATURE *Ngoc Le* PRINT NAME Ngoc Le	SIGNATURE *L Calrissian* PRINT NAME Dr. Lando Calrissian	16 June 2010	Transfer to Escort
1 – 4	SIGNATURE *L Calrissian* PRINT NAME Dr. Lando Calrissian	SIGNATURE *Ben Soria* PRINT NAME Ben Soria, Evidence Coordinator	19 June 2010	Accession into Lab
	SIGNATURE PRINT NAME	SIGNATURE PRINT NAME		

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Previous editions may be used until exhausted

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Figure 2. Sample DPAA Chain of Custody Form Using Numbered Seals

Defense POW/MIA Accounting Agency
Laboratory
Chain of Custody

Unique Mission Identifier 15-5GM RT-1
CIL _____

Evidence Obtained From: DPAA Excavation	**Evidence transferred to:** DPAA-LAB 106 Peacekeeper Drive, Bldg D Offutt AFB, NE 68113
Obtained By: Mr. Jacen Solo	**Date Obtained:** 4-7 May 2015
Seal Number(s): S-1234567, S-9876543 (if used)	**Village/District/Province or Equivalent:** Richelsdorf Village, Hessen District, Bad Hersfeld Province
Associated Incident/Site: MACR 1234/ GM-00123	**Grid Coordinate:** 55M DP 97564 18450 (WGS84) (Full MGRS and datum)
Conflict: WWII / **Country: GERMANY**	

Item Number	Bag/Container Label and Description Provide Terminus Statement Following Last Entry, e.g., "Nothing Follows," Number all evidence bags / containers
1	One sealed plastic bag labeled "MACR 1234, GM-00123, 15-5GM RT-1, 500N/505E, 5 May 2015, 25cmbs, Possible human remains, Burial Feature 1, JS, Bags 1 through 8 of 17" containing 8 bags of possible human remains.
2	One sealed plastic bag labeled "MACR 1234, GM-00123, 15-5GM RT-1, 500N/510E, 5 May 2015, 25cmbs, Possible human remains, Burial Feature 2, JS, Bags 9 through 17 of 17" containing 9 bags of possible human remains.
3	One sealed plastic bag labeled "MACR 1234, GM-00123, 15-5GM RT-1, 495N/505E, 6 May 2015, Found on surface, Possible material evidence, JS, Bags 1-22 of 30" containing 22 bags of possible material evidence.
4	One sealed plastic bag labeled "MACR 1234, GM-00123, 15-5GM RT-1, 500N/510E, 5 May 2015, 15cmbs, Possible material evidence, Found in association with Burial Feature 2, JS, Bags 23-30 of 30" containing 8 bags of possible material evidence. **********NOTHING FOLLOWS**********

SAMPLE FORM:
USING NUMBERED SEALS

Item(s)	Transferred from:	Transferred to:	Date	Reason for Transfer
1-4	SIGNATURE *JACEN SOLO* PRINT NAME **Mr. Jacen Solo**	SIGNATURE *Qui-Gon Jinn* PRINT NAME **Dr. Qui-Gon Jinn**	7 May 2015	Transfer of Sealed Pelican Case to Escort
1-4	SIGNATURE *Qui-Gon Jinn* PRINT NAME **Dr. Qui-Gon Jinn**	SIGNATURE *Tiffany Rubush* PRINT NAME **Tiffany Rubush**	10 May 2015	Accession into Lab
	SIGNATURE PRINT NAME	SIGNATURE PRINT NAME		
	SIGNATURE PRINT NAME	SIGNATURE PRINT NAME		

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Previous editions may be used until exhausted

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Annex B (Completing the Internal Chain of Custody Log) (A5.8.1.1d & e)

B1.0 GENERAL: Instructions for completing the Internal Chain of Custody Log (Figure 3) are outlined below. The order of events is not strictly chronological since some tasks may be mutually exclusive or lend themselves to concurrent operations.

B2.0 TRANSFER OF CUSTODY: The following tasks apply:

- **Receiving:** The Evidence Coordinator's name and dated signature should be entered in the block **"Received In CIL by."**
- **Individual Deliveries:** The individual delivering the evidence must acknowledge the transfer of custody to the CIL with their dated signature in **"Delivered by."** Additionally, the delivering individual's name and agency (e.g., DIA) should be entered on the appropriate lines.
- **Mail Deliveries:** If delivered by mail, the Evidence Coordinator should note the name of the individual or agency responsible for sending the package, as well as address if available in **"Sent by."** Items delivered by U.S. Postal Service or other accepted package delivery services (e.g., FEDEX) are exempt from the signature requirement specified in **Transfer of Custody,** above. Instead, appropriate parcel documentation (e.g., cancellation mark, return address, and registration label, when applicable) should be included with the chain of custody documentation. The tracking number, if present, should be logged on the signature line.
- **Witnessing the Transfer:** A third party, typically another member of the scientific staff, should witness the transfer of custody. The witness should list their name and applicable title along with their dated signature in **"Receipt Witnessed by."**
- **Photographic Documentation:** The transfer of custody should be photographed throughout the opening and examination. The name, title, and dated signature of the individual taking the photographs should be entered in **"Receipt Photographed by."**
- **Inventory:** The number and type of outer-most container(s) should be noted in **"Primary Container."** Similarly, the number and type(s) of inner containers (e.g., plastic bags, envelopes) should be noted in **"Inner Container."** A brief description of the container contents (e.g., possible osseous material, ID tag) should be listed in **"Brief Description Of Contents,"** Comments, explanatory notes, or observations about the contents may be made in **"Condition/Comments."**
- **Miscellaneous Tasks:** The Evidence Coordinator assigning the CIL number signs and dates **"Case Entered Into CARIS & TRAIL"** once the new accession has been entered into CARIS and TRAIL.

Figure 3. DPAA Internal Chain of Custody Log

INTERNAL CHAIN OF CUSTODY

CIL_____ Incident/Site_____

Primary Container	Inner Containers/Packaging	Brief Description of Contents	Condition/Comments
Box_____	_____	_____	_____
_____	_____	_____	_____
Bag_____	_____	_____	_____
_____	_____	_____	_____
Other_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Delivered By

Name_____ Signature_____

Agency_____ Date_____

Sent By

Name_____ Address_____

Agency_____ _____

Received in CIL By

Name_____ Signature_____

Title_____ Date_____

Receipt Witnessed By

Name_____ Signature_____

Title_____ Date_____

Receipt Photographed By

Name_____ Signature_____

Title_____ Date_____

Case Entered into CARIS & TRAIL

Name_____ Date_____

Attach mail registration or other transfer information on reverse or on a separate sheet of paper

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Annex C (Preliminary Assessment of Evidence)

C1.0 PURPOSE & SCOPE: This annex outlines procedures for the preliminary assessment of evidence accessioned into the CIL. Preliminary assessment does not constitute formal testing, rather its primary purpose is to determine the nature of the accession (e.g., osseous vs. non-osseous, human vs. non-human). Preliminary assessments also assist in identifying evidence in need of additional conservation or special storage.

C2.0 PRELIMINARY ASSESSMENT PROCEDURES: Upon accessioning evidence into the CIL, an Evidence Coordinator or a member of the CIL scientific or technical staff conduct preliminary assessments.

Odontologists typically conduct preliminary assessments of dental remains and appliances. If no odontologist is available, Laboratory Management may assign an anthropologist to conduct a dental preliminary assessment of dental remains. The assessment (along with accompanying high quality digital photographs of the dental materials) is forwarded to a CIL odontologist for review and concurrence. Since only odonotologists are trained in dental DNA sampling (see below) they provide the assessment of DNA potential needed to complete the dental preliminary assessment documentation.

Evidence Coordinators may approach Laboratory Management to assign assessments, as needed. Observations are recorded on the preliminary assessment form in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation) **(A5.7.3)**. Preliminary assessment includes:

C2.1 **Assess Basic Information:**

- List and briefly describe the evidence present. Determine the minimum number of individuals (MNI) represented.
- Identify any non-human and non-osseous material present.

C2.2 **Report Abnormalities or Departures from Specified Conditions:** Upon inspection of the evidence, abnormalities or departures from normal or specified conditions are recorded. Specifically:

- Conditions that could affect testing.
- When there is doubt as to the suitability of an item for tests.
- When the test required is not specified in sufficient detail by the customer.

The person conducting the preliminary assessment reports any of the above conditions to Laboratory Managements who may consult the customer for further instructions, as appropriate, before proceeding with tests. Records of the discussions are maintained **(A5.8.3)**.

C2.3 **Assess DNA Potential:** Assessing remains for DNA potential is done in accordance with Enclosure 1 (Assessment of DNA Potential) to this annex.

C2.4 **Update CARIS and Case File:** An Evidence Coordinator enters all preliminary assessments into CARIS, places a signed copy of the form into the case file, and stores an electronic copy in the appropriate network folder.

C3.0 SURETY: Laboratory Management is responsible for making sure that preliminary assessments are completed correctly and in a timely manner.

Since it may complicate future testing, reconstruction of remains, as discussed in DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation), should only be conducted during preliminary assessment when absolutely necessary. In the event elements need to be conjoined to complete the preliminary assessment (e.g., mandible fragments and teeth for radiography), use dental wax, tape, or other relatively temporary media instead of glue.

All preliminary assessments are entered into CARIS, a signed copy is placed in the case file, and the electronic version is stored in the appropriate network folder.

Enclosure 1 (Assessment of DNA Potential) to Annex C

C1E1.0 GENERAL: The following procedures may be used to assess the potential of remains to produce DNA, when sampled. Throughout the assessment process, consult DNA personnel, as needed.

C1E2.0 ASSESSMENT PROCEDURES: The potential to extract DNA is determined using the following criteria:

C1E2.1 **Osseous Material:** For MNI=1, estimate for the best material. Where MNI>1 the preliminary assessment should indicate the DNA potential for elements yielding MNI especially if there are wide variations in the DNA potential.

Since DNA is used to provide information to support identifications and to resolve commingling where practical, a single skeleton with no commingling is usually sampled on the two best elements available. If commingled individuals are represented by many skeletal elements then DNA likely targets material permitting efficient segregation of remains.

C1E2.1.1 **Elements:** The best osseous elements for testing are, in descending order:

- Femur.
- Tibia.
- First metatarsal.
- Os coxa.
- Lower margin of the mandibular body.
- Humerus.
- Scapula.
- Petrous temporal.

The less successful material (also in descending order) includes:

- Fibula.
- Rib.
- Radius.
- Vertebra.
- Clavicle.
- Ulna.
- Cranium (other than petrous temporal).

Additionally, undiagnostic long bone fragments can also be useful. Sternal portions of ribs, vertebral centra, the calcaneus, and talus are not currently good DNA candidates. Metacarpals and metatarsals 2 through 5 are DNA candidates where preservation is good.

C1E2.1.2 **Other Factors:** Besides being in the more successful group of elements listed above, factors correlated with good DNA results are:

- Completeness of the element.
- Good bone density (does the bone feel heavy for its size?).
- Good superficial preservation (is the cortex well preserved?).
- Metal staining (the metal ions seem to preserve the DNA).

Besides being in the "less successful" element list (or not on the list at all), factors correlated with poor DNA results are:

- Fragmentation.
- Heavy rootlet intrusion.
- Loss of bone density (it feels light for its size).
- Cracking, flaking, exfoliation.
- Evidence of heating (localized charring may still produce DNA).
- Having a cutable mass less than 2 grams.

C1E2.1.3 **Determine DNA Potential:** Based on the sum of the factors:

- No negative factors, potential should be Excellent
- One negative factor should be Good
- Two or more negative factors would be Poor or possibly No DNA Potential

C1E2.2 **Dental Material:** Since only odontologists are trained in dental DNA sampling, they conduct the assessment for dental remains.

The best potential samples are from molar teeth with unrestored and otherwise undamaged crowns, lacking carious lesions and with complete, closed, and undamaged roots. A tooth meeting these criteria has excellent potential.

However, all types of teeth have yielded positive DNA results, including incisors, canines and premolars. In addition, teeth with one or more negative factors (e.g., carious and restored teeth, those with cracked and fractured crowns, partially eroded or fractured roots, and/or partially decalcified dentine) have yielded sequence data. Consequently:

- Teeth with one negative factor should generally be termed to have Good potential.
- Two or more negative factors would indicate Poor DNA potential.

- A tooth lacking any recoverable dentine probably has "No DNA Potential" (the DNA potential for enamel samples is unknown but is believed to be limited).

C1E3.0 DOCUMENTATION: All relevant observations pertaining to DNA assessment are documented on the preliminary assessment form.

C1E4.0 SURETY: For cases where it is unclear if the evidence has DNA potential or not, request a review by DNA personnel. Cases that are assessed to have "No DNA Potential" may be reassessed later as technology advances. Regardless of the apparent or current DNA potential, all biological evidence should be treated as a potential target of DNA testing until a need for DNA testing is ruled out. As such, appropriate precautions should be taken to preserve the value of potential DNA evidence.

Where the customer requires deviations, additions or exclusions from the above assessment procedures, these are recorded in detail with the appropriate sampling data, included in all documents containing test results, and communicated to the appropriate personnel.

Annex D (Special Instructions for CIL-WP)

D1.0 PURPOSE & SCOPE: This annex covers evidence procedures for CIL-WP located in Building 17, Area B on Wright-Patterson AFB, Ohio.

D2.0 GENERAL PROVISIONS & FRAMEWORK: The following are general provisions and guidance involving evidence management and security at CIL-WP:

- The definitions and caveats presented in the body of this SOP fully apply.
- In general, evidence is signed out to CIL-WP using procedures that parallel the sign out to other areas of CIL-HQ (e.g., Autopsy Room, SEM Room), or CIL-OF. As such, CIL-WP is considered simply another CIL destination when evidence is signed out to that location from CIL-HQ or CIL-OF. Additional transportation considerations are discussed below.
- Evidence may be transported directly from the field to CIL-HQ or CIL-OF and accessioned there to include preliminary assessment. Accessioning follows the receipt of evidence and chain of custody processing guidance detailed in the body of this SOP.
- Transport of evidence to and from CIL Laboratory locations (CIL-HQ, CIL-OF, or CIL-WP) largely parallels the procedures of transporting evidence from the field to CIL-HQ or CIL-OF; however, the procedures are more streamlined (see below).
- Evidence conservation for evidence initially accessioned at CIL-HQ or CIL-OF may take place at either of these locations, prior to transport to CIL-WP if it is needed to prevent loss, cross-transfer, contamination, and/or deleterious change of the evidence. Generally, the evidence will be conserved at CIL-HQ or CIL-OF prior to being sent to CIL-WP. In the event of the former, analytical notes detailing the conservation are placed in the case file for that accession.

D3.0 EVIDENCE HANDLING PROCEDURES: The following procedures are used for the transport, handling, storage, and treatment of evidence between CIL-HQ, CIL-OF, and CIL-WP while at CIL-WP:

D3.1 **Transportation of Evidence:**

D3.1.1 **Planning & Management:** Movement of evidence between CIL-HQ, CIL-OF and CIL-WP, especially in a hurried or haphazard fashion, may contribute to its loss, cross-transfer, contamination and/or deleterious change. In order to protect evidence and maximize overall productivity and efficiency, Laboratory Management, Evidence Coordinators, and CIL Staff should all be proactive in planning for the transport of evidence back-and-forth between CIL-HQ, CIL-OF and CIL-WP.

D3.1.2 **Transportation Options:**

D3.1.2.1 **Commercial Courier:** Transportation of evidence back and forth between CIL-HQ, CIL-OF and CIL-WP is typically done using FEDEX or other commercial couriers with tracking capability. The tracking paperwork at the origination end of CIL-HQ or CIL-OF and the destination end of CIL-WP becomes part of the chain of custody records.

D3.1.2.2 **MILAIR:** Large shipments of evidence may be conducted by military airlift (MILAIR) in accordance with USAF manifest and transport procedures. In such instances the evidence leaves CIL-HQ or CIL-OF on a completed chain of custody form, taken to the MILAIR terminal and be signed over to an appropriate escort in accordance with the evidence transport procedures detailed in the body of this SOP. Additionally:

- Flights are of a timely duration and direct from Hawaii or Offutt AFB to Wright Patterson AFB. For example, a short layover at Travis AFB or Scott AFB is permissible provided an interim or final destination is Wright-Patterson AFB.
- Evidence is transported to the MILAIR terminal using the courier procedures detailed above.
- Laboratory Management periodically liaises with DPAA Logistics Air, keeps abreast of any deviations in the flight plans, and takes appropriate action in the event of such deviations.
- The CIL representative delivering the evidence remains at the terminal until the departure of the aircraft.

D3.1.2.3 **CIL Courier:** Evidence may be transported between CIL-HQ, CIL-OF, or CIL-WP (in the desired direction) by using CIL couriers largely using the same procedures documentation as for movement between CIL-HQ and external facilities (see above). The following additional instruction apply:

- The courier is typically a member of the CIL Staff competency trained in this SOP.
- The CIL prearranges all required permits to transport remains (e.g., transit permits, disposition of repatriated remains permits), as appropriate.
- Large shipments that must be checked as baggage are to be avoided.

- Whenever possible and practical, the evidence is transported as carry-on baggage in a suitably sized locked container.
- Evidence is transported between CIL-HQ, CIL-OF, and CIL-WP in the shortest time and most expedient manner possible. Interim stops and layovers are mission essential only (e.g., a layover as programmed by DTS or the travel agency). Normally, leave-en-route is not approved.
- Do not leave the evidence unattended; evidence should be under observation and control at all times.

D3.1.3 **Arrival at Destination:** For MILAIR shipments, an appropriate CIL-WP representative meets the aircraft and signs for the shipment on the CIL chain of custody form prepared in Hawaii or Nebraska. Courier procedures detailed above, as appropriate.

For all shipment options, the evidence is immediately taken to the secure analytical space (Room 125). Once the evidence is in the secure area, the CIL-WP Evidence Coordinator or Alternate Evidence Coordinator verifies the evidence shipment by inspecting, inventorying, photographing, and documenting all arriving evidence using the arrival procedures specified in the body of this SOP.

D3.1.4 **Disposition & Consistency of Documentation:** For every movement of evidence between CIL-HQ, CIL-OF and CIL-WP the original chain of custody and/or tracking documents become part of the chain of custody record. Scanned digital copies will be sent to CIL-HQ or CIL-OF (evidence origin location) verifying receipt of evidence. In the event there is a problem(s) and the evidence cannot be verified, the CIL-WP Evidence Coordinator or Alternate Evidence Coordinator at the destination immediately notifies Laboratory Management and the Lead Evidence Coordinator.

D3.2 **Internal Control of Evidence at CIL-WP:** Internal control of evidence at CIL-WP is managed by the CIL-WP Evidence Coordinator and/or Alternate Coordinator using previously established procedures.

Once evidence arrives at CIL-WP, the following controls take effect:

D3.2.1 **Location & Internal Movement:** CIL-WP does not have the TRAIL system. Instead, CIL-WP performs internal evidence custody and related record keeping utilizing an Excel spreadsheet. Specific procedures are as follows:

Arriving evidence is inventoried to ensure that packages have not been altered, damaged, or opened prior to arrival at CIL-WP. Any discrepancies are immediately photographed and documented.

- Evidence information is entered into the Case Tracking database by the CIL-WP Evidence Coordinator.
- A CIL Form 1301 is completed in accordance with this SOP prior to moving evidence into the Evidence Storage Area (Room 206) for storage or to an analytical table if immediate analysis is required.
- Information entered into the Case Tracking Database documents the receipt of the evidence. Information includes:

  - Accession number.
  - Date of receipt.
  - Alternate case identification number (e.g., REFNO, BUNO, MACR), if any.
  - Incident date.
  - Service component.
  - Vehicle or site type (e.g., aircraft loss or ground loss). Number of missing personnel.
  - Associated unit (if known).
  - Current location.
  - Remarks, if any.

- A folder is then created to hold all documents that arrived with the evidence. Specifically:

  - Pertinent case information is printed on the front of the folder.
  - The folder is then assigned a file number.
  - The file is then stored in the file storage cabinets in the Laboratory.

- The CIL-WP Evidence Coordinator (or Alternate Evidence Coordinator) places the evidence in an evidence storage container and further assigns the evidence to a storage rack space. Evidence may be stored adjacent to other accession numbers potentially related to the same incident.
- Alternately, evidence may be issued to an analyst for immediate analysis. In such instances, the location of the evidence is recorded:

  - In the Case Tracking Database.
  - On the whiteboard designated to show individual table assignment.

The evidence is logged and tracked by CIL accession number. The Case Tracking Database and the CIL1301 is annotated to track the assignment of evidence to an analyst, the movement of the evidence

around the Laboratory, and the return the evidence to storage after the completion of all testing.

Evidence is prohibited in areas outside of the Analytical Area (Room 125), the Photographic Studio (Room 105), or the Microscopy Room (Room 106) unless under physical control of the assigned analyst in the performance of his/her duties.

Disciplinary action may be taken against individuals found with evidence in unauthorized areas.

D3.2.2 **Evidence Storage:** The storage rack shelving in the Evidence Storage Area (Room 206) is the secure permanent storage areas for evidence at CIL-WP. The definitions and caveats presented in the body of this SOP fully apply.

D3.2.3 **Evidence Handling in Test Areas:** Evidence treatment and handling in test areas adheres to the provisions outlined in the body of this SOP, including placement on tables and other surfaces as applicable and practical.

D3.2.4 **Final Disposition of Evidence:** The procedures for final disposition of evidence are in accordance with those in the body of this SOP. CIL-WP works closely with the Science Director regarding all matters of evidence disposition including, but not limited to:

- Identified and associated material evidence.
- Return of material evidence to next of kin.
- Retention of material evidence at CIL-WP.
- Disposal of evidence.

D4.0 SURETY: All surety provisions listed in the body of this SOP apply. Additionally, the CIL-WP Evidence Coordinator, and/or his or her designee, performs periodic inspections of CIL-WP for compliance with this SOP and Annex. External audits conducted by appropriate personnel from CIL-HQ may also occur.

Annex E (Special Instructions for CIL-OF)

E1.0 PURPOSE & SCOPE: This annex covers evidence procedures for CIL-OF located in Building 301 (the "Martin Bomber Building") on Offutt AFB, Nebraska.

E2.0 GENERAL PROVISIONS & FRAMEWORK: The following are general provisions and guidance involving evidence management and security at CIL-OF:

- The definitions and caveats presented in the body of this SOP fully apply.
- In general, evidence is signed out to CIL-OF using procedures that parallel the sign out to other areas of CIL-HQ (e.g., Autopsy Room, SEM Room). As such, CIL-OF is considered simply another CIL destination when evidence is signed out to that location from CIL-HQ. Additional transportation considerations are discussed below.
- Evidence may be transported directly from the field to CIL-OF and accessioned there to include preliminary assessment. Accessioning follows the receipt of evidence and chain of custody processing guidance detailed in the body of this SOP.
- Transport of evidence to and from CIL-OF largely parallels the procedures of transporting evidence from the field to CIL-HQ; however, the procedures are more streamlined (see below).
- Evidence conservation for evidence initially accessioned at CIL-HQ may take place at CIL-HQ, prior to transport from CIL-HQ to CIL-OF if it is needed to prevent loss, cross-transfer, contamination, and/or deleterious change of the evidence. Otherwise the evidence may be transported to, and subsequently conserved at, CIL-OF. In the event of the former, analytical notes detailing the conservation are placed in the case file for that accession.

E3.0 EVIDENCE HANDLING PROCEDURES: The following procedures are used for the transport, handling, storage, and treatment of evidence between CIL-HQ and CIL-OF and while at CIL-OF:

E3.1 **Transportation of Evidence:**

E3.1.1 **Planning & Management:** Movement of evidence between CIL-HQ and CIL-OF, especially in a hurried or haphazard fashion, may contribute to its loss, cross-transfer, contamination and/or deleterious change.

In order to protect evidence and maximize overall productivity and efficiency, Laboratory Management, Evidence Coordinators, and CIL Staff should all be proactive in planning for the transport of evidence back-and-forth between CIL-HQ and CIL-OF.

E3.1.2 **Transportation Options:**

E3.1.2.1 **Commercial Courier:** Transportation of evidence back and forth between CIL-HQ and CIL-OF is typically done using FEDEX or other commercial couriers with tracking capability. The tracking paperwork on either end of CIL-HQ and CIL-OF becomes part of the chain of custody records.

E3.1.2.2 **MILAIR:** Large shipments of evidence may be conducted by military airlift (MILAIR) in accordance with USAF manifest and transport procedures. In such instances the evidence leaves CIL-HQ on a completed chain of custody form, taken to the MILAIR terminal and be signed over to an appropriate member of the aircrew in accordance with the evidence transport procedures detailed in the body of this SOP. Additionally:

- Flights are of a timely duration and direct from Hawaii to Offutt AFB. For example, a short layover at Travis AFB is permissible provided an interim or final destination is Offutt AFB.
- Evidence is transported to the MILAIR terminal using the courier procedures detailed above.
- Laboratory Management periodically liaises with DPAA Air Operations, keeps abreast of any deviations in the flight plans, and takes appropriate action in the event of such deviations.
- The CIL representative delivering the evidence remains at the terminal until the departure of the aircraft.

E3.1.2.3 **CIL Courier:** Evidence may be transported between CIL-HQ and CIL-OF (in either direction) using CIL couriers by largely using the same procedures documentation as for movement between CIL-HQ and external facilities (see above). The following additional instruction apply:

- The courier is typically a member of the CIL Staff competency trained in this SOP.
- The CIL prearranges all required permits to transport remains (e.g., transit permits, disposition of repatriated remains permits), as appropriate.
- Large shipments that must be checked as baggage are avoided.
- Whenever possible and practical, the evidence is transported as carry-on baggage in a suitably sized locked container.

- Evidence is transported between CIL-HQ and CIL-OF in the shortest time and most expedient manner possible. Interim stops and layovers are mission essential only (e.g., a layover as programmed by DTS or the travel agency). Normally, leave-en-route is not approved.
- Do not leave the evidence unattended; evidence should be under observation and control at all times.

E3.1.3 **Arrival at Destination:** For MILAIR shipments, an appropriate CIL-OF representative meets the aircraft and signs for the shipment on the CIL chain of custody form prepared in Hawaii. Courier procedures detailed above, as appropriate.

For all shipment options, the evidence is immediately taken to the secured analytical area (Room 108). Once the evidence is secure area, the CIL-OF Evidence Coordinator or Alternate Evidence Coordinator verifies the evidence shipment by inspecting, inventorying, photographing, and documenting all arriving evidence using the arrival procedures specified in the body of this SOP.

In the event there is a problem(s) and the evidence cannot be verified, the CIL-OF Evidence Coordinator or Alternate Evidence Coordinator at the destination immediately notifies Laboratory Management and the Lead Evidence Coordinator.

E3.1.4 **Disposition & Consistency of Documentation:** For every movement of evidence between CIL-HQ and CIL-OF the original chain of custody and/or tracking documents become part of the chain of custody record. Scanned digital copies may be sent to CIL-HQ if the need arises.

E3.2 **Internal Control of Evidence at CIL-OF:** Internal control of evidence at CIL-OF is managed by the CIL-OF Evidence Coordinator and/or Alternate Coordinator using the CIL-wide TRAIL system.

Once evidence arrives at CIL-OF, the following controls take effect:

E3.2.1 **Location & Internal Movement:** Evidence is first entered into TRAIL prior to moving it into the Evidence Storage Room (Room 116). Alternately, the CIL-OF Evidence Coordinator (or Alternate Evidence Coordinator) assigns the evidence to an exam table, annotating its location accordingly using the TRAIL system.

Evidence is prohibited in areas outside of the Analytical Area unless under a proper chain of custody form.
Evidence is prohibited in areas outside of Room 108 of CIL-OF unless under a proper chain of custody form.

Disciplinary action may be taken against individuals found with evidence in unauthorized areas.

E3.2.2 **Evidence Storage:** The compact shelving in the Evidence Storage (Room 116) and the walk-in refrigerator (Room 122) are the secure permanent storage areas for evidence at CIL-OF. The definitions and caveats presented in the body of this SOP fully apply.

E3.2.3 **Evidence Handling in Test Areas:** Evidence treatment and handling in test areas adheres to the provisions outlined in the body of this SOP, including placement on tables and other surfaces as applicable and practical.

E3.2.4 **Final Disposition of Evidence:** The procedures for final disposition of evidence are the same as in the body of this SOP. The CIL-OF Laboratory Director works closely with the Science Director regarding all matters of evidence disposition including, but not limited to:

- Identified remains.
- Return of material evidence to next of kin.
- Retention of material evidence at CIL-OF.
- CIL portions and admin fiats.
- Disposal of evidence.

E4.0 SURETY: All surety provisions listed in the body of this SOP apply. Additionally, the CIL-OF Evidence Coordinator, and/or his or her designee, performs periodic inspections of CIL-OF for compliance with this SOP and Annex. External audits conducted by appropriate personnel from CIL-HQ may also occur.

Annex F (Guidelines for Shipping Evidence to the DPAA Laboratory)

Intent: All evidence (remains and/or material evidence) shipped to the DPAA Laboratory is protected from loss, cross transfer or contamination, and/or deleterious change to the furthest degree possible.

General Guidance: Packaging evidence is performed on a case by case basis as it depends on the quantity and condition of the items being shipped. The preferred method to ship evidence is to package items in plastic zip bags in order to keep like items together and to prevent (further) commingling of the evidence during shipment. The bagged evidence should then be wrapped or covered with packing material (e.g. bubble wrap, packing pellets, crumpled newspaper) so as to absorb shock during shipment.

Specific Guidance:

- For shipping a skull: If already loose, keep the mandible (lower jaw) separate from the skull; remove any loose teeth and place them in a small zip bag; carefully wrap the mandible and head separately in bubble wrap, and surround them with packing pellets, or crumpled newspaper.

- For shipping material evidence (artifacts): Items may be placed in the same bag and wrapped with bubble wrap or surrounded with packing pellets. Items that appear to be brittle or fragile should be bagged separately from any other items and then wrapped with bubble wrap or surrounded with packing pellets.

- Along with the items being shipped, include CIL Form 1317 (Background Questions for Evidence Received by Non-Laboratory Personnel) which asks questions on the background of the evidence and how it came into your possession. The form is available upon request from the Laboratory. Also include copies of photos, maps, and Chain of Custody documentation, if any.

- Select a shipping company with a good tracking system, such as FedEx, UPS, or DHL. The tracking number is needed in the event that the items become lost during transit. The container should be clearly labeled "FRAGILE". Make sure that the shipping container is securely taped closed.

- A prepaid FedEx label may also be provided by the Laboratory upon request. If a FedEx label is requested, provide the box dimensions (length, width, height) and weight of the package.

- Most shipping companies will not ship "possible human remains". Use terminology such as "dry forensic samples, test samples, archaeological samples, or osseous" when noting the contents to the shipping company. Avoid the use of the term "human remains" as this implies that the package contains soft-tissue, organs, body fluids, or similar bio-hazardous materials.

- If possible, have the courier service pickup the package at the organization's location instead of dropping off the package at a drop off location. The approximate value of the contents should be "$0."

- Once the evidence has shipped, contact the applicable Evidence Coordinator via email (see below). Provide them with the shipment tracking information (tracking number).

- Ship items to the appropriate address (Laboratory Management determines which location to send):

  If sending evidence to the Hawaii Laboratory:

  Defense POW/MIA Accounting Agency Laboratory (or DPAA-LAB will suffice)
  ATTN: Evidence Coordinator (Ben Soria)
  590 Moffet Street
  Building 4077
  JBPHH, HI 96853
  U.S.A.
  If sending evidence to the Nebraska Laboratory:

  Defense POW/MIA Accounting Agency Laboratory (or DPAA-LAB will suffice)

ATTN: Evidence Coordinator (Tiffany Rubush)
106 Peacekeeper Drive
Building D
Offutt AFB, NE 68113
U.S.A.

- Address any questions and/or concerns to the respective Evidence Coordinator. Specifically:

Hawaii Laboratory Points of Contact:

Primary:
Mr. Benedick (Ben) Soria
Phone: 808-448-4500, ext 3715
Email: benedick.k.soria.civ@mail.mil

Alternate:
Ms. Tracilyn Ohashi
Phone: 808-448-4500, ext 3789
Email: tracilyn.k.ohashi.civ@mail.mil

Nebraska Laboratory Points of Contact:

Primary:
Ms. Tiffany Rubush
Phone: 402-232-4289
Email: tiffany.m.rubush.civ@mail.mil

Alternate:

SOP 1.4: CIL SAFETY PROGRAM

(Current and Updated Versions Located on the JPAC Intranet)
Last Revised: 4 March 2016
Citation: JPAC Laboratory Manual, SOP 1.4

CONTENTS

0.0 PRINCIPLE, SPIRIT & INTENT: *A safe work environment is maintained at all times. Hazards that cannot be eliminated are mitigated to the fullest extent possible within the context of the CIL's mission* **(SA5.3.6, SF5.3F-21)**.

1.0 PURPOSE & SCOPE: This SOP details policies and procedures for the CIL Safety Program. The purpose of the safety program is to establish a working environment that facilitates the accomplishment of the organizational mission while ensuring the safety of employees, visitors, and the public as well as government and private property. This SOP applies to all scientific, administrative, support and technical staff including all contractors and/or visitors that enter the CIL or recovery-scenes under the operational control of CIL personnel. This SOP is applicable wherever CIL personnel conduct business (CIL, crime scenes, recovery-scenes, and training locations). In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 DEFINITIONS:

"Action level" means a concentration for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

"Acutely Toxic" A chemical falling within any of the following toxicity categories: 1) a median lethal dose (LD50) of 50 mg/kg of body weight or less when administered orally to rats; 2) an LD50 of 200 mg/kg of body weight or less when administered to the skin of rabbits; or 3) a median lethal concentration (LC50) of 200 ppm or less gas or vapor, or 2 mg/liter or less of mist, fume , or dust when administered by inhalation to rats.

"Biohazard Bag" means bags that are red, orange, or red-orange in color, closeable, leak proof, meet the 165 gram drop dart test, and are marked with a three inch or larger biohazard symbol or one inch or larger letters as "INFECTIOUS WASTE."

"Blood" means human blood, human blood components and products made from human blood.

"Blood Borne Pathogens" means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

"Carcinogen" (see "select carcinogen").

"Chemical Hygiene Officer (CHO)" means an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. This definition is not intended to place limitations on the position description or job classification that the designated individual holds within the employer's organizational structure.

"Chemical Hygiene Plan" means a written program developed and implemented by the employer which sets forth procedures, equipment, PPE and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace.

"Combustible liquid" means any liquid having a flashpoint at or above 100 deg. F (37.8 deg. C), but below 200 deg. F (93.3 deg. C), except any mixture having components with flashpoints of 200 deg. F (93.3 deg. C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.

"Compressed gas" means:

- A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 deg. F (21.1 deg. C); or
- A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 deg. F (54.4 deg C) regardless of the pressure at 70 deg. F (21.1 deg. C); or
- A liquid having a vapor pressure exceeding 40 psi at 100 deg. F (37.8 C) as determined by ASTM D-323-72.

"Contaminated" means the presence or reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

"Decontamination" means the use of physical or chemical means to remove, inactivate, or destroy blood borne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.

"Designated area" means an area which may be used for work with "select carcinogens," reproductive toxins or substances which have a high degree of acute toxicity. A designated area may be the entire CIL or smaller areas such as a fume hood.

"Disinfect" means to inactivate virtually all recognized pathogenic microorganisms but not necessarily all microbial forms (e.g., bacterial endospores) on inanimate objects.

"Emergency" means any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment, which results in an uncontrolled release of a hazardous chemical into the workplace.

"Employee" means an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

"Explosive" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

"Exposure Incident" means a specific eye, mouth, other mucus membrane, non-intact skin or parenteral contact with blood or other potentially infectious materials that result from the performance of an employee's duties.

"Flammable" means a chemical that falls into one of the following categories:

- "Aerosol, flammable" means an aerosol that, when tested, yields a flame protection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening.
- "Gas, flammable" means: A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or a gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit.
- "Liquid, flammable" means any liquid having a flashpoint below 100 deg F (37.8 deg. C), except any mixture having components with flashpoints of 100 deg. C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.

- "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical is considered a flammable solid if, it ignites and burns with a self-sustained flame at a rate greater than $1/10^{th}$ inch per second along its major axis.

"Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite.

"Hazardous chemical" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes.

"High Risk Operations" means experimental procedures involving the manipulation, handling, or reaction of hazardous chemicals where the potential for release of gas, vapor, or aerosol contamination is high. This category includes, but is not limited to rapid exothermic reactions; transfer of electrostatic powders; heating, mixing or transfer of volatile chemicals; pressurized operations where there is potential for uncontrolled release and work involving aerosol generation.

"Laboratory" means a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

"Laboratory scale" means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person, excluding workplaces whose function is to produce commercial quantities of materials.

"Laboratory-type hood" means a device located in a laboratory, enclosure on five sides with a movable sash or fixed partial enclosed on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms. Walk-in hoods with adjustable sashes meet the above definition provided that the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazards.

"Laboratory use of hazardous chemicals" means handling or use of such chemicals in which all of the following conditions are met:

- Chemical manipulations are carried out on a "laboratory scale."
- Multiple chemical procedures or chemicals are used.
- The procedures involved are not part of a production process, nor in any way simulate a production process.
- "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

"Medical consultation" means a consultation that takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

"Occupational Exposure" means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

"Other Potentially Infectious Materials" means 1) The following body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, and any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; and 2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead).

"Oxidizer" means a chemical other than a blasting agent or explosive as defined in 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

"Parenteral" means piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.

"Physical hazard" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer pyrophoric, unstable (reactive) or water-reactive.

"Protective laboratory practices and equipment" means those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

"Regulated Waste" means liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dry blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

"Reproductive toxins" means chemicals that affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

"Select carcinogen" means any substance that meets one of the following criteria:

- It is regulated by OSHA as a carcinogen.
- It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition).
- It is listed under Group 1 ("carcinogenic to humans") by the International Agency for research on Cancer Monographs (IARC) (latest editions).
- It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
  - After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m.
  - After repeated skin application of less than 300 (mg/kg of body weight) per week.
  - After oral dosages of less than 50 mg/kg of body weight per day.

"Unstable (reactive)" means a chemical that in the pure state, or as produced or transported, vigorously polymerizes, decomposes, condenses, or becomes self-reactive under conditions of shocks, pressure or temperature.

3.0 GENERAL: It is the CIL policy to minimize to the greatest extent possible the risk of accident. Being a U.S. Government organization, the CIL adheres to federal safety standards. As such, guidelines in this SOP do not relieve personnel of responsibilities set forth in higher echelon policies and applicable laws that govern occupational safety and health.

Any conflict between guidance in this SOP and higher regulations, directives and applicable laws are resolved in favor of the immediate safety of personnel, then of property, and then of the higher echelon direction or legal requirements.

Discrepancies between the CIL policies and practices and the references above are immediately brought to the attention of the CIL Safety Officer. To maintain operational flexibility, some deviations from standards may be allowed after operational risk-management (ORM) is performed.

The body of information and regulations concerning safety in the workplace is extensive and constantly changing. In the event the need for a specific safety reference and/or regulation arises relevant to a safety issue in the CIL, consult the DPAA (West) Safety Officer.

4.0 RESPONSIBILITIES: Health and safety responsibilities for various personnel are as follows:

4.1 **Appropriate Base Ground Safety Office:** Upon request of the CIL:

- Provide professional guidance for the Safety Program per the existing Memorandums of Agreement and Understanding.
- Provide opportunities for professional safety-training support to all personnel.
- Conduct periodic inspections of CIL facilities and operations.
- Provide guidance and assistance regarding hazardous waste disposal including receiving and disposal of hazardous waste through an installation disposal contract.

4.2 **DPAA Deputy Director**: The DPAA Deputy Director is responsible for the overall protection of personnel and property under his agency and for ensuring full and effective implementation of safety measures throughout the DPAA.

4.3 **Science Director:** The Science Director acts to protect all CIL personnel and property and ensure full and effective implementation of applicable laws and policies related to safety, including occupational health and environmental protection. The Science Director implements standard operating procedures which conform to all pertinent safety laws, regulations and policies, and which consider the work processes of the CIL and its environmental impact.

4.4 **Safety Officer:** The Safety Officer is the primary point of contact for safety issues needing coordination with agencies outside of the CIL. The Safety Officer, in consultation with Laboratory Managers, the Lead Quality Coordinator, and supervisors, identify performance standards for safety and occupational health for the CIL and administer related programs **(SA4.1.7)**. The Safety Officer takes direct action and/or develop policies and procedures to:

- Instill safety as the first standard for every work activity. Aggressively pursue accident prevention. Conduct all work without compromising employee or public health and safety.
- Preclude unacceptable risk to the safety of personnel and equipment. Unacceptable risk is risk that could result in an accident.
- Ensure appropriate safety design criteria are incorporated into CIL construction or renovation. Monitor the same during the construction phase.
- Take expeditious action to correct identified deficiencies in the safety program.
- Terminate work in the presence of unsafe equipment, conditions, or practices. Take immediate action to correct or eliminate the same.
- Encourage the inclusion of accident prevention and occupational health standards as performance rating elements for military and civilian personnel.
- Request additional support, as necessary, to ensure effectiveness of the unit safety program.
- Act as liaison with supervisory, support, enforcement, and counterpart organizations, including, but not limited to, Base Ground Safety Offices, Army Safety Center, U.S. Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and other agencies as appropriate. Keep a consolidated list of updated point of contacts for these agencies
- Inform personnel of hazards and provide information and training regarding appropriate PPE.
- Secure periodic occupational health, safety, and other reviews from outside organizations to assist in the evaluation of the CIL Safety Program and work environment.
- Participate in regular CIL safety committee meetings and share information in a manner designed to improve overall safety of operations.
- Implement and conduct a safety-training program tailored to the needs of the CIL. Ensure employees possess required certifications.
- Conduct periodic and unannounced safety reviews and required inspections of CIL facilities and operations.
- Ensure that applicable CIL personnel are scheduled for recurring medical monitoring through the appropriate clinic.
- Maintain required records.

4.5 **Laboratory Managers, Supervisors, Support Coordinator & Lead Quality Coordinator:** These personnel protect the employees and property within their area of responsibility. They:

- Fully communicate the hazards to employees and provide appropriate PPE.
- Ensure that personnel are properly trained, are aware of, and follow safety guidance.
- Ensure that personnel have received adequate training to correctly and consistently use PPE.
- Terminate work until necessary action is taken to correct hazards and unsafe practices identified in the work place.
- Report immediately each accident that occurs in the workplace. Promptly complete safety and employee compensation report forms.
- Ensure that required subordinate personnel receive job related medical surveillance as specified in this SOP.
- Ensure that all CIL procedures address safety as part of their design and execution.
- The Lead Quality Coordinator acts as the Assistant Safety Officer in the absence of the Safety Officer.

4.6 **Support Coordinator:** Under the direction of the Safety Officer or Lead Quality Coordinator, the Support Coordinator is the primary point of contact for supply and service issues related to CIL safety.

4.7 **Recovery Leader (RL)**: Although the DPAA Leader's Handbook identifies the military Team Leader as the responsible official to ensure team safety, it is also the RL's responsibility to ensure that recovery scene procedures are designed and implemented in a safe manner. A more detailed discussion of field safety and responsibilities can be found in DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing).

4.8 **All CIL Personnel:** All personnel assigned to and employed by the CIL follow the procedures established in this SOP and supplemental safety and occupational health guidelines. All employees:

- Use equipment only for its designed purpose and operate in accordance with user guidelines and SOPs.
- Perform preventive maintenance on assigned PPE.
- Correctly use appropriate PPE during occupational exposure to hazards.
- Perform procedures in accordance with operational guidelines and SOPs. Know the safety rules and procedures that apply to the work being done.
- Demonstrate sound personal hygiene habits when working with hazardous materials.
- Determine the potential hazards and appropriate safety precautions before beginning any new operation. Ask questions and seek assistance as required.
- Know the location of and how to use emergency equipment in their area.
- Be familiar with emergency procedures.
- Think, act, and encourage safety. Remain alert to, and report, hazardous conditions, exposures, accidents, or abnormal circumstances associated with any operation. Take immediate corrective action including suspending work, if necessary.
- Store and dispose of hazardous waste in accordance with applicable regulations and guidance.
- Take/recommend actions to avoid or eliminate unsafe practices or conditions.
- Participate in required safety training.
- Participate in any required job related medical surveillance.
- In cooperation with the medical staff, provide immediate rescue and first aid for accident victims.

5.0 CIL HAZARDS, SAFETY MEASURES & ACCIDENT PREVENTION: Laboratory and fieldwork can be incredibly dangerous. Identifying hazards and then taking steps to mitigate them enhances safety. The more common hazards encountered by CIL personnel are outlined below. A more detailed discussion of field hazards can be found in DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing).

5.1 **Hazards & Mitigation:**

5.1.1 **Biological Material:** Biological hazards, addressed in Annex A (Blood Borne Pathogen Exposure Control Plan) of this SOP, are potentially present wherever biological evidence is located.

5.1.2 **Radiation:** Radiation exists in the CIL in two forms:

- **Ionizing Radiation:** X-ray producing instrumentation located within CIL includes the dental and medical x-ray machines, SEMs with integral x-ray diffraction device, and various hand held devices. Periodic inspections (with documentation maintained by the CIL) have determined that x-rays taken pose no exposure danger for operators of the equipment or personnel working in areas. Consequently, personnel are not required to wear body radiation dosimeter devices to monitor exposure levels.
- **Non-Ionizing Radiation:** Non-ionizing radiation sources include UV light sources and multiple wavelength light sources. These constitute primarily a visual hazard although there can be damage to exposed skin by UV.

The following precautions are taken to minimize exposure to radiation:

- Personnel are properly trained in the safe operation of radiation-producing instruments and made aware of potential hazards involved before operating them.
- Equipment is not operated without required and installed shields and guards in place. Personnel always have an effective barrier between them and the hazardous radiation. Shields within the device, external shields, protective clothing, appropriate protective eyewear, and distance can provide this.
- Quality Assurance arranges for regular surveys of radiation producing equipment at all CIL facilities so equipped.
- Employees immediately notify Laboratory Management and the Safety Officer of any incidents that result in unintended and/or potentially harmful exposure to radiation.

5.1.3 **Weapons and Ordnance**: These items are commonly encountered in the field and while handling evidence at the CIL. RLs follow the below safety measures regarding the return of weapons and/or ordnance to the CIL from recovery scenes:

- Trained explosive ordnance disposal (EOD) technicians are the only members of Recovery Teams authorized to handle unexploded ordnance (UXO). Generally, these individuals are under operational control of non-CIL organizations. Regardless, UXO poses a safety threat and all personnel follow any and all instructions provided by EOD technicians.
- **Do not bring back explosives or explosive devices!**

- Do not bring back any type of firearms. Importation of firearms into the U.S. requires approval from the Bureau of Alcohol, Tobacco, and Firearms (BATF)--a lengthy and paperwork intensive process. See DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing) for special instructions regarding field treatment of weapons related evidence.
- All weapons and/or ordnance unilaterally received in the CIL must be treated as loaded and/or armed until properly cleared by EOD technicians. The first analyst who breaches the sealed container holding the weapon should have the EOD technician clear and/or disarm the weapon using appropriate techniques.

5.1.4 **Hazardous Material & Wastes:** Hazardous material and waste, including compressed and sometimes cryogenic liquids, may be found in the CIL. Hazardous materials and waste are addressed in detail in Annex A (Blood Borne Pathogen Exposure Control Plan) and Annex B (Chemical Hygiene Plan) of this SOP.

5.1.5 **Mechanical Equipment:** Power tools, generators, utility equipment, etc. are found in the field and in the CIL and pose special hazards from noise, sharp edges and moving parts. The following safety measures apply:

- Only trained personnel should operate mechanical equipment.
- Equipment must be inspected regularly, maintained in proper working order, and all required or included safety devices, guards, and shields must be left intact and replaced as needed.
- Eye protection must be worn whenever there is an eye hazard presented by an operation. This includes cutting, drilling, sanding, and utilizing compressed air.
- Only qualified personnel should attempt to adjust, examine, service, or maintain mechanical utility equipment such as air handler units and other components of the heating and ventilation system. Only personnel with a legitimate need should enter the spaces where this equipment is found.
- Arrange for repair or disposal immediately after damage or malfunction is detected. Devices with service requirements must receive the required periodic maintenance by qualified personnel.
- Hearing protection must be worn when engaged in high noise operations.

5.1.6 **Electrical Equipment:** Electrical equipment is found in the CIL and in the field and is subject to the following safety measures:

- Extension cords, power strips, and splitters do not exceed the normal capacity of an electrical circuit. Whenever there is any indication that a circuit has been overloaded, the electrical devices being used are immediately removed and redistributed to ensure safe loading. Extension cord use is kept to a minimum.
- Frayed and defective electrical cords are not used. Proper grounding is used for all devices, and cords are not used where they pose a trip hazard or are subject to damage.
- Only qualified service personnel repair electrical devices.

5.1.7 **Sharp Objects:** Sharp objects are common during CIL and field operations and pose the primary hazard of tissue injury, which can then serve as the medium for introducing hazardous agents. The following precautions apply:

- Proper care should be taken in utilizing knives, box cutters, needles, scalpels, and glassware, especially if they are contaminated with hazardous materials.
- All medical instruments must be packaged in puncture resistant containers for shipping and should be marked to give appropriate warning.
- Scalpels not in use should be sheathed to prevent injury.
- Sharps containers should be used to dispose of sharp objects.
- Items contaminated with bio-hazardous material should be appropriately marked with an OSHA biohazard label. Specific guidance on biologically contaminated objects is found in Annex A (Blood Borne Pathogen Exposure Control Plan) of this SOP.

5.1.8 **Vehicles:** Vehicle hazards exist for all operations. All personnel are to familiarize themselves with the appropriate base traffic regulations. When deployed overseas, CIL personnel follow pre-established vehicle safety rules established by the host nation, U.S. embassy, and the DPAA.

5.1.9 **Fire:** Fire hazards consist primarily of flammable materials, open flames and heat producing devices. Sparks and malfunctioning equipment may also pose fire hazards. Fire safety and prevention is everyone's responsibility.

The Safety Officer, acting in conjunction with the Lead Quality Coordinator, is responsible for maintaining an awareness of fire-safety issues within the CIL, conducting periodic inspections in concert with the appropriate base Fire Marshall, scheduling fire drills, and ensuring that fire safety is in compliance with all applicable regulations. Fire safety equipment such as fire extinguishers, automatic detection **(SA5.3.4.1)** and

extinguishing systems, etc. are located throughout CIL facilities as deemed appropriate by the appropriate base Fire Department.

5.1.9.1 **Precautions:** The following general fire safety measures apply to all CIL personnel:

- Smoking and smokeless tobacco is prohibited within the CIL and is restricted to designated outside areas.
- Do not use an open flame to heat a flammable liquid.
- Open flames should be used only when absolutely necessary and then extinguished immediately.
- Before lighting any open flame, ensure all flammable substances are removed from the immediate area, and tightly close all containers of flammable substances in the area.
- Store flammable materials properly (See Annex B, Chemical Hygiene Plan).
- Use only non-sparking electrical equipment when volatile flammable materials are present.
- Monitor appliances such as coffee makers and space heaters. Do not leave on overnight.
- Fire extinguishers should be labeled to indicate the type of fire for which they are intended and their location marked with signs.
- Sufficient personnel familiar with the use of fire safety equipment are on hand during normal duty hours.

5.1.9.2 **Emergency Response & Evacuation:** The following procedures apply:

- When a fire is detected, first pull/sound the alarm and call the fire department. Telephones typically bear labels indicating emergency telephone numbers.
- Using the appropriate fire extinguisher, safely attempt to fight a small fire that has not spread beyond its immediate area. Fires should not be fought if hazardous to the employee or if escape routes could be blocked.
- Unless it has been pre-announced to disregard an alarm, those not fighting the fire must immediately evacuate the building upon hearing the fire alarm. Signs showing emergency escape plans and exits are posted in CIL facilities. As part of evacuation:
  - For CIL-HQ, do not use the elevators.
  - Continue to spread the alarm and pass word of the evacuation as you exit the building.
  - If time permits, close doors and windows in order to confine the fire (or other hazard) and to prevent drafts. Do not endanger yourself or others in this effort.
  - Once out of the building, proceed to the appropriate assembly area. These are:
    - For CIL-HQ, adjacent to the southeast fence corner of the Auto Skills shop. This is a few meters on the northern side of Moffet Street and immediately adjacent to the southwest most corner of the parking lot at Building 4077.
    - For CIL-OF, 100 meters into the East-West Road outside of the south face of Building 301, immediately across from Door #7.
  - Laboratory Managers account for CIL personnel against the day's muster.
  - Partial accountability of CIL personnel is reported to the DPAA WWOC (World Wide Emergency Operations Center) or other relevant agencies upon request and/or when all personnel are accounted for.
- Only fire department officials can allow personnel to return to the building. In any case where an unannounced alarm occurs, the full evacuation proceeds, even if during the evacuation it becomes believed or known that it is a false alarm. The fire department confirms that it is safe and informs personnel to return to the building.

Note: The above alarm, evacuation, assembly, and accountability procedures, as appropriate, may also be used in response to the following conditions/ events:

- HAZMAT spill or contamination.
- Bomb threat.
- Workplace violence (with exceptions, see below).
- Any other condition or event that makes occupation of the facility untenable.

5.2 **Additional Measures to Prevent or Mitigate Hazards & Accidents:** In addition to the measures described above, other generalized precautions are taken to prevent or mitigate accidents.

5.2.1 **Operational Risk Management (ORM):** Laboratory Management carefully analyzes inherent hazards in all operations and plans accordingly to minimize and mitigate risks. Detailed instructions for this process are found in Annex D (Operational Risk Management) to this SOP.

5.2.2 **Engineering Controls & Emergency Equipment**: Engineering controls are usually fixed items put in place to control exposure to hazards. These include, but are not limited to such as:

- Fume hoods.
- Local exhaust systems.
- Safety interlocks and shields on radiation producing devices.
- Facilities and/or equipment for proper waste disposal.
- Diffusers on hazardous light sources.
- Fire suppression systems.
- Material Safety Data Sheet (MSDS) Stations.

Engineering controls related to specific hazards can be found in Annex A (Blood Borne Pathogen Exposure Control Plan) and Annex B (Chemical Hygiene Plan) to this SOP.

5.2.2.1 **CIL Design:** All planned additions/renovations to the CIL include provisions for engineering controls. The engineering controls installed and their scale must be appropriate to the resulting physical facilities.

5.2.2.2 **Emergency Equipment:** Some engineering controls consist of equipment used to deal with emergencies and placed, as appropriate, depending on the operations being performed in each area. This type of equipment includes eyewash stations and showers and more portable items like fire extinguishers, first-aid kits, and chemical spill kits. It is the responsibility of the Laboratory Managers and the Safety Officer to use ORM (see Annex D) to evaluate all operational areas to ensure that the necessary emergency equipment is available and properly placed. The Safety Officer is responsible for the periodic inspection of all applicable safety equipment.

5.2.2.3 **Use of Engineering Controls:** The below guidelines are followed:

- Engineering controls are not to be tampered with or intentionally defeated.
- Personnel ensure that they are familiar with the intent and operation of existing engineering controls in their areas of operation so that their actions do not inadvertently defeat or impair their function.
- If performance of a procedure is hampered by established engineering controls, then the Laboratory Managers, Lead Quality Coordinator, and Safety Officer should be notified so that the control can be re-designed or adjusted appropriately.
- Engineering controls should be monitored continuously for proper performance and condition. Any problems should be immediately reported to supervisors and the Safety Officer. Appropriate contractors conduct preventive maintenance of fixed engineering controls (general ventilation system, hoods, etc.) at appropriate intervals.

5.2.3 **Signs & Labels (Hazard Communications):** Specific hazard communications requirements are found in Annex A (Blood Borne Pathogen Exposure Control Plan) and Annex B (Chemical Hygiene Plan) to this SOP. Generally, appropriate warning signs are posted identifying the following:

- CIL areas that have special or unusual hazards.
- Locations of emergency equipment (safety showers, eyewash stations, fire extinguishers, etc.).
- Exits and emergency escape plans.
- Smoking prohibited.
- Emergency numbers on all telephones.
- Specialty waste containers. Additionally, hazardous materials containers are labeled with their contents and information on the associated hazards.

5.2.4 **Work Practice Controls:** These are controls or regulations on work practices that reduce the likelihood of accident.

5.2.4.1 **Horseplay:** Avoid horseplay, practical jokes or other behavior that present potential hazards.

5.2.4.2 **Unattended Operations:** An operation should not be left unattended overnight without prior approval of a Laboratory Manager. If unattended operations are approved, lights should be left on, signs should be prepared and placed as appropriate, and provisions made for containment of toxic substances in the event of equipment or utility failure.

5.2.4.3 **Working Alone:** Use caution if working alone in the CIL during non-duty hours. Inform someone of your work plan, if possible.

5.2.4.4 **Avoidance of Routine Exposure:** Avoid routine exposure to hazards whenever possible by taking the following precautions:

- Never taste unknown or hazardous substances.
- Avoid smelling unknown or hazardous substances.
- Substitute less hazardous substances/practices in operations whenever possible.
- Vent toxic materials into hoods or local exhaust devices.
- Minimize working quantities of hazardous substances outside of storage.
- Close containers when not in use.
- Minimize aerosol formation.
- Mouth pipetting is prohibited. Mechanical pipetting devices and rubber bulbs are used.
- Restrain loose clothing and long hair to minimize the risk of contamination.

- Wear appropriate PPE and footwear when working with hazardous materials or in hazardous areas (see Annex C, Use of PPE).
- Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a likelihood of encountering hazardous materials. Food and drink are not stored in CIL refrigerators or cold rooms, shelves, cabinets, or on countertops or bench tops where potentially hazardous materials might be present.
- Glassware or utensils having been used for CIL operations are never used to prepare or consume food or beverages.

5.2.4.5 **Basic Hygiene:** Hand washing facilities and waterless hand sanitizers are located throughout the CIL. Hand washing facilities must include an adequate supply of running potable water, soap and single use towels or hot air drying machines. Follow these basic hygienic guidelines and practices:

- Wash hands after performing analytical work or other operations and before leaving the CIL.
- Wash hands and other skin areas with soap and water, and flush mucous membranes with water immediately, or as soon as possible, after contact with potentially hazardous materials.
- Shower if the neck, arms, legs, or body become contaminated.
- Wash hands and immediately, or as soon as possible, after removal of gloves PPE.
- When hand-washing facilities are not available (e.g., crime scenes), either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes are recommended. When antiseptic cleansers or towelettes are used, hands must be washed later with soap and running water as soon as possible.

5.2.5 **Personal Protective Equipment (PPE):** The use of appropriate PPE is required when engineering controls are insufficient or impractical to ensure control specific hazards and/or to provide a measure of protection in the general laboratory environment. PPE use may be designated both by general work areas and by the requirements of specific operations. PPE is discussed at length in Annex C (Use of Personal Protective Equipment) of this SOP.

5.2.6 **Housekeeping:** Measures are taken to ensure good housekeeping in the CIL **(A5.3.5)**.

5.2.6.1 **General:** Basic housekeeping rules include:

- Keep all CIL areas clean and free of obstructions. Access to exits and emergency equipment are not blocked.
- Avoid using halls as storage areas.
- Cleanup work areas at the end of each day's operations or following completion of analysis, whichever comes first.
- Store waste in appropriate receptacles or containers until disposal.
- Properly store equipment and hazardous substances.
- Broken glassware is not picked up directly with the hands. It must be cleaned up using a brush and dustpan, tongs, forceps or other mechanical means.

5.2.6.2 **Housekeeping Involving Hazardous Materials**: The following guidelines apply:

- All equipment and working surfaces must be properly cleaned and decontaminated after contact with potentially hazardous materials. All work surfaces where potentially hazardous materials are handled are decontaminated before and after each work session is completed.
- Floors are cleaned and disinfected, where appropriate, following a regular schedule or as needed. Any commercial cleaning compound (e.g., Lysol, ammonia solutions, 10% bleach) may be used but care must be taken to ensure that hazardous mixtures are not formed.
- Grossly contaminated (e.g., spilled blood) work surfaces and protective coverings, such as plastic wrap, aluminum foil, or imperviously backed absorbent paper, used to cover equipment and environmental surfaces is removed and replaced as soon as possible. Routine decontamination still takes place and at the end of the work shift.
- All bins, pails, cans, and similar receptacles intended for reuse which have a reasonable likelihood for becoming contaminated with potentially hazardous materials are inspected and decontaminated on a regular basis and cleaned and decontaminated immediately or as soon as possible upon visible contamination.

5.2.7 **Reporting Accidents, Injuries, & Spills:** Reporting of safety hazards and accidents assists in future mitigation and prevention as well as contributing to operational risk management (ORM). Employees report all accidents, injuries, and spills to Laboratory Management immediately and seek appropriate treatment. All incident reports and other documentation and supporting plans and SOPs are prepared as needed by the Safety Officer. In the event an employee is injured or incapacitated, Laboratory Management, working with the Safety Officer, conducts an inquiry to:

- Determine the cause of the incident/accident.
- Initiate action to abate the unsafe condition/practice.
- Initiate safety and compensation reports.

The supervisor obtains an employee statement at the earliest opportunity to supplement prior reports as necessary. The Safety Officer maintains all records relating to accidents. Accident documentation is sent to the DPAA Safety Officer who consolidates and forwards reports to the appropriate authorities.

5.2.8 **Workplace Violence:** Due to various factors (e.g., layered security, background checks on employees, employees seldom working alone) the threat of workplace violence in the CIL is low. The primary threat of this nature is from disgruntled CIL employees or former employees.

CIL Staff should report personnel to Laboratory Management who they believe are prone to workplace violence. Laboratory Management takes appropriate action to deal with the situation.

In the event of a workplace violence situation, the above alarm and evacuation procedures should be followed with the following exceptions:

- Spread the word that work place violence is occurring.
- Let personnel know that, instead of assembling at the pre-designated rally points, move as individuals or small groups away from the buildings in random directions until they are reasonably sure they are not being pursued or until they meet first responders.
- Upon reaching first responders, follow all of their directions.

Periodic training is given to CIL Staff on preventing and reacting to workplace violence.

5.2.9 **Oversight & Surveillance:** The following oversight of employee health is conducted:

5.2.9.1 **Medical Monitoring:** The health of employees is monitored as a proactive safety measure. The Safety Officer coordinates with the DPAA medical staff to refer employees who require medical monitoring as soon as possible after their arrival at the DPAA. The appropriate clinic provides medical support and maintains the medical records of all personnel medically monitored. Additionally, the DPAA coordinates appropriate vaccinations and blood studies for all employees scheduled for deployment and for those determined to be occupationally exposed as in accordance with in Annex A (Blood Borne Pathogen Exposure Control Plan) of this SOP.

5.2.9.1.1 **Routine Monitoring:** Initial medical examinations and consultation is provided to all employees facing potential exposure to occupational hazards. Routine medical surveillance for all potentially exposed personnel is accomplished by completion of subsequent occupational health physicals.

5.2.9.1.2 **Additional Monitoring: A**dditional medical attention is provided to employees under the following circumstances:

- When an employee develops signs or symptoms associated with exposure to an occupational hazard.
- When the results of any survey reveal exposure levels of an occupational hazard above the action level, or in its absence the PEL, for an OSHA regulated substance. Medical surveillance complies with the requirements for that particular OSHA standard.
- Whenever an abnormal occupational exposure event such as a serious spill, leak or explosion takes place in the CIL. The purpose of the medical evaluation is to determine whether subsequent medical surveillance is necessary.

5.2.9.2 **Physician Written Opinion:** For medical examinations and consultation required above, the examining physician should provide a written opinion that includes the following:

- Results of the medical examination and diagnostic tests.
- Any recommendations for further medical attention.
- Any medical condition that may be revealed in the course of the examination that places the employee at increased risk as a result of exposure to an occupational hazard in the workplace.
- A statement that the employee has been informed of the results of the consultation or medical examination and of any medical condition that may require further examination.

5.2.9.3 **Medical Records:** An accurate medical record is established and maintained for each employee subject to occupational exposure hazards. Employee medical records are kept confidential, and are not disclosed or reported without the employee's written consent to any person except as required by this SOP or by law. The records include:

- The name and social security number of the employee.
- A copy of the employee's vaccination status including the dates of all vaccinations and any

records relative to the employee's ability to receive them.
- A copy of all results of examinations, medical testing, and follow-up procedures required as a result of an occupational exposure to hazards.
- A copy of the healthcare professional's written opinion regarding any occupational exposures.
- A copy of information regarding occupational exposures provided to healthcare professionals.

5.2.9.4 **Pregnancy Surveillance:** Female employees of childbearing age are informed about reproductive hazards in the CIL. Female employees must inform Laboratory Management if they become pregnant so that the employee and her unborn child are not endangered by any work assignment. Pregnant employees notify their supervisor as soon as the pregnancy is known. If, after consulting her physician, the employee requests a change in her work assignment, every reasonable effort is made to accommodate her request. The supervisor may request medical certification as to the nature of any limitations recommended by her physician.

5.2.9.5 **Chain of Command & Key Personnel**: Safety is everyone's responsibility. To ensure that all CIL employees have input into the CIL Safety Program all employees are free to bring up safety concerns with the Laboratory chain of command, the Lead Quality Coordinator and the CIL Safety Officer at any time.

5.2.10 **Information & Training:** The Safety Officer, in conjunction with the Lead Quality Coordinator, establishes the training requirements for the CIL Safety Program based on the provisions of this SOP and ensure that all employees participate in safety training, consisting of introductory (competency), one-time, and recurring training. The training plan and objectives for this program are located in the CIL Training Manual. Additionally, the training program adheres to the following guidance:

- All training is provided at no cost to the employees and during working hours.
- All training must be documented.
- Trainers are knowledgeable in the subject matter covered as it relates to the CIL.
- Training on occupational exposure to hazardous materials takes place initially and at least annually thereafter.
- Training is provided when changes in procedures, facilities or equipment alter the safety environment of the CIL.
- Material appropriate in content and vocabulary to the educational level, literacy, and language of employees must be used.
- Sufficient personnel should be certified in basic first aid and CPR by a recognized agency.

The CIL maintains training records with the following information:

- The dates of the training sessions.
- The names of persons conducting the training.
- The names of all persons attending the sessions.

6.0 ENVIRONMENTAL REQUIREMENTS & COMPLIANCE: Environmental safety is a vital component to the overall safety and health of the CIL Staff. The CIL is concerned with the following areas regarding environmental safety and health:

6.1 **Environmental Compliance Officer:** The Safety Officer reports to the Science Director on environmental compliance issues and serves as the CIL liaison with the appropriate base environmental compliance officials. The Safety Officer ensures that the DPAA Director is kept apprised of all environmental issues and pending actions within the CIL and represents the CIL during environmental inspections and other visits.

6.2 **Waste Disposal:** The CIL complies with all requirements for the safe collection and disposal of hazardous materials, as outlined in Annex A (Blood Borne Pathogen Exposure Control Plan) and Annex B (Chemical Hygiene Plan) of this SOP. All costs associated with the safe collection and disposal of hazardous materials is the responsibility of the DPAA Staff and J-4 Section. The CIL ensures that materials are recycled, redistributed, or reused whenever possible rather than being placed in the waste stream.

6.3 **Environmental Reporting Requirements:** All toxic spills, sewer system discharges, or air releases which exit the CIL are reported to the installation environmental office for appropriate action. The Safety Officer provides information, as required by the appropriate base Ground Safety Office/Environmental Office, to local, state, and federal regulatory agencies. The Safety Officer also provides information, as required, for higher echelon inventories and reports, and to support various public information programs.

6.4 **Environmentally Harmful Substances:** The CIL actively works to substitute potentially harmful substances and processes with those that are less hazardous. Ozone depleting substances banned under the Montreal Protocol and EPA regulations are phased out and not replaced as supplies are exhausted in accordance with DOD policies.

6.5 **Environmental Monitoring:** Regular instrumental monitoring of hazards is not normally required. The Safety Officer determines requirements for periodic or special case monitoring as needed to evaluate potential hazards to employees. Monitoring is conducted if there is a reasonable probability of or it is already determined that excessive employee exposure has occurred.

6.6 **Shipment of Hazardous Materials:** An item of evidence may also be a hazardous material or object that needs special attention and handling in order to protect both the public and the investigators involved. These hazards fall in different areas, ranging from potentially infectious blood and body fluids to firearms, drugs, chemicals, and explosives. Most hazardous materials need to be packed and shipped under the supervision of the transportation office. The transportation office also ensures that paperwork is properly done. See Enclosure 1 (Shipping of Bio-Hazardous Material) to Annex A and Annex B (Chemical Hygiene Plan) of this SOP for more guidance.

7.0 DOCUMENTATION: Record keeping provides a contemporary and historical archive to be used by the CIL for decision making and planning regarding policies on health and safety and to deal with contingencies as they arise. The Safety Officer and Science Director ensure all records required by this SOP are made available upon request to employees or employee representatives having written consent by the subject employee.

If the DPAA ceases to do business and there is no successor employer to receive and retain records for the prescribed period, records are transferred to and maintained by another government agency, to be determined, and all employees, past and present, are advised of the location of and procedure for accessing those records. This notification is given at least 90 days before the relocation of the records.

8.0 SURETY: The CIL Safety Officer, Lead Quality Coordinator, and Safety Committee manage surety of safety practices. The Safety Officer maintains records of all correspondence, inspection reports, survey reports and other documents related to the safety program. The CIL is subject to the following surety inspections. The recommendations from these activities is considered and used by the CIL in developing and updating occupational health and environmental protection procedures and policies.

- The Safety Officer conducts formal periodic safety inspections, sometimes in conjunction with the appropriate base Ground Safety Office.
- The appropriate base Ground Safety Office and other agencies and offices may conduct industrial hygiene surveys.
- The appropriate base Fire Department periodically conducts fire-safety inspections.
- Quality audits of the provisions of this SOP are conducted by Quality Assurance in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

9.0 SPECIAL SAFETY INSTRUCTIONS FOR CIL-OF:

The following special safety measures are in effect for CIL-OF:

- The areas inside around the perimeter of the Martin Bomber Building are vehicular traffic areas. Stay to the side of vehicle lanes and be alert for moving traffic.

Annex A (Blood Borne Pathogen Exposure Control Plan)

A1.0 PURPOSE & SCOPE: This Blood borne Pathogen Exposure Control Plan applies to all areas, operations, and personnel of the CIL. The OSHA regulations are designed to protect all employees who may be exposed to blood borne pathogens through work-related contact with blood or other potentially infectious materials. In response to OSHA requirements, this Annex establishes general responsibilities, policies, and procedures for safe handling of bio-hazardous materials within the CIL and for protecting CIL personnel from occupational exposure to infectious disease causing agents.

There are no known associated health risks or blood borne pathogen exposures associated with the handling of old (25+ years) dry osseous and dental materials. Regardless, care is taken by all personnel to avoid undue exposure. Wet bone and osseous materials (fresh and/or decomposing tissue) is handled in accordance with this plan.

A2.0 RESPONSIBILITIES: Responsibility for bio-safety within the CIL rests at all levels:

A2.1 **The DPAA Director:** The DPAA Director has ultimate responsibility for bio-safety within the CIL and must provide continuing support for this plan.

A2.2 **Science Director:** The Science Director has overall responsibility for developing and implementing the Blood Borne Pathogen Exposure Control Plan within the CIL. Additional responsibilities include:

- Ensuring that subordinate personnel are properly trained in the provisions of this plan and are aware of and follow its safety procedures and guidance.
- Ensuring that personnel are provided and have received adequate training in the use of PPE.

A2.3 **Safety Officer:** The CIL Safety Officer, also the Exposure Control Officer, has responsibilities which include:

- Reviewing this plan and revising it as necessary to meet regulatory and operational requirements
- Assisting in implementing this plan by coordinating provision such as vaccinations, training, etc.

A2.4 **Laboratory Managers & Lead Quality Coordinator:** Have responsibility for bio-safety and infection control, including:

- Ensuring compliance with this plan by subordinate personnel.
- Ensuring that all procedures address bio-safety aspects and include appropriate precautions, engineering controls, work practice controls, and requirements for PPE.
- Performing continuous monitoring to identify and address bio-safety concerns.

A2.5 **CIL Personnel:** Each individual works in a safe manner, including:

- Planning and conducting each operation in accordance with proper exposure control procedures
- Using universal precautions (see below) to avoid contact or potential contact with bio-hazards.
- Complying with the provisions of this plan.

A2.6 **Occupational Health Clinic:** The base clinics provide medical support to the CIL as required by OSHA regulations.

A3.0 HAZARDS, SAFETY MEASURES & EXPOSURE PREVENTION:

A3.1 **Hazards**: Blood and body fluids may be capable of transmitting several human diseases, primarily Hepatitis B (HBV) and Human Immunodeficiency Virus (HIV). Both are potential risks when handling liquid material, but the hazard of HIV diminishes rapidly upon drying as the virus cannot survive for very long in an unprotected environment. Hepatitis, however, can remain stable and viable in dried form for several days and can be remobilized from dried material when wetted. Any human body fluid or tissue should be considered potentially hazardous, although the primary means of infection is blood and blood contaminated materials. Occupational exposure of CIL personnel to blood borne pathogens may occur during the:

- Handling, processing, and analysis of evidence, especially liquid blood and body fluids and items contaminated with them.
- Generation and handling of infectious waste.
- Handling and use of contaminated sharps.
- Processing of crime scenes.

A3.2 **Measures to Prevent or Mitigate Bio-Hazards & Accidents:**

A3.2.1 **Universal Precautions:** Universal Precautions is an approach to infection control where all human blood and body fluids are treated as if known to be infectious for HIV, HBV, and other

blood borne pathogens. Universal precautions are observed during all CIL operations.

A3.2.2 **Personal Protective Equipment (PPE):** Appropriate personal protective equipment (PPE) must be worn in occupational exposure situations. The type and characteristics of PPE required depend upon the task and degree of exposure anticipated. Annex C (Use of Personal Protective Equipment) discusses this subject in detail

A3.2.3 **Engineering & Work Practice Controls:** Engineering and work practice controls are used to eliminate or minimize employee exposure to blood borne pathogens. Where occupational exposure remains after implementation of these controls, PPE is also used.

A3.2.3.1 **Sharps & Sharps Containers:** Contaminated sharps are any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, and broken capillary tubes. The following precautions apply:

- All contaminated disposable sharps are discarded immediately or as soon as possible in approved disposable containers. Likewise, contaminated reusable sharps are placed in appropriate containers until properly reprocessed. Containers conform to the specifications outlined below.
- Containers for contaminated sharps must be easily accessible to personnel and located as close as possible to the immediate area where sharps are used or can be reasonably anticipated to be found, maintained upright throughout use, replaced routinely and not be allowed to overfill.
- When moving containers for contaminated sharps from the area of use, the containers must be closed prior to removal or replacement to prevent spillage or protrusion of contents during handling, storage, transport, or shipping. Containers should be placed in a secondary container (see below), if necessary.
- Reusable containers must not be opened, emptied, cleaned manually or treated in any manner that would expose employees to the risk of percutaneous injury.
- Contaminated needles and other sharps are not bent, recapped or removed unless no alternative is feasible. Such recapping or needle removal must then be accomplished through the use of a mechanical device or an appropriate one-handed technique. Shearing or breaking of needles is prohibited.

A3.2.3.2 **Handling Bio-Hazardous Liquids:** All procedures involving blood or other potentially infectious materials are performed using Universal Precautions and in such a manner as to minimize splashing, spraying, spattering, and generation of droplets of these substances. Additional precautions include:

- Tubes of liquid blood are opened wearing proper PPE within a hood with the sash lowered.
- Using gauze or toweling over the stopper to contain any splashing, spraying, etc.
- Mouth pipetting/suctioning is prohibited.

A3.2.3.3 **Storage of Bio-Hazards:** Specimens of blood or other potentially infectious materials are placed in a primary container which is closeable, constructed to contain all contents, puncture resistant, labeled or color coded in accordance with this annex, prevents leakage during collection, handling, processing, storage, or shipping and designed such that reaching into them does not endanger employees. Additional precautions include:

A3.2.3.3.1 **Labels & Signs (Hazard Communications):** Normally, containers for storage or transportation of infectious materials must be labeled or color-coded as described in Enclosure 1 (Storage and Shipping of Bio-Hazardous Material) of this Annex. However, since all specimens are handled using Universal Precautions while in the CIL, labeling or color-coding of **all** containers is not necessary provided that the individual containers are placed in a recognizable labeled outer container during storage, transport, or disposal. Accordingly, the following procedures apply:

- Warning labels are affixed to containers of regulated waste, including refrigerators and freezers, used to store, transport or ship blood or other potentially infectious materials, except as noted below. Additionally:
  - Labels are fluorescent orange or orange-red, or predominantly so, with lettering or symbols in a contrasting color and include the universal biohazard symbol.
  - Labels are affixed as close as possible to the container by string, wire, adhesive or other method that prevents their loss or unintentional removal.
  - Infectious waste or biohazard bags and containers must be marked with either a 3" or larger "biohazard symbol" or with "INFECTIOUS WASTE" in letters 1" or larger.
- Regulated waste that has been decontaminated need not be labeled or color-coded.

A3.2.3.3.2 **Secondary Containers:** Secondary containers are appropriate if outside contamination of the primary container occurs, if spillage could occur, or if the specimen could puncture the primary container. The primary container is placed within the secondary container with the latter being puncture resistant and leak proof during handling, processing, storage, transport, or shipping. The secondary container is also labeled or color-coded in accordance with this plan.

A3.2.3.4 **Contaminated Equipment:** Equipment, which may become contaminated with blood or other potentially infectious materials, must be examined and decontaminated prior to servicing or shipping. If decontamination is not feasible then:

- A readily observable label in accordance with Enclosure 1 (Storage and Shipping of Bio-Hazardous Material) must be attached to the equipment stating which portions remain contaminated.
- The responsible supervisor conveys information regarding the contamination to all affected employees, the servicing representative and/or the manufacturer, as appropriate, prior to handling, servicing or shipping the equipment so that proper precautions can be taken.
- Labels for contaminated equipment are in accordance with this plan and also state which portions of the equipment remain contaminated.

A3.2.4 **Waste Disposal**: Disposal of all regulated waste is in accordance with applicable federal and state regulations. An approved vendor normally provides infectious waste pick-up, transport, decontamination and disposal. All biohazardous items (e.g., blood soaked towels, surgical scrubs, tissues, paper towels) are placed in approved disposal bags. The disposal bags/containers are not used for disposal of waste material that is not regulated bio-hazardous material.

Do not offer for disposal to normal custodial personnel any containers/bags marked as bio-hazardous material, regardless of the actual contents of the container. Only designated CIL personnel or licensed regulated medical waste contractors may handle such materials.

A3.2.5 **Hepatitis B (HBV) Vaccination, HIV & Post Exposure Evaluation & Follow-up:**

A3.2.5.1 **General:** Vaccinations are available at a reasonable time and place at no cost to all CIL employees who have potential occupational exposure to infectious materials. The Safety Officer arranges post-exposure evaluation and follow-up for all employees who have had an exposure incident. The DPAA medical staff ensures that all medical evaluations and procedures, and post-exposure evaluation and follow-ups, including prophylaxis, are performed by or under the supervision appropriate healthcare professionals in accordance with the current guidance of the U.S. Public Health Service (USPHS).

A3.2.5.2 **Hepatitis B (HBV) Vaccination:** HBV vaccination is not applicable to employees who have previously received the complete series, if antibody testing has revealed that the employee is immune, or if the vaccine is contraindicated for medical reasons. Participation in a prescreening program is not required for receiving HBV vaccination.

A3.2.5.3 **Post Exposure Evaluation & Follow-up:** Following a report of an exposure incident, the CIL makes immediately available to the exposed employee a confidential medical evaluation and follow-up, including at least the following elements:

- Documentation of the route(s) of exposure and the circumstances under which the exposure incident occurred.
- The exposed employee's blood is collected as soon as possible and tested after consent is obtained. If the employee consents to baseline blood collection, but does not give consent at that time for HIV serological testing, the sample is preserved for at least 90 days. If, within 90 days of the exposure incident, the employee elects to have the base-line sample tested, such testing is done as soon as possible.
- The CIL provides at no cost to the employee all follow-up blood testing as recommended by the licensed healthcare professional and as recommended by the USPHS. The CDC recommendation for follow-up HIV testing is at 3 and 6 months post-exposure.
- Post-exposure prophylaxis, when medically indicated, as recommended by the USPHS.
- Counseling and evaluation of reported illnesses.

Source Individual: A source individual is any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to the employee. Examples include, but are not limited to, trauma victims, human remains, and individuals who donate or sell blood or blood components. The following apply to source individuals as part of the post exposure evaluation and follow-up:

- After consent is obtained, the source individual's blood is tested as soon as possible in order to

determine infectivity. If consent is not obtained, the Chief of Occupational Health establishes that legally required consent cannot be obtained. When the law does not require the source individual's consent, the source individual's blood, if available, is tested and the results documented.

- If it is known that the source individual is already infected, HBV/HIV testing need not be done.
- Results of the source individual's testing are made available to the exposed employee, and the latter informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual.

Enclosure 1 (Storage and Shipping of Bio-Hazardous Material) to Annex A

A1E1.0 GENERAL: This enclosure summarizes shipping guidelines by the category of material being shipped. By its very nature, evidence shipped to the CIL for examination is often a sample of blood/body fluids or is contaminated with such material. Shipment of materials containing blood or blood-contaminated materials is regulated by several different sources. These are: the Department of Transportation and its sub-divisions, OSHA, the Centers for Disease Control (CDC), the USPS, and common carriers (UPS, FedEx, etc.) following internal requirements and restrictions.

If the material is being submitted to or returned from the CIL as a diagnostic specimen for examination, or is a biological product, it does not have to be manifested as hazardous material or marked with the black and white infectious material label (see below) under DOT regulations. However, all packages must bear the orange OSHA blood-borne pathogen biohazard label (see below) if the contents meet the OSHA definition of a potentially infectious material. It should be noted that the DOT exemption is only for the marking and manifest requirements. All items must still be safely and adequately packaged. If the primary mode of transport is registered mail, particular attention must be paid to postal requirements. It is important to know that the various regulatory bodies do not coordinate with each other and levy their requirements independently.

A1E2.0 TYPES OF BIOHAZARDOUS MATERIALS:

A1E2.1 **Liquid Blood Samples:** All carriers accept liquid blood samples when properly packaged and in volumes less than 50 ml. All screw cap closures must be reinforced with tape. Packaging consists of a sealed, waterproof inner container surrounded by absorbent packing material that is then placed in a sealed secondary container. The secondary container is then packed in an outer shipping container. The orange biohazard symbol (see below) is placed on the secondary container and the exterior shipping container.

A1E2.2 **Dried Blood & Blood Contaminated Material:** These items must be fully air dried prior to shipping. Drying preserves the evidentiary value of the blood and allows a paper wrapping to be safely used. Once dry, specimens can be safely wrapped in paper and/or placed in a secondary container. The secondary container prevents wetting and remobilization of dried blood and contains flaking of caked blood and body fluids. If the blood or body fluid is completely absorbed and dried into the material of the item, such as fabric or paper, then the items may be exempt from the requirement to mark the exterior shipping container. However, the inner container holding the item should always be marked with the biohazard label to warn people processing the contents of the package. The outer container should be marked with the below orange biohazard label (not the etiologic agent label), if there are caked, clotted, or flaking blood/body fluids that easily detach from the item and would cause it to be classified as an OSHA bio-hazardous material.

A1E2.3 **Human Body Parts:** Most common carriers do not knowingly accept human body parts. The USPS accepts such packages. They should be packaged, as above, depending upon whether the contents are liquid or dry and should also have the OSHA biohazard label on the outside.

A1E3.0 LABELS: Several different types of shipping/marking labels are used depending upon the specific circumstances of the shipment. These are:

A1E3.1 **Black & White Infectious Substances Label:** This label marks a shipment as a hazardous infectious material containing at least one human pathogen. Most criminal investigation laboratory samples are exempt from this requirement and it should not normally be used. Common carriers require documentation of the specific hazard present, including a hazardous materials manifest, and recommend prior coordination shipping a package with this label.

A1E3.2 **Orange OSHA Bio-Hazardous Materials Label:** Used for any package containing material that contains materials with potential blood borne pathogens. It must be used on all such packages containing material defined under the OSHA rules as a biohazard for the protection of workers handling the packages. In general, this would include samples of liquid blood and body fluids, human tissue samples, and items grossly contaminated with clotted blood or body fluids that can be readily flaked off the item. Items in which the blood or body fluid has been completely absorbed and dried in the matrix of the material do not require marking. This label is placed on the interior containers holding the potentially infectious material and on the exterior shipping container.

A1E3.3 **Orange CDC Biomedical Material/Etiologic Agent Label:** This is used for shipments, which are believed to be or known to contain a human pathogen such as HIV. Generally, it is intended for the shipment of disease cultures and tubes of body fluids that are believed to be infected with a specific disease and are not normally used within the CIL. It has a phone

number that is used to contact the Centers for Disease Control if the package is damaged. Packages containing greater than 50 ml of material are not accepted by the post office if they have this label. Other carriers may accept packages containing greater volumes if the packages are prepared appropriately (see above).

Annex B (Chemical Hygiene Plan)

B1.0 PURPOSE & SCOPE: The Chemical Hygiene Plan (CHP) establishes responsibilities, policies and procedures for safe handling of hazardous chemicals (including cryogenic liquids and compressed gasses) within the CIL. The CHP applies to all areas and personnel of the CIL.

B2.0 RESPONSIBILITIES:

B2.1 **Science Director**:

- Oversee and ensure development and implementation of a Chemical Hygiene Plan (CHP).
- Appoint a Chemical Hygiene Officer (CHO) who should be qualified by training or experience (or have access to personnel who do) to provide technical guidance in the development and implementation of the CHP.

B2.2 **Safety Officer**:

- Serves as the CIL CHO and as POC for the appropriate base safety personnel.
- Investigate and/or document all reported accidents that result in overexposure to hazardous chemicals and train CIL personnel to avoid similar accidents.
- Develop and implement guidance for handling hazardous chemicals in the CIL.
- Periodically review the CHP revise as necessary to reflect current regulatory requirements.
- Review procedures for all CIL operations using hazardous chemicals.
- Assist in ORM of all proposed CIL operations using hazardous chemicals.
- Monitor procurement, use, storage, and disposal of chemicals within the CIL.

B2.3 **Lead Quality Coordinator & Laboratory Managers**:

- Comply with and enforce this CHP.
- Ensure that procedures safely use hazardous chemicals.
- Perform continuous inspections of operations using hazardous chemicals to ensure compliance with SOPs, this CHP, and applicable regulations.

B2.4 **CIL Personnel:** Plan and conduct CIL operations using hazardous chemicals in accordance with procedures found in SOPs, this CHP, and applicable regulations.

B3.0 HAZARDS, SAFETY MEASURES & EXPOSURE PREVENTION: Personnel are provided with information and training to ensure they are apprised of chemical hazards in the CIL. The Safety Officer maintains a comprehensive CIL chemical inventory including lists of chemicals that are reactive, shock sensitive, or have other special hazards. In addition, copies of the OSHA Laboratory Standard are available from the Safety Officer in the Chemical Inventory Binder in the MSDS reference library, or from the OSHA web site at http://www.osha.gov. Additionally, information regarding specific hazards of chemicals and applicable exposure standards and other health information is available through the Safety Officer or from the reference materials maintained by the CIL.

B3.1 **Hazards:** Since few laboratory chemicals are without hazards, all chemical exposures should be kept to a minimum, even with chemicals of no known risk. The risk associated with using hazardous chemicals should never be underestimated. Assume that any mixture is more toxic than its most toxic component, and that all unknown substances are toxic. Personnel are not exposed to airborne concentrations of hazardous chemicals that exceed the more stringent of either the Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV) for a specific compound or mixture.

B3.1.1 **Chemicals:** Chemicals are considered hazardous if their properties include:

B3.1.1.1 **Ignitability:** Materials that may either self ignite or respond to spark/flame at very low (less than 140 degrees Fahrenheit) temperatures and may cause fires.

B3.1.1.2 **Corrosivity:** Material which is extremely acid or basic (pH less than 2 or more than 12.5) may damage containers, spill and cause burns to people, and destroy metal, furniture, clothing, etc.

B3.1.1.3 **Reactivity:** Materials may explode due to inherent instability, which react violently with water, which free poison gases in contact with water, or ignite/explode as a result of physical energy applied, e.g., a drop of thirty inches, or a blow with a forklift blade.

B3.1.1.4 **Toxicity:** Material which may cause illness or injury by poisoning people, or causing them to be at a much higher than normal risk of diseases and cancer.

B3.1.2 **Cryogenic Liquids & Compressed Gasses:** Compressed gasses may be found on or adjacent to recovery scenes, especially underwater recovery scenes. Cryogenic liquids, while not a permanent

presence in the CIL, may be temporarily located there. A multitude of hazards exist for these materials. See Enclosure 1 (Storage and Handling of Cryogenic Liquids and Compressed Gasses) to this annex for detailed safety measures and precautions.

B3.2 **Measures to Prevent or Mitigate Hazards & Accidents:** Minimize chemical exposures through the use of appropriate engineering controls, safe work practices, and PPE. Procedures developed for any CIL operation using hazardous chemicals must address the safety aspects of using such materials. Special procedures are developed and implemented for safe handling of acutely toxic compounds, carcinogens, and reproductive toxins. The following section discusses a multitude of procedures and measures to prevent or mitigate chemical hazards and accidents in the CIL.

B3.2.1 **Engineering Controls:** Chemical hygiene related equipment and facilities should undergo continuing evaluation by Laboratory Managers and be repaired or modified if found to be inadequate. Specific engineering controls related to chemical hygiene are discussed below.

B3.2.1.1 **General Ventilation System:** Adequate ventilation is critical. All chemicals should be handled in properly ventilated areas. An appropriately designed and properly functioning general ventilation system that services all areas of the CIL including storerooms is required. The exception is the walk in refrigerator since it requires contained or re-circulated air. The general CIL ventilation system should:

- Provide general airflow that is relatively uniform without areas of turbulence, high velocity, or static flow.
- Provide a source of breathing air at the rate of four to twelve room air exchanges per hour to prevent increases of air concentrations of toxic substances during the day.
- Preclude re-circulation of exhausted and potentially contaminated air.
- Not be relied on for total protection from toxic substances released into the air.
- Be altered only if thorough evaluation indicates that worker protection from airborne toxic substances continues to be adequate.

B3.2.1.2 **Fume Hoods:** Sufficient laboratory hood space is provided for all personnel who routinely work with dust or chemicals.

Low risk operations, where the potential for generation of dust, gas, vapor or aerosol contamination is remote, requires no specialized ventilation, and may be conducted on the open bench.

In the CIL, toxic vapors and gasses are rarely present. Hoods are used instead to primarily control the spread of dust and particulate matter. Requirements and procedures for hoods include:

- Airflow into and within hoods should not be excessively turbulent.
- Hood performance should be evaluated periodically and after any repair or modification.
- Hoods should have a face velocity of 85-150 cubic feet per minute (cfpm) with the sash at working height with and optimum speed of 100 cfpm. Sash marks should be installed at the appropriate position when the face velocity requirement cannot be met with the sash in the full open position. Air flow/velocity should be as uniform as possible across the face of the hood with no individual measurement varying by more than 20% from the average.
- Hoods should not normally be used for storage of chemicals. Materials stored in hoods should be kept to a minimum. Stored chemicals or equipment should not block vents or adversely alter airflow patterns. Whenever practical, chemicals are removed from hoods to approved cabinets for storage.
- Use hoods for any operation that might result in release of toxic vapors or dust.
- Leave hoods running when in active use. In addition, leave hoods running any time toxic substances are stored within, or in any instance in which it is uncertain whether adequate general CIL ventilation will be maintained if the hood is turned off.
- Solid objects and materials such as paper should not be permitted to enter the exhaust ducts of hoods as they can lodge in the ducts or fans and adversely affect their operation.
- Confirm that the hood is functioning properly prior to use.
- Conduct operations with the hood sash closed or with the opening as small as possible to ensure optimum hood performance.
- Do not place your head inside the hood.
- Place all equipment and containers at least eight inches behind the face of the hood to minimize spillage from the hood.
- Since proper airflow patterns are critical to hood performance, no equipment, furniture, or fixtures should be placed within 12 inches of the front of the hood.
- Keep the slot in the hood's lower baffle free from obstructions. Apparatus and containers should be

safely elevated if necessary on shelves that allow flow to continue unimpeded.
- Trash, debris, and unnecessary equipment and supplies are not allowed to accumulate in hoods.
- Minimize pedestrian traffic past open hoods to prevent spillage and optimize hood performance.

B3.2.1.3 **Material Safety Data Sheet (MSDS) Station:** All hazardous material received must have a Material Safety Data Sheet (MSDS) filed with the Safety Officer. Employee copies of MSDS are located in clearly marked binders stored in various areas at each CIL location.

B3.2.1.4 **Eyewash Stations & Safety Showers**: Eye wash stations and safety showers, complying with ANSI Standard Z358.1, are located in CIL work areas where hazardous chemicals are handled or stored. The Support Coordinator is responsible for conducting or arranging periodic inspections of such equipment to ensure that they are functional. The Support Coordinator maintains an inspection checklist and fault sheet for these items. Eyewashes and safety showers are easily accessible at all times and free from obstructions. Aisles and walkways leading to eye wash stations and safety showers are not to be blocked or impeded. The floor under these stations should be skid resistant to minimize the chances of falls due to a wet floor.

B3.2.1.5 **Fire Safety Equipment:** See the main body of this SOP for details on fire safety equipment.

B3.2.2 **Controlled Procurement of Chemicals:** Safety regarding hazardous chemicals begins with their procurement. Procurement guidance is as follows:

B3.2.2.1 **Coordination & Planning:** Procurement of any new chemicals introduced into the CIL inventory or used in a substantially different process or procedure must be coordinated with the Safety Officer. Procurers must first be aware of the potential hazards of the substances being ordered, know if adequate facilities and trained personnel are available to handle the new substances, and whether a safe disposal route exists. Accordingly, no new hazardous chemicals should be ordered without the procurer first obtaining the MSDS for the new chemical via access to the DOD Hazardous Material Information System.

B3.2.2.2 **Quantities:** Order the smallest quantity of chemicals necessary to complete the work and only current working stock amounts should be kept within the approved storage spaces. Before restocking chemicals, check to see if they are already on hand in the work areas and chemical storage lockers. The CIL inventory shows the chemicals that are stored in work areas and lockers.

B3.2.2.3 **Inspection:** Inspect all containers of chemicals upon receipt to ensure they are intact and not leaking. Damaged or unlabeled containers are not accepted.

B3.2.2.4 **Training:** The procurer of new chemicals is responsible for circulating the MSDS among those likely to use the chemical and coordinating with the Safety Officer to ensure that a copy of the MSDS is included with the MSDS station. All personnel should have sufficient training beforehand to ensure safe receipt and handling of all new hazardous chemicals.

B3.2.3 **Safe Storage of Chemicals:** Properly designed and ventilated storage facilities are used. Chemicals are stored in such a way that their identity is retained from initial receipt or production to consumption or ultimate disposal.

B3.2.3.1 **Hazard Communications:** All chemical containers must be labeled with the chemical identity and appropriate hazard warnings.

B3.2.3.1.1 **Commercial Containers:** If the original manufacturer label does not adequately convey this information, it must be added using labels and symbols such as the NFPA diamond code. Additionally, containers of commercially procured chemicals should be dated and initialed when received, if necessary.

B3.2.3.1.2 **Secondary Containers:** When chemicals are transferred from the original container to a secondary container, a label should be prepared with the original warnings and dated with the date that was annotated on original source container. If a working bottle is filled from more than one container, the date on the oldest source chemical should be used. The exception is if the chemical being transferred is for the immediate use of the person making the transfer. If more than one person is to use the chemical in the secondary container, or if it is to be retained past that work shift, then the container must be fully labeled.

B3.2.3.2 **Chemical Storage:** The following general guidelines apply:

- Keep amounts of chemicals stored in CIL areas as small as practical.
- Storage on bench tops and in hoods should be avoided.
- Exposure to heat or direct sunlight should be avoided.

- Only one commercial container of any given chemical should be open at any given time per work area.

B3.2.3.2.1 **Storage Areas:** Chemicals should be segregated according to compatibility. A separate storage area should be used for each category. Chemicals may even be incompatible with others in the same group. However, if secondary (spill) storage trays/containers, dessicants, or other special precautions are instituted, chemicals from more than one category may be stored in the same storage facility. Additionally:

- Avoid overcrowding and poor housekeeping in storage areas.
- Label each storage cabinet or refrigerator containing chemicals with its contents.
- Do not use storerooms as preparation or repackaging areas.
- All potential sources of ignition are strictly prohibited in chemical storage areas.

B3.2.3.2.2 **Special Requirements for Flammable & Combustible Chemicals:** Special storage requirements exist for flammable and combustible chemicals. Additional requirements may be found in the body of this SOP. Special precautions include:

- Any flammable or combustible chemical stored in any CIL area other than a designated storage area may not exceed four liters unless approved by the Safety Officer.
- Flammable and combustible chemicals are stored in glass, metal, or plastic containers that meet NFPA 30 requirements.
- Flammable and combustible chemicals are stored in approved cabinets designed in accordance with NFPA 30 or in refrigerators which are explosion-proof in accordance with NFPA 45. Cabinets and refrigerators should not be located adjacent to exits.
- A designated central storage area for long-term or bulk storage of flammable or combustible liquids is used.

B3.2.3.2.3 **Special Requirements for Highly Toxic Chemicals:** Storage of unopened containers of highly toxic chemicals normally presents no unusual hazards. Once opened, containers should be resealed appropriately. Segregate highly toxic chemicals from other chemicals and store them in closed cabinets in well-ventilated areas. Cabinets are posted with appropriate warning signs.

B3.2.3.2.4 **Special Requirements for Corrosives:** The major classes of corrosive chemicals are strong acids and bases, dehydrating agents, and oxidizing agents. Some chemicals such as sulfuric acid belong to more than one class. Segregate the major classes of corrosives and store them in separate cabinets or refrigerators to the fullest extent possible.

B3.2.3.3 **Inventories & Inspections:** The Safety Officer periodically inspects and inventories stored chemicals. Outdated, corroded or leaking containers of chemicals are disposed of as appropriate. Excess chemicals are returned to the long-term storage areas.

B3.2.4 **Controlled Distribution of Chemicals:** When moving between rooms or through the CIL corridors, place chemicals in a carrying bucket or other unbreakable container. Use carts to move larger quantities of chemicals that cannot be hand carried. Carts must be able to travel over uneven surfaces without tipping or stopping suddenly. Carts with open shelves should be designed to prevent containers from creeping or tipping over.

B3.2.5 **Handling & Use of Chemicals:** Several measures are in place to ensure safe handling and use of chemicals in the CIL.

B3.2.5.1 **Planning:** Planning is the first step in prevention of chemical accidents. Personnel should seek information and advice about hazards, consider the available ventilation, plan appropriate protective procedures, evacuation routes, and plan the positioning of equipment before beginning any new operation.

B3.2.5.2 **Use of Clothing & Personal Protective Equipment (PPE):** Personnel in all CIL areas where hazardous chemicals are handled or stored must wear PPE suitable for the operation being conducted. See Annex C (Use of Personal Protective Equipment) for details.

B3.2.5.3 **Proper Use of Glassware:** Avoid exposure due to accidents with glassware.

- Handle and store glassware in such a way that damage is minimized
- Inspect glassware before each use. Damaged items should be discarded.
- Glassware should be held and handled by the sides or bottom rather by the neck or top.
- Avoid excessive force while clamping glassware.
- Use caution when applying extremely hot or cold temperatures to glassware. Pyrex glassware should be used for such operations.

B3.2.5.4 **Proper Mixing and Stirring:** Avoid exposure due to splash and agitation.

- Never look down into any vessel containing chemicals especially if being heated. A reaction may cause the contents to be ejected.
- Perform mixing and stirring operations in a manner that avoids spattering or spilling.
- When diluting a chemical with water, always add the chemical to the water. Never add water to a concentrated chemical. This is especially important with concentrated acids and bases.

B3.2.5.5 **Recognize Flammability Hazards:** Avoid fire and explosions.

- Use open flames only when absolutely necessary and then extinguish immediately.
- Do not use an open flame to heat flammable substances.
- Before lighting any open flame, ensure all flammable substances are removed from the immediate area and that all containers of flammable substances in the area are tightly closed.

B3.2.5.6 **Spill Control:** Personnel should be trained on how to handle small spills involving the materials they work with. The Safety Officer and Laboratory Managers ensure that training is provided on the appropriate techniques and materials used to contain spills. Adequate supplies and equipment should be on hand to contain spills. These include absorbents, neutralizers, mops, buckets, dustpans, paper towels, sponges and waste containers. Each work area has the materials necessary to contain reasonably anticipated spills. Spill kits are maintained in or adjacent to the chemical storage areas to handle spills in these areas. Additionally:

- Plan and conduct operations in such a way as to minimize the potential for chemical spills.
- To minimize exposure, handle spills with the smallest contingent of personnel possible.
- Clean-up chemical spills immediately to minimize contamination.
- Use spill trays for all operations where there is a reasonable possibility of spillage.
- Wear appropriate PPE to minimize chemical exposure during spill clean-up.
- If the spilled material presents a significant airborne hazard, heating and air conditioning systems that are shared with other areas should be shut off to prevent spread of the contaminant.
- Flammable material spills should be protected from all heat and ignition sources. The area should be continuously ventilated.
- All waste generated from clean-up of chemical spills is disposed of properly. Place all contaminated absorbent materials and devices in suitable containers.

For all spills that are too large or complex for CIL personnel to safely handle, the base Fire Department, should be summoned for assistance. If there is any doubt as to whether CIL personnel can safely handle a spill, then they should contain the spill as much as is safely possible and summon help immediately.

B3.2.5.6.1 **Liquid Spills:** Implement the following procedures:

- If safely possible, prevent a spill from getting larger (e.g., set an overturned container upright or shut off a valve or handle). Ensure that there is adequate ventilation to work in the area, preferably with exhaust capability being provided by fume hoods or other exhaust systems.
- Contain spills with trays, absorbents or paper towels whenever feasible.
- Drain openings, if present, should be blocked off or covered.
- Do not attempt to neutralize spills with anything other than spill control materials designed for that purpose. Direct neutralization of acids with bases and vice versa should not be attempted.

B3.2.5.6.2 **Solid Spills:** Generally, solid chemical materials may be swept into a dustpan and placed into a suitable container.

B3.2.5.7 **First Aid:** In the event of medical emergency related to chemical exposure, render first aid as trained. Check the MSDS or call Poison Control Center for guidance. Whenever there is an accident or injury involving a chemical, every effort should be made to provide a copy of the MSDS for the chemical involved to the medical treatment facility.

B3.2.6 **Disposal of Hazardous Wastes:** Minimize the generation of hazardous waste whenever feasible. When waste is present, supervisors, in coordination with the Safety Officer, are responsible for ensuring the proper disposal in accordance with all applicable environmental regulations and policies. Mitigate waste generation by substitution of less hazardous substances, process changes, or reuse. All waste containers are labeled with their contents.

B3.2.6.1 **In-Process Losses:** Incidental losses of any hazardous materials in minute quantities in the course of procedures and triple rinsing of containers can normally be safely disposed of through the sanitary sewer system. The quantities of waste disposed of in a drain at any one time must be strictly limited to small quantities of generally not more than a few grams or milliliters. The disposal should be performed by flushing with at least a 100 fold excess

water at the sink so that the waste becomes highly diluted in the wastewater effluent from the CIL and even more so by the time the effluent reaches the treatment plant.

B3.2.6.2 **Notification of Safety Officer:** When hazardous materials, beyond quantities deemed in-process losses, are no longer suitable for the use for which they are purchased (e.g., the work process is no longer performed, material is overage, has lost potency, is contaminated), the Safety Officer is notified. The Safety Officer records the following information:

- Quantity (e.g., 1 liter, 50 gallons, 5 milligrams).
- Type of container (e.g., #10 steel can, 500 ml plastic bottle, 50 ml glass "cough syrup" bottle).
- Any type of packing provided (e.g., can contained in sawdust-filled wood box, bottle contained in heat-sealed evidence bag).
- Any specific additional information/warnings needed to inform people regarding risks and/or packing (e.g., carcinogenic, dropping more than six inches may result in fire or explosion).
- The name and telephone number of the point of contact for the person reporting the waste.

B3.2.6.3 **Disposal Process:**

B3.2.6.3.1 **Volatile Chemicals:** Certain volatile chemicals that are used in larger quantities, such as ethers, chloroform, acetone, and methanol are not disposed of down the sanitary sewer system. These types of materials are disposed of in small quantities by evaporation in fume hoods.

B3.2.6.3.2 **Containers:** Prior to disposal of empty containers, thoroughly decontaminate them by washing/rinsing and remove the labels.

B3.2.7 **Shipping Chemicals:** Before shipping chemicals, check with Safety Officer for guidance for the specific item you are shipping. Do not ship evidence, such as arson debris, in the same package as suspected source chemicals because of possible cross contamination. Items, such as batteries, pesticide containers, aerosols, etc., may have special shipping hazards.

Enclosure 1 (Storage and Handling of Cryogenic Liquids and Compressed Gasses) to Annex B

B1E1.0 GENERAL: Compressed gas hazards in the CIL consist of alcohol burners and propane torches and the possibility of propane, acetylene and compressed air at recovery scenes. Cryogenic liquids are not permanently located in the CIL but may exist there on a temporary or contingency basis.

B1E2.0 HAZARDS: The storage and handling of cryogenic liquids and compressed gases must be considered more hazardous than the handling of most liquid and solid materials because of their special properties. The following are hazards associated with using of cryogenic liquids and compressed gases:

B1E2.1 **Pressure:** Hazards may arise from equipment failure and leakage from systems that are not pressure tight. Failure of a cylinder, plug, or valve, either spontaneously or as a result of an accident, may result in a violent release of gases or cause the cylinder itself to become a projectile. Improper pressure control may cause unsafe reaction rates due to poor flow control and mixing.

B1E2.2 **Diffusion**: Diffusion of leaking gas may cause rapid contamination of the atmosphere, giving rise to toxicity, anesthetic effects, asphyxiation, and the rapid formation of explosive concentrations of flammable gases. Leaking gases have all of the hazardous properties associated with the chemical such as corrosivity, toxicity, flammability, irritancy, and reactivity. Leaking gases may form secondary hazards upon contact and reaction with other substances in the environment.

B1E2.3 **Cold Injuries:** Cryogenic liquids and contact with gases when they are venting, can cause cold injuries such as frostbite.

B1E3.0 LABELS: Label or tag all gas cylinders to show their contents. Never rely on any form of color-coding of cylinders to identify their contents. When a cylinder is delivered, it should have an identification label or markings to indicate the contents. Never remove the identification markings from the cylinder. Empty and full cylinders are tagged as "Empty" or "Full" as appropriate.

B1E4.0 STORAGE & HANDLING: The following guidelines detail the safe storage and handling or cryogenic liquids and compressed gasses in the CIL:

B1E4.1 **Gas Cylinders:** The following procedures apply:

- Store all compressed gas cylinders in the facility designed for that purpose. The storage and use of compressed gas cylinders within the CIL is kept to an absolute minimum.
- Valve protection caps should be present at delivery and remain in place until the cylinder is transported to the point of use, secured in place, and placed in service. When cylinders are being moved from place to place, a suitable hand truck equipped with a restraining strap or chain should be used—even for short distances. Do not drag or slide cylinders. Move one cylinder at a time.
- Protect cylinders from extremes of heat, cold, and weather. Never allow flame to come in contact with a compressed gas cylinder. Sources of ignition and corrosive chemicals are not permitted near any tank storage.
- Gas cylinders are segregated so that flammable gases are physically separated from oxidizers by at least 25 feet.
- Full and empty gas cylinders are stored in separate locations within the CIL area. Appropriately mark empty cylinders.
- Valves are tightly closed and the valve protector cap in place for unused gas cylinders.
- Secure all gas cylinders by means of clamps, chains or straps while in storage or use.
- Never tamper with safety devices.

B1E4.2 **Regulators:**

B1E4.2.1 **Operation:** The following procedures are used to obtain the required delivery pressure:

1) Turn the delivery pressure adjusting screw on the regulator counterclockwise until it turns freely. Open the cylinder valve slowly until the tank gauge on the regulator registers the expected pressure. A difference may indicate a leak in the cylinder valve, safety device, or plug.

2) Flow can be controlled by means of a valve supplied in the regulator or by a supplementary valve placed down stream from the regulator. With the flow control valve downstream from the regulator in a closed position, turn the delivery pressure adjusting screw clockwise until the required delivery pressure is reached. The regulator itself should not be used as a flow control by adjusting pressure to obtain different flow rates. This defeats the purpose of the pressure regulator and may result in pressures in excess of system design at higher flow rates.

B1E4.2.2 **Maintenance:** Regulators should be checked periodically to ensure proper and safe

operation. Only suppliers or qualified repair technicians should repair regulators. Procedures for checking a regulator are as follows:

1) Turn off the cylinder valve. Drain all pressure from the system. The gauges should read zero.

2) Open the cylinder valve and turn the adjusting screw counterclockwise until it turns freely. The high pressure gauge should register the cylinder pressure. The delivery pressure gauge should be zero. Wait several minutes in this configuration. If the delivery pressure gauge begins to rise, this would indicate a leak in the system, possibly at the inlet, needle valve, safety devices, or diaphragm. The regulator should be removed from service and turned in for maintenance.

3) Turn the adjusting screw clockwise until the nominal delivery pressure is obtained. Observe to ensure that the regulator can maintain the proper pressure without "crawl" or movement of the reading caused by excessive wear of the valve and seat assembly.

4) Close the cylinder valve. Pressure should remain the same on the gauges for both the inlet and delivery side of the regulator. A drop in pressure over several minutes may indicate a leak. If a leak is indicated, remove the regulator from service and turn it in for repair.

5) An excessive fall in delivery pressure under operating conditions indicates an internal blockage or that the cylinder valve is not sufficiently open.

B1E4.3 **Special Precautions for Cryogenic Liquids:**

- Handle cryogenic liquids with extreme caution and in well ventilated areas.
- Wear eye protection, preferably a face shield, apron and closed toed shoes when handling cryogenic liquids.
- Use gloves that are impervious to the fluid being handled and loose enough to be tossed off easily if necessary.
- Transport small quantities of liquid using dewars vessels designed for that purpose.

Annex C (Use of Personal Protective Equipment)

C1.0 PURPOSE & SCOPE: Personal protective equipment (PPE) is specialized clothing or equipment worn by an employee for protection from a hazard. General work clothes (e.g., pants, shirts, or blouses) not intended to function as protection against a hazard are not considered PPE. The CIL provides to employees, free of charge, required PPE such as, but not limited to, gloves, gowns, laboratory coats, coveralls, face shields, surgical-type masks, respirators and eye protection. This annex details PPE use in the CIL and applies to all its employees and those working under their auspices.

C2.0 DETERMINATION OF NEED: PPE must be worn whenever there is a potential of exposure to hazardous materials or conditions. Supervisors using ORM (see Annex D) determine the operations requiring PPE. Supervisors should ensure that adequate types and amounts of PPE appropriate to the operations being performed are available. PPE is considered "appropriate" only if it does not permit hazardous materials to pass through to, or reach, the employee's work clothes, street clothes, undergarments, skin, eyes, mouth or other mucous membranes under normal conditions of use and for the duration of time which the PPE is used. Thus, the type and characteristics of PPE depends upon the task and degree of exposure anticipated.

PPE should always be used, if mandated through ORM, unless extraordinary circumstances prevent its use. Should the supervisor's or employee's professional judgment determine that PPE use prevents the delivery of public safety services, or poses increased hazards to the safety of the worker or coworkers, use of PPE may be waived **temporarily and briefly**. When such judgments are made, the circumstances are investigated and documented in order to determine whether changes can be instituted to prevent such recurrences.

C3.0 PROCUREMENT: The Safety Officer should be consulted when ordering PPE to ensure it is appropriate for the task intended. PPE are top priority when ordering supplies and equipment. If any employee is identified as needing PPE, and the needed items are unavailable, the supervisor or Safety Officer immediately initiates a priority requisition with a statement that the equipment is necessary for employee protection and OSHA compliance.

C4.0 TYPES & USE: PPE is not only used as a protective barrier against exposure, but also as a means to prevent cross contamination between CIL administrative and work areas. As such, remove contaminated PPE prior to exiting work areas (i.e., do not wear contaminated items in administrative and break areas). Turn in PPE for laundering or disposal once contamination has occurred or discard as appropriate. The following outlines the types of PPE, its proper use, and special precautions:

C4.1 **Laboratory Clothing:** The following guidance applies:

- Garment(s) penetrated by hazardous materials must be removed as soon as possible.
- Wear appropriate shoes for the operation being performed. Specialized foot protection is not normally required.
- Surgical caps or hoods and/or shoe covers must be worn when gross contamination can be reasonably anticipated (e.g., crime scenes, chemical spills).
- Special protective clothing such as rubber aprons, boots or one-piece suits may be required when there is gross or a high risk of contamination present. Inspect such clothing for damage and degradation prior to use.
- Appropriate masks in combination with eye protection must be worn whenever eye, nose, or mouth contamination can be reasonably anticipated.

C4.2 **Protective Eyewear:** The use of appropriate protective eyewear prevents critical and debilitating injuries. The type and level of protective eyewear is appropriate to the hazard and meet the requirements of ANSI Standard Z87.1. Wear protective eyewear in areas of the CIL where hazards are present. Face shields are worn in conjunction with routine eye protection when additional eye and face protection against splash or projectiles is necessary.

C4.3 **Gloves:** Gloves must be worn when it can be reasonably anticipated that the employee will be handling or touching hazardous materials and/or contaminated items or surfaces. Select gloves based on potential and severity of contamination as well as suitability for the operation performed. For operations with the potential for prolonged or severe contamination, glove selection should be based on available permeation and degradation data for the specific hazard. Butyl rubber utility gloves are preferred for chemicals. Latex examination gloves are used to protect against blood and body fluids. Insulated gloves prevent contact with hot or cold surfaces. Asbestos containing gloves are not used. Cloth gloves offer little protection against hazards. Take the following additional precautions:

- Visually inspect non-disposable gloves for damage or degradation before use. Discard damaged or leaking gloves.
- Remove gloves as soon as practical if contaminated during an operation. Non-disposable utility gloves may be decontaminated for re-use if the integrity of the glove is not compromised. However, they must be discarded if they are cracked, peeling, torn, punctured, or exhibits other signs of deterioration or when their ability to function as a barrier is compromised. Since the usable life of a glove is directly related to contact time with hazards, failure to rinse gloves off before storage can cause degradation and premature failure of gloves. Disposable (single use) gloves are not washed or decontaminated for re-use.
- Remove gloves so as to prevent cross-contamination. Wash hands after gloves have been removed.

C4.4 **Respiratory Protection:** Currently the CIL has not identified a need for respirators in conjunction with any typical procedures. If it is determined that respiratory protection equipment is required, the use of such equipment must comply with the Enclosure 1 (Respiratory Protection Program) of this annex. Laboratory Managers must ensure that the respiratory protection program, if implemented, is followed.

C5.0 SERVICING & MAINTENANCE:
Contaminated PPE increases the hazard to the individual by allowing and prolonging contact with a hazardous substance and can potentially spread contaminants to areas and people who would not normally be exposed. When PPE is removed it is placed in an appropriately designated area or container for storage, washing, decontamination or disposal. The CIL provides for the cleaning, laundering (minus lab coats, unless they are contaminated), disposal, repair and replacement of PPE, as needed, to avoid contamination and to maintain its effectiveness, at no cost to employees.

C5.1 **Disposal:** Disposable PPE used for hazardous operations is discarded into the appropriate hazard bags and delivered to a private hazard disposal firm.

C5.2 **Laundry:** Appropriate PPE should be turned in to the Support Coordinator for laundering whenever there is suspected contamination. The following precautions are taken regarding laundering PPE:

- Employees who have contact with contaminated laundry wear protective gloves and other appropriate PPE. Minimize handling and agitation of contaminated laundry.
- Ensure that no sharps are placed into laundry containers.
- Laundry contaminated with hazardous materials must be air-dried, if practical, in a ventilation hood prior to being placed into an appropriately labeled disposal container.
- If necessary, contaminated laundry may be double-bagged to prevent contamination of exterior surfaces prior to pick-up by the laundry service. All outer bags are tied closed.
- Bags containing contaminated laundry must be isolated and easily identified by laundry personnel.

C5.3 **Repair & Maintenance:** The user inspects all PPE before each use and after cleaning or laundering. The Safety Officer inspects PPE during periodic safety inspections. PPE that does not pass inspection is repaired or replaced immediately. Repairs and maintenance are referred to the Safety Officer and Support Coordinator.

Enclosure 1 (Respirator Protection Program) to Annex C

C1E1.0 PURPOSE & SCOPE: Exposure to occupational hazards from breathing air contaminated with gases, aerosols, microorganisms, or particulate matter is normally prevented by engineering controls (such as general and local ventilation, fume hoods) and the substitution of less hazardous processes and materials. When effective engineering and work place controls are not feasible, or while they are being instituted, appropriate respirators may be required. This enclosure outlines the safe and effective use of respirators by CIL personnel in the CIL and in the field.

C1E2.0 RESPONSIBILITIES:

C1E2.1 **DPAA Director:** The DPAA Director ensures that a respiratory protection program is established and appropriate resources are allocated to run the program.

C1E2.2 **Science Director:** The Science Director ensures that appropriate guidelines are in place and supervisors and CIL personnel comply with those guidelines prior to using respirators.

C1E2.3 **Safety Officer:** The CIL Safety Officer serves as the Respiratory Protection Program coordinator and is responsible for:

- Administering this program and monitoring its effectiveness.
- Implementing training and instruction programs.
- Making appropriate respirator selections.
- Approving the procurement of respirators.
- Ensuring that respirators are properly inspected and maintained.
- Maintaining records for this program including records of the number and types of respirators in use, medical clearances, selection decisions, training, etc.

C1E2.4 **Laboratory Administration:** Laboratory Administration is responsible for ensuring that respirators and replacement parts are only procured through the Safety Officer.

C1E2.5 **Laboratory Managers:** Laboratory Managers are responsible for:

- Ensuring that respirators are available as needed.
- Ensuring that employees wear respirators in accordance with this plan.
- Ensuring that respirators are only used by authorized employees in accordance with this plan.

C1E2.6 **Employees:** Employees are responsible for:

- Using respirators in accordance with instructions and training.
- Cleaning, disinfecting, inspecting, and storing respirators, as necessary.
- Reporting respirator malfunctions or problems to their supervisor or the Safety Officer for immediate repair or replacement.

C1E3.0 GENERAL: Laboratory Managers remain alert to situations in which respiratory equipment may be necessary to protect personnel during operations in which air contaminant concentrations are not sufficiently restricted by engineering controls. **Under no circumstances are respirators used to provide protection in oxygen deficient or immediately dangerous to life or health (IDLH) environments.** The Safety Officer assists in determining if respirator use is necessary.

Respirators may be used under the following conditions and situations:

- While cleaning up laboratory spills, particularly in poorly ventilated areas.
- Control of exposures associated with processing crime scenes.
- Control of nuisance odors while processing evidence.
- Under conditions less than ten times the applicable permissible exposure limit (PEL) or threshold limit value (TLV) for half-face respirators.
- Disposable dust mask style respirators are only used to control nuisance levels of contaminants for personal comfort. Nuisance levels are considered to be exposures below the PEL or TLV.

C1E4.0 PERSONNEL QUALIFICATIONS & TRAINING: Personnel must meet certain criteria prior to using respiratory protection.

C1E4.1 **Personal Restrictions:** Wear of respirators is not suitable for persons with cranial-facial anomalies and conditions, beards or other facial hair that interfere with the seal of the respirator against the face. Similarly, eyeglasses, hearing aids and other items must not interfere with the proper seal of the respirator. Persons who cannot detect the odor of IAA or other test substances or who cannot properly fit the respirator (see below) are also disqualified from using respiratory protection.

C1E4.2 **Medical Clearance:** Personnel who use any respirator must first be medically cleared.

Employees complete any relevant medical questionnaires required by Occupational Health.

C1E4.3 **Training:** Employees who may have to wear a respirator are periodically trained in its proper use. Both the employees and supervisors must receive this training. The training includes:

- Description of different respirators and their uses.
- Intended use and limitations of the respirator.
- Proper wearing, adjustment, and testing for fit.
- Cleaning and storage methods.
- Inspection and maintenance procedures.

C1E5.0 MANAGEMENT & USE OF RESPIRATORY EQUIPMENT:

C1E5.1 **Respirator Choice, Procurement & Distribution:**

C1E5.1.1 **Choice:** Respirator selection is based upon the physical, chemical, and physiological properties of the air contaminant and the concentration likely to be encountered. The quality of fit, the nature of the work being done and the protection factor also affects the choice of respirators. The capability of the respirator chosen is determined from appropriate government standards, manufacturers' tests and laboratory experience with the respirators. Only respirators that provide air (e.g., self-contained breathing apparatus) are effective in an oxygen deficient environment.

C1E5.1.2 **Procurement:** Respirators are appropriate for the type and concentration of contaminants present. The Safety Officer researches and specifies the type required and approve and orders all parts, and replacement cartridges for respirators (reusable and disposable).

C1E5.1.3 **Storage & Distribution:** Respirators are stored in a manner to protect against dust, sunlight, extreme heat and cold, excessive moisture and damaging chemicals. Generally, respirators should be stored inside sealed plastic bags or the original carton in a clean, protected location. Improper storage results in loss of effectiveness, reduced service life, and added cost. Respirators should be stored at common points in the CIL rather than being distributed to each individual. However, respirators may be issued to individual workers if that is a more advantageous work practice. Laboratory Managers ensure that only personnel meeting the above criteria and successfully fit tested (see below) are allowed to use respirators.

C1E5.2 **Inspection, Repair & Maintenance:**

C1E5.2.1 **Inspection:** The user inspects all respirators before and after each use and after cleaning. The condition of face pieces, headbands, valves, hoses, and canisters, filters, or cartridges are checked. The Safety Officer inspects respirators during periodic safety inspections. Respirators that are only for emergency use are tagged with the date of inspection and monitored by the Safety Officer. Single use respirators in multi-packs do not need to be individually tagged.

C1E5.2.2 **Repair:** Respirators that do not pass inspection are repaired or replaced immediately. Repair of respirators by the user is limited to changing filters and head straps. Only approved components designed for the specific respirator may be used. All other repairs are referred to the Safety Officer for action. Make no attempt to replace components, or make adjustments, modifications, or repairs beyond the user level. Disposable respirators are not repaired and are disposed of after they have reached their effective service life.

C1E5.2.3 **Maintenance:** Appropriate respirators are cleaned and disinfected as frequently as necessary and after each use. Disposable "dust-mask" style respirators are not cleaned and instead are disposed of and a replacement obtained. The following procedures are used for cleaning and disinfecting respirators:

- Filters, cartridges, or canisters are removed before washing and replaced as necessary.
- Respirators are washed in a detergent solution, rinsed in clean water and allowed to dry in a clean area. A brush is used to scrub the respirator to remove adhering dirt.
- Cartridges are not removed from disposable respirators. If the respirator cannot be adequately cleaned, it is disposed of and a replacement obtained.

C1E5.3 **Wear & Use of Respiratory Equipment:**

C1E5.3.1 **Respirator Selection:** Prior to the selection process, the user is shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to assess a "comfortable" respirator. This is not a substitute for formal training on respirator use, only a review. The following steps outline the respirator selection process.

1) The selection process is conducted in a room separate from any fit-test chambers to prevent odor fatigue (see below). A mirror is available to assist

the user in evaluating the fit and positioning of the respirator.
2) The user selects the most comfortable respirator from those available. Each respirator represents a different size and shape and, if fit properly, provides adequate protection.

3) The user holds each face piece up to his face and eliminates those that are obviously not giving a comfortable fit. Normally, selection begins with a half-mask and if a fit cannot be found, the user is asked to go to the full-face piece respirators. (A small percentage of users are unable to wear any half-mask.)

4) The more comfortable face pieces are recorded, donned, and worn for at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points below. If the user is not familiar with using a particular respirator, he dons the mask several times and adjust the straps each time, so that he becomes adept at setting proper tension on the straps.

5) Assessment of comfort includes reviewing the following points with the user:

- Chin properly placed.
- Positioning of mask on nose.
- Fit across nose bridge.
- Room for safety glasses.
- Distance from nose to chin.
- Ability to talk.
- Tendency to slip.

6) The user conducts the conventional negative and positive-pressure fit checks. Before conducting these checks, the user is told to "seat" his mask by rapidly moving the head side-to-side and up and down while taking a few deep breathes. After the respirator is worn for at least 10 minutes the user is ready for odor screening and fit testing.

C1E5.3.2 **Fit Testing:** All users must be successfully fit tested on the respirators they wear prior to use. Qualitative fit test protocols are in accordance with per OSHA guidelines. The isoamyl acetate (IAA) protocol is used for organic vapor respirators and the irritant smoke protocol is used for particulate respirators. The following fit tests apply:

C1E5.3.2.1 **Isoamyl Acetate (IAA) Protocol (Organic Vapor Respirators):** Respirators undergoing this test should be equipped with organic vapor cartridges or offer protection against organic vapors. This protocol is performed in a location with exhaust ventilation sufficient to prevent general contamination of the testing area by IAA.

C1E5.3.2.1.1 **Odor Screening Test:** Prior to fit testing using this protocol, users must be screened to ensure they can detect IAA (banana oil) odor.

C1E5.3.2.1.2 **Preparation:** Preparation includes:

1) The screening test is conducted in a room separate from the room used for fit testing. The two rooms are well ventilated but not be connected to the same re-circulating ventilation system.

2) Three 1-liter glass jars with metal lids (e.g., Mason or Bell jars) are required.

3) Odor-free water (e.g., distilled or spring water) at room temperature is used for the solutions.

4) The isoamyl acetate (IAA) (also known as isopentyl acetate) stock solution is prepared by adding 1 cc of pure IAA to 800 cc of odor free water in a 1-liter jar and shaking for 30 seconds. The mixtures used in the IAA odor detection test are prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the user.

5) The odor test solution is prepared in a second jar by placing 0.4 cc of the stock solution into 500 cc of odor free water using a clean dropper or pipette. Shake for 30 seconds and allow to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution may be used for only one day.

6) A test blank is prepared in a third jar by adding 500 cc of odor free water.

7) The odor test and test blank jars are labeled jar 1 and 2 for identification. If the labels are put on the lids they can be periodically dried off and switched to avoid people thinking the same jar always has the IAA.

8) The following instructions are typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, and then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

C1E5.3.2.1.3 **Conduct:** Conduct the odor screening test by having the user follow the instructions on the above card. If the user is unable to correctly identify the jar containing the odor test solution, the user is disqualified from using respiratory protection. If the user correctly identifies the jar containing the odor test solution, he may proceed to fit testing.

C1E5.3.2.1.4 **Fit Test:** Respirators have to be properly fitted to effective.

C1E5.3.2.1.5 **Preparation:** Preparation includes:

1) The fit test room is separate from the room used for odor threshold screening and respirator selection, and is well ventilated, as by an exhaust fan.

2) The fit test chamber in the fit test room is substantially similar to a clear 55 gallon drum liner suspended inverted over a 2 foot diameter frame, so that the top of chamber is about 6 inches above user's head. The inside top center of the chamber has a small hook attached.

3) A copy of the following test exercises and rainbow (or equally effective) passage is taped to the inside of the test chamber:

- Conduct normal breathing.
- Conduct deep breathing. Be certain breaths are deep and regular.
- Turn head from side-to-side. Be certain movement is complete. Alert the user not to bump the respirator on the shoulders. Have the user inhale when his head is at either side.
- Nod head up-and-down. Be certain that motions are complete and made about every second. Alert the user not to bump the respirator on the chest. Have the user inhale when his head is in the fully up position.
- The following paragraph is called the Rainbow Passage. Reading it results in a wide range of facial movements.

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

C1E5.3.2.1.6 **Conduct:** Conduct the fit test as follows:

1) After selecting, donning, and sealing the respirator proceed to the fit testing room.

2) Upon entering the test chamber, the user is given a 6 X 5 inch piece of paper towel wetted with 3/4 cc of pure IAA. The user hangs the wet towel on the hook at the top of the chamber.

3) Allow two minutes for the IAA test concentration to be reached before starting the above fit-test exercises. This would be an appropriate time to talk with the user, to explain the fit test, the importance of his cooperation, the purpose for the head exercises, or to demonstrate some of the exercises.

4) Each exercise described above is performed in the test chamber for at least one minute. If at any time during the test, the user detects the banana-like odor of IAA, he quickly exits from the test chamber and leaves the test area to avoid olfactory fatigue.

5) The user removes the respirator, repeat the odor threshold test, select and put on another respirator, return to the test chamber, etc. The process continues until a respirator that fits well has been found. Should the odor threshold test be failed, the user waits about 5 minutes before retesting. Odor sensitivity usually returns by this time.

6) When a respirator is found that passes the test, its efficiency is demonstrated for the subject by having him break the face seal and take a breath (smelling the IAA) before exiting the chamber.

7) When the user leaves the chamber, he removes the saturated towel and returns it to the test conductor. There should be no significant IAA concentration buildup in the test chamber from repeated tests. To keep the area from becoming contaminated, the used towels are kept in a sealed bag.

C1E5.3.2.2 **Irritant Fume Protocol (Particulate Respirators):** Respirators undergoing this test should be equipped with high efficiency cartridges. This protocol is performed in a location with exhaust ventilation sufficient to prevent general contamination of the testing area by the irritant smoke.

C1E5.3.2.2.1 **Threshold Screening Test:** This tests the respirator's ability to exclude irritants.

C1E5.3.2.2.2 **Preparation:** Preparation includes:

1) Advise the user that the smoke can be irritating to the eyes and instruct him to keep his eyes closed while the test is performed.

2) The user is allowed to smell a weak concentration of the irritant smoke to familiarize him with the odor.

C1E5.3.2.2.3 **Fit Test & Conduct:** The test conductor reviews this protocol with the user before testing.

1) Have the user properly don and seal the respirator (see above) and enter the test chamber.

2) Break both ends of a ventilation smoke tube containing stannic oxychloride, such as the MSA part No. 5645, or equivalent. Attach a short length of tubing to one end of the smoke tube. Attach the other end of the smoke tube to a low-pressure air pump set to deliver 200 milliliters per minute.
3) The test conductor directs the stream of irritant smoke from the tube towards the face seal area of the user. Begin at least 12 inches from the face piece and gradually move to within one inch, moving around the whole perimeter of the mask.

4) The exercises detailed above (breathing, talking, nodding, etc.) is performed while the smoke is challenging the respirator seal. Each is performed for one minute.

5) If the irritant smoke produces an involuntary reaction (cough) by the user, the test conductor stops the test. In this case the respirator is rejected and another is selected.

6) Each user passing the smoke test without evidence of a response is given a sensitivity check of the smoke from the same tube to determine whether he reacts to the smoke. Failure to evoke a response voids the fit test.

Persons who have successfully passed this fit test may be assigned the use of the tested respirator in atmospheres with up to 10 times the PEL of airborne contaminants. In other words this IAA protocol may be used to assign a protection factor no higher than 10.

Annex D (Operational Risk Management)

D1.0 PURPOSE & SCOPE: This Annex establishes responsibilities, policies and procedures for operational risk management (ORM) in the CIL. This annex applies to all areas and personnel of the CIL.

D2.0 RESPONSIBILITIES: The CIL Safety Officer, acting in conjunction with the Support Coordinator and Lead Quality Coordinator, is responsible for ORM in the CIL. The military team leader is responsible for ORM for all DPAA deployments.

D3.0 ORM:

D3.1 **Purpose & Goals:** The purpose of ORM is to:

- Identify and reduce risk factors for which there is some element of control.
- Assess the likelihood and severity of risks and their potential consequences.
- Make a final determination as to whether the resultant risk is acceptable.
- Based on the above, determine whether the CIL personnel participate in the mission.
- Develop information to train employees on the hazards of their jobs and to determine appropriate safeguards.

D3.2 **ORM Process:** Prior to deployment of CIL personnel for any mission, the J-2/J-3, and other staff, Team Leaders, RLs, and others review the proposed mission to ensure that known risks are appropriately managed. Missions include any recovery-scene excavations, recovery scene surveys, and/or other field activities in which CIL personnel participate. The ORM process typically is documented for all missions, either in the applicable case activity folder or by separate memorandum. Operational risks are generally managed using a process having the following components:

- Identify hazards.
- Assess hazards.
- Make operational decisions.
- Implement controls on risks.
- Supervise and evaluate.

D3.2.1 **Required Information:** As part of the process of planning operations, the appropriate CIL Staff gathers the following elements of information for use in making ORM decisions:

- The degree of control anticipated at the proposed work-site. If total control is absent, missing elements are identified.
- Any recognized uncontrolled hazards or severe hazards that are partially controlled by some measure, the identity of the hazards, and a plan for their elimination.
- Most importantly, to specifically identify significant hazards. These could include:

    - Hazardous chemicals*
    - Blood borne pathogens and other biohazards*
    - Ionizing and non-ionizing radiation*
    - Explosives or weapons*
    - Dangerous animals and plants*
    - Unusual work environments including:

        - Confined spaces or other constricted work areas.
        - Low oxygen or toxic gas environments.
        - Unstable structures, ground, terrain or sites*.
        - Work at heights or in pits or tunnels.
        - Low light conditions.
        - Underwater.
        - Facilities under high or low atmospheric pressure.
        - Proximity to flammable, combustible, or explosive materials.
        - Extreme cold or heat conditions.
        - Extremes of noise or vibration*.
        - Proximity to heavy machinery, high-pressure systems, electricity, compressed gases, or other hazardous energy*.

    - Health or preventive medicine issues such as:

        - Endemic diseases of concern (requiring immunizations).
        - Medical problems affecting personnel that could endanger themselves or others (e.g., seizures).

    - Infrastructure concerns such as:

        - Availability of adequate, safe, and healthy living accommodations.
        - Availability of adequate, safe, and healthy transportation resources.
        - Availability of emergency communications, response services, and medical care.

    *ORM Folders should be prepared and maintained in the CIL for these hazards

D3.2.2 **Evaluation & Assessment:** Required information must be evaluated to determine:

- The potential severity of the hazard (death, serious injury, disability, minor injury, loss of equipment or systems).
- The likelihood of an accident or incident occurring (unlikely to frequent or expected).
- Factors contributing to hazardous situations and how they can be eliminated or reduced (e.g., if driving at night in unfamiliar territory is a problem, can the mission wait until daylight?).
- Control measures to be implemented (PPE, waiting, additional assistance, etc.).
- The overall risk based upon the combination of the severity and the likelihood of an incident (extremely high, high, medium, or low).

D3.2.3 **Make Operational Decisions:** Based upon the above evaluation, the operational decision must be made whether to perform the mission, to modify it, or request relief until the hazardous conditions can be abated.

D3.2.4 **Implement Controls on Risks:** When a procedure or mission is developed or modified, the responsible Laboratory Manager coordinates with the Safety Officer to obtain hazard analyses. The DPAA Safety Officer provides a summary of the hazards involved in the procedure and identify all appropriate controls required to minimize risk to each employee. This assessment is included as a standard element of the written instructions for the procedure.

D3.2.5 **ORM for Local Operations:** The CIL Safety Officer performs ORM for each home station function/procedure performed in the CIL and locally in the field (e.g., recoveries for consult cases). The results are consolidated into position-specific summaries of occupational risks and exposures. Folders should be prepared for the items marked with an asterisk (*) in the above list. These items are common hazards encountered in the CIL and during local fieldwork. ORM should be conducted by the Safety Officer to identify any health, safety or environmental issues before any new operations are implemented.

SOP 1.5: CIL SUPPORT

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 21 October 2016
Citation: DPAA Laboratory Manual, SOP 1.5

0.0 PRINCIPLE, SPIRIT & INTENT: *CIL support operations are performed in the most cost effective manner possible and practical. CIL support operations enhance the quality assurance of the CIL and protect the government against fraud, waste, and abuse.*

1.0 PURPOSE & SCOPE: This SOP outlines policies and procedures for CIL support operations. This SOP pertains to the acquisition, accountability, control, and distribution of equipment and supplies, maintenance/repair of equipment, general facilities management, and services contracts **(A4.6.1)**. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 RESPONSIBILITIES:

2.1 **Laboratory Administrator & Support Coordinator**: The Laboratory Administrator is responsible for all support functions and directs the CIL Support Coordinators' actions. There is a Support Coordinator located at CIL-HQ and CIL-OF. The respective Laboratory Administrator is generally the initial point of contact for any support functions in the CIL. In the absence of the Laboratory Administrator, the Support Coordinators, in their respective areas, perform the required functions. The Laboratory Administrator duties, assisted by the Support Coordinators, include, but are not limited to:

- Establishing and maintaining safeguards against loss, theft, or damage to materials in storage or in use through a viable and accurate hand-receipt program.
- Becoming familiar with current regulations and local directives regarding supply procedures and ensuring compliance with these publications.
- Preparing and submitting all required paper work for procurement of supplies and services, supply transactions and maintenance requests.
- Preparing and evaluating supply report summaries and relaying pertinent information to Laboratory Management.
- Instituting efficient and practical supply procedures within the CIL.
- Maintaining a file history of appropriate supply documents.
- Annually conducting a complete and accurate equipment inventory of the Property Book.
- Properly disposing of all government property that is no longer needed by the CIL.
- Ensuring that all sharps containers and bio-hazardous materials are disposed of properly.
- Ensuring that unsatisfactory reports are submitted to DPAA Logistics on material/equipment items of substandard quality.
- Monitoring select service contracts to ensure compliance and reporting substandard service to DPAA Logistics.
- Acting as point-of-contact between service agencies and the CIL. Services include housekeeping, laundry, and bio-hazardous/hazardous materials disposal. (Note: the Lead Quality Manager handles forensic consultant services, which are quality assurance rather than service contracts).
- Requesting all required maintenance/repairs on a timely basis and maintaining a record of all work orders.
- Monitoring the safety and security of the CIL and reporting violations to appropriate personnel.
- Performing safety related duties as specified in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).
- Managing all common storage spaces as assigned by Laboratory Management.

2.2 **Laboratory Managers:** Laboratory Managers, with assistance from the Laboratory Administrator, are responsible for:

- Planning and forecasting for equipment, services, and supply needs.
- Making storage space and other assets available to the CIL Staff, as needed.
- Periodically observing the CIL for compliance with this SOP. Take corrective action when violations are observed or reported.
- During office inspections check for hoarding of office supplies.
- Assisting DPAA Logistics to determine liability for broken, lost, or missing equipment and supplies.

2.3 **Quality Assurance:** The role of Quality Assurance is discussed at length, below.

2.4 **Evidence Coordinator:** The Evidence Coordinator has overall responsibility for the operation and maintenance of the walk-in evidence

refrigerator in CIL-HQ. Special instructions regarding the refrigerator are found in Annex A (CIL-HQ Refrigeration Systems) and Annex B (CIL-OF Refrigerator & Alarm System) of this SOP.

2.5 **CIL Staff:** All personnel are responsible for the following:

- Familiarity and compliance with established supply procedures.
- Familiarity with, and implementation of, user preventative maintenance procedures.
- Safeguarding and conserving government property and resources against fraud, waste, and abuse. Always report any misuse or loss of government property, supplies, or equipment to the Laboratory Administrator, or if unavailable, Laboratory Management or the Lead Quality Manager.
- Reporting support problems that affect the quality assurance of the CIL to the Laboratory Administrator who coordinate corrective action with the Lead Quality Manager and/or Laboratory Management, as appropriate.

3.0 PROPERTY ACCOUNTABILITY: Property in this SOP refers to government owned property, whether procured through appropriated or non-appropriated funds, or contractor owned property ultimately leased to, or otherwise in the possession of, the CIL.

The Logistics Section is the property manager for all of DPAA and issues and loans property to designated property custodians. CIL property custodians report directly to the Laboratory Administrator and are responsible for sub-hand receipting to individuals in the CIL as well as conducting inventories to ensure accurate accounting.

All property requiring performance checking or used in scientific testing is approved for use in the CIL by the Lead Quality Manager.

There are several types of property in the CIL. Specifically:

3.1 **Minor Property**: Minor property is all property that costs in excess of $5000. Minor property items include, but are not limited to:

- Analytical equipment (e.g., radiographic equipment, total stations, ground penetrating radars).
- Select anatomical specimens (e.g., articulated skeletons).
- Information management equipment.
- Analytical and other software.

3.1.1 **Property List:** A consolidated list of minor property is maintained by the Support Coordinator. The list includes serial numbers of items, if applicable, and the number of items on hand.

The Support Coordinator maintains the property list and updates it as needed after inventories, supply transactions, etc.

3.1.2 **Issue & Loan (Hand Receipts):** Minor property can be issued or loaned to the CIL Staff using a hand receipt issued by the respective Support Coordinator in accordance with DPAA supply policies and procedures. Hand receipted property is also called accountable property. **A signature of the user is required to establish the validity of the hand receipt.**

All accountable property entering the CIL is hand receipted by the DPAA Property Manager to the CIL Support Coordinator. The Support Coordinator is responsible for the tracking, inventory, security, and documentation of supply transactions involving all accountable property.

Regardless of any changes in the document, hand receipts are updated at least annually (to include the property holder resigning and re-dating the document). Interim supply transactions (e.g., turn-in and/or issue of items) require the appropriate change to the hand receipt with the property holder re-signing and re-dating the document.

Minor property, consisting of numerous components (e.g., ground penetrating radar units, SEM), have a component list as part of the user's hand receipt. Individuals are responsible and financially liable for items they are hand receipted, including component lists. Minor property that is damaged, lost, or stolen through "simple negligence" on the part of the hand receipt holder, may provide a basis for monetary recovery by DPAA.

3.1.3 **Procurement:** Laboratory Management makes decisions regarding the procurement of minor property. Once a decision has been made to acquire an item, the procurement process is as follows:

- The person making the request researches the requirements and specifications of the item.
- **Any requests for property that affects scientific test results, impacts on CIL evidence or physical security, or otherwise may have relevance to the CIL Quality Assurance Program (see example listings below) are reviewed by Quality Assurance prior to purchase.** The review is documented on CIL Form 1500 which is attached

to the purchase requests sent to the Support Coordinator (see below).
- Requests are submitted to the Support Coordinator via e-mail using the Request for Purchase Form. Requests should be digitally signed by the requestor and include detailed information on requirements and specifications of the item(s).
- The Support Coordinator reviews the request to ensure compliance with all purchase card rules and that Form 1500, if needed, is complete and attached to the purchase request. However, it is the responsibility of the requestor to ensure the required Quality Assurance review is obtained. Incomplete or inadequate requests are returned to the requestor for corrective action.
- The Support Coordinator forwards the request to the Laboratory Administrator for approval.
- The Laboratory Administrator forwards to the comptroller for approval and to authorize payment using one of two processes:

  - Credit Card Purchases: Limited, or one-time purchase of items (e.g., a tool kit), usually valued under $2500, may be procured outside of the contracting process, usually through the DPAA Purchase Card (i.e., Credit Card). This is the most expedient, and thus preferred, process for procuring supplies and equipment and should be used whenever possible.
  - Contracting: An outside vendor, usually contracted through DoD by DPAA Logistics, provides more expensive (in excess of $2500) or bulk procurement of items to the CIL (e.g., evidence freezer, 30 caliper sets). The terms of contracts are very specific and are usually not modified without a re-negotiation of the entire contract.

No one in the CIL is authorized to negotiate a contract with, or commit government funds to, a vendor. Anyone who commits government funds without approval of the DPAA Comptroller may be personally liable to the vendor for the complete amount of the promised funds.

3.1.4 **Inventory:** Minor property, both held by the Support Coordinator and issued to users on hand receipts, is inventoried at least annually. Spot inventories may be conducted at any time. Inventories may be done in conjunction with performance check operations, supply inspection/inventories with the DPAA Logistics, and similar events. The property list and hand receipts is adjusted after each inventory to reflect the quantity of items on hand and liability assessed as appropriate (see below).

Where applicable, the condition of stored items is assessed at appropriate intervals to detect deterioration.

3.1.5 **Liability:** Individuals may be liable for damaged or lost minor property depending on the circumstances. Liability may be assessed against one or more individuals if:

- Property is missing or stolen by not following security procedures.
- Property is broken or ruined by not following user operating or maintenance instructions.
- There is negligence on the part of the user (e.g., leaving electronic equipment in the rain). Negligence is defined as failing to take action or safeguards that would otherwise be conducted or practiced by a reasonable person.
- Provisions of this SOP and/or other supply policies and regulations are ignored.

Liability is assessed by DPAA Logistics in accordance with DoD regulations. Laboratory Management participation may be needed to assist DPAA Logistics in determining liability. Individuals reporting lost, stolen, or damaged property are required to submit a memo to Laboratory Management outlining the circumstances of loss or damage in order to assist in assessing liability.

3.1.6 **Disposal:** Laboratory Management makes decisions regarding the disposal of minor property. Hand receipt holders should turn in un-needed or damaged minor property to the Support Coordinator and have the transaction reflected on the hand receipt.

The Support Coordinator arranges for minor property disposal through the Defense Reutilization Material Office (DRMO). All items delivered to DRMO are listed on a DD1149 (Requisition and Invoice Shipping Document) with a copy retained by the Support Coordinator along with the DD1348 (DOD Single Line Item Requisition System Document) received from the DRMO.

3.2 **Pilferable Property:** Pilferable property consists of items that fall below the minor property threshold of $5000 but meet one or more of the following criteria:

- Items that are easily converted to personal use or professional use outside of the CIL.
- Items that can easily be resold on the open market.
- Items that are obsolete or otherwise unusable but are valuable for parts or components.

Examples of pilferable property include, but are not limited to:

- UV crosslinkers
- Hand held radiographic equipment.
- Pubic symphysis and other casts or cast sets.
- Cameras and imaging equipment.
- Compasses.
- Calipers, caliper sets, and other osteometric equipment.
- Select anatomical specimens.
- Library text books.

Given its nature, pilferable property is managed using the same procedures as minor property, including hand receipting, as necessary.

3.3 **Expendable Property:** Expendable supplies and property are consumable or temporary in nature and consist of:

- General administrative supplies (e.g., pens, pencils, notepads, binders, folders, staples, hole punchers, labels, post-its, tape, field notebooks, graph paper, printer paper).
- Case file products including blank CDs, CD labels, plastic cases, binding materials, etc.
- Mailing materials (e.g., bubble wrap, Federal Express shipping boxes).
- Materials and supplies for preparation and disposition of remains (excluding transfer cases) such as blankets, safety pins, etc.
- Medical supplies and equipment.
- Cleaning agents/solutions.
- Chemical supplies including bleach, acetone, vinegar, etc.
- Cutting wheels and attachments for forensic biology sampling equipment.
- Items of a semi-permanent nature but which routinely wear out (e.g., brushes, medical/dental instruments, laboratory coats, surgical scrubs).

3.3.1 **Issue:** Expendable supplies are typically located in various supply cabinets in the CIL, the Laboratory Administration offices, storage rooms, and outdoor CONEX. These are accessible to the CIL Staff on an as needed basis. Expendable supplies are not hoarded or stored in excessive quantities in individual work areas.

3.3.2 **Procurement:** The CIL Staff routes expendable supply requests to the Support Coordinator using the same process as for minor property (see above).

3.3.3 **Inventory:** The Support Coordinator periodically conducts inventories to ensure that expendable supplies are well stocked and viable.

Where applicable, the condition of stored items is assessed at appropriate intervals to detect deterioration**.**

Expendable supplies that impact on the quality assurance of the CIL that are found to be spoiled, expired, or otherwise unsuitable for use, are removed immediately from service and reported to the Laboratory Administrator and Quality Assurance. The latter determines if the unsuitable items were used and, if so, the quality assurance impact on the CIL.

3.3.4 **Disposal:** Excess expendable supplies and expendable supplies unsuitable for use are turned into the Support Coordinator for proper disposition.

3.4 **Other Types of Property:** Other types of government property are located in the CIL, however, its management does not fall under this SOP. These are:

- Installation property (e.g., furniture, appliances, utility fixtures). DPAA Logistics largely controls installation property; however, DPAA Security controls security systems (e.g., alarm panels, swipe card reader boxes).
- Information management equipment (e.g., computers, scanners, copiers). The IT section controls information management property.

Although the management of the above property is not the responsibility of the CIL, it may impact on its quality assurance. As such, Quality Assurance and Laboratory Administrator monitor, as appropriate, such property, its effects on the quality assurance of the CIL, and inform the appropriate personnel when problems occur (see below).

4.0 REMOVAL OF GOVERNMENT PROPERTY: CIL personnel are required to use government property to perform assigned tasks and duties. Property may be designated for common use or may be issued to specific individuals through a hand-receipt system.

Ideally, all government property should remain at the DPAA unless its removal is required for use in a field setting. CIL personnel are authorized to remove government property from the CIL when doing so is deemed advantageous to the government. Examples include the home use of laptop computers for DPAA-related work or professional development, training during non-duty hours (e.g., GPS), preparation for

deployment, and short-term storage of personally issued property (e.g., clothing, camping equipment).

Government property designated for common use typically should not be removed from the CIL without approval of Laboratory Management and informing the Laboratory Administrator and the Support Coordinator. Further, the Lead Quality Manager are informed of the removal of any property related to the quality assurance of the CIL (e.g., test equipment, anatomical specimens, spare badges). Individuals borrowing government property may be required to obtain a hand receipt and may be held liable for the borrowed property in the event it is lost, stolen, or damaged.

5.0 SERVICES: The Laboratory Administrator is the central point of contact for obtaining services for the CIL. Quality Assurance is informed regarding procurement and management of services that affect the quality assurance of the CIL and is solicited for subject matter expertise and advice, as appropriate (see below).

When a need for a service is identified, the CIL Staff should submit a Purchase Request Form to the Support Coordinator making the requirement as clear and as specific as possible in order to facilitate the procurement process. The process is largely the same as the procurement of property, to include Quality Assurance reviewing requests with the requestor, as appropriate (see above). After the approval process is completed, the service is obtained using one of the below methods:

- Credit Card Purchases: Limited, or one-time services (e.g., maintenance), usually valued under $2500, may be procured outside of the contracting process, usually through the DPAA Purchase Card (i.e., Credit Card). This is the most expedient, and thus preferred, process for procuring services and should be used whenever possible.
- Contracting: An outside vendor, usually contracted by Federal Industrial Supply Center (FISC), provides more expensive (in excess of $2500) or continuing services to the CIL (e.g., housekeeping, hazardous materials disposal). The terms of contracts are very specific and are usually not modified without a re-negotiation of the entire contract.

No one in the CIL is authorized to negotiate a contract with, or commit government funds to, a vendor. Anyone who commits government funds without approval of the DPAA Comptroller may be personally liable to the vendor for the complete amount of the promised funds.

6.0 FACILITIES MAINTENANCE: CIL facilities utilized for testing, including but not limited to energy sources, lighting and environmental conditions, are such as to facilitate correct performance of the tests. Laboratory Management and the Lead Quality Manager ensure that the conditions of its facilities do not invalidate the test results or adversely affect the required quality of any measurement **(A5.3.1)**.

The CIL ensures the continued stability of its facilities. Laboratory Management and the Lead Quality Manager monitors, controls and records conditions as required by the relevant specifications, methods and procedures used or where they influence the quality of the results. Attention is paid, for example, to biological sterility, dust, electromagnetic disturbances, radiation, humidity, electrical supply, temperature, and sound and vibration levels, as appropriate to the technical activities concerned **(A5.3.2)**.

The Lead Quality Manager is the facilities manager for the CIL for overarching issues such as modernization, renovation, expansion, major repairs, procurement of installation property, space management, and systems development when such issues impact on the quality assurance of the CIL.

6.1 **CIL Facilities:** CIL facilities are defined as follows:

1) The structure and contents of Building 4077 (CIL-HQ) designated as the CIL on Joint Base Pearl Harbor-Hickam, and its surrounding areas.

2) The structure and contents of the second floor of Building 220 (CIL-PH) on Joint Base Pearl Harbor-Hickam.

3) The structure and contents of the first floor of the DPAA building inside Building 301 designated as the CIL and surrounding areas on Offutt AFB.

4) The structure and contents of select areas within Building 17 (CIL-WP) designated as the CIL on Wright Patterson, AFB.

These are discussed in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security) and DPAA Laboratory Manual, SOP 1.1 (CIL work Environment). The structures include:

- Physical enclosure (e.g., walls, floor and roof).
- Supporting utilities (e.g., electricity, plumbing, sewerage, climate control).
- Information management systems.

- Security systems (e.g., alarm system, swipe card readers, walk-in refrigerator temperature alarm system) **(A5.3.4)**.

The contents include everything (including installation property) located within the physical enclosure as defined above.

Additionally, the facility may include select areas outside of the structures that are of interest to Laboratory Management. These include, but are not limited to:

- Storage containers (e.g., CONEXs and/or MILVANs).
- Break areas.
- Parking areas.
- Exterior utilities (e.g., lighting, landscape sprinklers).
- Exterior security items (e.g., badge readers, fencing).
- Equipment/areas related to interior systems (e.g., refrigeration units for the walk-in refrigerator, mechanical rooms).

6.2 **Work Orders:** Facilities maintenance problems (less information management systems--see below) are reported to the Support Coordinator. If the Support Coordinator is unavailable, the problem should be reported to the Laboratory Administrator who takes the required action, including informing the Support Coordinator of the problem and its status upon his/her return **(A5.3.2)**.

If the problem cannot be safely and legally fixed using the CIL Staff expertise, a work order is prepared and submitted to the appropriate agencies.

All problems directly impacting evidence security (e.g., the walk-in refrigerator, compact shelving, alarm systems), the proper functioning of test equipment, or the immediate safety of the employees (e.g., electrical problems) is given priority for repair. **The Lead Quality Manager is informed of such problems that affect, or have the potential to affect, the quality assurance of the CIL (see below).**

The Support Coordinator keeps a record of all pending and completed work orders, including those involving outside contractors. Work orders should be followed up in a timely manner with the work order log including a record of any follow-up action taken.

6.3 **Information Management Systems:** Computers and information management equipment and the environmental and operating conditions necessary to ensure proper functioning and maintenance of the integrity of test data are monitored and maintained by the IT section.

Problems with individual computers are reported by the user directly to the IT help desk at the appropriate facility. Problems with CIL common equipment or systems (e.g., network printers, TRAIL, CARIS) are reported to the Support Coordinator, Laboratory Administrator and/or Quality Assurance, as appropriate, for resolution **(A5.4.7.2c)**.

6.4 **Housekeeping:** Measures are taken to ensure good housekeeping in the CIL. The Support Coordinator, Evidence Coordinator, and Quality Assurance monitors the housekeeping staff for contract compliance, and safety and security violations, as appropriate **(A5.3.5)**.

The housekeeping staff works under specifically defined parameters of work dictated by the housekeeping contract. As such, problems encountered by the CIL Staff regarding housekeeping should not be directly discussed with the housekeepers unless an immediate threat to safety or the integrity and security of the CIL and its evidence exists. Rather, problems should be reported to the Laboratory Administrator via email or to Quality Assurance.

New housekeeping staff receives safety and security training in accordance with DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education) prior to being allowed to perform duties in the CIL. Security issues related to housekeeping are discussed in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security).

7.0 SPECIAL INSTRUCTIONS REGARDING QUALITY ASSURANCE: The CIL ensures that purchased supplies, consumable materials, and services that have the potential to affect the quality of tests are not used until they have been inspected or otherwise verified as complying with standard specifications or requirements defined in the methods for the tests concerned. These services and supplies used comply with specified requirements. Records of actions taken to check compliance are maintained **(A4.6.2)**.

In order to fulfill the above requirement, Quality Assurance is involved in all aspects of CIL support management (e.g., supply and services procurement, installation upgrades, facilities maintenance) that may **impact on the quality assurance of the CIL.** The Support Coordinator, Laboratory Administrator, Evidence Coordinator, and any other personnel having a stake in CIL support proactively inform, and

effectively communicate with, Quality Assurance regarding support issues that impact on quality assurance. Specifically:

7.1 **Procurement of Property:** Quality Assurance is involved in the procurement of all of types of property that **have the potential to affect the quality assurance of the CIL**. Examples of minor and pilferable property that impact on quality assurance may include, but are not limited to:

- Microscopes.
- Balances.
- Calipers and caliper sets.
- Osteometric boards.
- Mandibulometers.
- Imaging equipment.
- Radiographic equipment.
- Anatomical specimens.
- Skeletal casts & exemplars.
- DNA sampling equipment.
- Field equipment (e.g., total stations, compasses).
- Library texts and journals.

Examples of installation property affecting quality may include, but are not limited to:

- Fume hoods.
- Security systems.
- Walk-in refrigerator.
- Compact and other types of security shelving and containers.
- Safety equipment (e.g., eye wash stations, HAZMAT decontamination showers).

Similarly, expendable items impacting on quality assurance may include, but are not limited to:

- Blood test kits.
- Personal protective equipment.
- Badging supplies and equipment.
- Fire extinguishers and other emergency equipment.
- Evidence management supplies.
- DNA sampling supplies.
- Photo scales.

The level of involvement of Quality Assurance may vary, depending on the nature of the items being procured and their impact on the CIL's quality assurance. As a minimum, Quality Assurance reviews proposed procurements that are initial and/or unique orders against competing items and/or suppliers submitted by the requestor. Quality Assurance may discuss with the requestor various factors related to the procurement (including technical matters) that may affect the quality assurance of the CIL prior to submitting the purchasing documents **(A4.6.2)**. These factors include, but are not limited to:

- Past performance of said items or the company that supplies them.
- Durability.
- Cost effectiveness.
- Ease of use.
- Maintenance/performance check requirements.
- Safety concerns or environmental hazards.
- Security concerns.
- Adequacy of the CIL facility to support the item (e.g., utilities, space needs, structural needs).
- SOP/training/proficiency test implications regarding the CIL Staff.

Recurring or routine orders or procurement of an item(s) need not be reviewed with Quality Assurance unless a potential problem or concern has been identified with said item(s).

Once applicable items arrive at the CIL, the Support Coordinator delivers them to Quality Assurance prior to distributing them to the requestor. Quality Assurance is involved in the reception, initial inspection, initial set-up or storage, etc. of all such property, as appropriate. Such items are not used until Quality Assurance has verified that they comply with the standard specifications or requirements defined in the methods or tests for which they were procured, if appropriate, and/or the initial procurement contracts/agreements **(A4.6.2)**.

7.2 **Procurement of Services:** Quality Assurance is involved in the procuring and monitoring of all services having the potential to impact on the quality assurance of the CIL, including facilities maintenance.

The level of involvement of Quality Assurance may vary, depending on the nature of the service, but as a minimum, it consists of the requestor or Laboratory Management keeping Quality Assurance informed on management decisions regarding contracted services, as appropriate **(A4.6.2)**. Quality Assurance should discuss with Laboratory Management or the requestor factors that may affect the quality assurance of the CIL relevant to the contracted services. Such services include, but are not limited to:

- Service, maintenance, or calibration contracts on property, e.g.:
  - Radiographic equipment.
  - SEM.
  - UV crosslinkers.
  - Light microscopes.

- Variable light source equipment.
- Superimposition equipment.
- Balances and other measuring equipment.

- Service or maintenance contracts on installation property such as:
  - Security, access, and alarm systems.
  - Walk-in refrigerator.
  - Compact shelving.
  - Fume hoods.
  - Showers and eye wash stations.

- Select utilities.
- Select structural components of the CIL.
- Housekeeping.
- Safety equipment.
- HAZMAT services.
- Training services including, but not limited to:
  - First-aid/CPR.
  - Equipment/software upgrades.
  - Management training and seminars.

- External technical consultants.
- Analytical services (e.g., isotopic analysis).
- Subcontracting of analytical work (e.g., DNA) especially as it pertains to DPAA Laboratory Manual, SOP 1.8 (Consult Case Management).

Recurring or routine orders or procurement for services need not be reviewed with Quality Assurance unless a potential problem or concern has been identified with said services.

Escort and control of service contractors performing work in the CIL is discussed in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security) **(A5.3.4)**.

7.3 **Documentation:** Quality Assurance has access to and/or maintains records or copies of records pertinent to the critical aspects of CIL support as it pertains to Quality Management **(A4.6.2)**. These may include, but are not limited to:

- Purchasing documents for items or services affecting the quality of CIL test results containing data describing the services and supplies ordered. These purchasing documents are reviewed and approved for technical content by Quality Assurance prior to release for purchase **(A4.6.3)**. Descriptions may include, but are not limited to:
  - Type, class, grade or precise identification of the item or service.
  - Specifications.
  - Drawings.
  - Inspection instructions.
  - Other technical data.
  - Quality required.
  - Standards applicable to the item/service

- Actions taken to check initial and subsequent compliance.
- Documents describing performance data (e.g., model numbers, inspection instructions, initial performance check results, technical specifications).
- Evaluations of the performance of the equipment and/or the suppliers. The CIL evaluates suppliers of critical consumables, supplies and services which affect the quality of testing, and maintains records of these evaluations and list those approved **(A4.6.4)**.
- Level of satisfaction with contracted services to include compliance monitoring reports.

8.0 DOCUMENTATION: Documentation or copies of support documentation obtained by the CIL Staff (e.g., repair invoices left with an equipment super-user) should be forwarded to the Support Coordinator who then forwards them to Quality Assurance, as appropriate (see above).

The Laboratory Administrator maintains basic documentation of CIL support as specified in this SOP. Documentation should be conducive to maintaining historical use data (i.e., kept in a format that is useful to Laboratory Management for forecasting, planning and budgeting). Readily retrievable "roll up" documentation that summarizes (at a glance) supply and equipment orders and consumption should supplement detailed invoices, supply requests, work orders, and other item/service specific documentation.

9.0 SURETY: The provisions of this SOP are subject to periodic informal inspections by the Laboratory Administrator and Laboratory Management. CIL support is also audited annually in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits) and possibly by outside agencies.

10.0 SAFETY: Under no circumstance are any CIL support operations undertaken that violate DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program). Qualified personnel perform all repairs and maintenance (e.g., electrical problems repaired by electricians) and comply with current building and safety codes.

Annex A (CIL-HQ Refrigeration Systems) (A5.3.1, A5.3.2, A5.8.4)

PURPOSE & SCOPE: This annex outlines standard procedures and protocols for the maintenance of the CIL-HQ permanent refrigerator systems and for correcting any mechanical failures in the systems. This annex does not pertain to portable refrigeration units.

A1.0 EQUIPMENT: Refrigeration equipment consists of two systems, the refrigeration components (walk-in refrigerator and refrigeration units) and the monitors and back-up systems. Specifically:

A1.1 **Refrigeration Components:**

- RWSmith&Co. Controlled Environment Rooms Refrigerators are located in Room 323 (Evidence Storage Room), Room 326 (Morgue Refrigerators), and Room 337 (Material Evidence / LSI Analysis Room).
- KeepKite Refrigeration/cooling/condenser systems are located in Room 346-1 (Mechanical Room).

A1.2 **Monitoring & Back-up Systems:** The temperature for each unit is set at 4 degrees Celsius. Adjacent to each Refrigerator System is a touch screen display that will report of any faults with the system.

The refrigeration units at Building 4077 are on redundant cooling systems. When the primary unit fails or performs poorly, the secondary unit will automatically activate to compensate for the primary unit to keep the room at the acceptable temperature range.

The Support Coordinator or Evidence Coordinator should contact DPAA facilities to obtain a work order for service of the refrigeration systems if a system fault is detected on the display.

A2.0 EMERGENCY PROCEDURES: Since the refrigeration system is a redundant cooling system and the building is equipped with back-up generators the need for emergency procedures is not necessary.

A3.0 SURETY: Surety is maintained through proper training and conducting scheduled and as-needed maintenance of the equipment. The DPAA Facilities Section schedules maintenance of all components and systems and maintains user's manuals and maintenance records for the same.

A4.0 SAFETY: Walk-in refrigerators are equipped with a safeguard inside release mechanism to ensure live persons cannot be locked inside. Refer to the DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) and to individual equipment manuals for the appropriate safety precautions and procedures.

Annex B (CIL-OF Refrigerator & Alarm System) (A5.3.1, A5.3.2, A5.8.4)

B1.0 PURPOSE & SCOPE: This annex outlines standard procedures and protocols for the maintenance of the CIL-OF refrigerator and its alarm system and for correcting any mechanical failures in the systems.

B2.0 EQUIPMENT: Refrigeration equipment consists of three systems, the refrigeration components (walk-in refrigerator and refrigeration units), the circular chart temperature recorder, and the alarm system. Specifically:

B2.1 **Refrigeration Components:**

- Nor-Lake Scientific Walk-In Refrigerator, Nor-Lake Inc. located in room 122 adjacent to the evidence receiving area.
- Refrigeration/cooling/condenser systems (two cycling units) located on the roof on the north side of the CIL-OF building.

User and maintenance manuals for the refrigeration components are:

- Norlake, Rack Mounted Remote and Ceiling Mount Quik Pak Refrigeration Systems, Installation, Operation and Maintenance Instructions
- Norlake, Walk-In Installation Manual

B2.2 **Circular Chart Recorder:**

- CoBex Circular Chart Recorder model 118540

User manual for the circular chart recorder is:

- Installation, Operation and Service Instructions for Circular Chart Recorders, CoBex Recorders, Inc.

B2.3 **Alarm System:**

- Nor-Lake custom Refrigerator Alarm System, located in a control panel on the wall adjacent to the door to the Cold Room (Room 122).
- Automatic Voice/Pager Dialer, AD-2000, United Security Products Inc. located in the Fire Suppression Room (Room 135).

User manuals for the alarm system are:

- Programmable Controller manual.
- Automatic Voice/Pager Dialer System with Verification, Model AD-2000, Owner's Manual and Operating Instructions.

B3.0 EMERGENCY PROCEDURES: The refrigerator alarm system is activated when the produce temperature inside the refrigerator rises above 4°C or drops below -2°C. The alarm system is also activated when the ambient air temperature inside the refrigerator rises above 8°C or drops below -2°C. Listed below are the procedures to follow should the refrigerator alarm be triggered.

1) Once the alarm is triggered by the Temp Alert System, designated persons (names are posted inside the cabinet of the Temp Alert System display) are notified via the Automatic Voice/Pager Dialer that the refrigeration system is malfunctioning. After normal duty hours, persons on the notification roster should acknowledge the automated recording if they wish to be designate as the first responder. Acknowledgment is accomplished by pressing "1#1#" within one second. This stops the dialer from notifying additional individuals on the roster.

2) Upon arriving at CIL-OF the first responder should:

- Check and note the alarm panel alert message
- Silence the alarm buzzer by pressing the "Alarm" button
- Check whether one of the dual refrigeration units is audibly working.
- If all systems appear to be functioning correctly and the product and air temperatures obtain desired range within a reasonable time, reset the alarm by following instructions posted on the wall next to the refrigerator unit door. Notify the Evidence Coordinator and Facility Maintenance of the occurrence during regular business hours.
- If the unit does not appear to be operating correctly, notify the Evidence Coordinator immediately.

3) Should the system fail to work or the temperature does not soon stabilize within the acceptable range, inform Laboratory Management.

4) In the event of system failure, the Evidence Coordinator and appropriate personnel take steps to best preserve the evidence stored in the refrigerator.

5) Notify the Support Coordinator the next working day to contact Facilities Maintenance to obtain a work order for service of the refrigeration systems.

B4.0 SURETY: Surety is maintained through proper training, conducting scheduled and as-needed maintenance of the equipment and the use of

appropriate forms to document testing and maintenance. The CIL Librarian maintains any existing equipment manuals. Copies are available on the ASCLD-LAB shelf in the Library. Quality Assurance maintains maintenance records for the refrigeration system.

B4.1 **Refrigeration Components:** Cleaning products used to clean the refrigerator or components must not contain ammonia or bleach. Maintenance on all refrigerator components is performed by Facility Maintenance personnel. Recommended maintenance includes cleaning coils and condensers every six months and cleaning the fans every year.

B4.2 **Alarm System:** The following procedures cover the standard testing of the refrigeration alarm system, which is completed by the Evidence Coordinator, or a designated alternate, every three months or once per quarter.

1) Notify the persons on the automatic call list that a test is being conducted.

2) Locate the product temperature probe that is situated inside the tube of glycerin that is positioned inside the refrigerator on the wall to the right of the door. The product temperature probe is the smaller of the two probes immersed in the glycerin and has a black wire running to it. Carefully remove the product temperature probe from the tube of glycerin and insert into a container of warm tap water.

3) The alarm should trigger when the product temperature reading has surpassed 4°C for 120 seconds and should be audible to anyone standing in the immediate area. The Automatic Voice/Pager Dialer should notify the persons on the call list following a five minute hold time after the initial triggering of the audible alarm. If either system does not perform correctly, notify the Support Coordinator to schedule service.

4) Carefully wipe the product temperature probe dry of water and return it to the glycerin tube located inside the refrigerator on the wall to the right of the door.

5) Note that the test was performed on the Performance Check/ Maintenance/ Calibration Summary sheet (CIL Form 3203), maintained Quality Assurance.

B5.0 SAFETY: The refrigerator is equipped with a safeguard inside release mechanism to ensure live persons cannot be locked inside. Refer to the DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) and to individual instrument/equipment manuals for appropriate safety precautions and procedures.

SOP 1.6: GENERAL CASEWORK PROCEDURES

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 23 September 2016
Citation: DPAA Laboratory Manual, SOP 1.6

A0.0 PRINCIPLE, SPIRIT & INTENT: *General casework is performed in an organized manner conducive to replication and verification.*

1.0 PURPOSE & SCOPE: This SOP is designed to provide new CIL Staff, non-CIL DPAA personnel, and lay people with a general overview of analytical casework procedures (i.e., the processing and analysis of evidence accessioned into the CIL) at the CIL. These procedures apply to typical cases. Specific SOPs cited within this SOP provide more detailed guidelines. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 DEFINITIONS: Terms and definitions specific to a SOP are defined in that SOP. The following terms and definitions apply to CIL casework:

2.1 **Active Case:** Active cases are those undergoing analysis or being considered for analysis. Cases default to an inactive status (see below) one calendar year from the accession date or when deactivated by Laboratory Management.

2.2 **Inactive Case:** Inactive cases are those for which analysis is put on indefinite hold, or for which analysis is completed but resulted in insufficient evidence to support a disposition status (see below).

2.3 **Disposition Status:** Disposition status is a collective term encompassing the following categories. Specifically:

2.3.1 **Identification:** A case status used to describe biological evidence (and associated material evidence) identified as a specific individual, as relating to grouped remains from a specific incident.

2.3.2 **Administrative Fiat:** This is a case status used to identify materials that are determined NOT to be evidence and thus in need of removal from the evidence management system. These can include but are not limited to non-human items (remains and non-biological material), artifacts not associated with a loss incident, and human remains known to bear no relationship to a CIL case (e.g. human remains that should never have been accessioned). Laboratory Management identifies accessions for removal by Administrative Fiat.

The intent of the administrative fiat is to formally remove the case or individual pieces of evidence from the management and tracking systems at the CIL. The administrative fiat can be a formal memorandum with analytical notes or a management review of non-evidentiary items. Laboratory management decides which format (memorandum or form) to use based on the nature of the case. The completed form is stored in the case file folder for the accession from which the items were removed (e.g., I-01, G-01).

An administrative fiat is written under the following circumstances:

- When an accession consists exclusively of non-human items and their removal empties the accession, resulting in the need for administrative closure. If the material in such cases was simply removed and discarded, there would be no record trail to account for it. This is the most common situation where an administrative fiat is used.
- When a case is comprised of significant human remains along with substantially smaller non-human items (e.g., rat femur, burned plastic, coconut shell). Under these circumstances the items are documented in the administrative fiat form and then culled (which is an extension of what is done in the field when the RL elects not to return every pebble).
- When, for whatever reason, non-human items have been returned to the CIL and documentation associated with the return process (e.g., field notes, chain of custody forms, JFR notes) consistently attests that the items are non-human.
- When Laboratory Management determines that an accession consists of items that are not evidence and should not have been accessioned into the evidence management system. Examples include the accidental accession of human remains intended for the study collection, the accessioning of evidence from a consult case when the customer intended to accession the evidence elsewhere, and the accessioning of artifacts or other materials that are determined to be irrelevant to any CIL cases.
- When there is a need to document a major aspect of the case. For example, the SAR, SITREP, or other relevant report, documents that possible human bone and teeth were recovered but the teeth are subsequently determined to be those of a pig or altogether non-human (such as a rock). The

administrative fiat documents the analysis of the teeth as non-human, their removal from the case, and accounts for their subsequent absence in the case file.
- When the case consists of a small number of remains that have been counted in some document such as a SITREP (e.g., 10 bone fragments) and a significant number are going to be eliminated, then an administrative fiat is in order. In such instances, the administrative fiat serves as an accountability tool explaining the absence of a said number of fragments.
- When a case is deemed to be of a nature where failure to document non-human items would potentially pose future questions and/or problems.

Materials subject to the above guidance are removed from the accession in accordance with guidance specified in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

Administrative fiats are treated as any other case work in terms of test and quality assurance procedures unless otherwise excepted by the Laboratory Manual. In other words, administrative fiats are not assumed to be a lesser form of case work.

2.3.3 **CIL Portion(s):** CIL portion is a shortened form of the term "CIL unknown portion." A single item is termed a CIL portion while two or more items constitute CIL portions.

There are three types of CIL portions, Type I, Type II and Type III.

Type I CIL portion is a case status used to describe biological evidence or material evidence having no probative value. As such, Type I CIL portions may fit one or more of the following criteria:

- Cannot be conclusively determined to be human remains.
- Cannot be associated to a specific individual or group.
- Determined to be an individual outside the jurisdictional concern of the DPAA (e.g., unknown foreign national).
- Determined to be related to an incident, but an identification cannot be effected, usually due to the lack of biological materials from a case/site.
- Deemed "insignificant" in nature (analogous to medical waste).

In most instances, Type I CIL portions are deemed non-evidentiary toward the pursuit of an identification. Type I CIL portions are removed from active case management but are not destroyed and can be reactivated based on new evidence. The change in status requires official case reactivation, which explains the nature of the change.

Type II CIL portion is a case status used to describe biological evidence that has been associated with a previously identified individual or individuals but which the primary next of kin (PNOK) have declared, in writing, that they do not want returned. Type II CIL Portions also are consult cases that the agency requesting the analysis no longer wishes to retain custody of the remains, at the end of the analysis.

The biological evidence may include sample residues from specialized testing (e.g., DNA analysis, isotopic testing, histology) that were not consumed during the analysis. DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security) further discusses sample residues. It is unnecessary to reactivate closed accessions to process and report sample residues as Type II CIL portions.

All remains in this category were initially assigned as additional remains (e.g., 2010-090-X-01), or by an individual number (e.g. 2010-138-I-01-C) if a consult case. The fact that the family or requesting agency declines possession of the remains allows the Science Director to re-designate the remains as a Type II CIL portion. The change in status is usually documented in the Science Director's identification cover letter or in a MFR at the completion of the consult case.

Type II CIL portions may be segregated and stored separately from Type I CIL portions. Type II CIL portions are not destroyed unless directed by a service casualty office or other appropriate agency.

Type III CIL portions are cases where the remains can be identified to a host country, and that country has refused acceptance of the remains, or when a mechanism to repatriate the remains is not codified. These are typically Southeast Asians; both Vietnam and Cambodia now are on record as not wanting remains repatriated to their countries. Other countries may follow this lead.

All remains in this category are initially assigned as an individual number (e.g. 2010-199-I-01). The fact that the host nation declines possession of the remains allows the Science Director to re-designate the remains as a Type III CIL portion. The change in status is usually documented in the Science Director's identification cover letter.

Type III CIL portions are closed cases and are not reactivated for future analysis. As such, Type III CIL

portions remain under red tape and, as a result, are not typically used as anatomical study collection specimens, or for display purposes, or removed from the CIL (e.g., as teaching specimens).

However, Type III CIL portions may be opened in specific instances for research or data collection. In rare instances, destructive testing may be performed. Any use of Type III CIL portions in these instances must be approved by Top Management (an email memo is sufficient for approval).

Instructions for storing, securing, opening, and handling CIL portions are found in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

Regardless of the type of CIL portion, the evidence is treated as any other case work in terms of test and quality assurance procedures unless otherwise excepted by the Laboratory Manual. In other words, CIL Portions are not assumed to be a lesser form of case work.

2.4 **Blind Analysis:** Uunless otherwise directed by Laboratory Management, anthropologists developing a biological profile for an unknown individual from skeletal remains work in the "blind." Blind analysis means that the anthropologist does not know, *a priori*, the physical characteristics of the individual thought to be represented by the remains (or other potentially biasing information). In short, blind analysis maximizes impartiality in the analyses conducted at the CIL.

Other information, such as conflict, type of incident (e.g., aircraft crash), or number of personnel involved in the incident may be supplied or withheld from the analyst(s) as deemed necessary by Laboratory Management. Typically, odontologists analyzing dental remains and anthropologists working on material evidence do not operate in the blind.

2.5 **Consult Case:** Casework performed on a consultation basis for another agency.

2.6 **Line of Evidence:** A collective term used to describe a particular type or category of evidence. Examples of common lines of evidence utilized by the CIL are:

- Recovery/field results.
    - Recovery scene findings (archaeology) e.g., context, associations.
    - Witness statements.
- Trace evidence.
    - Physical anthropology (skeletal remains).
    - Odontology (dental remains).
    - Material evidence (artifacts, wreckage, and personal effects).
    - Chest x-ray comparison.
    - Histomorphology.
- DNA.
- Historical and archival research including:
    - Circumstance of loss.
    - Unit locations and activities.
    - Personnel, mortuary, and other records and data.

Additional discussion on lines of evidence is found in Annex A (Human Remains Identification) to this SOP.

3.0 GENERAL CIL CASEWORK PROCEDURES:

3.1 **Location**: CIL analytical casework is performed in various secure areas of the CIL (DPAA Laboratory Manual, SOP 1.2 [CIL Physical Security] specifies secure areas). Reports are typically prepared in an office setting. External factors occasionally may require that related analysis or report writing be conducted under field conditions, or in a laboratory setting other than the CIL.

3.2 **Apparatus & Materials:** Equipment and comparative exemplars necessary to analyze evidence are maintained in the CIL. Examples of these include graphic and skeletal exemplars, synoptic collections of artifacts and non-human remains, and various analytical instruments (e.g., calipers, radiographic equipment).

3.3 **Sources of Evidence:** Evidence comprising CIL case work has various sources. These include, but are not limited to:

- DPAA field activity (e.g., recovery scene processing and investigative activity) as detailed in DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing).
- Unilateral turnovers from Federal agencies and worldwide sources.
- Customer submissions. These are usually of a medical-legal nature and are detailed in DPAA Laboratory Manual, SOP 1.8 (Consult Case Management).
- Disinterments from cemeteries. See Annex B (Disinterment Procedures) of this SOP for instructions on disinterment procedures and operations.

3.4 **Evidence Handling & Preservation**: Evidence is accessioned into the CIL and handled in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). Evidence at the CIL is typically robust in nature and is not easily affected by routine handling or by the ambient environment in the CIL. Care should be exercised in cases where evidence is friable because of the postmortem preservation environment. In these instances, special precautions or measures pertaining to specimen preparation may sometimes be required prior to analysis, including cleaning and reconstruction of evidence.

3.5 **General Accessioning Procedures:** Evidence is received into custody and introduced into the evidence casework and management systems (i.e., accessioned) at the CIL using the following procedures:

3.5.1 **Creation of the Master Case File:** At the time of accession, a DPAA master case file (i.e., case file) is started in accordance with DPAA Laboratory Manual, SOP 1.7 (CIL Case File Management). The master file is filed in chronological order by year in the Laboratory Administration File Room. As additional case information is later received or generated, it is placed in the master file. Typically, the master file should not be removed from the File Room except for purposes of making working copies of any or all of the contents.

3.5.2 **Preliminary Assessment:** Preliminary assessment is not a formal analysis rather it is a management tool that allows Laboratory Management to quickly evaluate evidence for its probative value and, in turn, prioritize and synchronize formal analysis with regard to the analytical case load.

Preliminary assessment may also determine the likelihood of obtaining DNA from biological evidence and if special measures are required to handle, store, or conserve evidence. Evidence Coordinators and select CIL Staff typically conduct preliminary assessment in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

3.5.3 **Casework Management:** Casework is continually reviewed and tracked by Laboratory Management. Following preliminary assessment, Laboratory Management assesses the status of a case and may place the case in an inactive status. Cases retained in an active status are assigned to one or more analysts or deferred pending additional field work or research.

When assigned to an analyst, he/she is told the case's relative priority and is given a suspense date. Typically, the analyst also is informed of previous accessions associated with the same incident or individual. Special instructions and information may be passed to the analyst at the time of the tasking. The analyst works with the Laboratory Manager for the relevant functional area of the analysis (SAR, FAR, MER, etc.).

Based on the results of preliminary assessment and formal analysis, the case is allowed to go into an inactive status, or is readied for disposition as an identification, CIL portion, or administrative fiat. Inactive cases may be later returned to an active status by the approval of Laboratory Management.

3.6 **General Casework Procedures:** Once an analyst is assigned a case, the Evidence Coordinator checks out the evidence in the analyst's name and assigns them a table in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). The analyst then begins analysis.

If instructed to do so, the analyst also examines previous accessions associated with the same incident, or name association for similarities or points of articulation. If the accessions are associated demonstrably, they are consolidated under a single accession number in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). At this time, a Memorandum for Record should be generated by the Evidence Coordinator and placed in the master file(s) of each of the cases being consolidated. The Evidence Coordinator and Laboratory Administration then consolidate the accessions and note the change in the DPAA databases.

Recommendations by the analyst to sample a case for DNA are reviewed by DNA personnel and/or the Science Director. If no DNA testing is required, or approved, the analysts finalize their reports. If DNA testing is approved, samples are taken in accordance with DPAA Laboratory Manual, SOP 3.7 (DNA Sampling). Results of DNA testing, when applicable, are supplied to the analysts assigned to the case and are incorporated into the final reports as necessary. Cases are typically stored following DNA sampling until the findings become available and casework can resume.

The analyst notifies an Evidence Coordinator when the analytical and peer review process is complete. The Evidence Coordinator returns the evidence to the evidence storage area in accordance with DPAA

Laboratory Manual, SOP 1.3 (Evidence Management & Security).

3.7 **Trace Evidence Analysis:** Categories of trace evidence include biological material (e.g., human osseous and dental remains, DNA) and artifacts (material evidence). The resulting documentation is turned over to Laboratory Administration for processing and filing. Analytical notes, including photo- and radiographic images, are prepared and annotated in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation) and maintained in the original case file. Quality Assurance conducts frequent audits of the quality of analytical notes.

3.7.1 **Dental Remains:** Analysis of dental remains includes, but is not limited to, the following:

- Identification of human versus nonhuman teeth.
- Resolution of dental commingling in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Determination of tooth type and/or tooth identification (position).
- All dental remains photographed in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).
- Depending on the nature and condition of the dentition received in a case, radiography may be performed in accordance with DPAA Laboratory Manual, SOP 3.5 (Forensic Odontology).
- Reconstructing remains to facilitate subsequent analyses in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Assist Laboratory Management in preparing "short lists" of candidates for investigation and identification
- Dentition received is compared against the dental database using the CARIS Dental Module or other search mechanisms, as appropriate.
- Prepare dental DNA samples in accordance with DPAA Laboratory Manual SOP 3.7 (DNA Sampling).
- All findings and opinions are submitted in writing in accordance with DPAA Laboratory Manual, SOP 3.5 (Forensic Odontology).

3.7.2 **Skeletal Remains:** Analysis of skeletal (osseous) remains includes, but is not limited to, the following:

- Gross examination followed by a microscopic examination when required.
- Selected reconstruction of fragmented remains to facilitate subsequent analyses in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- All skeletal remains photographed in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).
- Photographic and radiographic documentation of selected observations (apart from the main assemblage) is conducted in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging) and SOP 3.4 (Determining Biological Profiles), respectively.
- Segregation of biological from non-biological and human from non-human biological material in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Resolution of commingling in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Determining minimum number of individuals (MNI) in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Determination of the biological profiles (ancestry, sex, age-at-death, stature, and traits of individuation) in accordance with DPAA Laboratory Manual, SOP 3.4 (Determining Biological Profiles). Anthropological analysis of dentition is included in these procedures.
- Taphonomic observations (staining, postmortem modifications, etc.) in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Prepare osseous DNA Samples in accordance with DPAA Laboratory Manual, SOP 3.7 (DNA Sampling).
- Comparing addenda containing antemortem physical characteristics of the suspected individual(s) to the derived biological profile of the remains in accordance with DPAA Laboratory Manual, SOP 3.4 (Determining Biological Profiles).
- Findings and opinions are submitted in writing in accordance with DPAA Laboratory Manual, SOP 3.4 (Determining Biological Profiles).

3.7.3 **Material Evidence:** Analysis of material evidence includes, but is not limited to, the following:

- Gross examination followed by a microscopic examination when required.

- All material evidence is photographed in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).
- Collection of metric data.
- Whenever possible, given the nature of the evidence, the following determinations are made:

  - Material type.
  - Date of manufacture or issue.
  - Function (e.g., canteen cup, watch face).
  - Class versus individual characteristics.
  - Consistency and/or association with a missing individual, loss incident and/or with known circumstance of loss.
  - General observations (e.g., staining, modifications, adherent soil).

- When individualizing characteristics or features are present, these may be documented with supplementary photographs in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging). All findings and opinions are submitted in writing in accordance with DPAA Laboratory Manual, SOP 3.6 (Material Evidence Analysis).

3.7.4 **Chest Radiograph Comparison:** Analysis of antemortem chest radiographs and the osseous remains for chest radiograph comparison includes, but is not limited to, the following:

- Gross examination of antemortem radiographs and osseous remains (C3-T3 vertebrae and clavicles).
- Selected reconstruction of fragmented remains to facilitate subsequent analyses in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Photography of osseous remains in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).
- Postmortem radiography of osseous elements in accordance with DPAA Laboratory Manual, SOP 3.9 (Chest Radiograph Comparison).
- Postmortem and antemortem radiographic image comparison in accordance with DPAA Laboratory Manual, SOP 3.9 (Chest Radiograph Comparison).
- Findings and opinions are submitted in writing in accordance with DPAA Laboratory Manual, SOP 3.9 (Chest Radiograph Comparison).

3.7.5 **DNA Analysis**: DNA analysis of biological evidence may be necessary for case resolution. Samples for DNA testing are taken in accordance with DPAA Laboratory Manual, SOP 3.7 (DNA Sampling). The following is a summary of the current DNA process:

1) Anthropologists and odontologists review cases and recommend/request DNA sampling to assist in the resolution of commingling and to test identity of remains. The Science Director, Laboratory Managers, and R&A analysts may also request that DNA casework be directly initiated by DNA personnel.

2) Laboratory Management reviews, approves/revises recommendations while the DNA personnel sample for DNA in a clean controlled environment and provide other supporting operations pertaining to DNA.

3) The samples are sent via Federal Express under Chain of Custody to the Armed Forces DNA Identification Laboratory (AFDIL) who produces sequence data summaries, or report samples as inconclusive/no sequence obtained.

4) The reported sequence is requested compared to appropriate Family Reference Samples (FRS). AFDIL reports preliminary findings of Excluded, Inconclusive, or Consistent. Note: For mtDNA, "Excluded" means the DNA is definitely NOT from the casualty, whereas "Consistent" means it could represent the casualty. "Inconclusive" means either two or more casualties are consistent with the evidence or one or more casualties cannot be excluded due to a minor inconsistency between the reference and the evidence.

5) AFDIL produces final reports at the request of Laboratory Management.

3.7.6 **Histomorphology**: Small and otherwise unidentifiable fragments of material can be potentially identified using histomorphology. Histomorphological analysis is conducted in accordance with DPAA Laboratory Manual, SOP 3.8 (Histomorphology). The following is a summary of the histomorphology process:

- Analysts select and nominate samples for histomorphology analysis, after checking CARIS to verify if prior histomorphological preparation and/or analysis exist.
- DNA personnel are consulted to determine any impact, if any on possible DNA testing of the fragment.
- A sample is procured in accordance with DPAA Laboratory Manual, SOP 3.7 (DNA Sampling).
- The sample is prepared in accordance with DPAA Laboratory Manual, SOP 3.8 (Histomorphology).
- Data are collected in accordance with DPAA Laboratory Manual, SOP 3.8 (Histomorphology).

- Findings are reported as Match to non-human, Inconclusive or Non-osseous.
- Analytical conclusions are reported in the analytical notes and case reports in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).

3.8 **Peer Review:** All scientific analyses are subject to internal peer review in accordance with the guidelines set forth in DPAA Laboratory Manual, SOP 4.1 (Peer Review). Laboratory Management assigns cases and reports for peer review. For consistency and continuity of the peer review process, a report is peer reviewed by a single individual whenever possible. Typically only one peer review is required; however, the number of reviews that an individual report undergoes is subject to the discretion of Laboratory Management.

The peer review results in either a verification of the case work or its referral to Laboratory Management. Non-concurrence by Laboratory Management on referred peer reviews is reviewed by a Peer Review Oversight Committee (PROC) in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review) and corrective action taken, if warranted.

3.9 **Case File Coordination**: Cases leading to identifications require extensive documentation. A completed identification case file includes not only the results of CIL scientific analyses, but also may include acquisition information, record data, and results of analysis as supplied by other sections within the DPAA (e.g., regional Multi-Disciplinary Teams) and outside agencies (e.g., AFDIL, DIA, FBI). The process for assembling and checking this documentation, called Case File Coordination, is found in DPAA Laboratory Manual, SOP 1.7 (CIL Case File Management).

3.10 **External Reviews:** Each case for identification is reviewed by a member of the Armed Forces Medical Examiner System (AFMES). The Science Director sends each DPAA case to an appropriate reviewer. The reviewer may be located at DPAA (e.g., TDY or co-located at DPAA) or elsewhere. When utilizing off-station reviewers (usually located at Dover, DE), copies of the case files are digitally transferred to the reviewer in a secure manner. Additional guidance is found in DPAA Laboratory Manual SOPs 1.7 (CIL Case File Management) and 4.1 (Peer Review).
In addition to, or exclusive of, an AFMES external review, the Science Director has the option to send cases to external consultants under contract to DPAA for external review.

Upon receipt of reviewers' comments, the Science Director notifies the appropriate Laboratory Manager(s) that the case is ready for identification. The Science Director signs and dates the Medical Examiner Summary Report (MESR) and completes the DD Form 2064 (Certificate of Death Overseas). These documents are added to the casualty identification packet and the permanent CIL case file.

If no external review is required (typically in the case of X-Portions), the Science Director and/or his designee signs the Memorandum for Record approving the identification.

3.11 **Identification Packets:** Identification packets are stored in digital form on the network and in hard copy in the CIL Library. Following approval, Laboratory Administration reproduces the appropriate number of case files, or identification packets, for dissemination. Typically, packets are bound in book form. Laboratory Administration mails copies to the appropriate agencies. The original DPAA file retains internal review forms, the original images, and other documentation used in the case analysis. A final copy of the identification packet is placed in the CIL Library.

4.0 SURETY: Surety of casework is accomplished through internal and external peer reviews in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review), CFC, and external and internal audits and in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

5.0 SAFETY: All evidence, especially osseous and dental remains, and suspected osseous and dental remains, its analysis, and utilization of all equipment is in accordance with the appropriate procedures detailed in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) and the respective analytical SOPs. Safety for disinterments is detailed in Annex B (Disinterment Procedures) of this SOP.

Annex A (Human Remains Identification)

A0.0 PRINCIPLE, SPIRIT & INTENT*: The identification of human remains is the highest priority of the DPAA and the CIL and must be performed with respect, integrity, sensitivity, thoroughness, professionalism, and the highest degree of scientific certainty.*

A1.0 PURPOSE & SCOPE: The identification of human remains is the core function of the CIL. Identifications must be documented and established in such a manner as to ensure confidence in the process. Accordingly, the identification process must adhere to the highest ethical standards and must maintain transparency and traceability at all times. This annex summarizes and discusses the concepts, approach, and processes that assure identifications are scientifically sound and legally defensible. In the absence of specific procedures, or in the case of conflicting procedures, the principle, spirit & intent will be met.

A2.0 DEFINITIONS: For the purpose of human remains identification, the following definitions are used:

A2.1 **Burden of Proof:** The requirement to prove, or disprove, certain facts) e.g., an individual's identity).

A2.2 **Probative Value:** Evidence has probative value if it makes the existence of something more, or less, probable than would be the case in its absence.

A2.3 **Evidence:** A matter of fact used to prove, or disprove, an issue of legal concern.

A2.4 **Material Evidence:** Non-biological physical evidence.

A2.5 **Clear and Convincing:** The burden of proof in which the fact (i.e., identity), is established with a high probability or degree of certainty.

A2.6 **Unaccounted-For:** A generic term used to describe a range of casualty classes, including missing in action (MIA) and killed in action—body not recovered (KIA-BNR). Typically, the term "unaccounted-for" is applied to any individual within the DPAA's jurisdiction who has not been previously identified.

A2.7 **Remains:** Generic term for human biological tissue. Typically, remains are hard tissue (i.e., bone). Non-human bone generally is not referred to as "remains."

A2.8 **Additional Remains:** Human remains of an individual who has been identified previously.

A2.9 **Positive Identification:** "Positive" identifications are the outcome of a single line of evidence establishing a unique identity. Typically, lines of evidence leading to a "positive" identification historically have included visual recognition, fingerprints, dental radiographic comparison, or nuclear DNA. The CIL eschews the use of the term "positive" identification due to the unfortunate inference that other forms of identification are "less than positive."

A2.10 **Presumptive Identification: "**Presumptive" identifications are the outcome of several independent lines of evidence establishing a probable identity to the exclusion of all other reasonable possibilities. Presumptive identifications are different than "circumstantial" identifications in that the former is of a higher standard than the latter. A circumstantial identification generally has no associated scientific or laboratory evidence.

A2.11 **CIL Portion(s):** Short for CIL Unknown Portions. CIL Portions are biological specimens that cannot be attributed to a specific individual or event with any reasonable degree of scientific certainty. CIL Portions are discussed in the body of this SOP.

A2.12 **DD Form 1300:** Department of Defense, Report of Casualty form. The DD Form 1300 serves as a death certificate for Vietnam War losses, including MIA and KIA-BNR.

A3.0 JURISDICTION: The DPAA assumes jurisdiction for the recovery and identification of U.S. military personnel for whom a death certificate or similar instrument (e.g., DD Form 1300) has been issued. This includes all missing or unaccounted-for personnel from World War II, the Korean War, the Cold War, and the Vietnam War or other losses as directed by the Secretary of Defense. The Secretary of Defense may also direct DPAA to assume jurisdiction for non-military individuals.

A4.0 AUTHORITY: All identifications are established by the CIL Science Director. Additionally, the CIL Science Director maintains full discretionary authority over the identification process of individuals who fall within the DPAA CIL's jurisdiction. This includes the authority to waive, or otherwise deviate, from this annex as required to make an identification—subject to adherence of the principle, spirit, and intent of this annex.

A5.0 EVIDENTIARY FRAMEWORK: All DPAA-CIL identifications are based on a minimum of two independent lines of evidence. The most common lines of evidence are detailed below. Material Evidence, Physical Anthropology, and Odontology analyses are sometimes collectively called laboratory trace evidence analysis. Other lines of evidence may be introduced when considered to have probative value.

A5.1 **Historical Evidence:** (Also termed Circumstance of Loss.) The Historical Evidence consists of archival records, eyewitness accounts, personnel records, and other historical documents that place an individual, or group of individuals, into four-dimensional space. Normally, this refers to a particular battlefield or particular aircraft crash site at a particular time.

The historical evidence must be independent of all other lines of evidence. For example, historical evidence should place a specific individual in a specific aircraft at a specific location (e.g., the crash site) at a specific time (e.g., the time of the crash).

This evidence should not be dependent on identification media found at the site or any other material evidence generated through the recovery efforts. The historical evidence may be documented in a R&A Report or other official document.

A5.2 **Recovery Evidence:** The recovery evidence typically consists of observations and documentation generated through forensic archaeological recovery of a known loss site. Typically, the recovery evidence is documented in the Search and Recovery Report (SAR).

A5.3 **Material Evidence Analysis:** Material evidence is the physical evidence generated through a DPAA led recovery or turned over to the CIL from a third party. Material evidence should independently corroborate the presence of an individual, or group of individuals, in four-dimensional space. Typically, material evidence is documented in the Material Evidence Report (MER).

A5.4 **Physical Anthropological Analysis:** (Also termed forensic anthropology or biological anthropology.) Physical anthropological analysis focuses on the analysis of biological tissue—generally osseous—for the purpose of:

- Determining human from non-human remains.
- Generating a biological profile (e.g., ancestry, age, sex, stature, antemortem pathological conditions, anomalies and traits of individuation).
- Determining the minimum number of individuals present.
- Identifying and documenting taphonomy.
- Identifying and documenting perimortem hard-tissue trauma.

Typically, physical anthropological analysis is documented in the Forensic Anthropology Report (FAR).

Specialized anthropological analysis is documented in an appropriate report format, e.g., Chest Radiographic [X-Ray] Report (CXR). Other types of anthropological observations (e.g., skull-photo superimposition) typically are documented in memoranda.

A5.5 **Odontological Analysis:** Odontological analysis focuses on dental remains for the purpose of comparison to antemortem dental records of known individuals. Typically, odontological analysis is documented in the Forensic Odontology Report (FOR).

A5.6 **DNA Testing:** DNA testing of CIL casework typically is performed by the Armed Forces DNA Identification Laboratory (AFDIL) and is documented in a DNA comparison report.

A6.0 BURDEN OF PROOF & FINDINGS: The CIL's burden of proof for the identification of individuals under its jurisdiction is **clear and convincing.**

An identification is considered to meet the clear and convincing burden of proof standard when:

- The historical evidence and laboratory-derived evidence agree with the known antemortem facts of the case.
- All reasonable alternatives can be eliminated.
- There are no unexplainable or irreconcilable discrepancies between the antemortem facts of the case and the postmortem evidence that would preclude the identification.

The CIL Science Director renders an identification finding when he believes that the identification meets the clear and convincing burden of proof standard.

Typically, findings are categorized as:

A6.1 **Individual Identification:** Human remains identified as those of a specific individual—to the exclusion of all other reasonable possibilities.

A6.2 **Group Identification**: Human remains identified as those of known participants in a specific loss (e.g., aircrew from a specific aircraft). Group remains identifications follow Army Regulation 638-2 that states that in cases where, "No individual identification(s) can be made from the remains recovered, [and where] the material evidence and/or reliable circumstantial information clearly identifies the specific incident," the remains are interred in a government cemetery as a group.

A6.3 **Individual Identification of Additional Remains**: Human remains identified as more portions of a specific, previously identified, individual. This finding is not to be confused with the current identification of an individual who had been previously incorrectly identified.

A6.4 **Group Identification of Additional Remains**: Human remains identified as those of a specific, previously identified, group identification.

A6.5 **Non-U.S. Identification**: Human remains that cannot be attributed to a known individual but which can reasonably be demonstrated to be those of a non-U.S. citizen.

A6.6 **CIL Portion(s)**: As defined in the body of this SOP.

A7.0 DOCUMENTATION: The primary documentation establishing an identification is the Instrument of Identification. The Instrument of Identification is a dated Medical Examiner Summary Report (MESR), signed by the CIL Science Director.

The date on the signed MESR is the date of the peer review of the identification.

The MESR typically is sub-divided into the following sections:

- Background: Summarizes the historical evidentiary line and establishes the chain of custody for the remains and related material evidence.
- Summary of Identification: Summarizes the relevant analyses. Typically, this includes historical analysis, DNA analysis, odontological analysis, anthropological analysis, and material evidence analysis.
- Opinion: Incorporates the individual analytical findings into a comprehensive conclusion.
- Supporting Documents and Identification Memorandum: Supporting documents which form the evidentiary framework for the conclusion are listed in the Identification Memorandum. Typically supporting documents include relevant SARs, MERs, FARs, FORs, DNA reports, and historical documents and analysis. The Identification Memorandum also lists the date of identification established by the Science Director as well as the rank, name, and service number of the identified service member.

A8.0 SURETY: The identification of human remains requires strict adherence to a robust and transparent surety program. Surety dedicated to the identification process is detailed in DPAA Laboratory Manual, SOP 4.0 (CIL Surety).

An important surety measure is available at this point in the identification process. At the CIL Science Director's discretion, proposed identification findings may be submitted for external review prior to being finalized. The CIL maintains a pool of external forensic scientists (odontologists and anthropologists) as consultants for this purpose.

Typically, individual and group identifications are reviewed by at least one external consultant. External review is typically not utilized for identification of additional remains, CIL Portions, and non-U.S. personnel. The use of external consultants is further detailed in DPAA Laboratory Manual, SOP 4.0 (CIL Surety) and SOP 4.1 (Peer Review).

A9.0 SAFETY: There are no safety issues related to the identification process that are not already addressed by other DPAA Laboratory Manual SOPs.

Annex B (Disinterment Procedures)

Note: This Annex is undergoing extensive revision due to organizational changes within DPAA.

B0.0 PRINCIPLE, SPIRIT & INTENT: The CIL is charged with reviewing unknown remains that are interred for the purpose of identifying those individuals, particularly where new technology or information renders the likelihood of identification high.

Therefore it is the principle, spirit and intent of the CIL to comply with U.S. government policies and at the same time maintain a systematic process that generates a high degree of historical and scientific probability that remains interred as unknown may be successfully identified prior to their disinterment from U.S. cemeteries.

The principle, spirit and intent of this annex follow the policy established by the Under Secretary of Defense, signed 13 May 1999 addressing this issue. The memorandum states:

"A decision to disinter a set of remains now marked as 'unknown' must be based on sufficient circumstantial and anatomical evidence which when combined with current forensic science techniques would lead to a high probability of positive identification. The process of selecting a case, evaluating it, and making a decision to disinter is as follows:

"The Central Identification Laboratory – Hawaii (CILHI) will evaluate and prioritize cases which it believes meets this policy's criteria; CILHI will also consider cases brought to its attention by other government offices, non-governmental organizations, or families of servicemen missing in action.

"CILHI will first determine whether there is sufficient evidence to narrow the number of potential candidates to a point where mtDNA testing offers a high probability of identification. When such a determination is made, CILHI will contact the appropriate Service Casualty/Mortuary office to obtain necessary family reference samples to conduct the testing.

"If an appropriate sample is (or will be) available, and *CILHI* believes identification is highly probable, *CILHI will arrange with the appropriate cemetery authority for disinterment* (emphasis added).

"CILHI and the Armed Forces DNA Identification Laboratory will conduct the forensic testing."

Note: Due to organizational changes, the CILHI was re-designated the DPAA Central Identification Laboratory (CIL) on 1 October 2003.

The CIL has adhered to and implemented the above DoD policy since its inception and continues to do so. All cases submitted for disinterment must have a high degree of probability for identification. To date, the CIL has been successful at identifying those exhumed from U.S. cemeteries and, to this end, continues this effort by applying the highest degree of scientific integrity and professional standards.

B1.0 PURPOSE: This annex establishes guidelines for the preparatory research, disinterment process, and eventual identification of military members currently buried as unknowns in U.S. national cemeteries around the world. Further, this annex details the responsibilities of key personnel, and outlines the standards for establishing a high degree of probability for identification needed to authorize a disinterment.

B2.0 GENERAL: Routine case research on remains interred but unidentified is conducted in conjunction with systematic re-examination of documentary records of unidentified personnel. In addition, case research, CIL casework, and the examination of documentary records of unidentified personnel may result in reassessments of unidentified remains and/or previously made identifications. Further, advances in forensic science also establish new lines of evidence, as well as refining those already developed that can help identify unknown remains. These include, but are not limited to:

- Radiographic matching and superimposition.
- Photographic superimposition.
- New and updated dental databases.
- Advances in mitochondrial and nuclear DNA testing.

B3.0 PROCEDURES: Procedures for a multidisciplinary research approach for exhumation of unidentified remains is outlined below and is summarized in diagram format (Figure 1) at the end of this Annex.

B3.1 **General Considerations:** Laboratory Management, typically the Disinterment Coordinator, assigns a CIL historian, odontologist, and anthropologist to research a case or series of cases (the background documentation is typically referred to as an X-File). The case is usually confined to a particular area of interest (e.g. unidentified remains

from the National Memorial Cemetery of the Pacific related to the Chosin Campaign).

In some circumstances, an outside individual or agency may associate a name with a particular X-File. This research also may be considered when making assignments.

Regardless of where the historical research is initiated, all X-File disinterment memoranda conform to this annex since the final MFR is a CIL product.

B3.2 **Initial Development of the Short List:** The overall goal is to develop the shortest possible list of candidates who may be represented by the unknown remains. In order to create the best possible and most probative short list, blind analyses are not conducted. Further, the evaluation of the X-File is a fluid and collaborative process and several back-and-forth iterations between historians and analysts may be needed.

The historian is typically the lead author for constructing the short list. Specifically, the historian examines the geographic (location of recovery, date of burial as an unknown) and historical (previous name associations) background associated with the X-File and the historical background (e.g. unit records, battle charts, daily logs, POW movements) associated with all theater losses. The result is a pool of likely candidates that excludes those not historically possible.

In some instances, an odontologist may search dental profiles in CARIS to exclude individuals. Similar reductions based on ancestry or purported ages may be conducted by an anthropologist. Altogether, these preliminary eliminations reduce the number of candidates to more accurate and manageable levels.

The various lists, as well as the final short list (see below), are saved to the appropriate X-File electronic folder on the DPAA network. Short lists are considered preliminary test results until the final MFR is approved.

B3.3 **Refinement of the Short List:** The historian submits the short list, in a draft MFR (for disinterment) to the Disinterment Coordinator. At this time the MFR typically contains the introductory portions (see below).

The DPM reviews the draft MFR. If changes are necessary, the MFR is returned to the historian for edits. If the MFR is accepted, the Disinterment Coordinator assigns the case to an anthropologist or forwards the case to the FOR coordinator for assignment to an odontologist.
The list is further refined, as applicable, using the biological and dental profiles contained in the X-File by comparing them to the short-listed individuals' biological and dental profiles. This may entail new and/or more detailed analysis, such as a recalculation of the X-File stature using new models or comparing the X-File dental chart to "new" information contained in the personnel files.

The order of anthropological/odontological comparison depends on the number on individuals on the short list; 10 or fewer are usually dentally evaluated first, whereas those greater than 10 individuals are anthropologically evaluated first. The findings are annotated in the appropriate section of the draft MFR. Individuals not excluded are rank ordered by the anthropologist and odontologists in their appropriate section.

The final rank order is determined from a collaborative effort between the analysts and the historian. Geographic, historic, dental, and anthropologic data influence the order. The final rank order is depicted in a table that includes name, service number, and types of information available for analysis (e.g., biological/dental analyses, chest radiographic comparison, if FRS is on file at AFDIL, photographic superimposition) for each candidate for comparison to the unknown remains. The draft MRF is then forwarded to the Disinterment Coordinator for assignment of a reviewer. The draft MFR is finalized when the review is complete.

B3.4 **Finalization of the Short List & MFR:** When the biological analyses are completed, the case is returned to the historian. The historian completes a detailed summary of the historical facts surrounding the disappearance of the remaining (short-listed) individuals, and a summary/conclusion for the MFR that indicates the most likely individual(s), and the rank order of individuals associated with the unknown remains.

The current MFR template is on the DPAA intranet: J:\ASCLD-LAB\FORMS\1.6 CIL Portions & Admin Fiats. A standard MFR has the following sections; however, **its structure** may vary depending on the, conflict, nature of the case and the circumstances at hand:

- WWII and ROK Unknowns:
  - Initial Recovery and Assessment.
  - Disinterment and Processing.

- ~~Historical Investigations and Name Associations.~~
- ~~Declaration of Non-Identifiability.~~
- ~~Present Investigation (including a tabular listing of potential associated casualties).~~
- ~~Anthropology Summary (including a tabular comparison of casualties to the biological profile of the unknown remains).~~
- ~~Odontology Summary (including a tabular comparison of candidates to the dental profile of the unknown remains).~~
- ~~Associated Individuals (including map of initial recovery location of the remains and the last known location of associated individuals).~~
- ~~Summary and Conclusions (including a tabular final rank and forensic scientific analyses available for the case).~~
- ~~Endnotes~~

- ~~North Korea:~~

  - ~~Operation Glory Return.~~
  - ~~Initial Processing.~~
  - ~~Historical Investigations and Name Associations.~~
  - ~~Declaration of Non-Identifiability.~~
  - ~~Present Investigation (including a tabular listing of potential associated casualties).~~
  - ~~Anthropology Summary (including a tabular comparison of casualties to the biological profile of the unknown remains).~~
  - ~~Odontology Summary (including a tabular comparison of candidates to the dental profile of the unknown remains).~~
  - ~~Associated Individuals (including map of initial recovery location of the remains and the last known location of associated individuals).~~
  - ~~Summary and Conclusions (including a tabular final rank and forensic scientific analyses available for the case).~~
  - ~~Endnotes~~

B3.5 **~~Review, Approval & Submission of Documentation:~~** ~~The following procedures detail the review, approval, routing and submission of documentation:~~

- ~~The final MFR is routed to the Disinterment Coordinator who conducts a final review of the MFR. Any potential issues are addressed at this stage.~~
- ~~Once the MFR is finalized, the Disinterment Coordinator compiles the Disinterment Packet, which contains the MFR and the letter of Intent to Disinter Remains. The letter of intent is the cover letter that summarizes the results of the MFR and the location of the grave.~~
- ~~The Laboratory Director reviews the Disinterment Packet.~~

  - ~~If the likelihood for identification is low, Top Management may defer the memo until additional information is available to strengthen the case. In these cases, the MFR is electronically filed on the DPAA network and a hard copy is filed with the X-File in the R&A Records room. The original MFR is retained in the CIL.~~
  - ~~If the case presents a high potential for identification, the packet is approved by the Laboratory Director and forwarded to the CIL Science Director.~~

- ~~The Science Director is the internal approval authority for a disinterment, either concurring or non-concurring with the MFR.~~

  - ~~A non-concur by the Science Director stops the process. In such cases, the disposition of documentation is as described above.~~
  - ~~When the Science Director concurs, the MFR and Letter of Intent are forwarded to the DPAA Director for signature. The Letter of Intent is signed by the DPAA Director and the MFR is signed by the CIL Science Director.~~

- ~~After the MFR and Letter of Intent are signed, both are returned to the Disinterment Coordinator for scanning and creating pdfs.~~
- ~~Copies of the MFR and Letter of Intent are retained by the Evidence Coordinator until the remains are accessioned into the CIL. Copies are then placed in the casefile. Laboratory Administration also provides a copy to the R&A Records Room.~~
- ~~The pdf of the signed Letter of Intent and MFR are sent via AMRDEC Safe to DPMO for staffing. A copy is also sent via AMRDEC Safe to the Chief of Staff at PACOM. The Deputy Assistant Secretary of the Army (Military Personnel) receives the documents from DPMO. Copies are also provided to CMAOC (Past Conflict Repatriations Branch) and other DoD agencies, as appropriate, which constitutes their official notification.~~

B3.6 **Disinterment Operations:** Coordination of disinterments from the National Memorial Cemetery of the Pacific (NMCP), also known as the Punchbowl, is the responsibility of the Lead Evidence Coordinator. The Lead Evidence Coordinator:

- Submits an Application for Disinterment Permit to the Hawaii State Department of Health.
- Coordinate the disinterment with the NMCP and DPAA Worldwide Operations Section (WWOC).
- Completes the Department of Veterans Affairs Request for Disinterment and Disinterment Affidavit forms.
- Coordinates with DPAA for the appropriate honor guard and other personnel to conduct the disinterment, as well as transportation of the caskets to the CIL.
- Coordinates the casket opening and removal.
- Ensures proper disposal of non-evidentiary items associated with the casket opening. Note: the safety pins, pillows, mattress, blankets, cotton, any residual powder, and other material used to wrap the remains are equivalent to packing material and are typically not accessioned into the CIL as evidence. Non HAZMAT may be disposed of in the trash. HAZMAT is handled in accordance with DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

Those planning disinterments must consider the following constraints imposed by NMCP:

- Approximately 50 disinterments per year can be conducted. Approximately 5 disinterments per month can be accommodated. Due to major events and programs in May and November, disinterments are typically not conducted in those months; however, this constraint may be negotiable.
- Provide the NMCP staff with a 2 week prior notice for each disinterment, whenever possible. Exceptions may be granted by NMCP but only for exceptional circumstances.
- Schedule disinterments in the morning in order to take advantage of a full work day.

Disinterment from other cemeteries are assigned to a Laboratory Manager who coordinates with Operations and any relevant outside agencies. These agencies include, but are not limited to:

- Department of Veteran's Affairs.
- American Battlefield Monuments Commission.
- United States Army Mortuary Affairs Activity-Europe.
- U.S. Forces Korea Mortuary.
- State or foreign health departments.

The process can be lengthy and varies on a case-by-case basis.

B3.7 **Disinterment Safety:** Disinterment operations generally include the following activities:

- Cemetery operations. Cemetery operations end when the caskets are unloaded and placed on stands at the location of the casket opening.
- Casket opening. Casket opening commences when personnel begin removing the rivets from the casket. It ends when casket materials are bagged, caskets are removed from the opening location, and debris cleaned up and bagged for disposal.
- Laboratory operations. Laboratory operations commence upon the casket lids being removed and evidence being photographed in the caskets. Evidence is then removed from the caskets, loaded onto carts, and transported to the analytical areas to be cleaned and analyzed.

A task hazard analysis, safety checklist, and standard safety briefing exist for disinterment activities. These are found on the DPAA network. Safety guidance pertaining to osseous and dental remains, and suspected osseous and dental remains, their analysis, and utilization of all equipment, are in accordance with the appropriate procedures detailed in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) and the respective analytical SOPs. In addition to the guidance found in these documents, the following safety provisions apply:

- Coordination of safety issues with other DPAA sections (e.g., Operations, the Senior Enlisted Leader or his/her representative) is conducted in conjunction with disinterment planning. Applicable safety documents are provided to relevant sections.
- A designated supervisor (usually a Laboratory Manager, or his/her representative) is on hand at each of the disinterment activities to oversee and coordinate operations including safety monitoring and enforcement. It is highly recommended that the supervisor utilize the CIL Disinterment Safety Checklist (located on the DPAA Network) when monitoring and enforcing safety.
- Those participating in the disinterment meet before each activity at a designated location. Each participant receives a safety briefing and draws personal protective equipment (PPE), as applicable.
- Safety briefings are conducted for each of the above disinterment activity, as applicable. The briefing may be given by the on-hand supervisor or his/her representative. One overarching briefing may be given at the start of the disinterment or separate briefings may be given for each of the above activities. The briefing(s) must include

inherent hazards and mitigations measures. It is highly recommended that the briefer utilize the CIL Disinterment Safety Briefing (located on the DPAA Network) when conducting the safety briefing(s).

- Disinterment activities do not commence until all participants have been briefed on safety and all PPE has been drawn, is demonstrated to fit, and determined to be in working order, as appropriate.

SOP 1.7: CIL CASE FILE MANAGEMENT

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 11 January 2017
Citation: DPAA Laboratory Manual, SOP 1.7

0.0 PRINCIPLE, SPIRIT & INTENT: *Case files are managed in a manner conducive to the traceability of casework. The CIL retains, in a case file, records of original observations, derived data, relevant staff records and correspondence, a copy of each test report issued, and other sufficient information in order to establish an audit trail. In all situations it will be possible to identify the person accepting responsibility for the verification and release of the test report* **(A4.13.2.1)**.

1.0 PURPOSE & SCOPE: This SOP details the following pertaining to the management of case files (also called case records) **(A4.13.1.1, SF4.13.2.1F-2a)**:

- Identification.
- Indexing.
- Access and retrieval.
- Storage.
- Security.
- Maintenance.
- Transfer and shipment between locations.
- Disposal.

Additionally, this SOP provides guidance on properly updating the Centralized Accounting Repository & Identification System (CARIS) with case related data.

This SOP applies to all case files as well as associated technical records and other documentation. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 GENERAL:

2.1 **General Legal Considerations:** The contents of case files (detailed below) are often relevant to the medical-legal and/or criminal justice system and are thus legally discoverable, usually through subpoena. Therefore, case files must be kept secure and accountability maintained.

2.2 **Facilities:** Case file management is conducted primarily in the Laboratory Administration areas of the CIL. The file rooms in CIL-HQ and CIL-OF Laboratory Administration are the central areas for the management of case files and related documents (e.g., JFR records).

When not in use, individual case files are maintained in compact shelving in secure file rooms when not in use **(A4.13.1.2)**. The files are organized sequentially by accession number.

Original records related to casework (e.g., medical records, personnel files) may also be securely stored in the file room at CIL-OF, when not in use. The presence of these records in CIL-OF is temporary and they are usually returned to the DPAA Records Custodian or the original repository after casework is complete or the records are no longer needed by the CIL. Original hardcopies of records and case files are sent via FEDEX.

The file rooms are climate controlled, safeguarded against fire (equipped with a fire extinguisher and water sprinklers), and unauthorized intrusion.

2.3 **Apparatus & Materials:** Required materials for case file management include general office supplies, file cabinets, and computer systems. The File Tracking System (FTS) is a computer system that tracks case files and allows for the production of case file history reports, to include when and to whom a case file was checked out. The FTS is designed to work in conjunction with CARIS and operates in parallel with the Tracking Automated Inventory Log (TRAIL) by tracking case files in a manner similar to evidence.

2.4 **Responsibilities:** Laboratory Administration, supervised by the Laboratory Administrator, is responsible for the management of case files, and updating CARIS accordingly.

The Laboratory Administrative Technician acts as the File Administrator and is primarily in charge of the daily management of individual case files. In the absence of the Laboratory Administrative Technician, the Laboratory Administrative Assistant acts as the File Administrator, followed by the Laboratory Administrator.

3.0 CASE FILE MANAGEMENT: The following procedures, presented in approximate chronological order as casework progresses, are used for managing case files:

3.1 **Types of Documentation:** Case files contain administrative and examination documentation.

Generally, examination documentation, also called analytical notes, consists of documentation created or used during the testing process.
Administrative documents and materials in a case file are anything not considered to be analytical notes (e.g., messages, emails relating to the case, case reports, reports from outside agencies, etc.).
Administrative and examination documentation is further discussed in DPAA Laboratory Manual, Part III, SOP 3.0 (Analytical Notes & Documentation).

3.2 **Accession (CIL) Numbers:** Accession numbering is the CIL system for identifying test items and activities. The accession number (also called the CIL number) is the "case number" and is used as the unique case identifier for identifying and indexing technical case records **(SA4.13)**.

The original accession number is retained throughout the life of the item in the CIL (even in consolidations the original number must be traceable). The intent of the system is to ensure that items cannot be confused physically or confused when items and activities are referred to in records or other documents. The system accommodates sub-division of groups of items and the transfer of items within and from the CIL **(A5.8.2)**.

When created, all case files are assigned an initial accession number which derives from the current year, followed by a dash and a three digit number to indicate the sequence of accession (e.g., CIL 2001-001, CIL 2001-002, CIL 2001-003, etc.). The Evidence Coordinator issues the initial accession number.

The accession number is prefaced by CIL or CILHI depending if the case was accessioned before or after the CILHI/JTFFA merger. The prefix CIL or CILHI may be used for case file materials accessioned prior to 1 October 2003. In such instances reports may initially refer to the historical accession number (CILHI), and subsequently by the CIL number. Materials accessioned 1 October 2003 or later are only designated with the CIL prefix.

Suffixes may be added to the accession number as the case progresses to denote the type of evidence present and the number of individuals. Suffixes include:

- I =Individual.
- P=CIL Portion.
- D (for "discard")=typically non-human remains or non-osseous material.
- A=Artifact or material evidence item.
- X=Additional portions of a previously identified individual.
- G=Group remains that cannot be segregated into individuals.
- C=Consult cases.
- L=Life support evidence evaluated by Life Support Investigators.
- R=Search and Recovery (SAR) activity/report.

Further suffixes may be added to denote a specific individual or items present in an assemblage (e.g., CIL 2003-045-I-01 and CIL 2003-045-I-02 are two individuals associated with a single accession while CIL 2003-045-A-01 and CIL 2003-045-A-02 are two items of material evidence from the same accession).

3.3 **CARIS Entries:** During accessioning, the Evidence Coordinator is responsible for creating an associated accession in CARIS and entering all initial data. The initial data may include:

- Repatriation date.
- Received date.
- Ceremony (if applicable).
- Minimum number of individuals (MNI).
- Type of accession (joint or unilateral turnover and official or unofficial).
- Conflict
- Country.
- Remarks.
- Purported names associated with the accession and associated incident(s).
- Casualty individual(s) lost in the incident(s).
- Preliminary assessment.
- DNA memoranda field.
- Site association.
- Incident association.
- Source information.

3.4 **Case File Folders & Accession Log Sheets:** The Evidence Coordinator constructs the hard copy case file folder and starts the accession log sheets at the time of accessioning. The accession folder (referred to as the master case file) is always color-coded yellow for "active" for the first year and labeled with the appropriate accession number.

When the Evidence Coordinator creates the case file folder, an electronic equivalent is also created on the DPAA network. As with the hard copy case folder, sub-folders are also created within the electronic folder.

Various items are added to the hard copy and electronic sub-folders by various individuals as the case progresses.

After the first year active case status refers only to cases that are being tested and/or written up for identification. As such, inactive case files are cases more than a year old that are on hold pending additional information, evidence, and/or testing. These case files are stored in red folders. Cases pending external review or an identification are in green folders.

3.5 **Preliminary Assessment:** The Evidence Coordinator or other designated individual conducts preliminary assessments in accordance with DPAA Laboratory Manual, Part I, SOP 1.3 (Evidence Management & Security) and updates CARIS accordingly. The case file contains skeletal, dental, material evidence, and DNA potential assessments, as appropriate. Exceptions to this procedure are consultation cases where the evidence is not accessioned into the CIL (see DPAA Laboratory Manual, Part I, SOP 1.8, Consult Case Management).

3.6 **Receipt of Case File:** Upon completion of the accession paperwork:

- An Evidence Coordinator creates a "New Accessions" word document by taking the remarks from CARIS and placing them in the word document for each new case. A notes section is added after the remarks.
- Evidence Coordinator forwards the master case files and the New Accessions document to Laboratory Management for review (typically the Case Manager).
- Laboratory Management determines if the case will be accepted or not by officially acknowledging the receipt and activation of the case on the Laboratory Accession Record in the master case file.
- The Case Manager creates a course of action for each case and details the actions in the notes section for each new case in the New Accessions document.
- The New Accessions document is electronically forwarded to Laboratory Management, Laboratory Administration, Case Coordinators, and Evidence Coordinators (for all CIL locations, as necessary). This serves as notification of a new accession(s) and the master case file is passed to Laboratory Administration.
- Upon receipt, the original accession log sheets are filed sequentially by calendar year in the accession binders maintained in Laboratory Administration. A stamped copy of the original sheet is maintained in the miscellaneous file folder.

- Upon receipt of the master case file folder, the File Administrator typically performs the following:
  - Creates a barcode using the FTS (see appropriate Laboratory Administration Desk Guide for detailed instructions).
  - Creates initial sectional folders as appropriate.
  - Updates and includes any file inventory sheets with the case file.
  - Labels each document received or generated by the CIL with the accession number to include additional documents as they are added to the case file. The accession number may be hand written or machine generated. Multi-paged documents which are **permanently** bound together, in some manner (e.g., glued, sewn, or spiral bindings) such as field notebooks, identification packets, etc. may be identified by a unique identifier on the front page of the document **(SA4.13.2.8)**.

3.7 **Creation of Sectional Folders:** The case file may consist only of the initial accession and sectional folders at this stage. As documentation increases, sectional folders are added as required. Each sectional folder has a file inventory document listing the contents for each sub-accession (-I-01, -I-02, -G-01, etc.). As documents are added to the sectional folders, the file inventory(s) is updated to reflect the contents.

Due to resource constraints, there is no specific requirement regarding the arrangement of documents within the sectional folders. However, unless otherwise specified below, the contents of section folders should be filed by type of document and then chronologically, whenever possible.

In addition to each folder's unique file inventory document, the types and contents of the sectional folders are as follows **(SF4.13.2.1F-2a, A4.13.2.4)**:

3.7.1 **Search & Recovery:** This folder includes, if available, but is not limited to:

- Field notebook.
- Draft and final search and recovery (SAR) report(s).
- SAR Peer review record(s).
- Routing records.
- Historical research/analysis.
- Operational research/analysis.
- Messages.
- Maps, drawings/sketches, and/or mapping data.
- Photo CD, photographs, and/or negatives.
- Subject-specific correspondence.

As of 1 January 2006, the SAR numbering system (e.g., 2005/CIL/016) became obsolete in favor of the accession numbering system (e.g., CIL 2006-001).

Regardless of whether evidence was recovered or not, the RL obtains the accession number from the Evidence Coordinator upon return from the field and informs Laboratory Management of the number. In the event of field activity resulting in no evidence, "empty" accessions are created for a single site or a series of sites. For field activities resulting in evidence, accession numbers are created for each such scene investigation for that specific mission.

Completed SAR reports that do not involve evidence are entered into the FTS and then transferred to DPAA Records for archiving. When these "stand-alone reports" become associated with physical evidence and/or another site resulting in physical evidence, they are retrieved from DPAA Records and transferred to the case file.

3.7.2 **Anthropology:** This folder includes, if available, but is not limited to:

- Skeletal analytical notes.
- Draft and final forensic anthropology report(s) (FAR).
- FAR peer review record(s).
- Routing records.
- Photo CD, photographs, and/or negatives.
- Radiographs or radiographic CD.
- Draft and final addenda.
- SEM analysis notes and reports.
- Histological analysis.
- Management Review of Non-Evidentiary Items.
- Subject-specific correspondence.

3.7.3 **Odontology:** This folder includes, if available, but is not limited to:

- Odontology analytical notes.
- Draft and final forensic odontology report(s) (FOR).
- Ante- and postmortem dental records.
- FOR peer review record(s).
- Routing records.
- Photo CD, photographs, and/or negatives.
- Addendum.
- Subject-specific correspondence.

3.7.4 **Material Evidence:** This folder includes, if available, but is not limited to:

- Material evidence analytical notes.
- MER peer review record(s).
- Draft and final material evidence report(s) (MER).
- Photo CD, photographs, and/or negatives.
- Disposition of artifacts.
- Addendum.
- SEM analysis.
- Routing records.
- Subject-specific correspondence.
- Original life support investigation (LSI) notes, reports, and related documentation.

3.7.5 **DNA**: This folder includes, if available, but is not limited to:

- Chain of custody form(s) (DNA CoC) for sample submissions.
- Data summary reports (sequencing results).
- Inputs to and output from the AFDIL Laboratory Information Systems Applications (LISA).
- Interim and/or final Armed Forces DNA Identification Laboratory (AFDIL) reports.
- Subject-specific correspondence.

Because the DNA folder is frequently accessed, it may be segregated from the master case file in a separate file cabinet until the CFC process begins for that case. At that point, the DNA folder is filed with the other subfolders in the case file. The following considerations apply to the DNA subfolder:

- The DNA CoC form is used when osseous and dental remains are sampled for DNA and sent to AFDIL. A letter of instruction ("cover letter") accompanies each sample batch. Copies of the DNA COC form and cover letter are sent to Laboratory Administration for filing in the case file DNA folder. Sample designation, evidence tested, date sampled, and weight are entered into CARIS and cross checked against the DNA Sample Log.
- AFDIL confirms receipt by signing and returning the DNA CoC form with a memorandum indicating the samples received and the AFDIL case numbers assigned. AFDIL case numbers are added to CARIS and the DNA Sample Log by Laboratory Administration (or a designated individual). The receipt memo is then filed in the DNA CoC binder and the signed DNA COC form in the appropriate DNA sectional folder.
- AFDIL sequence data is entered in CARIS under the TEST tab by DNA personnel, and then submitted to Laboratory Administration for inclusion in the DNA file.
- DNA personnel initiate a DNA case summary containing information relevant to the samples submitted to AFDIL.
- The DNA CoC binder holds the outgoing DNA CoC form and cover letter. (The binder may also contain historical photographs, contact prints, and negatives of the DNA samples.) Filing CoC forms is done by Laboratory Administration (or a designated individual). Binders are maintained by date as indicated on the chain of custody form and

all paperwork is filed in chronological order by date of cover letter. Where digital photography is used to document the CoC, the images are stored in backed-up network file space and are periodically archived to a CD for storage with the DNA CoC binder.

- An Evidence Coordinator creates the DNA memoranda field in CARIS and associates it with the appropriate accession and associated casualty lists. Any relevant DNA correspondence, typically e-mail traffic, relating to an accession is stored in this field in CARIS. Printed hardcopies are also filed chronologically, most recent on top, within the DNA folder. The default location for unfiled e-traffic is the DNA Admin Processing email box. Information regarding an individual (e.g., FRS) is stored in the casualty individual's memoranda field in CARIS.
- The sample(s) designated as blind DNA proficiency tests are given a new accession number. A case file is created for the DNA sample. When the test is complete, the DNA file is consolidated into the original case file from which the sample was taken. The status of the sample is adjusted to "blind sample." DNA personnel prepare a memo for the Science Director's signature with a copy filed in the Blind Sample Log maintained by DNA personnel.
- DNA case summary documents are created and added to CARIS by Laboratory Administration under DNA Memoranda that describes the current status of all submitted samples relating to an accession. DNA personnel update case summaries from the historical material. Other material developments in the DNA case are reflected in subsequent case summaries complied by DNA personnel. Such case summaries are submitted to Laboratory Administration through the DNA Admin Processing email box.

3.7.6 **Chest Radiograph Comparison:** This folder includes, if available, but is not limited to:

- Chest radiograph comparison analytical notes.
- Draft and final chest radiograph comparison report(s) (CXR).
- CXR peer review record(s).
- Routing records.
- Photo and radiographic CD(s).
- Subject-specific correspondence.

3.7.7 **Miscellaneous:** As sectional folders are created, the initial case file folder may be relabeled as the miscellaneous folder. This folder includes, if available, but is not limited to:

- New Accession Record
- CIL Accession Record (stamped copy)
- Preliminary assessment forms.
- Detailed report of investigation (DRI)/Excavation summary report (ESR) initial messages.
- Case activation notification record (added when an inactive case becomes active).
- Case deactivation notification record (added when an active case becomes inactive).
- Transmittal memos to consultants.
- Accession photos or photo CD.
- Consultant notes & reports.
- Transmittal memos to other agencies.
- Draft(s) of identification memoranda and/or report(s).
- Internal DPAA memoranda.
- Consolidation record packages.
- Case Status – One Year Review Record.
- Chain of Custody form(s) for receipt of evidence.

3.7.8 **Case Correspondence:** This folder includes, if available, but is not limited to:

- Archival records (medical/dental).
- Miscellaneous military records.
- Congressional inquiries.
- Correspondence from outside sources and agencies that do not belong in other section folders.

3.7.9 **Disposition of Remains:** This folder includes, if available, but is not limited to:

- Certificates of death.
- Photographs or photo CD.
- Copies of signed notice of intent.
- Notification of person authorized to direct disposition (PADD) instructions.
- Correspondence from service mortuary affairs.
- Chain of custody form(s) for release of remains.
- Itineraries.
- Subject-specific correspondence.

3.7.10 **Identification:** The identification folder is a packet that is made in anticipation of CFC (see below). It includes final reports and documents generated by the Science Director that are used toward identification (e.g., Science Director's MFR. This folder is also called the "Green Folder" or "CFC Folder."

3.8 **Consolidation:** Accessions that are found to be associated with each other may be consolidated. The analyst assigned to the case informs the Evidence Coordinator who then sends a memorandum to the File Administrator explaining the consolidation, justification, and a checklist of tasks to perform.

The File Administrator is responsible for consolidating and updating the file folders, the respective accession log sheets, FTS, and sending a copy of the memo to DPAA Records. Detailed instructions for consolidation of case file materials are found in the appropriate Laboratory Administration Desk Guide.

Traceability of **accession** numbering for documents, log sheets, file folder (including SAR folders), etc. is maintained by striking through the old accession number and adding the new number. Because consolidation is an administrative and not an analytical process, strikeouts associated with crossing out an old accession number are exempted from initialing requirements required in DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).

To minimize confusion, where DNA testing is initiated prior to consolidation, CIL policy is not to consolidate such an accession into another until all DNA testing (to include comparison results) is completed. A cross reference is added to the file of all DNA cases concerned.

3.9 **Security of Case Files:** All case files and case file information, including customer confidential information and proprietary rights, are secured and held in confidence, to include when held in electronic storage, and during transmission of case file materials **(A4.1.5c, A4.13.1.3)**.

3.9.1 **Storage & Access:** All case files are stored in the Laboratory Administration File Rooms when not checked out (see below) and are maintained by the File Administrators.

The file rooms are secured with a magnetic key lock and only routinely accessed by Laboratory Management, Laboratory Administration Staff, and other personnel designated by the Laboratory Director. Other CIL personnel may have various levels of magnetic key access to the file room, but access is on an **emergency** basis only.

The doors to the file rooms should never be propped open since this allows individuals to enter who do not have access. Additionally, individuals who have access may forget to swipe their badge over the magnetic badge reader which results in no record of their entry into the File Room.
Security measures for file rooms are further documented in the DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security).
3.9.2 **General Security Precautions:** Security of the case files is the responsibility of all members of the CIL Staff. Laboratory Management handles security violations. The following procedures apply to all personnel to ensure the security of case files:

- Authorized personnel involved with a case are allowed to make copies of documents to take back to their workstations. Typically, all copies are working papers and are stamped or marked "COPY" and, unless modified, (see DPAA Laboratory Manual, SOP 3.0, Analytical Notes & Documentation) are not filed back in the case file, but are destroyed by shredding.
- For individuals occupying cubicles at CIL-HQ, original analytical notes, case files, and other case work materials are prohibited in cubicles. Instead, storage cabinets in the Examination Areas are assigned to analysts to store case materials. Copies are permitted in cubicles. Copies are secured in locked cubicle cabinets and containers when not in use.
- Oversize items (e.g., radiographs) that do not fit into the case file are stored in a separate cabinet in Laboratory Administration. In such instances, the File Administrator prepares a memo which is filed in the case file and a copy filed with the oversized item for cross-referencing. The memo contains the corresponding CIL number, a brief description of the item, and indicates where the item is stored. As with other case file materials, oversized items are transferred to the DPAA Records Custodian upon resolution of the case.
- Case files typically are not checked out for more than 14 days. The File Administrator is responsible for generating a report for all cases that have reached their 14-day due date and submitting this information to the Laboratory Administrator; a copy is posted daily in the File Room. The Laboratory Administrator contacts the first-time violators. Subsequent violations are reported to Laboratory Management. If the case file needs to be kept for a longer period of time, it must be returned to the File Room and checked out again on or before the 14th day after initial check out. This procedure can be repeated as many times as necessary. The intent is to preclude or detect the loss of a case file as a result of protracted absence from the File Room.
- The individual who checks out the case file is responsible for the security of the file. Checked out case files must be stored in a secure area (e.g., locked office or desk drawer) when not in use. Case files must be returned to the File Room if the possessor is going on extended leave or TDY.
- Case files should never be transferred to another person without going through the process of first checking in the file with the File Administrator.
- Case files in any stage of the identification process typically are not taken out of the CIL.

- Completed case files for consultants' review and submission to the services are copies of original documents and are packaged and submitted via a secure mail service **(A5.10.3.7)**.

3.9.3 **Electronic Security:** Electronic storage of case files and the transmission of results are protected by various DoD and DPAA information system security programs (see DPAA Laboratory Manual, SOP 1.2, CIL Physical Security) **(A4.1.5c, A4.13.1.4, A5.10.7)**.

3.9.4 **Case File Check-in & Check-out:** When a file is taken from or returned to the File Room at CIL-HQ, or the Administrative area of CIL-OF, it is tracked using the FTS.

The steps required to check out a case file include:

- Scanning the identification barcode of the File Administrator or acting File Administrator.
- Scanning the identification barcode of the individual checking out the case file.
- Scanning the case file barcode.
- Indicating the reason for checking out the case file. FTS provides a drop-down menu. If "Other" is used, a brief remark is required.

The steps to check in a case file using the FTS include:

- Scanning the identification barcode of the File Administrator or acting File Administrator.
- Scanning the identification barcode of the individual checking in the case file.
- Scanning the case file barcode.
- Items added to the case file during check out are brought to the attention of the File Administrator so inventories can be updated.

In the event FTS becomes inoperative, Laboratory Administration maintains a manual sign-out/sign in log. Manual entries are added to FTS once the system resumes operation.

3.9.5 **Confidentiality & Release of Information:** The CIL is legally responsible for the management of all information obtained or created during the performance of its investigative and analytical activities. The CIL informs customers, in advance, of the information it intends to place in the public domain. Except for the information the customer makes publicly available, or when agreed between the CIL and the customer (e.g., for the purpose of responding to complaints), all other information is considered proprietary information and is regarded as confidential.

When the CIL is required by law or statute and/or contractual commitments to release confidential information, the customer or individual concerned is, unless prohibited by law, notified of the information provided**.** Information about the customer obtained from sources other than the customer is treated as confidential**.**

All CIL Staff, including contractors, subcontractors, and personnel acting on behalf of the CIL are required to maintain confidentiality of all information obtained or created during investigation and analytical activities, except as required by law.

As such, CIL Staff will not release information contained in case files, to include test results and customer information, to external parties (including other DPAA Sections or Directorates) except as directed in the relevant parts of the Laboratory Manual.

Release of case file information to external parties outside of the provisions of the Laboratory Manual (i.e., non-routine requests) is coordinated with Laboratory Management, relevant DPAA Directorates (e.g., Director, Public Affairs Office), and other DoD agencies (e.g., DPMO, JAG, etc.), as appropriate. Freedom of Information Act (FOIA) and Privacy Act provisions may apply.

CIL Staff receiving non-routine requests refer the requestor to Laboratory Management **(SA5.10.3.3)**. Laboratory Management oversees preparation of the necessary forms and documentation required for release of information.

3.9.6 **Transfer of Original Documents to External Agencies:** Do not allow original documents to leave the CIL in pursuit of casework (e.g., documents in need of translation by external personnel) or any other activity (e.g., court subpoena) unless permission is granted by Laboratory Management.

A clear need must exist that demands that the original documents be used. In the event original documents must leave any CIL location, legible and accurate copies are first made. Copies are annotated and authenticated in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes and Documentation) and retained in the case file in lieu of the original documents.

A MFR is prepared by the CIL that describes the documents being transferred and that reflects acknowledgement by the person(s) receiving the documents and their signature(s). Other documentation may be required in the event original

documents leave DPAA (e.g., in response to court subpoenas).

Once the original documents are returned to the case file and checked for their completeness against the MFR description, the copies retained in the case file may be destroyed.

3.9.7 **Transfer of Case Files Between CIL Locations:** Documents should be shared through electronic means whenever possible and practical. In the event original case files and related documentation need to be transferred back and forth between CIL-HQ and CIL-OF, the following procedures are used.

- Ship using FEDEX or other commercial carriers with commercial capability.
- Shipping and tracking documents generated or obtained at either end of the shipment are retained. At the origin, the outgoing shipment is logged in a shipping/receiving log and the shipping/tracking documents maintained in an organized fashion. At the destination documents accompanying the incoming shipment become part of the case file and are treated as administrative documentation in accordance with this SOP.
- The shipping/receiving log reflects:
    - CIL number of case file being shipped/received.
    - Name of person responsible for preparing the shipment (outgoing only).
    - Name of person receiving the shipment (incoming only).
    - Date the shipment left/arrived at the facility
    - Remarks, if any.
- Back-up copies (hard copy or electronic) of all documents are prepared prior to shipment.
- Evidence and case files are never combined in the same shipment.
- When shipments are received they are immediately turned over to the respective Laboratory Administration or secured until such time as Laboratory Administration can take possession.
- At the earliest opportunity, Laboratory Administration verifies the contents of the shipment by inspecting and inventorying all arriving case files and related documents.
- In the event there is a problem(s) and the shipment cannot be verified, Laboratory Administration immediately notifies Laboratory Management.
- In instances where evidence is being permanently transferred between CIL-HQ and CIL-OF, the entire original case file associated with the accession should be transferred to the receiving facility.

3.10 **Medical Examiner Summary Report (MESR) and/or the Identification Memorandum for Record (MFR):** As an identification nears completion, the Science Director or another medical examiners (ME) prepares a MESR that summarizes the scientific findings of the case and also evaluates and accounts for all information pertaining to it, including biological, historical, physical, and/or circumstantial information.

Upon completion of the draft MESR, the Science Director, or assigned ME sends the case to another ME at the DPAA for peer review and quality control.

If another ME is not available at DPAA, an alternate approach is required. This approach specifies that all reports related to an identification undergo the quality assurance and Case File Coordination processes (see below) prior to sending the case out for ME review at AFMES or to external reviewers. The alternate approach is used during times of transition between MEs at DPAA, or when an ME is absent from DPAA for a long period of time (usually a month or more).

After internal peer review, the Science Director sends out an electronic identification notification to Laboratory Management, Case Coordinators, Laboratory Administration, and the appropriate Service Casualty Office, and the case goes into Case File Coordination (the date of this email includes the date of identification and serves as the official identification date). The electronic notification includes the draft MESR (undated and unsigned).

Concurrently, the Science Director also completes an Identification Memorandum for Record (or simply "Identification Memo;" a memo detailing the name, rank, service, and date of identification of the casualty, which also includes all enclosures that will be part of the outgoing case file). This memo remains unsigned and undated until the Case File Coordination and external review processes are complete.

Identification of additional portions is typically done using a MFR drafted by Laboratory Management or other designee. The MFR summarizes the prior identification of the casualty, and then summarizes the additional lines of evidence leading to the designation of the additional portions of that casualty. The MFR is co-signed by the Science Director. At the discretion of the Science Director or Laboratory Management, the MFR may or may not be subjected to external review. As with the MESR, the Science Director notifies the same parties to begin the Case File Coordination Process.

The MESR is the vehicle by which identifications are made while the MFR is typically used for additional portions. Cases other than identification (e.g., CIL portion(s) [CP], administrative fiat(s) [AF]) are approved through a Memorandum for the Science Director or Management Removal of Non-Evidentiary Items for AF/CP, which are typically drafted by the analyst(s) working the case.

3.11 **Case File Coordination:** Cases leading to identifications require extensive documentation. The process for assembling and checking this documentation is known as Case File Coordination.

Case File Coordination is a process undertaken by several persons, to include a Case File Coordinator (CFC) (see below).

Note: Case File Coordination is a process, while a Case File Coordinator (CFC) is a person.

After completion of the Science Director's MESR (as outlined above), the Science Director electronically notifies the Case Manager, Case Coordinators, and Laboratory Administration of the identification. With this notification, a Case Coordinator begins the process of electronically and physically assembling the case file. A Case Coordinator also may be assigned to act as the CFC; alternately, that duty may be assigned to other laboratory personnel such as Forensic Anthropologists and Archaeologists.

Additionally, if requested by the Science Director, the Case Manager assigns a Case Coordinator or a Forensic Anthropologist to complete a Forensic Anthropology Addendum for the case. The Addendum summarizes the anthropology findings for the case and compares those results to the biological data found in the casualty's personnel records.

The CFC performs a review of the case records, consulting with Laboratory Management (in particular the Case Manager), as needed in accordance with the CFC Desk Guide. In general, the Case File Coordination process is as follows:

3.11.1 **Compilation:** The compilation and assembly of case files for CFC usually takes place at CIL-HQ. Using the MESR as a guide, the Case Coordinator collects, collates, and organizes all relevant enclosures including summaries, supporting documentation (e.g., radiographs), and results of testing into the case file. As such, documents needed by the CFC, such as final test reports (e.g., FAR, FOR, AFDIL reports), case histories, etc., are transferred by the Case Coordinator from their respective network subfolder to a hard copy Case File Coordination folder. The appropriate routing sheet is placed on the exterior cover of the folder, and a checklist/signature sheet is placed on the inside cover.

Additionally, the electronic case file is organized in such a manner that the test reports and necessary documents for identification are appropriately named and numbered in the initial network case file (mirroring the hard copy file).

3.11.2 **Review:** Following compilation of the case file, the CFC:

- Reviews the contents, examining each word, line, sentence, paragraph, page, photograph, diagram, etc. for consistency, accuracy, and completeness.
- Performs a standard review of spelling and grammar.
- Makes non-substantive changes (e.g., corrects typographical errors).

3.11.3 **Processes, Changes & Revisions to the Identification Package:** If the CFC and the case are at different CIL locations, the following process takes place:

- The CFC downloads all of the enclosures for the assembled case packet from the network, conducts the review, corrects hard-copies (non-substantive changes and corrections), and saves these changes to the network files. All substantive changes (see below) must be reviewed by the authors or Laboratory Management. These changes are completed at the same time as the non-substantive changes.
- The CFC notifies the Case Coordinator at CIL-HQ as to which pages for each enclosure need replacing in the case packet.
- The Case Coordinator makes the needed substitutions.
- When complete, the Case Coordinator signs the Case File Coordination checklist (inside the green folder) for the CFC and returns the case to Laboratory Administration. Note: the corrected hard copies are initially stored at CIL-OF, but are sent to CIL-HQ each month for incorporation into the case file for permanent storage.

If the CFC is co-located with the case at any CIL facility, similar processes are followed, though several steps are omitted. Specifically:

- The CFC checks the case out from Laboratory Administration and reviews all enclosures. Hard copies are annotated, changes (all types) are made on the network, and the affected pages are re-printed for each enclosure.

- The CFC signs the checklist, and returns the case to Laboratory Administration.
- The hard copy changes are stored with the permanent record.

The CFC sends all substantive changes in the MESR, if any, to the Science Director or designee for action. Once reviewed by the Science Director or designee, a corrected copy of the MESR is saved to the case file on the network. The CFC is notified that the changes are accepted/not accepted, completing the MESR process.

If substantive changes to other documents are needed, the CFC apprises the Case Manager and contacts individual authors for corrective action. In the event that an author is not present (deployed, extended leave, etc), the Case Manager may make the changes, or assign to another Laboratory Manager or analyst to do so. Regardless, the author is informed that the changes were made (usually by email but a copy of the changes placed the case file is also appropriate).

Once the Case File Coordination process is complete:

- Laboratory Administration forwards the case packet to the Case Manager for a final review.
- The Case Manager reviews the case packet, particularly the MESR or MFR for any substantive scientific questions or changes missed. If additional problems are discovered, the Case Manager repeats the above process for changes to the case packet.
- If the case clears the review, the Case Manager signs the routing sheet and returns the case file to Laboratory Administration.

At the completion of this review:

- Laboratory Administration informs the Science Director or designee that the CFC is complete.
- The Science Director determines which of the vehicles of external review to utilize.

3.12 **External Review:** Typically, each case for initial identification is reviewed by a member of the Armed Forces Medical Examiner System (AFMES). At the Science Director's discretion, cases may undergo review by forensic consultant scientists under contract to DPAA in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review).

Identifications undergoing external review by the AFMES are prepared by the Science Director for transmission to the reviewer. The Science Director typically creates .PDF files of the draft MESR, all final analytical reports (e.g., SAR, FAR, FOR, MER, Historical Report), pertinent personnel records, and pertinent message traffic. The Science Director sends these reports to the reviewer via the Armed Forces Medical Examiner Tracking System (AFMETS), a secure electronic system. The AFMES does not own the reports saved to AFMETS and cannot distribute them without the consent of the DPAA Science Director. At the conclusion of the review, the case is uploaded into AFMETS in order to generate the DD Form 2064.

For cases undergoing external review by DPAA consultants, case files are prepared with the following procedures/considerations:

- Consultants are contracted by the DPAA to provide an external review and give a formal report as to the adequacy of the casework. The Science Director or designee selects the consultant(s) to be used.
- Laboratory Administration contacts the assigned consultants for their availability. If a consultant is unavailable (the timeline is usually within a week), Laboratory Administration informs the Science Director that a different consultant is needed.
- After Case File Coordination, Laboratory Administration scans and/or converts reports and documents into .PDF files, which are saved back to the DPAA network. Documents may include, but are not limited to:

    - Title page.
    - MESR or Identification MFR.
    - Laboratory Administrator's MFR.
    - Test reports (e.g., anthropology, odontology, material evidence, etc.).
    - Search and recovery (SAR) report(s).
    - Department of Defense, Office of the Armed Forces Medical Examiner Consultation reports on contributor material (also known as AFDIL Final Reports).
    - Message traffic (detailed report of investigations (DRI), detailed report of excavation, analysis of material evidence message).
    - Relevant personnel records (e.g., medical and dental records, death certificate, IDPF).
    - Report of casualty.

- Upon the completion of the pdf process, Laboratory Administration prints the electronic pdf files and sends them to the reviewers. The Laboratory Administrator first reviews the files prior to transmission to ensure all items are arranged in the proper order. An electronic disc may be included in the package to facilitate

external review of images and radiographs. These are then sent to the reviewer, typically via FEDEX.

- External reviewers notify either the Science Director or Laboratory Administration of completion of the review. If a contracted DPAA consultant is utilized, Laboratory Administration scans and saves the applicable external review reports onto the DPAA network. If AFMES is the external reviewer, Laboratory Administration ensures that all correspondence pertaining to the review is on the network and a hard copy is placed in the case file after the file is uploaded by the Science Director.
- Laboratory Administration notifies the Case Manager and/or the Science Director of receipt of the reports/comments. Comments regarding DPAA test reports are directed to the Case Manager. Comments regarding the MESR are directed to the Science Director.
- The Science Director (for the MESR) as well as the Case Manager (all other reports) or designee (typically the CFC) will address the external review non-substantive comments (e.g., typos); or give the comments to the original authors to address (the preferred action, particularly if the comments are substantive). Any changes to the case packet (reports, etc.) are annotated on the external review comments, are then made electronically, and the affected pages printed out and given the Laboratory Administration for inclusion in the case file.

3.13 **Final Identification Packet:** After external review, the Science Director completes the Form DD 2064 (Certificate of Death) and prints, signs, and dates the MESR and the Identification Memo. These are given to Laboratory Administration where they are scanned and placed in the electronic and hard copy case files.

Laboratory Administration then prepares the case for final release. Specifically:

- Laboratory Administration prepares the case file coordination checklist for the final report.
- A complete final identification packet is printed in accordance with the enclosures listed in Identification Memo or the MFR for additional portions from the electronic case file on the DPAA network. Printing of the final case packet may be accomplished at either Laboratory location, other through an approved outside vendor.
- Laboratory Administration emails PDF files of the death certificate, Historical Report, and Science Director's MESR to the appropriate service and to DPAA External Communications, concurrently notifying Laboratory Management. Any absent documents are noted in the email.
- Laboratory Administration provides two copies of the final case file to the appropriate SCO and one copy for the CIL Library.

3.14 **Disposition of Documentation:** Disposition of case documentation is as follows (**A4.13.1.1, SF4.13.2.1F-2a**):

3.14.1 **Case Files for Identified Accessions:** Electronic case files for accessions that are identified and sent to the services are stored on the same network drive as active case files.

3.14.2 **Transfer of Case Files:** Following an approved disposition, the entire master file is transferred to DPAA Records for archival purposes. All case file archiving flows through CIL-HQ Laboratory Administration. An exception may occur in cases with multiple individuals. In such instances, all individuals in the accession may be identified prior to transferring the file to DPAA Records. In cases involving an identification, the transfer usually takes place following shipment of the remains to the family.

Laboratory Administration writes a memorandum indicating the accession number, incident, identification, and approval date. This memorandum is signed by the receiving the DPAA Records personnel endorsing the acceptance of the closed case file. DPAA Records is given a copy of this memorandum and the original is filed in the File Room. FTS and the applicable accession log sheet are also updated to remove the case file from the inventory.

3.14.3 **Joint Forensic Review Notes & Reports:** Notes and forms generated during the Joint Forensic Review (JFR) process (see DPAA Laboratory Manual, SOP 2.2, Forensic Reviews) are stored in a binder labeled with the JFR number in the File Room. The JFR binders are available to anyone with normal access to CIL case files. This binder typically contains:

- Notes produced by analysts during the JFR.
- Any reports generated.
- Photographic CDs (or contact sheets and negatives for older cases).
- Any other associated material relevant to the JFR (e.g., table listing reviewed remains).
- Copies of any Field Forensic Review generated reports, analytical notes, contact sheets and negatives, and any other associated material (e.g., interview notes from witnesses).

The JFR binders typically should not be removed from the File Room. In unusual circumstances where a JFR binder must be removed from the File Room (e.g., audits) the File Administrator must approve the removal. Because JFR binders are not bar coded, and therefore cannot be tracked using FTS, they must be manually checked out of the File Room.

3.14.4 **DNA Documentation:** The DNA CoC Log and Blind Sample Log are maintained indefinitely in a secure area of the CIL (see DPAA Laboratory Manual, SOP 1.2, CIL Physical Security).

3.14.5 **Commingled Human Remains (CHR) Documentation:** These files include, if available, but is not limited to:

- Notes produced by analysts during CHR analysis.
- Signed copies of CHR reports.
- Report drafts and peer review documentation.
- Any other materials relevant to the analysis of CHR (e.g., photographs).

The following considerations apply to the CHR folders:

- Notes, forms, and reports generated by for CHR projects are prepared in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation), Annex B (Segregation and Analysis of Commingled Human Remains [CHR]).
- Since CHR documents are internal documents used only by the CIL and other select DPAA staff, they are stored separately from the master case files. As such, they are available to authorized personnel without cluttering the master case files.
- CHR files are arranged according to project (e.g., K208 files are kept separate from files pertaining to Tarawa). Within each project, CHR files are labeled with unique identifiers and separated into subdivisions that are appropriate to the project. For example, K208 files are labeled with their respective village sequence numbers, and filed according to village or recovery provenience.
- CHR files are checked out of the File Room using FTS.
- CHR files are retained in their respective project until the project is closed, at which time the files may be archived to DPAA Records.

3.15 **Special Instructions for Consult Cases:** Special case file management provisions apply to consult cases. See DPAA Laboratory Manual, SOP 1.8 (Consult Case Management) for details on consult case file management.

4.0 SURETY: Internal and external audits are performed on case file management in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits) to ensure compliance with this SOP.

Laboratory Administration conducts and documents internal controls for 10% of the stored case files each month. Controls include, but are not limited to:

- Ensuring all subfolders and their internal documents are administratively labeled with the correct CIL number.
- Verifying that documents from other cases are not misfiled in the case subfolders.
- Ensuring that inventory sheets match the contents of the subfolders, to include any items removed for CFC.

Internal controls are documented on the appropriate forms located on the DPAA network. Documentation should include the dates that the controls were done, who did them, the case files involved, and any other pertinent information.

5.0 SAFETY: There are no specific safety considerations associated with case file management. Large amounts of paper records pose a fire threat. Laboratory Administration personnel will be familiar with the fire prevention, fire safety, and firefighting provisions specified in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

SOP 1.8: CONSULT CASE MANAGEMENT

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 5 February 2015
Citation: DPAA Laboratory Manual, SOP 1.8

0.0 PRINCIPLE, SPIRIT & INTENT: *Forming the basis for accreditation, and having a high potential to result in court testimony, consult cases are carefully managed.*

1.0 PURPOSE & SCOPE: Casework that falls outside of the jurisdiction of the DPAA is deemed a "consult case." This SOP outlines the management of consult cases performed by the CIL in both the field and laboratory environment **(A4.2.4, A4.4.1)**. In the absence of specific procedures, or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 GENERAL: Consult cases normally involve casework that falls outside of the CIL's primary mission (i.e., jurisdiction) of recovering and identifying U.S. military personnel, certain American civilian personnel, and certain allied personnel unaccounted for from World War II, the Korean War, the Vietnam War, and other conflicts and contingencies. Typical agencies (Federal and non-Federal) that have drawn on, and continue to draw on, the CIL's forensic expertise include, but are not limited to:

- Medical Examiners.
- Local Police Departments.
- Various State Police Departments.
- FBI.
- Federal Emergency Management Agency (FEMA).
- Naval Criminal Investigative Service (NCIS).
- Army Criminal Investigation Division (CID).
- Air Force Office of Special Investigations (OSI).
- Armed Forces Medical Examiner (AFME).
- National Parks Service (NPS).
- Other Federal Agencies

For the purposes of this SOP, the term "case" as it relates to the CIL refers to specific casework performed by the CIL at the request of the customer. "Case" is not to be inferred to mean the overall scope of a wider investigation as it pertains to the customer.

Under the above criteria, activities such as routine telephone or email inquiries, routine requests for information (rather than assistance), etc. directed at the CIL Staff that do not solicit casework, or result in casework, and/or are not otherwise addressed in this SOP, are not considered consult cases. CIL Staff contacted in the above manner respond within the bounds of their professional expertise and report the contact to Laboratory Management using the notification procedures detailed below, as appropriate.

3.0 CONSULT CASE PROCEDURES: Consult cases are largely tracked and managed by Laboratory Management in the same manner as CIL jurisdictional cases with the following additional considerations:

3.1 **Notification:** Normally, the requesting agency (also referred to as the "customer" or "client") notifies the CIL that assistance is required (usually by telephone but letter and email requests for support may also occur). Any CIL staff member may receive a request for support. The notified CIL staff member **neither accepts nor declines the request for support**. In the event of a notification by telephone, the following information is recorded by the contacted CIL staff member **(A4.4.2)**:

- Date/time of notification.
- Name of person requesting support and their point of contact information.
- Nature of the support required.

The notified individual **immediately** passes the request for support and all pertinent information (including written correspondence) to the Science Director or Laboratory Director for further action. In the event that the Laboratory Director is unavailable, the Deputy Laboratory Director or designated Laboratory Manager in charge is notified. Once notified, the Laboratory Director may choose to delegate the management of the casework to a Laboratory Manager.

Occasionally, packages containing evidence may be delivered to the Evidence Coordinator. As the evidence is being processed, and the request for services becomes clear, the Evidence Coordinator immediately notifies the Laboratory Director that a potential consult case was received. Notification utilizes the above procedures, as appropriate.

3.2 **Initial Management Review:** Once notified of the request, Laboratory Management conducts one or more management reviews. The initial review is expedient in nature, reviewing the information at hand and determining if additional information is

required (see below). The initial review determines if the request from the customer **(A4.4.1)**:

- Poses any jurisdictional issues (i.e. whether the case does or does not fall under the CIL's primary mission). Jurisdictional issues that may arise are resolved through the Science Director prior to accepting the case.
- Is within the CIL's capability and resources to provide the requested services. The review of capability should establish that the CIL has the necessary physical capability, test methods, skilled personnel, and information resources for the performance of the casework requested **(A4.4.1a, A4.4.1b, A4.4.1c)**.
- Requires casework to be referred or subcontracted to another agency (see below) **(A4.4.3)**.

A management review checklist is available on the DPAA network to assist Laboratory Management to systematically conduct and document initial and interim management reviews. These should be completed for the initial and each interim review for a particular case **(A4.4.1a, A4.4.2)**.

3.3 **Coordination with the Customer:** Once notified, the Laboratory Director (or his designated representative) contacts the customer for additional information, if needed, and to effect coordination. Coordination should include, but is not limited to, the following issues:

3.3.1 **Role of the CIL:** Regardless of the nature of the casework (field or laboratory), Laboratory Management determines whether the CIL assumes a **consulting** or an **advisory** role in the casework, and notifies the CIL participants accordingly.

The role of the CIL ultimately has evidentiary and case file management implications (see below). Regardless of the role, casework is conducted to the highest scientific standards with all work, methods, and procedures governed by the DPAA Laboratory Manual to the fullest extent possible.

The conditions outlined in the two roles, below, are typical but not absolute. A provision of one role may be applied to another depending on the outcome of the management reviews and agreements made with the customer. Laboratory Management, however, should make such blurring of the roles a rare exception rather than a common occurrence.

At the earliest opportunity and prior to the commencement of case work, a CIL representative has the customer representative sign the Understanding of Consultation Responsibility form, located on the DPAA network.

3.3.1.1 **Advisory Role:** In an advisory role the customer retains full responsibility for the results of the support, services, and/or expertise solicited from the CIL. Most often the customer uses its own protocols, methods, and procedures. As the term implies, the CIL Staff member assumes a technical advisory role, rendering informal technical advice and professional opinions, as appropriate. Since the CIL Staff member lacks any authority over the activities conducted in these situations, he/she is not responsible for the outcome of the casework for which the advice was given. However, he/she may have to justify to the Science Director any technical advice provided, especially if it falls outside the provisions of the DPAA Laboratory Manual and/or their professional training and expertise.

Normally, a memorandum for record, fully describing the advisory case, is generated by one or more of the CIL participants in lieu of a peer reviewed report.

3.3.1.2 **Consulting Role:** In a consulting role the CIL assumes responsibility for the services and support requested (e.g., scientific testing, reporting, quality assurance) for the casework at hand. In general, consulting casework results in a peer reviewed report typical of CIL jurisdictional cases.

3.3.2 **Completion Date:** The efficacy of medicolegal investigations depends on the rapid completion of casework. Consequently, an understanding should be made ahead of time, if possible, between the CIL and the customer on a deadline date for completing all tests and reports related to the casework.

Laboratory Management should ensure the customer fully understands the time constraints of CIL services being performed in a consult case. Once work has commenced, in the event of unforeseen problems or circumstances, both parties should immediately re-negotiate the expected completion date. In the interests of time, verbal understandings are permissible; however, Laboratory Management should follow up with an email or prepare a short summary of the conversation for the record.

3.3.3 **Special Requirements or Concerns:** Any special requirements of concern to the CIL or the customer should be addressed. These include, but are not limited to:

- Specialized expertise and/or equipment.

- Sensitivity of the case (i.e., any special public affairs consideration).
- Federal, state, and local statues that may be an issue.
- Any evidence security, handling or management issues not addressed by the protocols of the CIL or the customer.

Follow-up should be conducted by the analyst after he/she is assigned to the case.

3.3.4 **Safety:** Laboratory Management should inquire if any non-routine safety hazards/issues exist and the mitigation measures to be taken.

3.3.5 **Referring or Subcontracting Casework:** In consulting cases, the CIL may decide that casework should be referred or subcontracted to outside agencies (e.g. DNA, optical lens testing) for testing. In such instances, the conditions found in DPAA Laboratory Manual, SOP 4.0 (CIL Surety) are met.

3.3.6 **Surety Considerations:** The consult case should be evaluated for surety considerations. For example, consult cases may introduce into the CIL a significant source for DNA contamination. If the casework does not otherwise require DNA sampling, surety considerations may necessitate sampling of the remains for DNA and having the sequence ultimately placed in the appropriate data base.

Coordination with, and approval of, the customer may be required prior to implementing the surety measures. If the customer refuses to cooperate in mitigating surety concerns on behalf of the CIL (e.g., refuses DNA sampling), Laboratory Management may opt to decline the case.

3.3.7 **Methods & Procedures:** The CIL uses test methods and procedures, including those for sampling, which meet the needs of the customer and are appropriate for the tests required (**A5.4.2, SF5.4.2F-23a, SF5.4.5.1F-32**). In general, methods do not have to be reviewed with the customer on a case-by-case-basis. By submitting evidence, or requesting services, the customer agrees to the CIL's methods and procedures (**A4.4.1a, A4.4.1c**).

Where the customer requires deviations, additions or exclusions from documented procedures, including sampling procedures, these are recorded in detail with the appropriate data, included in all documents containing test results, and communicated to the appropriate personnel. The CIL informs the customer if their proposed deviations, additions or exclusions from documented procedures, or any methods proposed by the customer, are considered inappropriate.

Additional guidance on the appropriate selection and use of methods and procedures is discussed in DPAA Laboratory Manual, SOP 4.0 (CIL Surety).

3.4 **Accepting or Declining a Case:** Once the initial management review is complete, Laboratory Management determines if the CIL is to participate in the case, or not, and informs the customer accordingly. Upon the CIL's acceptance of the case, the customer should be made aware that the CIL has the option of withdrawing from casework, all or in part, at anytime (see below).

Once a case has been accepted, any remaining differences between the CIL and the customer regarding conduct of the casework is resolved prior to starting work, especially regarding the role of the CIL in the case. In other words, the terms of conducting the case must be agreeable to the CIL and the customer. Should there be any subsequent deviations to the agreement by either party (especially regarding the role of the CIL), these should be communicated to all participants (**A4.4.1, A4.4.1a, A4.4.1c, A4.4.4**).

Upon acceptance of a case, the member of Laboratory Management making the decision forwards a copy of the management review checklist to the appropriate Laboratory Manager and to the Evidence Coordinator.

If not already notified, the Laboratory Manager informs the Evidence Coordinator that a consult case was received. At this time the Evidence Coordinator immediately assigns an accession number to the case and generates a case file folder. The Laboratory Manager then enters the information into the special fields that exist in the case tracking database for consult cases.

In the event a case is declined, the case is still given an accession number and entered into tracking as a matter of record. Should future negotiations with the customer result in acceptance of the case, the case may be activated using the already assigned accession number.

3.5 **Assignment of the Case:** After the case is accepted by the CIL and preliminary coordination is completed by Laboratory Management and the customer, the case is assigned and tracked as with CIL jurisdictional cases in accordance with DPAA Laboratory Manual SOP 1.7 (CIL Case File Management).

Laboratory Management strives to assign the case to a CIL Staff member with experience commensurate to the work required. Additionally, Laboratory Management should (with the assent of the customer) capitalize on the training opportunity at hand and assign additional staff (including interns) to the case as observers/trainees, as appropriate, in order to obtain valuable experience.

Laboratory Management briefs the analyst on the case to the fullest extent possible prior to the analyst participating in the case, including the results of the management review. Laboratory Management may authorize the CIL participants to directly contact the customer in order to develop more information, to assist in mission planning.

3.6 **Monitoring the Case:** The management review is a constant process. Cases may be reassessed by Laboratory Management in interim management reviews after casework has begun. In the event conditions change from those originally present when the CIL accepted the casework (e.g. safety or surety concerns arise), Laboratory Management, after coordination with the customer, as appropriate, decides to continue the case (making changes in the conduct of the casework as needed) or, if necessary, withdraw the CIL from the case. Once changes are made in the conduct of a case, all affected participants should be notified accordingly **(A4.4.2, A4.4.4, A4.4.5)**.

3.7 **Cooperation with the Customer & Other Agencies:** The CIL cooperates with customers or their representatives in clarifying the customer's requests and in monitoring the CIL's performance in relation to the work performed, provided that the CIL ensures confidentiality of other customers is not compromised **(A4.7.1).**

The CIL allows the customer or their representatives to conduct coordination meetings with the CIL and to monitor or observe casework or analytical processes associated with a particular case. Visitors from the customer agency are granted reasonable access and escorted in accordance with DPAA Laboratory Manual SOP 1.2 (CIL Physical Security). The customer representative may be required to submit a DNA sample.

Since there is a plethora of sensitive information (e.g., casework, investigative information, privacy related material) being handled and/or discussed in the CIL, non-customer agencies (e.g., defense attorneys or defense teams, members of the press) are not allowed access to the CIL for the express purpose of monitoring or observing analytical processes associated with a particular case. Such visits are too disruptive, have no benefit for the CIL, and pose an undue risk to evidence and other sensitive materials associated with unrelated cases.

Agencies whose presence has a tangible benefit to the CIL or impact on its mission (e.g., ASCLD-LAB representatives, trainees, consultants) are granted access on a case-by-case basis.

3.8 **Consult Case File Management:** Consult case files are managed in accordance with DPAA Laboratory Manual SOP 1.7 (CIL Case File Management). In addition, the following special provisions apply to managing consult case files:

3.8.1 **Numbering:** Consult cases are assigned an accession number regardless of whether or not evidence is accessioned into the Laboratory. In other words, the activity is accessioned instead of the evidence.

Consult case documents are numbered the same as jurisdictional cases except that a suffix "C" is placed after the accession number in order to designate the case as a consult case.

The basic accession number (e.g., CIL 2005-200-C) is used for initial case documentation (e.g. management review checklists, customer agreements, accessioning and chain of custody documentation).

Additionally, the basic accession number is used when there is no evidence accessioned into the CIL **and** no test report(s) are written for the customer.

Some of the more common scenarios where consult case evidence is not accessioned include:

- Search and recovery work when no evidence is recovered or all of the evidence is retained by the customer, and no test report is written.
- DNA or anthropology consults where a member of the CIL Staff is providing technical advice or expert opinions without ever taking custody of any actual evidence.

As the case progresses and it is determined that evidence needs to be accessioned and/or test reports are to be written for the customer, sub-accession numbers (e.g., CIL 2005-200-I-01-C, CIL 2005-200-D-01-C) are added to appropriate documentation. This situation usually applies to off-site consults (e.g., dental visits to the medical examiner's office) where all work is performed remotely, a test report is written, but no evidence is returned to the CIL.

3.8.2 **Timely Performance of Case Work:** The completion dates for casework negotiated by Laboratory Management with the customer usually means that consult cases must move rapidly through the testing stages at the CIL. Therefore, anyone involved in these cases needs to expeditiously submit all case material to Laboratory Management and Laboratory Administration. A checklist unique to consult cases, used to facilitate the movement of these cases through the system, is found on the DPAA network. Reports should be placed on the DPAA network immediately after completion in order to expedite peer review.

3.8.3 **Documentation of Discussions:** CIL participants in the case, to include Laboratory Management, maintain records in the case file of pertinent discussions within the CIL Staff, and with the customer relating to the latter's requirements and/or the results of the work during the case at hand. Email correspondence is acceptable. If such records do not appear in the analytical notes, reports, or other places in the case file, or in the management review checklist/tracking system (see above), separate memorandum for records are prepared **(A4.4.2)**. The case number should appear in all such correspondence.

3.8.4 **Reports:** Reports conform to the provisions of DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation) whenever practical. Consult cases often result in stand-alone reports rather than the typical identification packet produced by the CIL. As such, information not typically included in jurisdictional reports may be presented. Such information in individual reports includes, but is not limited to:

- The name, organization, address, etc. of the customer **(A5.10.2d)**.
- Results of tests performed by subcontractors (see above) **(A5.10.6).**
- Statements concerning acquisition and disposition of the evidence.
- Discussions of the chain of custody (e.g. dental testing conducted at the Medical Examiner's Office but skeletal remains analyzed at the CIL).
- Extensive evidence treatment and preparation (e.g., maceration).
- Deviations from, additions to, or exclusions from the test method, and information on specific test conditions, such as environmental conditions, as applicable **(A5.10.3.1a)**.
- Where relevant, a statement of compliance/non-compliance with requirements and/or specifications **(A5.10.3.1b)**.
- Where applicable, a statement on the estimated uncertainty of measurement; information on uncertainty is needed in test reports when it is relevant to the validity or application of the test results, when a customer's instruction so requires, or when the uncertainty affects compliance to a specification limit **(A5.10.3.1c).**
- Where appropriate and needed, opinions and interpretations **(A5.10.3.1d)**. Opinions and interpretations in the test report may include, but is not limited to, the following **(A5.10.5)**:

  - Fulfillment of contract obligations to the casework.
  - Recommendations on how to use the results.
  - Additional information which may be required by specific methods, customers or groups of customers.
  - Guidance to be used for improvements.

- Additional information which may be required by specific methods, customers or groups of customers **(A5.10.3.1e)**.

In some cases it may be appropriate to communicate the opinions and interpretations by direct dialogue with the customer. All such conversations should be documented in writing **(A5.10.5)**

The signatory of the test report is relevant to the case at hand. Laboratory Management ensure reports bear the signature of a person who conducted, participated in, observed, supervised, or technically reviewed the testing **(SA5.10.3.7)**.

3.9 **Final Management Review & Closure of Cases:** A final management review is conducted by Laboratory Management and a final check done by Quality Assurance prior to case closure and the release of documentation, reports and evidence, as applicable to the customer. Final management reviews include, but are not limited to the following activities **(A4.4.1)**:

- In addition to peer reviews of individual reports, a review for consistency across multiple reports, if applicable, is conducted by a member of the CIL Staff, preferably a Laboratory Manager.
- In addition to the peer review checks, Quality Assurance thoroughly checks the analytical notes for SOP compliance.
- Consulting cases are administratively closed by a memo from the Science Director, or designee, prepared by the analyst or Evidence Coordinator. If multiple analyst's are involved, Laboratory Management designates the individual to prepare

the memo. An electronic example of a closeout memo is on the DPAA network. Completed reports or case materials **are not** forwarded to the customer until this memo is signed and added to the case file.

- The member of Laboratory Management conducting the final management review documents that the review was completed by initialing the appropriate blocks on the Consult Case Checklist accompanying the case file.
- Ensuring that the contracted requirements of the customer have been met.

3.10 **Additional Considerations:** The following additional considerations apply:

3.10.1 **Evidence:** Consult cases may or may not result in evidence being accessioned into the CIL. Special provisions for evidence associated with consult cases are as follows:

3.10.1.1 **Non-Accessioned Evidence in the CIL:** In advisory cases where evidence enters the CIL and custody is retained by the customer, a chain of custody form is not prepared. In such circumstances, a representative from the customer must be physically present with the evidence at all times. Although no evidence is accessioned, the case is still be accessioned as an activity (i.e., an "empty" accession) and assigned an accession number.

3.10.1.2 **Accessioned Evidence in the CIL:** All accessioned evidence associated with consult cases is treated in accordance with DPAA Laboratory Manual SOP 1.3 (Evidence Management & Security). Additionally, consult case evidence is labeled (usually with the CIL number) in such a manner, if practical and permissible (by the customer), to minimize the potential for accidental or incidental commingling. Evidence that cannot be readily labeled must be otherwise identified or secured in such a manner as to minimize the potential for accidental or incidental commingling.

Upon receipt of evidence into the CIL, or during subsequent activity, abnormalities or departures from normal or specified conditions, relevant to the test methods, is recorded. When there is doubt as to the suitability of an item for testing, or when an item does not conform to the description provided, or the test required is not specified in sufficient detail, Laboratory Management consults the customer for further instructions before proceeding and records the discussion **(A5.8.3)**.

The condition of evidence is often markedly different from the typical CIL case. Consult case evidence may require special treatments and preparation (e.g., maceration) prior to testing. These methods should be conducted in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation) to the extent possible. While standards for testing do not differ, documentation prior the application of any special treatments or preparation, including photographic and radiographic documentation, may be more extensive for consult casework.

Evidence is retained in the CIL until the Science Director signs the closeout memo for the case (see above) unless otherwise requested by the customer. Laboratory Management informs the Evidence Coordinator when to release the evidence to the customer or issue instructions to dispose of the evidence if the customer does not desire its return.

3.10.2 **Testing Considerations:** Although the CIL has a uniform standard regarding the quality of casework between jurisdictional and consult cases, there are different approaches in the way the CIL tailors the casework to needs of the customer and the conduct of the actual tests.

Jurisdictional cases are typically done “blind.” However, there is still a substantial probability that the remains are those of a young male. For WWII, or earlier, there is a lower, but still significant, probability that the individual is white. Furthermore, the CIL attempts to determine whether remains are consistent with a profile since there is usually a "short list" of associated individuals.

Consult cases are usually done with significantly more information known by the analyst, there is a much wider possibility of demographics, and the CIL constructs a profile for the customer to check against missing persons reports or other information.

Altogether, the CIL strives for accuracy and precision in its jurisdictional work (because of strong presumptions) and tries to segregate otherwise broadly similar individuals. In consult cases the CIL maintains the accuracy of the tests but reports with less precision. This ensures that suspected decedents are not inadvertently ruled out.

4.0 TRIAL TESTIMONY: Individuals involved in consult cases should be cognizant of the fact that they may have to provide testimony either in deposition and/or in open court. The following procedures apply **(SA5.9.6)**:

4.1 **Preparation:** CIL participants may be prepared to testify by a member of the court (usually the

prosecution) or by a Laboratory Manager. Periodic training on effective trial testimony and the presentation of evidence in court may be offered **(SA5.2.1.2, SF5.2.2F-13)**.

4.2 **Monitoring & Review:** Each member of the CIL Staff who testifies has the testimony monitored and/or reviewed by an appropriate member of the scientific staff or by a key member of the court. When a member of the CIL is directed to testify, and a member of the court will not or cannot provide adequate monitoring or review, the person testifying notifies the Laboratory Director. The Laboratory Director arranges the appropriate monitoring and/or review by another member of the CIL **(SF5.9.1F-53)**.

4.3 **Conduct of Testimony:** While legal challenges to jurisdictional CIL casework are always possible, these are relatively rare and are not fully congruent to the expert witness testimony in criminal court that may result from consult casework. In general, for reasons beyond the scope of this SOP, expert witness testimony is more effective if the analyst avoids over stating the test results. Over-interpretation or speculation may have a detrimental impact on the quality of the CIL casework, even when such statements are accurate, and may lead to irreversible damage to the professional reputation of the CIL and the individual analysts. Reporting should be tailored to the appropriate question and audience.

4.4 **Documentation & Evaluation of Testimony:** Once the testimony is complete, the persons in charge of monitoring/reviewing the testimony complete the CIL Trial/Deposition Appearance Evaluation and Log (which includes appearance, performance, and effectiveness of presentation **[SF5.9.1F-53]**) and return it to the CIL Staff member who testified. If the monitor/reviewer is a member of the court, the CIL member testifying is responsible for supplying him/her with the appropriate paperwork. The CIL Staff member supplies the completed paperwork to the Laboratory Director for review and/or discussion.

Each individual is given feedback regarding their performance during testimony. Remedial training is conducted in accordance with DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education) should the evaluation be less than satisfactory **(SA5.9.6, SF5.9.1F-53)**. Less than satisfactory results may also result in a review of the training actions related to trial testimony **(SF5.2.2F-13)**

Once the documentation is complete, it is forwarded to Quality Assurance who files the documents in the testifying individual's Training and Development File. Records of testimony monitoring are retained not less than one full ASCLD-LAB accreditation cycle **(SA5.9.7)**.

5.0 INSTRUCTIONS FOR ANALYSTS: Guidance to analysts conducting consult casework is found throughout this SOP. This guidance is summarized below:

- Immediately obtain the case folder from Laboratory Management, Laboratory Administration, or the Evidence Coordinator, as appropriate.
- Obtain as much information about the case as possible prior to conducting casework.
- Involve interns in local field work, if possible.
- Directly coordinate with the customer if directed to do so. Document all discussions **(A4.4.2)**.
- Host the customer representative in the CIL if directed to do so in accordance with the above guidance and other CIL SOPs.
- Report problems/issues to Laboratory Management as they occur.
- Oversee subcontracted work, as appropriate.
- Complete casework in a timely manner.
- Tailor reports accordingly taking into account the customer's needs.
- Do not sign a report "for" another analyst unless you are relevant to the case at hand.
- Ensure completed reports are added to the DPAA network ASAP.
- Ensure the case is properly closed.
- Be proactive and stay on top of your case.
- Handle and secure evidence in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security), when appropriate.
- Prepare for testimony. Ensure it is monitored, and that your performance is documented.

6.0 SURETY: The conduct of management reviews, including surety considerations, is discussed above. Field and analytical notes and reports generated in consult cases are subject to peer review in accordance with DPAA Laboratory Manual SOP 4.1 (Peer Review). Internal and external audits are performed on consult cases in accordance with DPAA Laboratory Manual SOP 4.3 (Audits) to ensure SOP compliance.

Customer complaints are handled in accordance with DPAA Laboratory Manual, SOP 4.0 (CIL Surety).

7.0 SAFETY: Consult cases potentially involve bio-hazardous materials (e.g., soft tissue, body fluids, "wet bone") as well as toxic chemicals, hazardous terrain, and other detrimental environmental

conditions. The CIL Staff comply with the provisions of DPAA Laboratory Manual SOP 1.4 (CIL Safety Program), the safety guidance in DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing), and any protocols or guidance used by the customer, as appropriate. Conflicts between CIL safety protocols and those of the customer are brought to the attention of Laboratory Management and are resolved prior to allowing the CIL to proceed further with the casework.

DPAA Laboratory Manual

(Current and Updated Version Located on DPAA Intranet)
Last Revised: 21 April 2017
Citation: DPAA Laboratory Manual, Part II Cover Page

PART II: FIELD SCIENCES & REMOTE OPERATIONS

Not all CIL operations occur in the Laboratory facility. The CIL is involved in remote operations, usually related to field sciences. Remote operations include recovery scene processing, including underwater recovery scenes, or other field investigative work. Additionally, human remains recovered as a result of investigative activities, usually in Vietnam, are subject to forensic reviews, usually the Joint Forensic Review (JFR) conducted by U.S. and host nation delegations. Part II of this manual establishes procedures for field science and remote operations. As such, CIL personnel participating in field sciences and remote operations are required to competency certify in Part II, as appropriate.

SOP 2.0: RECOVERY SCENE PROCESSING

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 30 March 2017
Citation: DPAA Laboratory Manual, SOP 2.0

CONTENTS

0.0 PRINCIPLE, SPIRIT & INTENT: *Recovery scenes are processed in an organized manner conducive to the replication and verification of the work performed.*

1.0 PURPOSE & SCOPE: This SOP provides Scientific Recovery Experts (SREs) with the guidance and standards of operation needed to process recovery scenes in a manner that is scientifically sound, legally defensible, and ethically above reproach. These procedures allow SREs to effectively locate, document, and recover human remains and associated material evidence.

Deviations and exclusions from, and/or additions to, this SOP are permitted in exceptional circumstances and, if applicable, only when technically justified, authorized, and accepted by Laboratory Management or the customer (e.g., consult cases, see below) **(A5.4.1)**. The circumstances, as well as information on specific field conditions, including environmental conditions, are thoroughly documented. Where relevant, a statement of compliance/non-compliance with the requirements and/or specifications of this SOP are provided **(A5.10.3.1a, A5.10.3.1b)**. In the absence of specific procedures, or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 GENERAL PRINCIPLES & THEORETICAL FRAMEWORK: Recovery scenes are locations where human remains and associated material evidence have been, or are believed to be, deposited. Associated materials include, but are not limited to, identification media, aircraft debris, data plates from mechanical parts, military hardware, clothing, and other material evidence.

DPAA recovery scene processing procedures are a unique blend of archaeological and criminal investigative methods and techniques. Evidence recovered by the DPAA was typically deposited many years ago. Consequently, most sites require excavation using archaeological techniques.

Archaeological principles provide the basis for interpretation of the context in which remains are found, and permit the association of material evidence and/or remains to a loss incident in a scientifically sound manner. Further, recovery scenes, whether related to a criminal case or not, must be treated as analogous to a crime scene and

managed according to the appropriate forensic principles and procedures that provide for the security of evidence and maintenance of the chain of custody.

The process of recovery is unavoidably destructive. Through the collection and removal of evidence from recovery scenes, actual spatial relationships and associations between transportable and non-transportable evidence are permanently lost. All DPAA recovery scene personnel have the responsibility for ensuring that the loss of these physical relationships is mitigated as far as possible **(A5.4.1)**. Accordingly, the goals of any recovery operation are:

- To select a recovery strategy that maximizes data recorded and physical evidence recovered from a scene in order to minimize the loss of physical evidence and other pertinent data **(SA5.9.1.1)**.
- To establish and fully document the context in which all evidence is found. The recording of all spatial and contextual associations should be such that any subsequent identification process is not hindered or compromised **(SA5.9.1.1)**.
- To recover all relevant evidence from the recovery scene.
- To secure, store and stabilize evidence from the point of its recovery to its accession to the CIL.
- To maintain a chain of custody through documentary and photographic records that links the recovered evidence to the recovery scene.
- To ensure that the evidence is safely and securely transported to the CIL.

Successful attainment of these goals ensures that the DPAA can demonstrate, post-recovery:

- Any direct associations between physical evidence and a recovery scene.
- The association of non-biological evidence to any potentially recovered individuals.
- The formation processes and event history of not only the loss incident, but all subsequent activity at that recovery scene.

3.0 COMMAND & CONTROL: Under the operational authority of a Detachment Commander, DPAA Investigative Teams (ITs) and Recovery Teams (RTs) (or simply, the "Team") perform investigative or recovery operations, respectively. Accompanied by a civilian SRE, DPAA Teams consist primarily of active duty military personnel, who are typically led by a Team Leader (TL) and an Assistant Team Leader (ATL).

The Remote Operations Chain Of Command is as follows:

Director→
  Deputy Director→
    Regional/Scientific Analysis (Science) Director→
      Detachment Commander→
        Team Leader/Recovery Leader

Responsibilities, support relationships, and leadership roles for key, and other, personnel are discussed below **(A4.1.5)**.

3.1 **Science Director:** The responsibilities of the Science Director are discussed in DPAA Laboratory Manual, SOP 1.1 (Work Environment).

3.2 **Detachment Commander:** The Detachment Commander is the Director's senior official [forward stationed] for all investigative and recovery operations occurring within their respective areas of operation, and has operational authority over all team and individual activities. The Detachment Commander is the **supported** official by all Team and Team members operating in their AOR. The Detachment Commander assumes authority and takes operational direction from the Regional Director, Deputy Director, and Director.

3.3 **Recovery Team (RT):** The RT is comprised as follows:

3.3.1 **Scientific Recovery Expert (SRE):** The SRE is a civilian employee or fellow who works with a variety of teams. SREs work directly under the Laboratory Director and for the Science Director.

Until November 2016, the SRE was referred to as the Recovery Leader, or RL. This terminology may still appear in CIL and DPAA documents.

*While physically on site, the SRE is the **supported** official and determines all recovery priorities and recovery methodologies.* Off site, the SRE is the principal advisor to the TL in the preparation and training for all investigative/recovery activities. The SRE is in a **supporting** role to the TL in all other associated operational activities – including administrative instructions. The SRE executes the Science Director's scientific authority, and during the mission window, takes operational direction from the Team Leader, Detachment Commander, SA Director, Deputy Director, and Director.

The SRE is the Science Director's technical and subject matter expert for the Teams and, thus, responsible for any aspect of evidence recovery and handling during remote operations. The SRE ensures

that remote operations are planned and executed to the highest possible scientific standard. The SRE makes all the scientific and technical decisions related to the investigation and recovery scene and all procedures that may impact on the scientific integrity thereof.

In most field circumstances, the SRE has the sole responsibility for the recovery of evidence and maintenance of the chain of custody documentation, particularly when this is in reference to possible human or other biological remains. Of the team members (of either an IT and RT), only the SRE has the requisite skills to maintain the chain of custody.

Under recovery operations, typically, the SRE:

- Obtains and analyzes mission packets located on the DPAA intranet as well as any physical documentation in the DPAA Records Section.
- Shares special requirements (training or equipment) with the other team leadership (TL and/or the ATL).
- Performs specialty functions in accordance with appropriate regulations and guidance.
- Adheres to all DPAA policies.
- Opens and close sites (only the DPAA Director can administratively close a site. The TL has the final authority to close the site for safety/security reasons.).
- Is the on-site expert and makes decisions regarding excavation and recovery methods.
- Maintains the scientific integrity of the site.
- Determines the scope of work, project areas, and site boundaries, including the horizontal extent and vertical depth of the recovery scene/effort.
- Continually monitors the progress of the recovery.
- Conducts the initial site survey.
- Determines the approximate number of days and local workers needed to complete the project.
- Organizes the work and establishes the processes and procedures for the recovery operation not already covered by military regulations or DPAA procedural guidance.
- Serves jointly with the TL as team POC with media and dignitaries as required.
- Participates with the TL and ATL in daily team meetings, as an integral part of the team leadership, to discuss work progress and excavation priorities.
- Determines daily work schedules and load and coordinates with the TL accordingly.
- Determines site work organization.
- Documents the recovery from start to finish.
- Provides the TL with scientific, technical, and other recovery scene input for required field reports.
- Typically, prepares the ESR and/or DRI prior to redeployment, as appropriate.
- Prepares the SAR following redeployment.
- Provides for and supervises the proper handling, conservation, security, and chain of custody of evidence.
- Is the primary point of contact with DPAA Detachments and other DPAA sections regarding the recovery process, program, and prognosis.

Under investigation operations, typically, the SRE:

- Obtains and analyzes mission/historical packets located on the DPAA network as well as any physical documentation in the DPAA Records Section.
- Shares special requirements (training or equipment) with the other team leadership.
- Performs specialty functions in accordance with appropriate regulations and guidance.
- Adheres to all DPAA policies.
- Is the on-site expert and makes decisions regarding investigation and documentation methods.
- Maintains the scientific integrity of the site.
- If feasible, determines the scope of work, project areas, and site boundaries, including the horizontal extent and vertical depth.
- Conducts the initial site survey.
- Organizes the work and establishes the processes and procedures for the investigation operation not already covered by military regulations or DPAA procedures and guidance.
- Serves jointly with the TL as team POC with media and dignitaries as required.
- As an integral part of the team leadership, participates with the TL in daily team meetings, to discuss work progress and investigation duties and priorities.
- Determines daily work schedules and load and coordinate with the TL accordingly.
- Determines site investigation organization.
- Documents the investigation process from start to finish.
- Provides the TL with scientific, technical, and other investigation scene input for required field reports.
- Typically, prepares the DRI prior to redeployment, as appropriate.
- Prepares the CIL Site Survey Form following redeployment.
- Provides for and supervise the proper handling, conservation, security, and chain of custody of evidence.
- Is the primary point of contact with DPAA Detachments and other DPAA sections regarding the investigation process, program, and prognosis.

Law enforcement agencies occasionally request DPAA support to recover evidence from crime scenes (e.g., when burials must be found and excavated). The DPAA is also asked, on occasion, to provide support in the recovery of the victims of mass fatality incidents, such as aircraft crashes or natural disasters. Such cases are deemed consult cases and their management is detailed in DPAA Laboratory Manual, SOP 1.8 (Consult Case Management). SREs assigned a consult case should review SOP 1.8 when assigned a consult case.

3.3.2 **Team Leader (TL):** The TL (usually the military grade of O-3 or higher; although this position may be held by a military grade of E-7 or higher) is the ranking military team member. The TL is the Regional Director's senior official responsible for the overall mission preparation, execution and welfare of team members (to include the SRE and all attached enabling/support personnel).

Specifically, the TL is responsible for personnel movements, budgeting, dealing with embassy officials, and negotiating with foreign officials. The TL is also responsible for safety during a mission (when present at the scene), and serves as the Safety Officer under normal circumstances. The TL is under the direction of the DPAA Operations Section during deployments.

The RT/IT, under the leadership of the TL and Assistant Team Leader (ATL) are in a **supporting** role to the SRE for all investigation/excavation activities on the recovery site. The TL assumes authority from the Regional Director and, during the mission window, takes investigative/recovery direction from the SRE (while in a **supporting** role on site), Detachment Commander, Regional Director (through the Director of Expeditionary Support), Deputy Director, and Director.

3.3.3 **Assistant Team Leader (ATL):** The ATL (usually the military grade of E-6 or higher; also known as the Team Sergeant) is the principle advisor to the TL in all mission preparation and operational activities. The ATL is also the foreman, responsible for individual training and development, and the assignment of all work details in support of the TL's priorities. The ATL controls the rank and file team members, creates and maintains safe working conditions, and ensures that the proper equipment is available during the recovery operation. The ATL is under the authority of the TL and assumes their duties in his/her absence. The ATL takes operational direction from the TL, Detachment Commander, Regional Director, Deputy Director, and Director.

Leadership Responsibilities: Leadership during all field operations is balanced between the TL, SRE, and the ATL. The SRE is responsible for developing and organizing all aspects of an effective investigation or recovery strategy that maintains the scientific integrity of the operation and its results. While only the SRE is authorized to direct the recovery or investigation, the TL and ATL typically discipline military team members, make purchases with unit funds, make arrangements for travel, etc.

The SRE cooperates with the team leadership in ensuring safe working conditions, and to freely communicate safety concerns to the team leadership and members. Regular communication and planning among the three leaders is essential to a successful mission.

3.3.4 **Remainder of the Investigation or Recovery Team:** Ideally, the composition of the remainder of the Team is tailored to the circumstances of the recovery or investigation. Typically, the remainder of the team typically consists of:

- Mortuary Affairs Specialists.
- Infantry soldiers.
- Combat engineers.
- Medic (occasionally a military physician).
- Explosive ordnance disposal (EOD) technician.
- Photographer.
- Linguist/analyst.
- Life Support Investigator (LSI) (typically, when excavating aircraft crash sites in Southeast Asia).

3.3.5 **Life Support Investigator (LSI):** The LSI offers specialized technical knowledge concerning specific components of material evidence. Life support investigation and the role of the LSI are found in Annex A (Life Support Investigation) to this SOP.

3.4 **Senior Scientist:** In situations where one or more members of the Scientific Staff are co-located (e.g., Laos base camp), the Science Director, or designated member of the Laboratory Management, may temporarily designate one of the staff to serve as the Senior Scientist. In recovery situations, this individual would function as the Senior Recovery Leader. In situations where one or more members of the Scientific Staff are not co-located, the Laboratory Director, or designated member of the Laboratory Management, may temporarily designate one of the Scientific Staff to serve as the Senior Scientist In-Country.

The role of the Senior Scientist is to serve as a point of contact for decision-making and to mediate

conflict that may arise during the course of the recovery or mission. The Senior Scientist has authority to act in situations where obtaining direct guidance from the Science Director is impracticable or impossible.

In recovery situations, the Senior Recovery Leader—in the absence of the Laboratory Director's specific guidance—has authority to decide issues such as whether or not to pull an anthropologist off of a site to perform a survey, which anthropologist may perform forensic reviews, etc. The Senior Scientist may provide advice to individual SREs on how to effectively and efficiently perform their recovery operation.

The role of the Senior Recovery Leader, however, is not to usurp the on-site authority of any other Recovery Leader. The Senior Recovery Leader is expected to work in consultation with the Senior Team Leader if applicable. The Senior Recovery Leader is expected to work at all times within the rules, guidelines, policies, and directives set forth by the Laboratory Director and whenever possible, this Laboratory Manual.

3.5 **Multi-Disciplinary Team (MDT):** The MDT is a regionally-based team from various disciplines within DPAA who conduct research, investigation, and logistical planning for field operations. The Asia Pacific Directorate and the Europe-Mediterranean Directorate control the MDTs. MDTs may vary in composition. They are typically comprised of operational planners, analysts, and historians. Scientific related authority, direction, recommendations, and support are provided to the MDTs through their Directorates by CIL personnel, or CIL approved personnel. The MDT provides subject matter expertise only and has no command and control function.

4.0 INVESTIGATION & RECOVERY SCENE PROCESSING: The following are the general procedures for investigation and recovery scene processing which are presented in approximate chronological order **(SA5.9.1.1).**

4.1 **Mission Planning & Pre-Deployment:** Mission planning is essential for the success of search and recovery missions and should take place prior to departing to the recovery scene. Data should be constantly checked and updated to allow the IT or RT to arrive at the project area with current and detailed background knowledge for the task at hand. Despite careful planning, SREs must be prepared to face actual on-the-ground conditions different from the expectations developed. Mission planning includes, but is not limited to, the following:

4.1.1 **Background Research:** Background research provides the basis for recovery operation planning. Arrival at any recovery scene location, whether the current project is intended as a scene survey or full-scale recovery excavation, must be preceded by a background investigation. SRE background research should be directed at:

- Gaining the fullest possible understanding of the circumstances of loss, the physical aspects of the site and how these affect recovery methods. Background research should include, at a minimum, a review of the standard recovery packet MDT. Additional sources may be reviewed as deemed necessary.
- Local Statutes and Regulations. In many countries (including the U.S. and the past trust territories) there are statutes, regulations, and guidelines detailing the protection and treatment of cultural resources and the possession and transport of human remains. Regardless of location, the SRE is responsible for statutory compliance. The SRE must ensure that the operations section has identified local regulations and laws prior to the start of fieldwork. The SRE has the professional responsibility to cease illegal field operations.
- Threat assessment for safety purposes. Safety concerns can be tentatively identified during background research.
- Formal risk assessments are prepared by the DPAA Operational Sections as well as Detachment 4 personnel (TLs/ATLs) and include assessments of hazards outlined in the Safety section of this SOP.
- Security Requirements (see Annex B, Recovery Scene Security) to this SOP.

Note: When the CIL uses information supplied by any other party as part of the investigation process, it shall verify the integrity of such information **(F7.1.6)**. This may be done by considering the trustworthiness of the source.

4.1.2 **Development of Investigation & Excavation Strategies:** The SRE should review all available information on the recovery scene conditions and provide a pre-deployment briefing to Laboratory Management, as appropriate. The SRE subsequently provides the RT with a pre-deployment briefing (formal or informal) on the requirements needed to successfully process the recovery scene.

4.1.3 **Assessment of Projected Equipment:** Investigation and recovery scene equipment operation, performance checks, maintenance, measurement traceability, and uncertainty of measurement are discussed in Annex C (Investigation & Recovery Scene Equipment) of this SOP.

The SRE determines and coordinates with the IT or RT the equipment required to investigate or process the scene. The SRE is responsible for determining what equipment is required to process each recovery scene. Typically, the ATL provides the SRE with a basic equipment list for a deployment. The SRE should review the list and recommend any additions or deletions. The basic equipment list for a recovery scene excavation is presented in Enclosure 1 (Equipment Lists) to Annex C of this SOP.

The SRE should select the appropriate equipment based on the reported scene conditions, and should determine if any additional specialized equipment (e.g., magnetometers, dredges, rappelling equipment, etc.) is required.

Recovery scene equipment should be maintained and performance checked with these documented, as appropriate prior to deployment **(SA5.6.1.1, SF5.6.1F-38)**. Performance checks are conducted in accordance with Annex C of this SOP and DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability).

4.1.4 **Projected Indigenous Labor Requirements:** Generally, a formal assessment cannot be completed until reaching a recovery scene and performing the initial site assessment. In some areas of operation, however, particularly Southeast Asia, labor requirements are planned well in advance of the actual recovery operations as part of political negotiations.

4.1.5 **Special Training Requirements:** The TL and the SRE should determine if any special training is required (e.g., ground penetrating radar, cesium magnetometer, rappelling classes, climbing, sling loading, operation of equipment).

4.2 **Field Operations:** Field operations are intended to investigate alleged recovery scenes, and recover material and biological evidence that support the identification process in the CIL, and to facilitate understanding of site context and the circumstances of loss. The methods employed during the recovery process should ensure the recovery of potential relevant material as well as gather the relevant contextual information. Regardless of the recovery procedure employed, the SRE is expected to perform the recovery in an effective and efficient manner, in terms of both time and resources.

There is a continuum of various field procedures from investigation through discovery to full recovery. Investigation and discovery techniques are usually part of the surface and subsurface site survey operations while the bulk of the recovery usually takes place during the recovery scene excavation. The types of procedures employed are directly related to the nature of the recovery scene.

There are two fundamental requirements of any SRE when executing a recovery plan. The first is to use appropriate methods to sufficiently collect and document the evidence and data from a recovery scene in order to support an individual identification.

The second task is to avoid the use of complex recovery and documentation procedures that cause undue expenditure of time and resources that result in negligible contributions to the resolution of the case. If unsure of which procedures to employ during the planning process, the SRE should seek guidance from Laboratory Management through a review of the excavation strategies prior to deployment.

Recovery scene procedures are subject to change due to extenuating circumstances, such as safety concerns or political considerations. Such extenuating circumstances should be noted in the recovery scene field book as appropriate.

4.2.1 **Investigations:** Recovery scenes or potential recovery scenes are investigated by Investigation Teams (ITs) well in advance of recovery scene processing. ITs work under the purview of the Asia Pacific and Europe-Med MDTs, and are primarily responsible for the field investigations of cases. An IT is typically composed of:

- TL (usually a military officer)
- ATL (usually a senior non-commissioned officer).
- MDT analyst/historian.
- Several linguist/analysts.

Although not always present, a CIL SRE may accompany the team. The analysts bear the bulk of writing the reports.

Typically, an SRE can be tasked with assessing and surveying a current site that may be excavated within the following year. While not a regular part of an IT, an SRE may be assigned to provide scientific interpretation of a site after conducting an archaeological site survey, to include (but not limited to) the:

- Archaeological extent of the site.
- Interpretation of various site and land transformation processes.
- Pattern and distribution of incident-related items.
- Likelihood of finding incident-related evidence.

In lieu of this expertise, an IT should undergo training from a CIL SRE to standardize investigation strategies.

When accompanying an IT, the role of the SRE varies according to the geographic region, the conflict in question, and the purpose of the investigation. Each of these situations also requires a different type of documentation (see below).

A Phase 2 Testing Team (P2TT) is a specialized form of IT (although any RT can also employ a P2T strategy, if appropriate). This team is similar in composition to an IT, but the SRE has more responsibility in developing mapping data and subsurface survey and testing procedures for specific sites. The primary duties of the P2TT are to gain additional archaeological information on evidence patterns and distribution beyond the IT on an already identified recovery scene. This information is necessary to assist in the development of a more efficient recovery strategy. P2TTs are primarily charged with defining and evaluating sites that encompass large areas or assessing the recovery potential of previously excavated sites.

4.2.1.1 **Types of Investigations:**

4.2.1.1.1 **Investigation Scene/Activity:** An investigation scene is a physical place on the ground that may or may not be associated with a loss incident. This investigation is done through a physical survey of the scene using archaeological survey and discovery methods (see above). An activity is any action related to the investigation of loss incident. These activities can range from witness interviews, known scene visits, archival research as well as formal discovery strategies at a possible investigation scene.

4.2.1.1.2 **Formal Investigations:** Formal investigations occur when a case is in an active search status; in other words, little or nothing is known about the loss incident location. Formal investigations usually involve a large, multi-person team with various investigative specialties such as SRE, EOD technician, linguist/analyst, historians, etc.

4.2.1.1.3 **Site/Scene Visits:** Site visits are done when a team or sub-element of a team visits an already known location. The purpose of visits usually involves a specific task (e.g., to prepare or set up an area for an upcoming recovery/excavation).

4.2.1.2 **Investigation Products:** Information regarding investigation products may be found in the current DPAA Directive (or Instructions) Report Writer's Guide. Investigation products include:

4.2.1.2.1 **DPAA Archaeological Site Survey "Form" (ASSF):** The ASSF (sometimes abbreviated as SSF) is the lowest level of documentation for site-specific information. The ASSF follows the format of standard archaeological survey forms. The purpose of the ASSF is to provide the SRE or other relevant personnel sufficient archaeological information to pursue a recovery. This form should be complete at the end of each investigation by the SRE for field locations that have sufficient site related archaeological information.

Even though data is entered into the ASSF "form" the documents are not considered field notes. Rather, the ASSF is a summary report of the field notes, allowing the customer to review the site information in an objective and systematic fashion. The ASSF does not rise to the level of a test report under accreditation standards. However, it is peer reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). The ASSF is authenticated by the author initialing next to his/her name on the top of the front page.

4.2.1.2.2 **Detailed Report of Investigation (DRI):** Information that is more specific to the investigation (vice the site location) is captured in the Detailed Report of Investigation (DRI). The purpose of a DRI is to record all pertinent details concerning the investigation of a case in clear concise message traffic format in a manner useful to all concerned.

The DRI should document all information the team obtained during the course of the investigation as well as all actions taken or attempted by the team during the course of the investigation. While this document has some specific scene information, it is also a logistical document concerning residence, travel, and safety.

DRIs are typically prepared at the end of a formal investigation process. Typically, the Investigation Leader (IL) on the team completes the DRI, but in the absence of an IL, where the SRE leads the investigation, the SRE should submit a DRI if an ASSF is not written. Typical DRI sections that involve comments by the SRE include, but are not limited to:

- Site description.
- Logistics of recovering the scene.
- Remains found at site.
- Estimated Excavation Requirements.
- Terrain and Weather Considerations.

- SRE comments.

Other documentation that should be filed with the DRI includes:

- Field notebooks.
- Digital photographs (on CD).
- Digital photograph logs.
- Site survey forms.
- Sketch maps.

4.2.1.2.3 **Additional Information Report (AIR):** The AIR documents information obtained through unanticipated activities that occur while investigating a scheduled case, during coordination visits, and/or unilateral/bilateral investigations. AIRs include activities and information concerning a case or scene that does not require in-depth treatment at the time.

Commonly, these reports result from information presented to the team by citizens of the host nation, additional information obtained during the conduct of an investigation that pertains to a case other than the one the team is investigating, or additional information obtained during an investigation that cannot be readily correlated to any known case. Examples of situations that may result in an AIR include interviewing additional witnesses or a unilateral turnover of possible biological or material from a scene that do not involve a site visit.

The AIR should present the information obtained in a clear and concise format and document the exact means and process by which the information was obtained. The AIR is completed by the IT or RT TL, depending on the mission. The SRE (if present) fills out the pertinent sections of this report and provides assistance to the TL when necessary.

4.2.1.3 **Geographic Considerations:** The conduct of investigations varies according to the country or region of operations. Any site visit that is a component part of an investigation, whether formal or informal, results in an ASSF. AIRs may also be necessary.

4.2.1.3.1 **DPRK:** Typically, the DPRK maintains strict control over IT and RT composition. An SRE is rarely allowed to accompany an IT without prior approval by the host nation. The following procedures are followed depending on the leadership of the IT:

- If the IT is headed by a senior NCO (which is usually the case), he is responsible for completing the DRI. While the SRE may assist in the quality of these products, he is not responsible for their content.
- The SRE prepares a DRI or ASSF only if he has physically participated in the investigation. They may, however, review the work of others.
- In the SRE comments section of any DRI written by a second individual, the SRE should insert a statement to the effect that they cannot ascertain the validity of the report unless they physically participated in the investigation.

4.2.1.3.2 **World Wide:** World wide investigations typically have a smaller team composition where the SRE plays a more definitive role. If a SRE is involved in worldwide investigations, the products include the ASSF and pertinent portions of the DRI. If the SRE is absent, the team is responsible for providing a DRI. If the activity is a brief visit to a previously recorded site prior to an excavation, the SRE completes the ASSF or SVR only (see below for an explanation of the SVR).

4.2.1.3.3 **Southeast Asia:** Investigations in Southeast Asia are the most formal of the DPAA investigations. If an SRE is present on an IT, they are responsible for the ASSF and the pertinent portions of the DRI.

4.2.2 **Recovery Scene Site Surveys:** Recovery archaeological scene site surveys are systematic inspections that are designed to discover the location of evidence required to support identifications. Archaeological site surveys are a means of establishing the scene perimeter, initial scene interpretation, and the primary tool for determining recovery strategy. Archaeological site surveys also seek to collect data on, among other things:

- Site formation, transformation and land transformation processes.
- Stratigraphy.
- Topography.
- Alluvial flow and hydrology impacts.
- Erosion.
- Taphonomy.
- Bioturbation.
- Bombturbation.
- Geology.
- Spatial and mapping coordinates.

Surveys may be conducted as part of a field investigation by ITs (see above), months in advance of actual recovery scene processing, or immediately prior to the commencement of processing by the RT.

Standard archaeological procedures designed to maximize the recovery of evidence in its spatial

context are used to delineate recovery scene context and boundaries. Survey activities may be simple surface survey activities, or may employ subsurface techniques including soil probes/augers, shovel tests, and/or remote sensing techniques (see Annex D, Use of Remote Sensing Equipment, to this SOP). The P2TTprogram falls under these types of activities.

In the CIL, results obtained from field activities are the result of horizontal and vertical excavation and/or recovery operations. The goal of these excavations is to completely excavate the recovery scene given the parameters outlined in this SOP. In sampling, as defined by ISO 17025, the extent of the universe (in this case, the recovery scene) is unknown. Since the scene must be processed to its fullest geographic, archaeological, and stratigraphic extent, sampling as a recovery activity is not done during field operations. Therefore it does not fall under the definition of sampling by ISO 17025 **(A5.7.1, SF5.7.1F-43)**.

Generally, survey activities are considered to be "limited-collection" activities. That is, evidence should only be collected if it is in danger of being removed or lost between the time of discovery and any future recovery activities. If evidence is collected from the surface or subsurface, its location should be plotted on a map for future reference, and then transported in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). Receiving evidence without context renders it useless.

4.2.2.1 **Surface Survey:** The following tasks may be undertaken during surface surveys:

- Locate local witnesses and bring them to the survey area if possible.
- Interview witness using the witness interview procedures in Annex E (Informant/Witness Interviews) of this SOP as a guide.
- Develop additional questions for witnesses based on answers received.
- Compare witness statements to other witness statements, to any relevant documentary and cartographic evidence, and to local topography, and vegetation, as appropriate.
- Determine the initial survey area based on witness testimony, background research, distribution of visible evidence, topography, depositional environment, and other potentially significant factors.
- Perform informal safety assessment of the area and implement EOD search, if needed.
- Clear vegetation when necessary.
- Complete a systematic transect survey (pedestrian reconnaissance) of the area using a method such as line-abreast pedestrian reconnaissance.
- Complete metal-detector search of area, if appropriate.
- Determine recovery scene perimeter (see below).

4.2.2.2 **Subsurface Survey:** If the SRE determines that surface survey is inadequate to define either the loss location or to determine the recovery scene perimeter, a subsurface search may be implemented. Currently, P2TT protocol falls under this type of survey. Subsurface surveys have four distinct purposes:

1) To provide supplementary information to support the results of the surface survey.

2) To assess stratigraphy and other aspects of recovery scene soils and sediments and formation and disturbance processes.

3) To collect subsurface evidence to determine the nature and distribution of evidence.

4) To develop an assessment of the recovery scene conditions, contents, and any intrasite patterning.

The process for conducting subsurface surveys includes:

1) Determine the initial search area based on results of past site survey, witness testimony, background research, distribution of visible remains and material evidence, topography, depositional environment, and other potentially significant factors.

2) Perform informal safety assessment of search area and implement EOD search if deemed necessary.

3) Clear sufficient vegetation to initiate subsurface survey.

4) Conduct subsurface survey using any or all of the following methods. Areas where subsurface discovery techniques are used should be plotted on the recovery scene map (see below). The perimeter and density of subsurface testing need not be piece-plotted; only the general density and general perimeter needs to be noted.

- Metal-detector.
- Other remote sensing devices (e.g., cesium magnetometer, electronic resistivity, etc.).
- Soil probes and augers.

- Shovel test pits (small excavation units, typically 50-x-50 cm with the excavation sediment screened or not screened at the discretion of the SRE).
- Examination of exposed soil profiles such as a road cut, gullies, stream bank, etc.
- Test pits (a square meter or larger with the excavation sediment screened). Test pits are usually employed to recover evidence, to guide placement of future excavation units, or to determine if any intrasite patterning is present*. Test pits must be plotted on the recovery scene map (see below).
- Trenching: Parallel test trenches are best employed when looking for a large feature (mass grave, filled in crash crater, etc.) with no visible surface manifestations. Cross trenching as a discovery process is not allowed in any circumstances.
- Mechanical equipment (e.g., bulldozers, belly scrapers, backhoes). Mechanical equipment may be used to strip sediments away from large areas when soil conditions are right (shallow soils, sheet wash erosion covering buried soils, etc.)*.

*Note: These techniques typically are used as subsurface discovery techniques to define recovery scene distributions and perimeters. However, the excavation strategies used to recover a scene require block excavation techniques. Individual burials are always addressed through a block excavation strategy.

5) Define the recovery scene perimeter. The recovery scene perimeter comprises the area within which the SRE *expects* to recover evidence associated with the loss incident. The recovery scene perimeter is typically delineated by the distribution of evidence encountered during systematic surface and subsurface surveys (if necessary), the local depositional environment and sediment transport mechanisms (e.g., rice paddies with low-energy transport mechanisms, mountain slopes with high-energy transport mechanisms), witness testimony, background research, topographic features (e.g., cliffs), safety considerations, and political considerations of the host country. The recovery scene perimeter may change during the course of scene processing as new data related to the distribution of evidence are generated.

Special Instructions Regarding Trenching: Trenching is a discovery method, not a recovery technique, of excavating long, linear, parallel units. Annex F (Mechanical excavation) to this SOP provides more detail on Trenching operations.

Linear columns of soil, or balks, are used to separate parallel trenches. Trenching should always be conducted using a systematic strategy with grid locations placed on the site plan map. The advantage to trenching as a discovery strategy is that large areas of the recovery scene can be examined and the resulting long sediment profiles can provide insight into intra-site patterning and formation and disturbance processes affecting the outcome of the recovery effort.

Balks between trenches should not exceed 0.5 m in width and trenches are typically at least one meter wide. Upon completion of the trenching, and once the recovery scene perimeter has been defined, all balks within the recovery scene perimeter must be excavated and screened. Only the balks within the defined recovery scene perimeter require excavation and screening. Balks within discovery (testing) areas (e.g., outside of the recovery scene perimeter) may remain. If testing a small area, even if no evidence is recovered, all balks should be excavated and screened.

Trenching is most likely not the appropriate technique to use in either discovery or recovery operations when:

- Poor preservation of human remains has been documented in the vicinity of a specific recovery scene.
- Small features or scattered remains may be present.

Block excavation and screening of excavated sediments is the most appropriate technique under these circumstances. If the SRE elects to use a trenching technique under the above conditions then they must justify why it is more effective than block excavation and screening.

4.3 **Recovery Scene Excavations:** These guidelines outline the basic field methods used by the SRE directing the processing of recovery scenes (excavations of burials, ground losses, and/or aircraft crash sites). The archaeological principles of the Law of Association, Law of Superposition, and other principles of stratigraphy are the foundations that support the relevant and accurate description of evidence context. However, the methods used are as diverse as the numerous sites and environments where RTs operate.

While recovery scene circumstances vary, the SRE must always seek to fulfill the intent and principles of this SOP. Accordingly, the SRE must adapt conventional archaeological techniques to unconventional situations in order to maintain the crucial balance between maximum data recovery and existing constraints. Excavation procedures must be flexible and adaptable and are determined by the

circumstances of the loss, location and the results of information gathering. Topography, soils/sediments, vegetation, excavation strategy, and other factors influence the procedures selected by the SRE. A few of the basic strategies, methods and techniques employed are listed below.

4.3.1 **Site Location & Datum:** Where feasible, it is required to use a Global Positioning System (GPS) to determine the recovery scene location in reference to the CIL standard map datum system of WGS-84. The use of this map datum system ensures consistency in databases. As well as determining coordinates using WGS-84, it may also be necessary to determine location using a more appropriate local map datum system, particularly if local maps use another map datum system, such as North American 1927.

Map datum systems are reference standards; however, being beyond the control of the CIL, the provisions of ISO 17025 do not apply **(A5.6.3.1)**. Laboratory Management monitors external agencies regarding the status of map datum systems. Problems or caveats reported by external agencies (especially the USGS Mapping Standards and the US National Map Standard) should be factored into CIL operations, as appropriate.

Where the use of a GPS is precluded, calculate Military Grid Coordinate System grid position, Universal Transverse Mercator Grid (UTM) position, or latitude and longitude, or use other appropriate methods (resection, legal location, etc.) to locate the recovery scene on the land surface.

Establish a site origin and grid system that aids in recording provenience and context. The spatial grid should be oriented in such a manner that the Northing and Easting baselines are most appropriate for the layout of the recovery scene with respect to topography, site structures, specific vegetation, slope, land features, etc. In an ideal situation, Grid North is oriented with Magnetic North, but where the layout of the site dictates a more logical deviation, Grid North should never exceed 45 degrees in azimuth from magnetic North.

The grid point N500/E500 is typically the excavation unit-mapping datum/grid origin. Grid coordinates employing S (south), E (east), N (north), or W (west) quadrants should be avoided.

By DPAA convention, the southwest corner of the grid unit is the unit designation, if the excavation units are of uniform size and orientation throughout the entire excavation (e.g., only 4-x-4-meter excavation units or only 2-x-2-meter excavation units were used).

If the excavation units are of differing sizes and/or orientations, further documentation is required using the four coordinates that make up the excavation units. A short-hand for this designation would be N500-504/E500-504. This would designate a 4-x-4-meter unit, while N502-504/E502-504 would designate a 2-x-2-meter unit, and N502-504/E500-504 would designate a 2-x-4-meter unit oriented with its long axis east-west. This notation allows differing sizes and oriented units to be designated easily within the field notes.

Baseline provenience systems require both east-west and north-south baselines that are tied into permanent points as described below. These baselines are the preliminary steps required to establish a grid system and, thus, should follow the designations already outlined.

The grid origin must be tied into a permanent vertical and horizontal datum using distance and bearing measurements. The grid origin may also be tied into a second point using distance and bearing measurements. Two such points allows a more accurate method to relocate or triangulate the grid origin. Typically, the horizontal and vertical datum is a permanent item on the landscape such as a boulder or corner of a structure or cultural object. This point may coincide with the grid origin.

The size of the excavation units depends on the perceived complexity and density of evidence distribution at the recovery scene. Recovery scenes with dense and/or complex distributions of evidence may require smaller excavation units than less dense and complex recovery scenes to adequately record evidence provenience and context. Grid units at recovery scenes are typically 4-x-4 meters, which allow for even subdivisions if finer mapping and recovery is required. The standard excavation unit size (and any deviations from standard) should be recorded in the field notes.

While, ideally, a mapping datum/grid origin should be constructed with rebar and cemented in place, this is rarely practical as the datum materials are likely to be scavenged. Instead, the SRE may construct the site datum from temporary materials such as a wooden stake or other materials. As noted above, the mapping datum/grid origin should be linked (i.e., with azimuth and distance measurements) to some permanent or semi-permanent feature of the landscape such as a large boulder or building corner.

4.3.2 **Block Excavation:** Block excavations are defined as the excavation of contiguous excavation units that encompass all areas within the recovery scene perimeter. No balks are left between units and all units are excavated to incident-sterile soil. However, at the discretion of the SRE, individual excavation units may remain unexcavated within the block excavation. Block excavations are the typical excavation method for recovery scene processing.

When possible evidence is deeply buried, and the entire recovery scene area has been defined, contiguous excavation units typically should be excavated by strata across the entire recovery scene. In other words, individual excavation units should not be excavated to a sterile level and then a new unit started. Rather, the entire area of recovery scene should be systematically excavated through the incident depth. Where strata are sufficiently thick, arbitrary levels within strata are appropriate.

Where no soil or sediment is present to excavate at a recovery scene (e.g., bedrock exposures), the collection of evidence is the preferred recovery method. This includes appropriate mapping and documentation of the horizontal provenience.

4.3.3 **Excavation Techniques:** Standard excavation techniques are listed below.

4.3.3.1 **Hand Excavation:** Hand excavation uses hand tools including, but not limited to, trowels, bamboo picks, paint brushes, and other small tools. Sharp metal tools (such as dental picks) and sharpened trowels should be avoided around *in situ* biological evidence as these tools tend to damage fragile bone and other evidence. Hand excavation generally should be employed under the following circumstances:

- Examination of soil/sediment stratigraphy.
- Definition or examination of excavation-unit floors.
- Pedestaling or exposing evidence.
- Excavation in confined spaces (e.g., between roots or rocks) or in areas of limited soils/sediments.
- Situations where only small amounts of soils/sediments have to be excavated (e.g., a known isolated burial location) and there is a strong *a priori* suspicion that evidence will be encountered.
- Feature excavation.

4.3.3.2 **Large-Tool Excavation:** Large-tool excavation employs larger tools (e.g., shovels) for the systematic removal of soils/sediments in a defined unit of space. The use of picks is discouraged since they cannot be controlled in the same way as a shovel (i.e., using a pick has a greater chance of damaging evidence). However, picks are effective for breaking up sediments too compact for shovels. Often during the course of a recovery effort, hand excavation techniques are mixed with large-tool excavation techniques.

4.3.3.3 **Mechanical Excavation:** In certain circumstances, mechanical excavation using heavy equipment may be required to efficiently excavate a recovery scene. Mechanical excavation is detailed in Annex F (Mechanical Excavation) of this SOP.

4.3.4 **Excavate to Sterile Strata:** Incident-sterile strata are defined as being free of significant equipment, material evidence, wreckage, possible human remains, or other material contemporaneous with the event in question that supports identification.

The natural environment may preclude excavating to sterile conditions (e.g., reaching the margin of streams, rock outcrops, escarpments, and other natural phenomena. Political and/or cultural constraints may also preclude excavating to sterile conditions (e.g., local burial sites). Where possible, solutions to political situations should be negotiated so that the excavation can proceed.

4.3.5 **Screening:** All excavated soils and sediments should be screened (either wet or dry screened depending on the consistency and/or moisture content of the soil/sediment and availability of water) through one-quarter-inch wire mesh unless mission constraints dictate otherwise. Notable exceptions are when overburden caps the incident deposit or when sites lack soils/sediments. The decision to forgo screening must be supported by subsurface testing.

The SRE is responsible for implementing the screening policy of limiting the number of screens used at a recovery scene to ensure that no relevant evidence is overlooked. **A U.S. RT member supervises all screens.** Typically, each U.S. team member periodically undergoes screen training. The rules for screening include:

- The U.S. team member is responsible for ensuring that remains and material evidence are collected from the screens.
- As a general rule, U.S. team members can supervise up to two screens at a time. SREs may use more than two screens per U.S. team member under special circumstances, which must be documented in the field notes.
- SREs may allow supervision of up to three screens when sediment and screening conditions warrant (e.g., dry screening of extremely sandy sediments).

- Additional screens may be added where excavated soil/sediments require extended processing time to pass through the screens (e.g., heavy clays).
- The U.S. team member may supervise additional adjacent screens when another team member must be temporarily absent from their screening assignment (e.g., a bathroom break).
- The SRE must document and justify the use of additional screens in the field notes

4.3.5.1 **Dry Screening:** Dry screening is where excavated soils/sediments are shaken or pressed through a ¼-inch (approximately 6 mm) mesh screen allowing materials larger than ¼ inch to be retained. When dry screening using indigenous labor, screens cannot be emptied of materials unless approved by an U.S. team member. Team members place all retained materials in evidence containers. The SRE and LSI then identify materials that may constitute evidence for supporting an identification and the circumstances of loss.

4.3.5.2 **Water Screening:** Water screening is where excavated soils are passed through a ¼ inch (approximately 6 mm) mesh screen using both water pressure and water flow to dissolve soluble materials, leaving the non-soluble materials greater than ¼-inch in diameter. Water screening is particularly useful when processing soils/sediments with small particle sizes that are wet or tightly compacted. Water pressure should not discharge excavated materials out of the screen. The same monitoring rules apply for water screening as for dry screening.

4.3.6 **Recovery of Evidence:** Material found during the course of a recovery must be evaluated for evidentiary value and possible collection as evidence. The materials and information collected should be germane to the identification process that follows (i.e., they provide circumstantial evidence supporting an identification or they provide evidence on the context and circumstances of the loss incident) **(SF5.7.1F-44)**.

The SRE obtains guidance from Laboratory Management prior to deployment (when feasible) regarding field determinations of evidence. When determinations cannot be reliably made in a field environment, materials are sent to the CIL for further evaluation in a controlled setting. Extenuating circumstances (e.g., political complexities or safety issues) may not allow the SRE to retain all evidence collected.

When recovering evidence in support of criminal investigations, every effort is made to cooperate with police officials to collect evidence in support of the investigation.

During the screening process, much of what is recovered is of non-evidentiary value (e.g., non-diagnostic aircraft wreckage, unidentifiable metal fragments). These materials may be photographed as part of the documentary process, but should be disposed of in a manner that does not allow their reintroduction into the site/scene. This is particularly important for sites that require multiple missions for completion. Common solutions include removing the material well away from the site/scene and burying it (in the latrine is preferred). This prevents scavenging of the material as well as minimizing the reintroduction of previously processed materials back into the site/scene. Recording the burial location is mandatory.

Special Instructions Regarding Weapons & Ordnance: Do not bring back any type of firearms. Importation of firearms into the U.S. requires approval from the Bureau of Alcohol, Tobacco, and Firearms (BATF)--a lengthy and paperwork intensive process.

After first ensuring the firearm is determined to be safe by EOD, make every effort to photo document firearms in the field, and then leave them with responsible local officials. If a firearm has evidentiary value, such as having identifying names, initials, or serial numbers, expose the markings and photo document extensively. If removable parts (e.g., data plates, monogrammed pistol grips) have evidentiary value, remove these and return them to the CIL.

Ordnance (sometimes referred to as UXO—unexploded ordnance) is any munition, or part there-of, that still has the capability of exploding, launching, burning, or functioning in the manner in which it was intended. In other words, it is still "live." Examples of ordnance typically encountered at recovery scenes include, but are not limited to:

- Intact rounds of small arms ammunition (e.g., bullets still attached to the shell casing).
- Small arms shell casings with intact primers or powder charge but no projectile attached.
- Incendiary bullets detached from the shell casing.
- Intact rifle or hand grenades.
- Intact free fall bombs or their sub-munitions.
- Intact mortar/artillery projectiles and their sub-munitions.
- Projectile, bomb, or grenade fuses not attached to the primary round.

As such, empty shell casings with a spent primer, expended small arms ball ammunition (i.e., having no incendiary filling), detached hand grenade pins,

empty rifle magazines, etc. are not considered ordnance.

If there is any question about the status of an artifact as ordnance, consult EOD.

Ordnance, including small arms ammunition, should never be returned to the CIL. If determined safe by EOD, spent shell casings may be returned if they are determined to have evidentiary value. Document as necessary.

4.4 **Termination of Operations:** The SRE decides when the recovery effort should cease. The recovery effort should continue until the recovery scene is processed to its reasonable limits, i.e., the likelihood of recovering additional evidence pertinent to support the identification(s) is minimal (see Annex G, Fullest Accounting of Human Remains).

The initial scene surveys, the distribution pattern of recovered evidence and the subsequent interpretation developed during recovery provides the basis for cessation or continuation of recovery efforts. The SRE determines the point at which continuing recovery, both horizontally and vertically, yields diminishing returns. In some cases, extenuating circumstances such as political and safety concerns influence the termination of the operation.

SREs must err on the side of caution when deciding what is enough. Many crash recovery scenes represent highly disturbed assemblages. If sealed stratigraphic units cannot be definitively identified, extending excavation units beyond the peripheral relevant evidence is warranted and encouraged. Extended margins of 2 to 4 meters beyond the last relevant item frequently provide adequate indication that the potential to recover additional evidence is diminished.

5.0 DOCUMENTATION: Since recovery scene processing destroys important spatial and contextual information, meticulous recording of this information is required. Documentation must be sufficient to establish the context from which evidence was recovered. Therefore, a primary focus of any work at a recovery scene is documenting, in a thorough and consistent manner, the activities, observations made, and evidence present at the scene **(SA5.9.1.1)**.

The preparation of field notes parallels that of analytical notes (see DPAA Laboratory Manual, SOP 3.0, Analytical Notes & Documentation), with certain exceptions and supplements, noted below. Standardizing the methods used in taking field notes (also called examination documentation) provides consistency in recording the results of tests and in maintaining case file records, and preserves the integrity of the documentation.

Observations, data, and calculations are recorded at the time they are made, or in exceptional circumstances as soon as reasonably possible, and are identifiable to the specific task to ensure accurate and pertinent data **(A4.13.2.2)**. All provisions detailed below for field notes, maps, and other documentation are applicable at the survey level as well.

In situations where unusual circumstances preclude the application of these provisions, the results indicate why the standard field notes could not be prepared, the alternative procedures that were implemented, and an opinion of how these alternative procedures affect the accuracy and reliability of the resulting tests.

Special Instructions for Initial Documentation: Documentation of the recovery scene begins prior to commencement of processing so that the initial scene condition and environment are noted and made part of the permanent record. Initial documentation establishes baseline spatial, contextual, and temporal information upon which subsequent decisions about recovery strategy, methods, techniques, and evidence handling are made. Initial documentation observations are made from the below list as well as other information relevant to the appearance and condition of the scene upon arrival.

5.1 **Required Information:** The following information must be documented and maintained, as appropriate, as a permanent record:

- Observations of the recovery scene including:
  - Location on the planet.
  - Any surface features.
  - Recovery scene perimeter.
  - Vegetation.
  - Topography and resulting constraints imposed.
  - Location and type of evidence.
  - Abnormalities or irregularities that are shown to, or immediately identified by, the SRE or other personnel (e.g., staged recovery scene). These should be clarified before remote operations commence or proceed any further.
  - The reasons when the investigation eliminates a possible sequence of events based on a lack of conformity between the recovery scene and/or the evidence and the proposed sequence of events.
- Relevant witness statements (see Annex E, Informant/Witness Interviews, to this SOP).

- Actions of the SRE, the RT, and host government officials.*
- Cultural and political problems, considerations, and constraints.*
- Strategies, methods, and techniques used.
- Approximate number of laborers employed.
- Formation and disturbance processes.
- Soils and sediments.
- Unusual conditions.
- Location of evidence in three-dimensional space (e.g., excavation units listed).
- A summary of each day's activities.
- All problems that detract from the successful excavation including personnel problems, equipment, weather, etc.*
- Dimensions of any features (burial and other) encountered.
- Other observations pertinent to establishing the context of recovered evidence.

*Note: The comments and discussions should remain objective and professional in tone and content.

5.2 **Field Notes:** Field notes are made using a variety of media including field notebooks, maps, photography, and sketches.

5.2.1 **Field Notebooks:** Typically, most field notes are recorded in self contained bound notebooks, which serve as the baseline recording medium for recovery scene processing. Pre-printed field notebooks are required to be used by the SRE. These notebooks contain the requisite information detailed below as well as numerous pages for a daily narrative. If required, a blank second or third notebook may be used for continuation of the daily log and other information.

The SRE should take notes on relevant observations and events in a timely manner. While circumstances are highly variable in recovery scene operations, some items are standard entries in field notebooks. The instructions and items listed below are mandatory when filling out field notebooks:

- Each field notebook should have the following information clearly printed on the outside cover and the first page inside the front cover. The intent of the latter is to preserve required information in the event the outside cover becomes missing or damaged.

  - CIL number (see below).
  - Unique identifier (e.g., REFNO, case, mission number, etc.).
  - SRE name.
  - Number of books used (see below).
  - Project dates (see below) **(SA4.13.2.2.1)**.

- Upon return to the DPAA each SAR is assigned a CIL number, which is added to the outside cover of the field notebook and the first page inside the front cover.
- If more than one book is used, each book cover should be labeled 1 of X, 2 of X, etc. An annotation should be made at the end of the field notebooks that notes are continued in a subsequent notebook. If more than one SRE is present at a scene, notebooks should be labeled sequentially in the series.
- Use one (or more if necessary) field notebook per site/case as defined by the SRE. Do not use one field book for multiple sites or cases.
- Project dates are defined as the time the site was physically occupied **(SA4.13.2.2.1)**. As such, the start date is the day the SRE arrived at the site. The project end date is the date the SRE departed the site. Pre- and post-project activity (e.g., travel to the site, base camp activity, evidence processing, etc.) may still be recorded in the field notebook, however, these dates are not regarded as project dates.
- All notes are to be taken in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation), however:

  - For ease of drawing, when maps and their legends are placed in the field notebook, they may be prepared in pencil. Extensive notes relating to the map, recorded on separate pages, should be made in ink.
  - Extenuating circumstances may dictate that field notes be made in pencil (e.g., in an extremely wet environment where ink would run on the page). Such circumstances are the exception, not the rule, and must be justified in the notes.
  - Since the field notebook is bound, the unique site identification number is not required on every page.
  - Since the field notebook is bound, the analyst's initials are not required on every page.
  - Page numbering is mandatory for the entire field notebook. A page is considered to be one surface of the bound paper. Pages are sequentially numbered beginning with the first paper surface after the cover is opened and ending on the last page. Consequently the front of the first surface would be page 1 and the back surface page 2, etc. The surfaces of the back cover of the field notebook are not pages therefore they are not numbered and should be devoid of any other writing.
  - Termini are used in the field notebooks. In particular, the terminus appears after:

- ❑ Notes that are followed by blank pages (see below). In such instances, the terminus should specify the page where the notes continue (e.g., "continued on page___").
- ❑ The final entry in the field notebook (e.g., "Nothing Follows" or "Continued in book 2, etc.)

- ○ Pagination in sequential field notebooks should continue from the last page of the previous notebook (e.g., if the last page of Book 1 of 2 is page 64, the first page of Book 2 is page 65).

Note: A page is considered to be blank when it is devoid of notes. The page number and terminus statement in the field notebook are not considered to be notes.

- Relevant observations from the above list are recorded.
- Space in the field notebook should be dedicated to recording other relevant information needed to establish the context of recovered evidence such as sketch maps, drawings and catalogues (see below).
- In order to maintain traceability of the recovery work, field notebooks are never shared among SREs. Examples include recoveries where there may be more than one SRE on a site (e.g., mentor/trainee competency) or when a site is handed off to a subsequent RL (e.g., European missions). Regardless of the situation, each RL maintains his/her own field notebook at all times **(A4.13.2.1)**.

5.2.2 **Maps, Sketches & Drawings:** Spatial relationships among recovered materials and associated features must be established in the field and documented in a manner that permits reconstruction of the relationships (in the laboratory setting) that are pertinent to the identification process.

The primary concern of the SRE when establishing spatial and contextual relationships is the association of evidence with the loss incident being investigated. Media for this type of documentation are recovery scene maps, sketches and drawings. Unlike field notes, maps, sketches and drawings, including those in the field notebook, may be created using pencil rather than pen. These are intended to document:

- The area within the recovery scene perimeter.
- The three-dimensional location and associations of items within the recovery scene perimeter.
- Stratigraphic sections.
- Features (non-transportable evidence within a circumscribed space).
- MGRS coordinates for site datum/origin
- CIL number (added post-deployment).
- Other relevant spatial information.

Types of these documents include:

5.2.2.1 **Recovery Scene Plan Map:** A plan map is typically be made of every recovery scene location. All recovery scene plan maps are typically measured drawings to scale. The site may be mapped using any of the following methods: transit and stadia rod/total station, compass and tape, compass and pace, or a grid-mapping system. These maps typically contain the following information:

- Recovery scene perimeter location.
- Excavation grid and grid notation system.
- Relevant man-made features on the landscape (trails, roads, buildings, etc.).
- Relevant natural features on the landscape (large boulders, trees, streams, etc.).
- Location of relevant evidence (if present).
- Location (horizontal and vertical) of burial or other types of features (if present).
- Location (horizontal and vertical) of relevant wreckage (if present).
- Location of stratigraphic sections or submaps (large-scale plan drawings of individual excavation units).
- Elevations.
- Locations of any temporary bench marks (TBM) and datums.
- North arrow and bearing of recovery scene excavation grid base lines if they deviate from true or magnetic north.
- Map key including:

  - ○ Case number/REFNO.
  - ○ Map scale.
  - ○ Date map completed (date ranges are permissible).
  - ○ Person who created map.
  - ○ Symbol key (if needed).
  - ○ Map scale.
  - ○ Grid origin/site datum location.

Plan maps should be of sufficient size so that they are legible and confined to a single page in the field notebook or a single page of graph paper. Larger sites may be depicted on multiple pages of graph paper or larger size graph paper.

Plan maps of the final site may be constructed from composite maps. If the detail is sufficient for drawing in a field notebook, plan maps can be drawn on the graph paper sections of the field notebook. However, if sufficient detail cannot be produced

within the field notebook, the SRE should use a single or multiple sheets of separate graph paper.

5.2.2.2 **Section Drawings:** Each mission must have a section drawing, if appropriate that represents the stratigraphy of the site in addition to a photograph of each section drawn. Sediment strata and soils are recorded, as appropriate, where they are present. The specific stratigraphy and sediments/soils recorded as well as the location of the section are at the discretion of the SRE, but a drawing must be completed for each mission. However, the area selected for recording should be suitable to demonstrate the stratigraphic context of evidence, the general stratigraphic or pedogenic situation, and/or document formation and disturbance processes at the site.

If there are widely varying stratigraphic sequences over the site, enough sequences must be drawn with the appropriate drawings and photographs to document this variation. Section drawings can be included in the field notebook, if they can be completed in sufficient detail and scaled to demonstrate the stratigraphic context. If this detail cannot be obtained on a page within the field notebook, the section drawing is done on separate graph paper.

Section drawings are typically measured drawings to scale and usually contain the following elements:

- Grid coordinates or other sufficient locational notation (such as a directional arrow).
- Strata and/or soils/sediments are labeled with accompanying description that includes color, texture and sediment type. The use of Munsell color chips is highly recommended in the description of soil, sediment, and rock colors. The Munsell coding system (hue, value, and chroma) should be noted as well as the color name (e.g., Munsell 5R 6/8; light red). Sediment texture can be described using a geotechnical guide or sand gauge.
- Key including:
    - Site number/case number/REFNO.
    - Date section completed (date ranges are permissible).
    - Person who created the section.
    - Symbol key (if needed).
    - View of section.
    - Scale.
- When discussing section drawings in the text or when labeling figures, specific terminology must be used. If using grid coordinates (e.g., 500N-500E) the excavation grid coordinates can only be the coordinates from an excavated unit and not the next unexcavated unit. When referring to the wall in general the two end points of the section drawing and the view can be referenced (e.g., 500N-500E to 508N-500E, view west).

5.2.2.3 **Archaeological Feature Drawings:** Archaeological features can be defined as any of the following:

- Any non-portable remnant of human activity (e.g., burial pit, aircraft crash crater).
- Concentrations of artifacts and/or organic residue as well as structural remains in a defined space. These structural remains can be positive (e.g., walls, buildings) as well as stratigraphic interfaces (e.g., pit features, graves, crash craters).
- Spatially-defined clusters of material evidence as well as stratigraphic interfaces that may originate from human activity ranging from digging a hole to the impact of an aircraft.

With regard to recovery scenes, relevant archaeological features are incident-related as well as any feature(s) that modify incident-related contexts. The documentation of these incident-related features and their modification is necessary for the interpretation of a recovery scene. Post-incident modifications may include burial pits impacted by road or house construction, ditches dug through a crash crater, or house foundations built over a crash site.

All relevant archaeological features believed to be associated with the recovery scene typically are drawn on a separate **plan map,** unless the feature can be documented in sufficient detail on the recovery scene plan map. If additional detail is necessary, a separate plan map is completed. Any stratigraphic features (such as a crash crater) should be documented with a section drawing. All drawings are prepared in the same manner as the recovery scene plan map and section drawing, described above.

5.2.2.4 **Field or Sketch Maps:** These maps are optional, are typically sketched in the field notebook and serve as supplements to plan maps, stratigraphic section drawings, feature drawings, etc. Field sketches or maps may supplement the description of important associations. If used, sketch maps must include a key that typically contains the map scale (sketch maps in field notebooks should be roughly to scale), appropriate grid numbers, and a north arrow.

5.2.3 **Catalogs:** Catalogs are comprehensive lists of sequentially numbered items relevant to the provenience and context of a recovery scene and also

serve as an organizational aid to the SRE in the field. Catalogues, if extensive, may be separate documents, however, they are usually compiled in space set aside in the field notebook.

5.2.3.1 **Evidence Catalog:** Evidence catalogues usually list the item of evidence and its provenience.

5.2.3.2 **Feature Catalog:** This catalog should list the type of feature, vertical and horizontal dimensions, contents, grid coordinates, and depth of initial discovery below surface. If few features are observed, feature descriptions may be detailed in daily notes and not in a separate catalog.

5.2.4 **Photographs:** Photography provides an additional means of documenting all aspects of the recovery scene and is used extensively to supplement other forms of documentation prepared during recovery scene processing. Full guidance on recovery scene photography can be found in Annex H (Investigation & Recovery Scene Photography) to this SOP.

5.2.5 **Other Field Documentation:** Should the SRE acquire loose paper or other medium records during the course of an investigation or recovery, the documents should be labeled with the appropriate identifying number (mission number, REFNO, CIL number, etc.), the SRE's name, and date. These records become part of the case file upon return to the DPAA. Smaller items (e.g., business cards) may be stapled to a permanent page of the field notebook after being annotated with the required information.

5.3 **Search & Recovery (SAR) Report:** The SAR report is the final report on the processing of a particular recovery scene **(A5.10.1)**. It is prepared in accordance with Annex I (Preparation of the Search and Recovery Report) of this SOP.

5.4 **Expeditionary Support Mission Documents:** Expeditionary Support (ES) may task each TL to prepare internal documents (e.g., Site Execution Report [SER], Mission Execution Report [MExR]. The TL reports may require site specific information provided by the SRE. In particular, mission specific information is provided to the TL for ES reporting purposes and for use in After Action Reports (AARs). The SRE provides this information but does not physically complete the reports for the TL.

5.5 **Site Visit Report (SVR):** A Site Visit Report (SVR) is a short, post-mission report used to document an SRE visit to a field location, but for various reasons the SRE did not collect sufficient scientific data to merit submission of an ASSF. This usually occurs when the SRE is physically on site for insufficient time to conduct an archaeological survey. The reasons for abbreviated site visits may include sudden inclement weather, political decisions by the local officials, safety issues, or logistical and planning issues.

6.0 SURETY: All documentation, including field notes and photographs, relevant to processing a recovery scene is peer reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review) **(SF4.13.2.1F-5)** and is subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits). The maintenance, performance checking, and serviceability of key recovery scene equipment are discussed in Annex C (Investigation & Recovery Scene Equipment) of this SOP. Each annex to this SOP may contain additional surety measures.

Uncertainty of measurement is reported in accordance with DPAA Laboratory Manual, SOP 4.0 (CIL Surety) when it may have a significant impact on traceability regarding the processing of the recovery scene **(A5.4.6)**.

Where applicable, a statement on the estimated uncertainty of measurement and/or information on uncertainty is needed when it is relevant to the validity or application of the field results, when a customer's instruction so requires (see DPAA Laboratory Manual, SOP 1.8, Consult Case Management), or when the uncertainty affects compliance to a specification limit **(A5.10.3.1c)**.

This uncertainty can be tied to several sources, most specifically, the visibility of the scene on the landscape and GPS error. Large aircraft crash debris fields have a higher archaeological visibility on the surface than small, burial (subsurface) features.

While the use of site/scene datum and mapping points allows an SRE to readily re-locate a site/scene on subsequent missions, often these standards are not implemented with non-CIL Investigation Teams (see above). Often GPS coordinates are used to relocate a site, but as discussed in Annex C of this SOP, a point measurement can be anywhere within a 75 m2 and 300 m2 area (error between +10 and +20 meters), depending on the satellite coverage that is reflected in the location error estimate.

In general, if the recovery scene cannot be easily located in subsequent missions, then uncertainty of measurement should be addressed in the field notes and SAR.

7.0 SAFETY: RTs frequently work under hazardous conditions. Consequently, safety is an issue that

receives considerable attention during the planning and implementation of a recovery operation. RTs include a safety officer (typically the senior military team member) and a medical professional responsible for creating and maintaining safe working conditions.

ALL team members share responsibility for maintaining safe working conditions. This means that everyone avoids unnecessary risks, watches for potential dangers, and responds rapidly and efficiently when injuries occur. The SRE cooperates fully with the safety officer, medical staff and, the Explosive Ordnance Disposal (EOD) technician in maintaining safe working conditions.

However, the SRE and other team members work together to mitigate safety risks in order continue to process the recovery scene. DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) and the annexes to this SOP list potential hazards. The following are brief descriptions of typical dangers commonly encountered during recovery operations.

- **Unexploded Ordnance:** Since most recovery operations are related to military combat-loss incidents, unexploded ordnance (UXO) is an ever-present danger (see above for a definition of what constitutes UXO). EOD technicians search for potential UXO hazards and clear the hazards before further work is done. Under no circumstances should unqualified individuals attempt to dispose of UXO. Some recovery scenes are determined to be unsafe due to the UXO hazard.
- **Flora/Fauna:** Recovery scenes are usually found in outdoor environments and frequently in foreign countries. Consequently, the potential for encounters with unfamiliar and/or dangerous plants and animals is high. Steps should be taken to reduce the risk of injury due to such encounters. Field clothing should cover most of the body to minimize insect bites and contact with poisonous plants. Footwear should cover the entire foot and preferably the ankle. Special precautions such as insect repellent sprays and snake chaps may be necessary for some scenes. As a general rule, all contact with animals, wild or domestic, and handling or consumption of wild or otherwise unfamiliar plants is prohibited.
- **Terrain:** Recovery scenes are found in highly variable environments. Safety risks include, but are not limited to, automobile traffic, trails with poor footing, falling, drowning, and decompression sickness. Many recovery operations require special equipment, training, and personnel to ensure safety. Safety procedures are tailored to meet the special requirements of each scene.
- **Disease:** The risk of contracting diseases is a concern for RT members who travel to foreign countries, come into contact with soils, standing water, and possibly bio-hazardous materials. Recovery operations in most tropical regions include measures to control insect-borne diseases such as malaria or dengue fever. Many countries are known to have substantial risks from other diseases including hepatitis, anthrax, and meningitis.
- **Injury:** Sharp edges of aircraft wreckage can cause cuts, cobbles on a trail can lead to twisted ankles, and thin air at high altitudes can cause hypoxia. Typically, a medic is present at the scene and RTs are required to have first-aid kits, devices for transporting the incapacitated, a medical-evacuation plan, and at least one team member certified in first aid. Preparation of the first-aid kit and the development of a medical-evacuation plan is the responsibility of the medic and TL, respectively. In the event of an injury to a team member, the SRE takes all measures necessary to support the successful treatment and transfer to an appropriate medical facility.
- **Hazardous Materials:** Recovery scenes occasionally contain hazardous materials, most often chemicals associated with an aircraft crash. Oil, fuel, and hydraulic fluid tend to concentrate in low areas, especially within crash craters. Some sites have become receptacles for human waste, garbage, and toxic substances unrelated to the loss incident. The TL, medical officer, and SRE assess the risks present at the scene and develop a recovery-processing plan that mitigates any potential threat. Some scenes require special clothing (e.g., gloves, masks, boots) while others may be judged "unsafe."
- **Remains:** Remains handled by team members are typically "dry bone" and are not considered a biohazard. However, remains recovered in frozen environments, at recent crime scenes, or from the scene of a mass disaster must be considered hazardous and appropriate handling procedures are to be followed. The Safety Officer, in consultation with the DPAA medical staff, ensures that proper measures for disease prevention are taken and develops a medical evacuation plan in the event a team member becomes ill.
- **Deep Excavations:** On occasion, recovery scenes require deep (> 2.0 m) excavations. These situations pose a danger of wall collapse that can injure or kill workers in the trench. The SRE either supports the walls of deep trenches with panels, spreaders, and/or buttresses, or by stepping back deep excavation unit walls.

- **Equipment:** Recovery scene equipment may pose unique hazards. Consult the authorized operator's or user's manuals for details on safety hazards.

Annex A (Life Support Investigation)

A0.0 PRINCIPLE, SPIRIT & INTENT: Life support investigations at recovery scenes are conducted in an organized manner conducive to the replication and verification of the work performed.

A1.0 PURPOSE & SCOPE: This annex outlines procedures for life support investigations as they pertain to remote operations. This annex applies to typical CIL cases and is used by all LSIs and LSI Augmentees working for the CIL or under its auspices.

All of the provisions specified or implied in the body of this SOP remain in effect, as appropriate, unless specifically or implicitly contradicted by this annex.

A2.0 GENERAL PRINCIPLES & GUIDELINES: Life support investigation is restricted to the examination of aircrew life-support equipment, aircraft-related survival equipment, and aircraft wreckage.

Life support investigation provides support for identifications in the area of time, space, and context, as well as associating specific items of evidentiary value (e.g., identification media, personal effects, military equipment) to specific loss sites and events, individuals or groups of individuals. Life support evidence may also provide information that can help to interpret the circumstances of a loss. The ultimate goal is to aid in and support casualty resolution by providing documented circumstantial evidence.

Life support investigations largely involve expertise with relatively modern aircraft (post 1950) and their related life support equipment. As such life support investigations usually support Southeast Asia remote operations. Only under specific circumstances is a LSI assigned to non-Southeast Asia operations.

A2.1 **Objectives:** During remote operations life support investigation has three objectives:

1) Determine the type, model and serial number of the aircraft associated with the excavation site.

Example: Loss of an OV-1 Mohawk.

Approach: Aircraft wreckage analysis. Aircraft wreckage analysis focuses on locating and identifying potentially diagnostic aircraft parts (e.g., part number sequences specific to an aircraft model or a specific aircraft) and recording their provenience. Such determinations confirm that the site correlates to the loss incident being investigated. The following is an example of the application of aircraft wreckage analysis:

- Team investigated alleged crash site—recovered piece of wreckage with stenciled numbers.
- OV-1 Technical Order identified item as an armor panel.
- Corresponding diagram shows location of item in aircraft cockpit.
- DPAA data files indicated subject aircraft was only OV-1 lost within 15 kilometers.
- Correlation probable--site recommended for excavation.

2) Locating and identifying aircrew. Life support equipment can, in many instances, confirm the presence of one or more crew members in the aircraft when it crashed. Determinations are made independently of the presence of human remains and thus support the Southeast Asia "accounting" mission of the DPAA.

Example: Loss of an F-4C Phantom.

Approach: Use multiple approaches to determine if one or more individuals were in the aircraft at the time of impact.

- Team investigating alleged crash site recovered a data plate.
- Data plate identifies aircraft type but not model or serial number (tail number).
- Aircraft manufacturer contacted---determined data plate came from lower access panel of F-4 (C and D models) with serial numbers falling within 63-7712 and 64-0881 range.
- Data files indicated case aircraft was the only F-4 with serial number in given range within 50 kilometers of surveyed site.
- Aside from data plate, three other key items were found: life raft inflation valve, oxygen hose fragment and anti-G garment fragment.
- Items confirmed presence of at least one individual in aircraft at time of impact.
- Excavation produced two microphone brackets and two survival kit inner container zipper slides.
- Duplicate items confirmed presence of two individuals in the aircraft at time of impact.

3) Guide the recovery team to areas most likely to yield human remains.

Example: Loss of a UH-1H Huey Helicopter.

Approach: Debris field analysis. Debris field analysis assists SREs to determine the best possible areas for excavation so as to yield remains. Specifically, LSIs help identify cockpit related debris that, in turn, may suggest the location of aircrew remains.

- Excavation produced small quantity of wreckage from crash.
- Two key items found during excavation: manual cargo release plate and cargo tie-down ring.
- Items are known to originate from cargo/passenger compartment.
- Focused recovery efforts in area where items were found produced remains from four individuals.
- Remains later identified as missing air crew.

A2.2 **LSI Personnel:** LSI personnel are comprised of permanent party CIL Life Support Investigators (LSIs) and LSI Augmentees who belong to organizations external to the DPAA and support remote operations on a temporary basis. The general duties and responsibilities for, and a brief discussion of, both positions are found in the DPAA Laboratory Manual, SOP 1.1 (CIL Work Environment).

All South-east Asia investigation teams have a CIL LSI assigned. All recovery teams, except Vietnam recovery teams (VRTs), have either a CIL LSI or trained LSI Augmentee assigned.

A2.2.1 **CIL LSIs:** CIL LSIs have the following duties and responsibilities:

Related to remote operations, LSIs offer specialized technical knowledge concerning specific components of material evidence. Specifically LSIs:

- Are primary DPAA subject matter experts on aircraft life-support materials (e.g., ejection seats, parachutes, survival equipment).
- Deploy with all SEA investigation teams.
- Deploy with all SEA recovery teams to aircraft crash recoveries.
- Peer review permanent party and LSI Augmentee message traffic and related analyses.
- Write Life Support Reports (LSR).
- Are first-line responders for LSI related requests for information from field teams calling back to the DPAA.
- Compile appropriate reference materials and exemplars for DPAA specific conflicts.
- Prepare LSI Augmentees for remote operations. Specifically:
    - Review the current year OPLAN to determine LSI Augmentee requirements for a given mission
    - Review planning slides (found under the J-3 Workspace) for that particular mission to review most current requirements. Often, changes to the published OPLAN are made during these briefings regarding the sites to be excavated and their manning requirements. Pay attention to implied tasks. For example, LSI support may not be needed for certain sites (e.g., ground loss); however, alternate sites might require an LSI.
    - Monitor all e-mail traffic regarding the mission. The warning order is sent by J-3 (Plans and Scheduling) to PACAF and CDRPACFLT at least 60 days before the start of the mission. The J-1 usually cc's all e-mails regarding LSI Augmentees to the Life Support Mailbox.
    - Once PACAF and/or PACFLT provide LSI Augmentee names and contact information, email each a:
        - Welcome letter.
        - Current roster of CIL LSI personnel.
        - Current packing list.
        - Warning order (and other mission details).
        - Instructions that 1) passports be signed and remain in effect for the entire duration of the mission, and 2) FEDEX'd to DPAA with 6 additional passport pictures.
    - Create a labeled case folder for each LSI Augmentee that contains:
        - Primary and alternate cases
        - Checklists to track LSI Augmentee progress
        - CD containing:
            - Data on primary/alternate sites
            - E-case files
            - Technical data on the aircraft
            - LSEL reports on case
            - Other helpful documents (e.g., this SOP Field Guide, blank LSWA, etc.).
            - LSI Augmentee Mission Critique & Comment Form.
            - Bio information from Brite Light.
            - Per diem breakdown for all locations.
            - Language 'head start' information for the JFA location.
    - Assign LSI Augmentees to Recovery Teams and contact J-3 to update the team matrix.
    - Train all LSI Augmentees. LSI Augmentees arrive 10 days prior-to-mission departure and are available for training until the day of the pre-deployment briefing. Typically, LSI Augmentees attend all relevant training required

by DPAA permanent party personnel. Checklists are used to track training during the pre-deployment period. Typically, training includes, but is not limited to:

- Discussion of, and hands on experience with, the information presented in this SOP and various field guides.
- Instruction on DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security) and related guides.
- Individual teams may also conduct training on areas such as excavation/screening techniques, set-up/use of communications equipment, basic mountaineering, etc.
- Pre-deployment briefings addressing security, safety, medical/health, and standards of conduct issues.
- Cultural awareness and host nation customs briefings.

- Supervise and advise LSI Augmentees in the field.

For South-east Asia missions, a senior CIL LSI is assigned prior to the mission. The Senior CIL LSI conducts reviews of life support evidence and in-country reports and provides life support guidance accordingly.

A2.2.2 **LSI Augmentees:** LSI Augmentees are normally Air Force Specialty Code Aircrew Flight Equipment and Navy parachute riggers. LSI Augmentees supplement the manning of CIL LSI's on missions to SEA and may comprise the LSI presence on a DPAA Recovery Team. Since their training is limited, LSI Augmentees are not assigned to Investigative Teams. On Recovery Teams they largely have the same responsibilities as CIL LSIs.

Since they are not competency certified, any field work in which LSI Augmentees participate is done so under the full auspices and supervision of fully competency certified CIL LSIs. To this end, all LSRs prepared by LSI Augmentees are co-signed by a CIL LSI.

A2.2.3 **Collective Duties & Responsibilities:** Regardless of personnel status, LSI personnel have the following generic duties and responsibilities when deployed to conduct remote operations:

- Assist the SRE in various aspects of the remote operation as directed including, but not limited to, site preparation, construction of facilities (e.g., screening stations, latrines, break area), excavation, etc. Note: different color pin flags are used to differentiate possible life support evidence from other items.
- Collect and safeguarding life support and other material evidence
- Maintain an accurate documentation of recovered life support evidence.
- Conduct field testing that accomplishes the primary objectives listed below.

A3.0 LIFE SUPPORT INVESTIGATION: Field procedures for life support investigation are as follows:

A3.1 **Evidence Collection & Triage:** In order to achieve the above three objectives, LSI personnel monitor all aspects of remote operations, in particular when material evidence relevant to the operation is discovered and collected.

LSI personnel examine the material, including significant aircraft wreckage and individual items and determine what needs to be processed as life support evidence. Items should be first examined *in situ* whenever possible.

Examples of individual items (or parts thereof) that may contribute to achieving the three LSI objectives include, but are not limited to, aircrew:

- Uniforms and related items. Note: Rank insignias, unit patches, nametags, identification tags, blood chits, watches, and eyewear are uniform-related but are considered personal effects.
- Survival equipment
- Charts/maps/checklists
- Components of the aircraft's emergency egress system.

Examples of wreckage that may contribute to achieving the three LSI objectives include, but are not limited to:

- Main/nose landing gear assemblies.
- Engines.
- Major aircraft structures.
- Internal armament (e.g., guns, cannons).

An evidence collection station is built specifically for life support investigation during site preparation.

Ensure that team members and hired workers know that all items found in the screens are placed into the collection buckets. When two or more units are simultaneously excavated, ensure provenience for the items is maintained. Examine buckets frequently and

let the SRE know immediately of any significant finds.

Most of what is found cannot be identified and is of no probative value to the remote operation. The focus is on items that assist in achieving the above objectives. Designate an area near the LSI collection station where all aircraft debris and related items with no evidentiary value (i.e., "junk") is placed. The "junk pile" is photographed at the end of the excavation with a placard indicating the:

- Case number.
- Mission identifier.
- Site grid coordinates.

Exercise care to preserve and conserve life support evidence. Some items are fragile and easily damaged or destroyed. Handle accordingly. Solvents (usually water), dental picks and brushes may be used to lightly clean an item but only to the extent necessary to identify it.

Some life support evidence may be impractical to bring back (including hazardous items as defined in the body of this SOP). In such situations the evidence is documented in the LSI field notes and extensively photographed. Note any identifying numbers or markings.

Life support evidence identified for return to the CIL is packaged and entered into the evidence control system as soon as practical in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). LSI personnel assist the SRE with maintaining the integrity of all potential recovered life support evidence.

Special Instructions for Non-Southeast Asia Operations: Special circumstances exist for non-Southeast Asia life support evidence as it has a different purpose than that in Southeast Asia.

Typically, life support materials are brought back from non-Southeast Asia sites for further analysis, only if they support Objectives 1 & 3, above (i.e., to aid in the identification of individuals and/or the incident. In other words, since the "accounting" mission of the DPAA does not apply to non-Southeast Asia cases, there is no requirement to return life support evidence to the DPAA in support of Objective 2.
Examples of situations or where evidence which may support Objectives 1 & 3 include:

- Identification of the aircraft/aircraft type (e.g., data plates or other serial numbered items, excluding weaponry),
- Incident date (i.e., manufacturing date of equipment).
- Individual casualties (e.g., initials affixed to a throat microphone).

Altogether, because of the more limited role of life support evidence for non-Southeast Asia cases, the SRE makes the final decisions on whether or not to return an item of life support evidence to the DPAA.

A3.2 **Requests for Information (RFI):** LSI personnel deploy on remote operations with a variety of reference materials. These and technical experience are used to conduct an objective analysis of the materials and situations at hand and make recommendations that advance the operation.

Occasionally, items or situations (e.g., debris distribution) that appear probative may fall outside of the on-hand references and/or the experience of LSI personnel which hinder subsequent decision making. When such situations arise, use the following approach:

- Consult with other deployed LSI personnel, if available.
- Otherwise assess if determining what the item is and/or interpreting the situation, at the current stage of the operation advances the operation. In other words, identification/interpretation should have a profound bearing on fulfilling one or more of the three LSI objectives.

REFNO: 1238 08-2VM (91st JFA)
RT-3

1. Metal Data Plate with:
" AIRCRAFT MOD F-4
PART NO. 32-32067-825
CONT NO. _____
SERIAL NO. MM 18-230 "

2. Possible Turbine Blade with:
" T 230 ED 365
665E-338 P1 "

3. Rubberized Orange Cloth with:
" 32- 84 ? ? 57- 01 "

Figure A-1 Sample RFI.

- If the assessment determines that the item/interpretation advances the case, submit a

request for information (RFI) through the Team Leader or SRE. The RFI (see Figure A-1) should include:

- REFNO
- Mission identifier
- Team designation
- Item/situation description (as applicable) including relevant photograph(s).
- Any pertinent notes or other information.

- Contact the CIL LSI Section by phone or E-mail at:

Commercial: 808-474-4992 or 4985

E-mail: life.support@jpac.pacom.mil

Note: Process any RFI associated items as evidence.

A3.3 **Documentation:** Relevant LSI documentation consists of field notes (logs) and reports.

A3.3.1 **Notes (Log):** Details of LSI remote operations are recorded in the field notes in accordance with this SOP and DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). The field notes include all observations that were relevant to the field activity and the evidence and the formation of professional opinions.

LSI field notes are compiled in the form of a daily log. Blank logs are found on the DPAA network. Noted in the log is the life support evidence that is found in each unit along with any related notes. Evidence is logged as soon as possible after it is found. Only evidence returned to the CIL needs to be logged. Completed logs are filed in the case folder at the end of the operation.

Document all life support evidence suspected to be probative weather it is returned or not.

A3.3.2 **Photography:** Life support investigation requires photographic documentation. While the photography process parallels that done by the SRE, LSI photography remains separate from SRE photography.

Accordingly, under the guidance of LSI personnel, the Team Photographer photographs each item of life support evidence in accordance with Annex H of this SOP. Included in the photograph is:

- A label showing:
  - REFNO.
  - Mission #.
  - Team.
  - Unit.
  - Depth.
  - Contents.
  - LSI name or initials.
  - Date item was recovered.
  - Bag number. Note: For LSI Augmentees, the bag numbers may initially be left blank until reviewed by a CIL LSI. Once the review is concluded the bags can then be numbered.

- Metric Scale

Figure A-2. Example photo of life support evidence.

A3.3.3 **Reports:** Two official reports are produced to document life support investigations.

The SRE produces the ESR, an in-country report, which contains a brief section for life support investigation. Input into this section is provided by LSI personnel.

LSI personnel begin to compile LSR in the field for eventual finalization after their return to the DPAA. DPAA Laboratory Manual, SOP 3.6 (Material Evidence Analysis) provides guidance on compiling and writing LSRs.

Use the most current report templates on the DPAA network. The material evidence list can complicate report-writing if not planned in advance. List the recovered items to the next higher assembly. The LSR is a summary report therefore, there is no need for lengthy list or descriptions for each item. Consider the below examples:

- Helmet shell, chin strap, nape strap, visor, visor housing, and liner could all be listed as: Flight Helmet Pieces.
- Oxygen hose, mask straps, mask adjustment buckles, rubber face form, oxygen valve as: Oxygen Mask Pieces.
- If there are lots of both of the above they could be combined as: Helmet and Oxygen Mask Pieces.

Other higher assemblies include:

- Life Preservers (floatation cell, container, CO_2 bottles, inflation assembly).
- Life Rafts (flotation cell, CO_2 Bottles, inflation assemblies, boarding handles)
- Parachutes (canopy, lines, risers, links, connectors, container).
- Back-Style Parachutes (canopy, lines, risers, links, connectors, buckles, container, webbing, ejector snaps, V-rings, D-rings, PLD components).
- Torso Harness (webbing, brackets, disconnects, V-rings, D-rings, adjustment buckles, PLD components).
- Boots (soles, leather and cloth uppers, heels, metal shanks).
- Survival Kits (fiberglass, rucksacks, actuation handles, buckles).
- Unidentified Materials (all unidentified webbing, fabric, cloth, metal, rubber, leather, plastic).

A3.4 **Final Review:** Toward the end of each mission, the ranking CIL LSI reviews all LSI personnel's life support evidence and documentation. Specifically:

- Open all live support evidence bags and review the evidence for probative value.
- Final determinations are made as to what evidence is returned to the CIL
- Documentation is reviewed for adequacy and compliance.
- Evidence prepared for return to the CIL for accessioning.

A4.0 SURETY: All LSI documentation, including field notes and photographs, relevant to remote operations, as well as LSRs, is peer reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). All field notes and related documentation are made available to the peer reviewer at the time the LSR is reviewed.

Since they are not competency certified, any field work in which LSI Augmentees participate is done so under the full auspices and supervision of fully competency certified CIL LSIs.

LSI remote operations are also subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

A5.0 SAFETY: There are no safety concerns with LSI remote operations above and beyond those listed in the body of this SOP.

Annex B (Recovery Scene Security)

B1.0 PURPOSE & SCOPE: This annex provides guidance to TLs and SREs to ensure that recovery scene security is maintained regardless of location.

B2.0 GENERAL: Recovery scenes must be secured from intruders. Intrusion is defined as any ingress or egress into the scene that adversely affects the integrity of the scene and evidence therein. Since much of the DPAA's work is in foreign countries, cooperation with the host government is essential to prevent the compromise of evidence.

B3.0 PROCEDURES: The SRE ensures that scene security is maintained at active recovery scenes within the constraints imposed by political and/or cultural considerations. The primary responsibility for scene security is the TL. An active recovery scene is a confirmed location of a loss where active recovery activities are taking place (i.e., excavation units are open). In addition, areas outside of the recovery scene perimeter (e.g., base camps, supply storage areas) may require protection.

B3.1 **Security Guards:** Guards are obtained according to the location of the recovery scene.

B3.1.1**Outside U.S.:** The SRE ensures the TL hires local guards to protect the recovery scene during the absence of the SRE and the RT. Working with the host nation and TL, the SRE instructs the local guards on their duties and responsibilities.

B3.1.2**U.S. Territory:** On U.S. territory, three options for site security are available to the SRE:

- The use of commercial security firms.
- Local law enforcement.
- Local military personnel.

The SRE, working with the TL, should ensure that guards are available to protect active recovery scenes during the absence of the SRE and RT. Working with the TL, the SRE should ensure that the security staff are briefed their duties and responsibilities.

B3.2 **Other Measures**: Other protective measures may be used.

B3.2.1**Barriers:** In urban or populated areas, erect a barrier between the public and the recovery scene as appropriate.

B3.2.2**Covers:** Where possible and deemed necessary, the SRE should cover active recovery locations (excavation units) with plastic sheeting or tarps to protect (potential) evidence.

B3.2.3**Control Access:** In remote areas, barriers may be unnecessary, however, indigenous (local) labor must be kept out of the recovery scene when work is halted and instructed to this effect by the host government officials or security.

B3.3 **Hostile Intent:** The RT must be protected from hostile outside groups. The SRE, in consultation with the TL, should determine when local conditions warrant removal of the team from the scene location.

B4.0 DOCUMENTATION: Recovery scene security measures should be documented in the field notes.

Annex C (Investigation & Recovery Scene Equipment) (A5.5)

C1.0 PURPOSE & SCOPE: This annex describes the types of traceable field equipment, its storage, safe transport, field uses and functions, maintenance procedures, and surety and safety considerations to ensure proper functioning and in order to ensure accuracy and traceability of field data **(A5.5.6)**.

The provisions in this annex apply to field investigative activities, as appropriate, as well as recovery scene missions.

The provisions in this annex parallel those in DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability), as appropriate and applicable. SOP 3.2 should be consulted in the event expanded guidance pertaining to field equipment is required.

Traceable field equipment is defined as equipment needing special maintenance and performance checks in order to provide accurate measurement data during field missions. As such, other equipment commonly used during field missions (e.g., shovels, picks, screens, etc.) does not meet these criteria and thus are not addressed in this annex. Traceable field equipment (here after referred to simply as "equipment") discussed in this annex includes, but is not limited to:

- Garmin GPSmap 60CS or 60CSx GPS receiver or other authorized GPS system.
- Electronic Theodolites (various manufacturers).
- Total Station (various manufacturers).
- Brunton Compass.
- Tape measures.
- Photo scales.
- Stadia rods.

This annex applies, for the most part, to GPS units, theodolites, total stations, Brunton compasses, and similar equipment whose measurement capabilities depend on moveable or electronic parts.

For measuring devices that do not depend on moving or electronic parts for measurement viability (e.g., tape measures, photo scales, stadia rods), this annex has only limited applicability. Instead, such items are subject to the provisions of DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability) in terms of traceability, maintenance, and performance checks. Regardless, the SRE ensures the accuracy of the length measuring devices used during remote operations **(SF5.6.1F-39)**.

C2.0 GENERAL PROCEDURES: Measurements are usually necessary during field missions and must be traceable as to their accuracy and reliability. As such, the following guidance pertains to field equipment used by the CIL **(A5.5.1)**.

- Field equipment is normally controlled by the CIL. In those cases where the CIL needs to use field equipment outside its permanent control, it ensures that the requirements of this annex and appropriate ISO 17025 criteria are met **(A5.5.1)**.
- Unless excepted by Laboratory Management, SREs and other individuals are not to use personal GPS units, compasses, and survey equipment to obtain field data during a mission. If an exception is granted, the field equipment is subject to all of the provisions of this SOP, as applicable.
- Use of personal tape measures, photo scales, and stadia rods are permitted provided they comply with and are performance checked in accordance with DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability).
- All equipment and its software used for field work must be capable of achieving the accuracy required and complies with specifications relevant to the field problem at hand **(A5.5.2)**.
- Each GPS unit, compass, and survey equipment item or similar item of field equipment and its software used for testing and significant to the result is, when practicable, uniquely identified **(A5.5.4)**.
- Field equipment is performance checked (see below) prior to deployment and operated by authorized personnel. Current instructions on the use, maintenance, and performance checking of field equipment (including any relevant manuals provided by the manufacturer of the equipment) are readily available for use by the appropriate personnel.
- Special training required to operate/handle field equipment is conducted in accordance with the user's manuals and Field Equipment Performance Check Guide prior to allowing users to utilize the items unsupervised. Such training may be part of the Competency Program outlined in DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education) **(A5.5.3)**.
- All field equipment, including equipment for subsidiary measurements (e.g. for environmental conditions) affecting, or potentially affecting, the accuracy or validity of the result of field work is performance checked before being used **(A5.6.1)**.
- As opposed to trace evidence equipment (see Laboratory Manual, SOP 3.2, Measurement & Observation Traceability), where Quality

Assurance handles most performance checks, the maintenance and performance checking of GPSs, theodolites, total stations, and Brunton compasses is decentralized, usually being delegated to the SRE or other user. Regardless of the type of item, specifics of performance checks include:

- Procedures and standards for performance checking field equipment depend on the specific requirements of the field work being carried out relevant to the key quantities or values of the instruments where these properties have a significant effect on the results **(A5.5.2, SA5.6.1.1, SF5.6.1F-38)**.
- It is normally necessary to conduct performance checks, as applicable, prior to deployment and following service or other substantial maintenance **(SA5.6.1.1)**.
- An outdoor, NIST traceable, performance check station for performance checking GPS units, compasses, and survey equipment is set up and maintained on the eastern side of CIL-45. A Field Equipment Performance Check Guide for using this station is found on the DPAA network. This station is also useful for performance checking tape measures and stadia rods **(SF5.6.1F-38)**.
- SREs are not to use personal field equipment or any other non-CIL equipment to performance check any field equipment.
- In general, performance check intervals are not less stringent than the existing manufacturers' recommendations **(SA5.6.1.1)**.
- New, repaired, or refurbished field equipment received at the CIL is not used until inspected and processed by Quality Assurance in accordance with DPAA Laboratory Manual, SOP 1.5 (CIL Support). Before being placed into service, field equipment is performance checked in accordance with this annex or DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability) in order to establish that it meets the relevant manufacturer's and the CIL's specifications and requirements **(A5.5.2)**.
- When, for whatever reason, field equipment goes outside the direct control of the CIL Staff, the CIL ensures that the equipment is performance checked and shown to be satisfactory before the equipment is returned to service **(A5.5.9,)**.
- When interim performance checks are needed to maintain confidence in the field equipment, these checks are carried out according to a defined procedure **(A5.5.10)**, usually that specified in the user's manual.
- Where performance checks give rise to a set of correction factors, the SRE ensures that the data are correctly annotated and updated in the field notes **(A5.5.11)**.

- Field equipment, including both hardware and software, are safeguarded from adjustments which would invalidate the field results **(A5.5.12)**. SREs should position, use, and safeguard field equipment accordingly.
- Do not use any item suspected of being, or known to be/have been **(A5.5.7):**
  - Mishandled.
  - Defective.
  - Inaccurate.
  - Performing outside of tolerances or specified limits.
  - Overloaded.
  - Providing suspected results.
  - Malfunctioning.
  - Damaged.
  - Unsafe (e.g., safety devices in some way compromised).
- If any of the above are suspected or confirmed, cease operations and notify Quality Assurance upon return from the mission **(A5.5.7)**.
- Field equipment not performing as desired is:
  - Isolated to prevent their use or clearly labeled or marked as being out of service. The item remains out of service until repairs are made and performance checks indicate the item is functioning correctly **(A5.5.7)**.
  - Examined for the effect of the defect or departure from specified limits on previous field work. Quality Assurance institutes "control of nonconforming work" procedures in accordance with DPAA Laboratory Manual, SOP 4.0 (CIL Surety) **(A5.5.7)**.
- If the performance of field equipment becomes suspect due to damage or the length of time it has been in service, items should be repaired or refurbished, if economical to do so, or discarded and new items ordered in accordance with DPAA Laboratory Manual, SOP 1.5 (CIL Support).

C3.0 EQUIPMENT PROCEDURES: The following section pertains to the use, care, maintenance, performance checks, and storage of specific items of equipment. These topics are presented in detail in the user's manuals located in the CIL Library. Additional manuals for the compass and GPS instruments are issued to SREs with the individual equipment.

Field equipment is hand receipted to the SRE in accordance with the procedures outlined in DPAA Laboratory Manual, SOP 1.5 (CIL Support).

Equipment is used in the field setting. When not in use field equipment is usually stored at the DPAA.

C3.1 **Garmin Global Positioning System Receivers:** Various models of the Garmin GPSmap receivers are used to provide the geographical location of the field sites and their components. It may also be used to map the perimeters of large sites.

The GPSmap requires communication with at least three satellites in order to triangulate and determine its horizontal (two-dimensional) position; a minimum of four satellites is required to obtain a horizontal and vertical (elevation) or three-dimensional location; however, the Garmin GPSmap is most effective when tracking of five or more satellites. Field, weather, terrain conditions, and host government restrictions may prevent use of the GPSmap at certain times or locations.

The GPSmap needs to be initialized prior to each use if:

- Initial use after receipt from the manufacturer.
- It has been moved more than 500 miles with the power off.
- The receiver's memory has been cleared.

Initialization procedures and instructions for standard use are described in detail in the appropriate Garmin GPSmap user's manual.

The GPSmap requires two AA batteries for operation. The batteries provide approximately 24 hours of continuous use. An on-screen battery indicator is designed for alkaline batteries. Rechargeable NiCad or lithium batteries can also be used, however, the battery indicator does not indicate when these need recharging. No other user maintenance is required beyond battery replacement.

C3.2 **Theodolite:** Survey equipment (including theodolite, tripod, and stadia rod) may be used during field missions to provide angle, distance, and elevation readings to various components of the recovery or investigative scene, to turn 90^0 angles to map, and to place excavation units. Instructions for set-up and standard use of survey equipment are provided in the instrument user's manual located in CIL Library.

Maintenance in the field for survey equipment includes checking the battery prior to each use. No other routine field maintenance is required for the theodolite other than storage in the protective case and keeping the instrument clean when not in use. If the Theodolite is stored for long periods of time, the unit should be checked every three months.

C3.3 **Total Station:** Total stations provide three-dimensional survey capabilities in downloadable format. The maintenance standards are similar to those of the theodolite. Consult the user's manual provided with the total station. Standard maintenance on the total stations should be performed on an as needed basis or when the requisite use hours have accumulated. Maintenance in the field includes:

- Checking the battery prior to use.
- Ensuring both the horizontal and vertical rotating plates on the machine are loose prior to placing the machine into the carrying case.
- Completely disassembling the equipment between set-ups.
- Not moving the machine while it is on top of the tripod.
- Not leaving the machine unattended in high traffic or high wind areas.

Note: Foreign countries may require the serial number to be submitted on the cargo manifest.

C3.4 **Brunton Compass:** Instructions for use are provided in the Brunton Pocket Transit user's manual. The Brunton Compass is typically used during field missions to:

- Provide degree readings for scene orientation.
- Read compass bearings to different points within or near the scene perimeter.
- To measure the slope when appropriate.

When used with the Brunton monopod, the Brunton compass can function as a pocket transit.
No routine maintenance is required for the Brunton Compass other than storage in the protective case and keeping the instrument clean when not in use.

C4.0 MAINTENANCE: SREs are responsible for inventorying field equipment and performance checking its condition before and after each field activity. As needed maintenance or repair requirements are noted in the field and brought to the attention of Quality Assurance and the CIL Support Coordinator upon return to the DPAA.

If equipment becomes damaged or requires extensive cleaning and/or maintenance, Quality Assurance and the Support Coordinator are informed by the SRE. Quality Assurance and the Support Coordinator collaborate and make a decision to retain the item or to dispose of it and order a replacement (usually the latter). If maintenance and/or repair are in order, the CIL Support Coordinator contacts the service company and arranges for the work to be done.

C5.0 DOCUMENTATION: Records are maintained for each item of field equipment and its software significant to the field tests performed **(A5.5.5).**

SREs document the performance checks of their GPS units, compasses, and survey equipment in their field note books for each mission. Information captured includes, but is not limited to:

- The manufacturer's name, type identification (make, model, etc.), and serial number or other unique identification for each unit of equipment.
- A statement that the equipment passes or fails the performance check or otherwise complies with specifications. If the equipment does not comply with specifications, a short statement to that effect and a brief summary of the problem.

For equipment that is sent in to a service provider for maintenance or repair, the service provider documents all measures pertaining to the items including any performance checks and cleaning. Quality Assurance retains all non-user maintenance and service records pertaining to field equipment. The retained records include at least the following, if applicable **(A5.5.5 a-h)**.

- The identity of the equipment and/or its software, manufacturer's name, type identification (make, model, etc.), and serial number or other unique identification for each unit of equipment.
- Checks that that equipment complies with specifications.
- The current location, where appropriate, or to whom the equipment is hand receipted.
- Dates, results and copies of reports and certificates of all external performance checks, adjustments, acceptance criteria, and the due date of next external performance check, if applicable.
- The maintenance plan, where appropriate, and the maintenance carried out to date.
- Any damage, malfunction, modification or repair to the equipment.

Additionally, if necessary, all field equipment under the control of the CIL, and requiring performance checks, is labeled, coded or otherwise identified to indicate the status of the check to include the date when last checked and when another check is due **(A5.5.8)**. This requirement is usually non-applicable if the equipment is in storage or signed out on a hand receipt to a SRE or other CIL individual.

C6.0 SURETY: Surety is maintained through training, as-needed maintenance of equipment, and the use of appropriate forms to document maintenance. The provisions of this annex are subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

C7.0 SAFETY: Consult the user's manuals for any safety hazards associated with the equipment listed.

Enclosure 1 (Equipment Lists) to Annex C

The basic equipment for processing a recovery scene includes, but is not limited to, the following tools and equipment. When doing a survey or investigation project, necessary equipment can be selected from this list.

ITEM
Axe, single bit, 4 in, EA
Bag, Resealable, various sizes
Bag,, various/heavy duty
Batteries, various sizes (AA, C, D, Lantern, 9-volt)
Block (pulley) #5 for block and tackle
Bow Saw, 30 in.
Can, fuel, various types and sizes
Chain assembly, light, 14ft, 5.16in links, 2720 test, EA
Chain assembly, rugged, 20ft, 3/8in links, 8500 test, EA
Chain, 3/16 in with ¼ in slip hooks, 10 ft
Chain, 3/16 in with ¼ in slip hooks, 15 ft
Chainsaw and set, various sizes
Cord, nylon, (550 cord)
Detector, metal w/ with components
Survey Flag, wire, marking, various sizes and colors
Generator set, 3 KW to 5 KW, various models
Gloves, white cotton, work
Hammer, sledge, 8 lb
Machete, without case BX (6)
Stakes (wooden or other material, various sizes)
Measure, tape, 10 meter, 30 meter, 100 meter
Measure, tape, 100 meter
Oil, 2 cycle
Oil, bar
Oil, engine, 10W30
Pail, 3 gal plastic
Pick axe handle and pick axe
Pump, backpack, forest service outfit, 4 gal
Pump, water, 1.5 in w/ components,
Pump, water, 2 in with components
Radio, Motorola-type with components
Rakes, hand (cultivator)
Ribbon, surveyor, blue, orange, red, white, yellow
Rope, nylon, OD, 120 ft coil, various types
Screen, sifting (28.5 x 16.5 in)
Screen, sifting (12 x 10. 5 in)
Shears, hedge trimming
Shears, prune, heavy duty
Shovel, hand, round point
Shovel, flat blade
Spade, flat blade, 14.5 x 7.25 in blade, 29 in
Spout, can, flexible
Tarpaulin, various sizes
Tent, various types
Tool kit, mechanics with components
Trowel, pointed, 2.5 x 6 in blade
Twine, cotton, various types
Voltage converter, if necessary

Additional Equipment (if required)
Remote sensing devices
Cesium magnetometer
Resistivity survey equipment
Water-screening system
Laptop Computer for remote sensing

Evidence Collection Supplies (intended to aid in storing, preserving, and protecting evidence)
Self-sealing evidence bags (multiple sizes)
Waterproof markers, pens, pencils
Waterproof bag labels
Desiccant packets
Brushes, various
Wash basin
Photographic scales
Evidence tape, blue
Graph paper, metric
Clipboard

Photographic Equipment (usually taken by the Photographer)
SLR digital camera
Normal lens (a 60 mm lens)
Wide angle lens (28mm or similar)/Digital lens
Close-up lens or accessories (e.g., macro lens, 1:1 adapter, extension tubes, bellows, reversing ring, or close-up filters)
Filters (UV Polarization)
Electronic flash
Remote sync cord for electronic flash
Extra camera and flash batteries
Locking cable release
Tripod or monopod
Film/CDs for archiving
User's manual for cameras and flash
Notebook and pen
Scales and north arrow
Gray cloth
Lightweight versatile camera
Weather resistant gear bag
Lockable storage container

Anthropologist Packing List of Essential & Useful Items
Field-pack/rucksack
Appropriate field/work clothes
Appropriate formal clothes (suit, etc.), if necessary
Approved GPS
Brunton compass
Surveying equipment (transit/EDM, metric stadia rod, tripod for appropriate transit/EDM model
Line level
Rebar (usually 4 each 12"-18" pieces)
3 or 5-meter metal hand tape
Trowels

Brushes, various
Work gloves
4-5 sets of latex gloves
Gerber/Leatherman tool
Digital camera (w/spare batteries and card)
Hand-lens
Laptop computer and accessories
"Flash-drive or thumb-drive"
Approved field notebook
Approved metric graph paper
Munsell Soil Color Chart
GSA Rock Color Charts
Sand Gauge or Geotechnical Guide
Duct tape
Calculator
Pencils, pencil sharpener and eraser
Straight edge (ruler) and protractor
Scissors
Appropriate pens for writing in field notebooks
Fine "Sharpie" pens for writing on "Zip-lock" bags
Chain of custody forms
Roll of waterproof internal labels
Pelican case
Combo-lock (with key to adjust combination)
Seals, if necessary
Relevant copies of previous SARs, ESRs and DRIs
Relevant maps – either hard copy or digital
Falconview-type maps

<u>Packing List of Personal Essential and Useful Items</u>
Passport/government ID card
Travel orders
Cash/credit cards
Glasses
Fanny-pack
iPod or MP3 player
Reading material
Water bottles/containers
Medications (issue and prescription)
Sunscreen and sunglasses
Extra prescription glasses
Flash light w/batteries

Hygiene kit:
- Babywipes
- Soap and shampoo
- Toothbrush/toothpaste/floss
- Nail clippers
- Hair brush/comb

Work clothes:
- Hat
- Boots
- Socks
- Shirts
- Trousers
- Underwear
- Wet-weather gear

Leisure and work-out clothes
Suit and tie (if relevant)
Sleeping bag/bed roll

Food preparation and cooking gear (where relevant):
- Nest of pans
- Stove
- Fuel bottle
- Knife, fork, spoon & other utensils
- Mug and coffee filter
- Pan-scrubber

Annex D (Use of Remote Sensing Equipment) (A5.5)

Note: This annex is a draft and has not received the final approval of Laboratory Management.

D1.0 PURPOSE & SCOPE: This annex outlines procedures for using remote sensing equipment (e.g., cesium magnetometer, electrical resistivity, and metal detector) at recovery scenes. Operation and other procedures for use of the equipment are outlined below. Consult the user's manuals for detailed instructions on the use of remote sensing equipment and interpretation of data.

D2.0 GENERAL: Geophysical surveying equipment can be used as a tool to inform decisions about excavation strategies at some recovery scenes. When and where a given technique should be applied in the field is based on the discretion of the SRE.

Remote sensing equipment is not appropriate in all field situations. For example, the resistivity or the cesium magnetometer at the DPAA does not function in underwater contexts; and resistivity is not appropriate in rocky areas without soil development.

Even under ideal circumstances, the reliability of geophysical survey results may vary significantly. Data gathered via these methods should never be used to "rule out" areas of a recovery scene without other corroborating evidence.

D3.0 PROCEDURES: Any SRE intending to use remote sensing equipment should have the appropriate training prior to deployment. Because of its high cost, this equipment must be signed out on a hand receipt from the DPAA Logistics.

D3.1 **Electrical Resistivity:** The following pertains to the GEOHM 40D Earth Tester kit: The kit is comprised of:

- One digital display tester unit/voltmeter
- Four screw-type metal earth electrodes
- Four short test leads (2 blue, one red, one black and red)
- Three reels of test lead (two blue, one red) with attachable handles

D3.1.1 **Site Preparation:** Prepare the site as follows:

- Clear the survey area and establish a grid (see the body of this SOP). Mark grid points with spray paint rather than metal or wooden stakes, as these may possibly interfere with readings.
- Note the weather conditions (temperature and precipitation affect resistance), and soil type.
- Record the location of any visible surface features (for example the locations of trees) on a site sketch map. Measurements are recorded directly on the sketch map.

D3.1.2 **Data Collection:** A variety of electrode configurations may be used to collect resistivity data, but the Wenner Array is one of the most commonly used techniques for basic horizontal archaeological mapping (Clark 1990:37). Data collection for the Wenner Array follows the below procedures:

- E/C1 and H/C2 are the current electrodes (C for current). ES/P1 and S/P2 are the potential electrodes that measure the voltage (P for potential).
- Four electrodes are equally spaced along a straight line; the C1 and C2 electrodes go on the outside and the P1 and P2 go on the inside. Keep the 1 and 2 electrodes together, (for example place C1, then a space of one meter, then P1, then a space of one meter, then P2, then a space of one meter, then C2, etc.). Crossing the 1 and 2 electrodes throws off the reading.
- The depth of reading is approximately equal to the distance between electrodes. For example, if electrodes are spaced one meter apart, then the reading is most focused from about 50 centimeters to one meter below surface (Bevan 1998:10).
- Insert electrodes into the ground about 2-10 cm deep, but no deeper. The threads on the electrode end at about ten centimeters, so this can be used as a guide.
- If the soil is too dry, it may be necessary to add some water to the area around the electrodes to facilitate conductivity
- Hook the blue wires to the P electrodes and the red/black ones to the C electrodes. Leaving the entire setup in the box and moving it as a unit is helpful.
- Record the location of the reading (measured in the center between the two P electrodes) and the resistance, "leap frogging" the electrodes in a line until the entire grid is covered.
- Resistance, essentially the difference between the introduced current (C) and the measured current (P) is measured in ohms (ς); resistivity, measured in ohm-meters (ς-m), is a standardized calculation that facilitates comparison. Measurements may be recorded directly on the site sketch map, or the Resistivity Data Collection Sheet may be used.

D3.1.3 **Data Analysis:** High resistivity reading indicates that the soil does not conduct electricity well. Dry soils or porous soils such as sand and gravel generally have high resistivity values. Moist soils and soils with high metal content tend to have lower resistivity values because they conduct electricity relatively well (Bevan 1998:8).

Analysis of the data essentially entails looking for any anomalous pattern in the soil resistivity at a recovery area to determine potential locations of disturbance. For instance, a grave pit might show up as an area with lower resistivity than the surrounding area because of differences in porosity and/or moisture content.

In order to visually interpret the resistivity data a contour map should be prepared using the following process:

- The data must first be entered into an Excel spreadsheet. Use the first column for X grid coordinates, another column for Y coordinates, and another column for resistance measurements.
- Calculate resistivity using the following formula: resistivity = resistance x 2π x distance between electrodes. For example, if measurements were spaced one meter apart and resistance data had been entered into Excel spreadsheet column C, then the following formula would be entered into the first cell of column D: C1*2PI(from the fx button) *1.
- Once this initial formula has been calculated, right click on the cell with the first result and copy it, then select the entire column below it and paste. Excel should automatically calculate all the formulas in the column at once.
- Save the Excel file as an Active Workbook 4.0.
- Import the file into Surfer®. Start by opening the Surfer® program and choosing "grid" from the "data" pull down menu.
- From the "open data" screen select the Active Workbook 4.0 file just created.
- In the "scattered data interpolation" box, choose the desired gridding method (krigging and nearest neighbor generally produce fine results).
- Ensure that the X, Y, and Z data corresponds to the X (east/west coordinates), Y (north/south coordinates), and Z (calculated resistivity) columns entered into Excel. Press the "OK" button.
- Once the data are "gridded," a basic map can be created. In the Surfer® screen, pull down the "map" menu and select the desired map type (e.g., contour map).
- In the "open grid" screen, select the data set just gridded. Adjust any visual preferences in the "contour map" screen and press "OK" when done.
- A contour map produces a visual display of the resistivity data on a horizontal plane, rendering subsurface anomalies visually detectable. Using the X/Y coordinates on the map, anomalous areas can be pinpointed in the field and targeted for excavation.

D3.2 **Cesium Magnetometer:** The following pertains to the cesium magnetometer. Items included with the MagMapper G-585 model cesium magnetometer include:

- Data collector console.
- Two sensor heads with connection cables attached.
- Two battery belts (before departing for the field, check to ensure that the batteries are charged (full charge takes about 6-8 hours).
- Shoulder harness.
- Battery charger with power cable.
- Sensor rod (in connectable sections) and shoulder strap.
- Serial cable for connection between console and PC.

D3.2.1 **Site Preparation:** Prepare the site as follows:

- Use CSAZ in the Magmap software package to determine the best orientation for the sensor head and direction of survey based on the site's location.
- At the site, clear an area at least two meters beyond the established survey boundaries.
- Set up a grid using spray paint, wooden stakes, or other nonmetallic markers. Mark survey lanes (for example two meters apart) using brightly colored rope, flagging tape, or spray paint. Clearly mark off intervals (one or two meters, usually) on the survey lane.
- Ensure that the operator removes all metallic and/or magnetic clothing and accessories.
- Record details about any potential magnetic interference in the area (for example power lines), as well as the approximate air temperature and weather conditions. The Magnetometer Data Collection Sheet may be used to organize field notes.
- If the magnetometer is to be used with a single sensor, then a second magnetometer should be set up away from the survey area to measure diurnal variation in the earth's magnetic field during the period of the survey. Alternatively, the magnetometer can be set up as a gradiometer (two sensor heads) for the same purpose.

D3.2.2 **Data Collection:** Data collection follows the below procedures:

- Prepare the equipment in accordance with the user's manual.
- In "search mode", run a test transect before beginning the survey, noting visual and audio indicators of magnetic anomalies. This test transect is compared to an identical test transect run at the completion of the survey to check for variation or inconsistency in the data collection.
- Start the survey by selecting "simple survey" from the main menu. The data may be saved in any one of the five available files.
- Press the "mark" key and begin slowly and steadily walking the delineated transects with the sensor head(s) pointing to the ground.
- Press "mark" at every interval marker.
- Press "end line" just after the sensor crosses the final mark of the line. A summary of the line appears.
- Press any key to clear this box and hit "mark" to begin the next line.
- A line or marks can be deleted from the survey by pressing the menu button and selecting "edit line and mark."

D3.2.3 **Data Analysis:** The following procedures are used to download and subsequently interpret data:

- Plug the data transfer cable into the top right outlet on the console and the serial port on the back of your computer (the sensor heads can be unplugged at this point).
- Open MagMap on the computer. Pull down the "File" menu and select "Import G-858 Data."
- On the main menu of the data collector console, select "data transfer" and then "PC controlled transfer."
- Press the "okay" button on the MagMap screen and deselect all but the files you wish to download. Files may be renamed at this point.
- Once the data files are down-loaded, select the proper grid orientation of the survey and enter the spacing of the marks and lines. The map that results can be edited in a number of ways (refer to the MagMap Software user's manual). The file can also be exported into Surfer® (select Export from the File menu and follow prompts). A map can then be created in the same manner as described above.
- The magnetometer data can be interpreted in much the same way the resistivity data are interpreted. In other words, the contour or surface map created from the data presents the locations and intensities of detected anomalies. In the case of the magnetometer, these anomalies may represent ferrous material, burnt soil, or any other material or feature with a distinct magnetic signature.
- The presence of magnetic material, for example ferrous metal, obscures other anomalies present in the ground. Therefore, it may prove difficult to detect subtle features such as burial pits in areas with scattered metal debris.

D3.3 **Metal Detector:** DPAA uses several varieties of metal detector. The team Explosive Ordnance Disposal (EOD) Technician usually uses one on missions to search for unexploded ordnance (UXO) as well as assist in determining the scene perimeter and boundaries based on metal wreckage distribution. Regardless, sets include, three basic components:

- Control panel with battery compartment (usually C or D batteries).
- Telescoping pole with handle.
- Sensor head and connecting cable.

D3.3.1 **Site Preparation:** A metal detector sweep can be performed in informal transects throughout a project area, with little or no site preparation.

D3.3.2 **Data Collection:** The team EOD Technician usually completes a metal detector survey to detect potential unexploded ordnance. This survey can be performed in conjunction with or separately from an archaeological metal detector survey. The team EOD technician is generally experienced with the use of metal detectors and can complete an archaeological survey. The SRE can also use a metal detector to carry out a survey. In this case, the user's manual for the specific model of metal detector should be consulted for exact operating procedures.

In general, all metal detectors operate in the same way: The search coil senses metal material buried in the soil using an electromagnetic field. The operator simply passes the sensor head over the ground and listens or looks for the detector to indicate the presence of metal.

D3.3.3 **Data Analysis:** Locations of buried metal can be marked using pin flags, excavated, and mapped with the data being analyzed as discussed in the body of this SOP.

Additionally, metal detector data is useful in assisting with the delineation of site boundaries and double-checking excavated units. A metal detector survey can be interpreted prior to excavating to provide clues about the horizontal extent of potential incident-related debris. Once units are excavated, a metal detector should be used to sweep over the floor as a check for any potential incident-related debris that may have been missed.

D4.0 DOCUMENTATION: Recording forms for both resistivity and magnetometry surveys are found on the DPAA network. These forms present the basic information that should be recorded in each survey. In addition to these forms, a basic sketch map should always be produced at the time of the survey in accordance with this SOP. Information not recorded on the field forms should be included in any field notes recorded for the survey.

Report remote sensing equipment use, even if the results are inconclusive or ambiguous. If excavation strategies are influenced by geophysical information, then this should be noted in both the field notes and report. For example, if a resistivity survey is completed in an area suspected to contain a burial, the notes might state "anomalies were detected in the southeast corner of the grid, so excavation units were opened in this area first." Relevant data should be presented on a sketch map.

Reports of geophysical survey should include information such as:

- The area covered.
- The intervals used.
- The number of people involved.
- The amount of time the survey took.
- Any weather conditions or interferences that may have affected results.
- How the results were processed.

D5.0 SURETY: The results of remote sensing methods are subject to the surety measures listed in the body of this SOP. Additional considerations include:

- Interpreting the results of magnetometer or resistivity surveys is somewhat subjective, even under ideal circumstances. Numerous factors may contribute to "noise" in the data, which may interfere with successful detection of subsurface anthropogenic (human-produced) anomalies. Because of the inherent subjectivity and unreliability of the data, geophysical survey findings should never be used to categorically "rule out" areas of potential investigation. Any field decisions influenced by geophysical survey results should be clearly explained and justified both in field notes and the final report.
- To assist the operator in interpreting results, pre-survey tests may be conducted. For example, the equipment may be run over a known feature (such as an excavated and backfilled pit) and the results recorded for comparison to areas where unknown features are sought.
- One "test transect" should be run with the magnetometer before a survey and the same test transect should be run upon completion of the survey to ensure that the results remain consistent. If different readings are measured on the same transect, then this clearly indicates either some type of interference (for example solar storms) or a malfunction of the equipment.
- Because the equipment is rarely used in the field, it does not require regularly scheduled maintenance. Operational failures or malfunctions should be reported to Quality Assurance.

D6.0 SAFETY: Unexploded ordnance is not set off by the small amount of electrical current introduced into the ground.

Annex E (Informant/Witness Interviews)

E1.0 GENERAL: Informant/witness interviews are an opportunity to obtain information from persons who actually witnessed, know of, or participated in loss incidents. As such, interviews may provide the following:

- Pinpoint isolated burials and the point of aircraft impact.
- Independent data regarding the loss incident and the circumstances in which materials were deposited at the recovery scene.
- Data that can aid in the interpretation of a recovery scene.

Recovery scene processing results can either corroborate or refute informant/witness testimony. Interview data corroborated by excavation findings provide additional strength to potential identifications. Interview data refuted by excavation findings call into question the reliability of the witness and the accuracy of witness' statements.

Interviews of informants/witnesses are not to be considered the legal testimony of said persons.

Guidelines for typical cases and informant/witness interviews may not be applicable in current death investigations or in countries with on-going hostilities (e.g., Iraq, North Korea).

E2.0 INTERVIEW PROCESS: The interview process consists of three phases: 1) preparation, 2) interview, and 3) reporting.

E2.1 **Preparation:** When possible, determine the functional position, or status, of an informant/witness (village chief, military commander, etc.) as far in advance as possible. Once determined, develop a plan on how to conduct the interview.

E2.2 **Interview:** Follow these guidelines:

- **Dress Neatly:** If in a formal setting, wear long pants and a collared shirt when interviewing elderly people and senior officials; field clothes may be appropriate if this is done in a field setting at a recovery scene.
- **Team Effort:** During an investigation, if present, or recovery operation, the SRE conducts the interview and note taker, while the linguist/analyst acts as a translator. If the SRE is not presented during an investigation, the IT should assign one member (usually the lead analyst) to conduct the interview, a linguist/analyst translates and another team member acts as the note taker.
- **Segregate:** When possible, try to interview the informant/witness individually. However, the setting where most interviews take place nearly eliminates the possibility of solitude. Curious villagers want to watch and sometimes contribute to the interview. This can be advantageous. Have team members watch the crowd for individuals who appear eager to provide information. These individuals should also be interviewed. At the same time, make sure to prevent the crowd from answering questions for the informant/witness.
- **Sensitivity:** All interviewers should be aware of cultural and social differences, (e.g., what we consider to represent the color purple may be termed blue in another culture). Use examples to verify colors, height, distances, etc. (e.g., does anyone here have the same eye color?).
- **Introduction:** Introduce yourself and the members of your team and explain the DPAA mission. Try to put the informant/witness at ease (e.g., this is not an interrogation). Be conscious of social customs.
- **Put at Ease:** Without offending the informant/witnesses, make it clear that you only want to know the truth and that the interview is being conducted as part of a humanitarian effort.
- **Interview:** Although you want to compile the most complete information possible when conducting an interview, bear in mind that you are often dealing with people that lack a formal education. Their idea of "complete" information may be different from yours.
- **Go Slowly:** Don't wear out the informant/witness.
- **Be Thorough:** Make every attempt to solicit all information from an informant/witness but be culturally sensitive to the individual and circumstances.
- **Control:** Maintain control of the interview. It is all right for the informant/witness to wander a bit, but use your planned interview strategy to bring the informant/witness back to the line of questioning you intend to follow.
- **Ancillary Evidence:** Encourage the informant/witness to turn over any supporting documents or evidence.
- **Closing:** Make certain the informant/witness agrees to be re-interviewed.
- **Informant/Witness Background Data:** At some time during the interview, gather background data for each informant/witness when possible and if applicable. Example questions can include::

    - Name (ensure that the note taker gets the correct spelling).
    - Date and place of birth.

- Current residence (include province, district, village, and house number if possible).
- Occupation.
- Name and address of a contact person.
- Did any government official ever contact/interview you concerning this incident?
- What did you do during the war?
- Rank or position.
- Time period of the duty.
- Military unit designation.
- What did your duties entail?
- Where were you stationed during the war?
- Who was your commander?

This information can be critical in contacting the informant/witness in the future, correlating the informant/witness to other cases, or to verify the information provided by the informant/witness. However, asking for such information may make the informant/witness nervous. Choose the most appropriate line of questioning for each informant/witness and the time to ask it. It may be preferable to ask these questions toward the middle or end of the interview to first allow time for the informant/witness to become comfortable with the interviewer. The informant/witness is then more willing to volunteer personal information.

- **Questioning**: Every effort should be made to ensure that interviews are as thorough and complete as possible. Enclosure 1 details numerous questions SREs may want to ask an informant/witness. These questions were originally designed for recovery efforts relating to the war in Southeast Asia. The SRE needs to select and/or modify questions selected from this list for the appropriate conflict and geographic region. The SRE provides a summary statement within the field notebook based on the questions asked of the informant/witness.
- **Informant/Witness Category**: Upon completion of any informant/witness interview, the interviewer should categorize the informant/witness proximity to the event using the following classification:

  - **Eyewitness:** The individual was at the location at the time of the event and observed or participated in the actions detailed in their interview.
  - **Informant:** The individual gained the knowledge of the event presented in the interview directly from an eyewitness with no intermediaries
  - **Secondary Informant:** The individual gained the knowledge of the event presented in the interview from an informant, i.e., the information has been filtered through intermediaries or was gained from oral or written accounts.

E2.3 **Reporting:** If on an IT, the SRE should immediately sit down with the note taker, review notes of the interview, and prepare a report in accordance with the DRI format. It is important to capture all information from informant/witness interviews in a report, even if it doesn't correlate to the case you are excavating. For information received on other cases, the team must generate an Additional Information Report (AIR) during report writing. If the SRE is working within a recovery operation, the SRE should sit down with the linguist/analyst, review the notes of the interview and write the appropriate section of the report in accordance with the ESR format.

Enclosure 1 (Sample Informant/Witness Interview Questions)

General:
Do you know of any gravesites containing U.S. service member remains in the area now or in the past?
If remains were removed, who removed them? Where were the remains taken?
Do you know of anyone maintaining U.S. service member remains in the area?
Do you know of any U.S. service member remains anywhere in the area?
Do you know of any U.S. aircraft crash sites in the area?
Did you witness any aircraft shoot-downs or crashes during the war?
Do you know of anyone who has aircraft wreckage or is using aircraft parts in his home or at his work place?
Do you know of anyone who has material evidence, identification media, or equipment that once belonged to an U.S. service member?
Are there any museums or tradition houses containing military artifacts in the area?
Do you know of any other person who has knowledge of the above topics?

Aircraft Crash Interview Guide:
Did you actually observe the crash or only hear of the aircraft crash?
If someone told you about the crash, who is that person and is he/she still available?
What day, month, and year did the crash occur?
During what season did the crash occur?
What time of day did the crash occur?
What was the weather like on the day of the crash?
What was the aircraft doing prior to the crash?
Where were you at the time of the crash?
What were you doing at the time?
Did anyone else see the crash? If so, are they still available?
Where is the site? Be as specific as possible. Describe the surrounding terrain. Use distance and direction from/to peaks, slopes, villages, streams, or other landmarks.
Describe the aircraft. What type of aircraft was it?
How many engines did the aircraft have?
How many rotors did it have?
How many tails did it have?
Did the aircraft have any numbers and do you remember them?
What color was the aircraft?
How was the aircraft marked?
If you saw a picture of the aircraft, could you recognize it?
How did the aircraft crash?
Was it shot down?
What unit shot down the aircraft?
Were you in the unit?
Who else was in the unit?
Where do they live now?
Was the aircraft shot down with a missile, AAA guns, small arms?
Did you see the missile/rounds hit the aircraft?
Did the aircraft explode in the air?
Did it catch on fire?
Did you see a smoke trail in the sky?
What was the aircraft's position at the time it impacted the ground (nose up, nose down, parallel to the ground)?
Did the aircraft break up before it hit the ground?
Did you ever go to the actual crash site?
Do you know anyone who ever went to the crash site? If so, is that person still available?
Do you remember seeing the cockpit of the aircraft at the crash site?
Can you remember where the cockpit was?
Was it still intact?
Did you see the glass from the cockpit?
Do you remember seeing any bodies or human remains at the crash site?
What kind of aircraft parts or equipment were at the site?
Has the site been salvaged by anyone?

Do you know who salvaged the site?
What happened to the parts they salvaged?
How many times have you visited the crash site?
What was your purpose in going to the site?
Do the government authorities know about this crash site?
How many other people know about this incident?
Are they available for interview?
What are their names and addresses?

Disposition of the Pilot Interview Guide
Did you see the pilot eject from the aircraft?
Did you see or hear of the pilot ejecting from the aircraft?
Did you see or hear of any parachutes in the sky following the ejection? If so, how many?
Please describe the parachutes. What color? What was it made of? Were the risers (straps) attached? If so, how many? What were the risers made of?
How far away were the parachutes?
Did the parachutes drift? What direction did they drift?
What did the local militia/military units do as the parachutes descended?
Could you see the pilot under the parachute? If so, what was he doing? Did he appear to be conscious or unconscious?
Did you go to where the parachute landed?
When you got to the site, was the pilot still there?
Was the pilot alive on the ground? If so, was he mobile?
Was he injured?
Was he bleeding?
Was he in shock?
If the pilot died, when did he die?
How did he die?
Where did he die?
What was he doing when he died?
Where did you last see the pilot (alive/dead)? Be as specific as possible. Describe the surrounding terrain. Use distance and direction from/to peaks, slopes, villages, streams, or other landmarks.
If the pilot died, did anyone move the body?
What happened to the body? Was it hidden, buried, or left alone?
Were there any material evidence such as dog tags, I.D. cards, photographs, watch or ring?
Were there any items of personal equipment along with the parachute?
Did anyone scavenge any portions of the parachute or personal equipment? Who?
Where are these people now?
Did you personally scavenge any items? Do you still have the items? May we photograph the items?
Did you ever return to the site? How many times?
When did you return to the site? When you returned, was the site different? How had it changed?
Does the site still exist today?
Do you recall the location of the site?
Can you lead the team to the site?

Gravesite Interview Guide
When did you see the grave?
Did you see the grave or hear about it?
Where is the gravesite? Be as specific as possible. Describe the surrounding terrain. Use distance and direction from/to peaks, slopes, villages, streams, or other landmarks.
Describe the grave. Is it large or small? Is it dirt? Concrete?
Is there a marker or head stone now or in the past?
Is there a name of any kind on the grave?
How did the U.S. service member die?
Who buried the U.S. service member?
How do you know the grave is that of a U.S. service member?
When was the burial?
How are any bodies buried in the grave?

Describe the burial. Was a coffin used? Was the U.S. service member clothed? Was the body draped in anything before burial?
Did anyone prepare records or sketches of the area at the time of burial?
Were there any photographs taken? Who did this? Do these records still exist? Where?
Has anyone ever dug up the grave?
Has anyone ever scavenged remains from the grave?
How many times have you visited the site?
When was the last time you visited the site?
Do you still remember where the site is located?
Will you guide the team to the site?
Does anyone else know about this grave?
Are they available for interview?
What are their names and addresses?

Land Use History Guide
Who farms this field?
When was the field cleared? By whom?
What is the flood regime?
What is the plowing schedule?
When was this house/barn/structure built?
When was this road constructed?
Where was the road fill obtained?
What happened to the fill removed from this ditch?

Annex F (Mechanical Excavation)

F1.0 PURPOSE & SCOPE: This annex summarizes procedures for the use of heavy equipment when conducting mechanical excavations. It applies to SREs and other personnel, as appropriate involved in the mechanical excavation of recovery scenes. Compliance with the provisions in this SOP during mechanical excavation is compulsory unless otherwise stated in this annex.

F2.0 GENERAL: Although hand excavation of archaeological deposits is the preferred recovery method at the DPAA, the use of mechanical equipment (backhoes, road graders, bulldozers, and front-end loaders) for mechanical excavation of recovery scenes can be cost effective and efficient under certain circumstances. Mechanical excavation is particularly efficient in the discovery process as opposed to recovery excavations. Heavy machinery is useful particularly when:

- Large areas have to be excavated to a uniform depth.
- Large amounts of topsoil, plow zone or overburden, unrelated to the incident being investigated, has to be removed.
- Limited indigenous labor is available.
- Deep stratigraphy requires examination.
- Large horizontal areas need to be examined for the presence of archaeological features or deposits.
- Systematic controlled excavation of shallow deposits over an extensive area
- Deep site testing to discover buried features.

F3.0 MECHANICAL EXCAVATION:

F3.1 **Equipment Considerations:** The following provisions govern the use of mechanical equipment:

- Tracked equipment should not be used except as a last possible resort (e.g., it is the only means to achieve effective recovery operations).
- Smaller backhoes with buckets under one meter in width are preferred. In certain circumstances, larger buckets may be used with caution.
- Use backhoe buckets without teeth. If unavailable, the SRE must assess the skill of the operator in removing sediments. For example, experienced backhoe operators can excavate successive levels at a depth of about an inch for each cut or swath. This is considerably better than most untrained personnel using hand-tools.

F3.2 **Prohibitions:** Mechanical equipment should not be used under the following conditions:

- For the recovery of scattered surface remains, small crash sites, or small features (excluding exhumations in known cemeteries).
- Any situation where there is a heavy root or rock infestation.
- Very deep excavations (defined as excavations deeper than the arm of the machine). This is a safety issue. Very deep excavations require shoring or stepping or other engineering safeguards.
- Where there are unstable soil conditions that do not safely support mechanical equipment. The SRE needs to assess the deep soil stratigraphy underlying the mechanical equipment position to determine if buried unstable soils are present.
- Where there are steep slopes, or limited available space for the equipment to operate.
- When overhead or buried power lines, other utilities, or obstructions may interfere with the equipment.
- When competent equipment operators are unavailable. These can be difficult to find in some of the areas that the DPAA typically operates. If any fine-scale work is required and the SRE is not confident of the ability of the equipment operator, heavy equipment should not be used.
- When other safety concerns over-ride utility.

F3.3 **Controls:** The following procedures are used to control mechanical excavations:

F3.3.1 **Provenience:** When mechanical excavation is used it should be performed in a systematic manner. Provenience is maintained, at least in a general sense. A grid system is not necessarily required, but some means of spatial control must be employed. If mechanical excavation is followed by large tool or hand excavation, a formal system of spatial control is required.

Large quantities of sediments resulting from mechanical excavation typically outstrip screening ability. A large quantity of tarpaulins or other temporary storage system is useful to maintain provenience when using heavy equipment. Excavated units in line for screening can be stockpiled on individual tarps with appropriate provenience information maintained at the stockpile site.

F3.3.2 **Sediment Management:** Considerable planning is required in order to manage the massive amounts of loose sediment generated by mechanical excavation. When most sediment is disturbed or removed, its compactness is lost. For planning

purposes removed sediment occupies up to 30% more volume compared to when it was *in situ.*

When removing large volumes of sediments from a recovery scene area, a front-end loader may be useful to move and transport excavated sediments from the excavation area to the screening, stockpile, or discard areas.

F3.3.3 **Screening:** Depending on the purpose of using mechanical equipment, excavated sediments may or may not be screened. When screening is necessary, the standard DPAA field/screening system is largely inadequate to cope with the very large amounts of sediment that can quickly accumulate during mechanical excavation.

A screening system must be developed that can cope with large amounts of sediment. This should be devised in consultation with the ATL, but usually works most effectively if a high pressure, large area wet-screen-type system, with a series of retractable "splash-boards," is utilized.

F3.3.4 **Monitoring: Mechanical excavations must be monitored by the SRE at all times!**

F3.4 **Recovery/Excavation Strategies:**

F3.4.1 **Excavation of Shallow Archaeological Deposits:** At large recovery scenes (greater than 100 m on any axis) suspected of lacking burial or buried features, a backhoe can be used to remove sediments from excavation units within a very large, shallow site (e.g., less than 50 cm in depth.). Road graders cannot undertake this type of excavation. Typically, hand excavation of the walls and floors of the excavation units unit is required subsequent to mechanical excavations. Excavated sediments typically are stockpiled to be later transported to the screening area.

F3.4.2 **Removal of Deep Overburden:** Removal of incident sterile overburden with mechanical equipment is appropriate with either a backhoe or a road grader. Prior to removal of sediments, the depth of sterile overburden should be determined within the recovery scene boundaries using either hand excavation or backhoe test excavations. Excavated sediments should be spot checked for cultural/incident related material.

F3.4.3 **Discovery Excavation for Large Buried Features:** Discovery of large buried features (e.g., crash or bomb craters) is one of the few instances that trenching is an appropriate discovery technique. Backhoes and road graders are appropriate equipment used to discover large buried features—backhoes for trench testing and road graders for stripping topsoil to expose an entire feature. Excavated sediments should be spot checked for cultural material. Team members should follow the equipment and shovel skim the excavated areas to assess the presence or absence of buried features.

F3.4.4 **Excavation of Fill from Large Features:** Mechanical equipment can be used in restricted settings to remove feature fill from large features (e.g., crash or bomb craters). The depth and extent of the feature should first be determined via some form of testing mechanism, typically by an excavated trench through the feature. The feature may have infilling deposits that may or may not contain material evidence and/or remains.

The SRE should not attempt to excavate the feature to the edges of sterile sediment with the mechanical equipment rather hand excavation should be employed. Any large items or concentrations of wreckage within the fill should also be hand excavated. All feature fill must be screened.

F3.4.5 **Discovery Excavation for Small Buried Features:** The recovery of small features (e.g., burials) is best achieved through hand excavation techniques when a limited area is identified by a witness/informant or historical documentation. When large areas with unknown boundaries are identified, mechanical excavation techniques may be appropriate as follows.

- Trenching for small buried features typically is not an acceptable method—block excavation is the preferred discovery excavation method. Any form of shallow, systematic soil stripping activity using mechanical equipment is allowable if certain conditions are met. That is, if general preservation is good, the remains were buried more or less intact, and the configuration and size of the suspected feature is known. The preferred equipment is a road grader with the team members following the equipment and shovel skimming excavated areas to assess the presence or absence of buried features.
- In the absence of a road grader a backhoe could be used to systematically strip topsoil and overburden in order to obtain a clean surface to allow the evaluation of possible feature stains. This activity must be closely monitored by the SRE at all times. Team members should follow the equipment and shovel skim excavated areas to assess the presence or absence of buried features.
- Given the lack of preservation in some regions, it is highly recommended that when this method is used all excavated sediments be screened in the immediate vicinity of any identified feature. This

is particularly important if there is any evidence of turbation in and around the feature. At a minimum, a 5 meter wide zone centered on the feature should be screened when soils and sediments represent a disturbed context. So called "broadcast screening" or periodic inspection of mechanically excavated sediments from a recovery scene or around a small feature are prohibited.

F3.4.6 **Mechanical Excavation in Cemeteries:** In formal cemeteries with specific grave plots and markers, a backhoe can be used to excavate individual graves, particularly during exhumations. In unmarked cemeteries, the SRE is attempting to discover small buried features. The SRE should follow the above stated guidelines concerning the discovery of small buried features.

F4.0 SAFETY: In addition to the overall challenges to maintaining the recovery scene as a safe working environment, risks increase significantly when heavy machinery is used. Safety equipment (e.g., high visibility vests, hard-hats, and safety boots (having steel toes) should be utilized by all workers (both U.S. and indigenous) when working around heavy equipment.

High visibility flagging/survey tape is useful to mark off areas where machinery is operating. A "safe" radius of at least twice the extension of any hydraulic arm needs to be maintained around the equipment. A linguist, where available, should work with indigenous operators who may speak little or no English.

Annex G (Fullest Accounting of Human Remains)

A recurring issue in the POW/MIA arena is the question, often expressed colloquially as, "when is enough, enough?" or, as it sometimes is more fully articulated "what is the difference between 'Fullest Possible Accounting' and 'Fullest Possible Recovery'?" The positions taken by the various organizations comprising the POW/MIA community reflect the differences in mission charters and mandates. The DPAA-CIL is not constrained by geographic or temporal boundaries and so adopts the following position:

"All reasonable measures will be undertaken to affect the full and complete recovery of the remains of U.S. personnel lost in service to this country."

This position was initially codified in CMAOC policy that directed that the DPAA would not make identifications if the probability of additional remains being recovered was high. The central issue is what constitutes a "full and complete" remains recovery. It should be accepted by all that a "complete" recovery, i.e., the recovery of all remains, of any site is almost never possible given the nature of loss scenarios and the effects of time and nature on remains preservation. The physical inability to affect a "complete" recovery, however, is not sufficient grounds to abrogate a basic responsibility to undertake—to the fullest extent possible given safety and resource constraints—a full and complete recovery of a given loss site.

The DPAA-CIL defines a full and complete recovery as one in which "*reasonable and prudent measures have been taken to affect the recovery of all significant human remains from a loss location, to the extent that the probability of subsequent recovery of additional remains from that location is minimal.*" In practical terms this means that—all circumstances being equal—untrained persons, operating without the resources available to the U.S. government, should not be able to recover significant human remains from a site closed by the DPAA-CIL.

The issue of "Fullest Possible Accounting" versus "Fullest Possible Recovery" can be categorized into two scenarios:

1) Is it reasonable to close an excavation or recovery effort as soon as evidence sufficient to affect an identification has been recovered? In other words, is it reasonable to close a particular site as soon as identifiable remains (e.g., a restored tooth) or other evidence sufficient to affect an accounting are recovered?

2) Is it necessary to continue excavation or recovery of a loss site when evidence sufficient to affect an identification has been recovered? In other words, is it reasonable and necessary to return to a loss site for subsequent recovery attempts after identifiable remains have been recovered solely for the purpose of doing a more "complete" recovery?

The answer to the first question is relatively straightforward: No. Although it may initially appear to be cost effective to terminate excavations at a site as soon as human remains are recovered, this may actually consume more resources in the long run. The identification of remains is a complex process. Seldom can it be reliably determined in a field setting that sufficient evidence has been collected to make an identification. Ultimately, the decision to identify remains is made by the DPAA Science Director after all available evidence has been analyzed. If the evidence proves insufficient to affect an identification and it is determined that additional evidence is needed, the cost of deploying a second team and all their equipment to a site greatly exceeds the resources that would have been expended to complete the initial recovery. Furthermore, evidence may be lost or degraded in the interim between recovery efforts and the additional time that families must wait after the decision is made to return to a site is emotionally taxing. Therefore, recovery sites should not be closed based on field analysis of recovered remains and material evidence.

The answer to the second question is not as clearly straightforward. The decision to conduct multiple recoveries at a particular site must be weighed against a myriad of variables: chiefly safety and the probability of recovering additional remains. Nevertheless, all decisions must begin with the assumption that DPAA search and recovery operations lead to legal identifications and must be sufficiently supported to withstand legal challenge. Thus, an analogy can be made between a DPAA recovery site and a traditional crime scene. In both instances, substantial conclusions are drawn about what happened at that location based on relatively scant traces of evidence. Failure to fully recover the crime scene is unacceptable in any court of law and would be considered professionally incompetent. The same holds true for a DPAA operation.

From a practical standpoint, incomplete recovery of human remains provides an avenue for additional portions of the skeleton to appear after an identification has been established. Whether the remains surface via "bone dealers" or through individuals legitimately attempting to assist the

POW/MIA issue, these unilateral turnovers require an inordinate investment of resources and manpower to resolve which may significantly overshadow the amount of resources saved by an incomplete recovery. In fact, the DPAA expends tremendous resources each year identifying additional remains from previously resolved cases—including many that are almost 60 years old.

Annex H (Investigation & Recovery Scene Photography)

H0.0 PRINCIPLE, SPIRIT & INTENT: The traceability, integrity, and authenticity of documentary images depicting field missions are maintained at all times.

H1.0 PURPOSE & SCOPE: This annex provides guidance to SREs and photographers in order to ensure that field scenes are adequately photographically documented. This annex applies to all documentary photography at field sites.

H2.0 GENERAL: Photography of the field mission documents a wide variety of relevant subject matter throughout its processing from start to finish.

For the purposes of this annex the terms photograph(s) and image(s) are used interchangeably. Both terms refer to digital imagery, both in electronic and print format.

The Scientific Working Group on Imaging Technology (SWGIT) defines two types of forensic imagery Category 1 and Category 2.

Category 1 includes images that are used for documentation only and are not used in analysis. The majority of CIL field images fall into this category.

Category 2 images are evidentiary in nature and may be used for analysis and comparison. Field images are considered evidentiary (Category 2) when one or both of the following circumstances exist **(SA5.8.4.4)**:

- There is an absence of testimony by the SRE and/or other team members.
- The activities, evidence, and contexts portrayed can only be recorded or collected by photography, and cannot be otherwise replicated.

All images are a **fair and accurate representation** of the subject material as it was at the time the image was taken. Additionally, all involved in field photography ensure that the following are maintained for field images:

- Traceability: The ability of the CIL to verify the history, location, or application of a field image.
- Integrity: The ability of the CIL to ensure the long-term maintenance and security of photographs, from time of capture onwards.
- Authenticity: The ability of the CIL to prove the origins of images, i.e., that they were taken by a particular person of a specific subject at a certain time and place.

Deviations from this annex can be made where extenuating circumstances exist and should be described and documented in the field note book. Often DPAA teams work in foreign countries where cultural and political constraints may prohibit the taking of desired photographs. The SRE should determine through negotiation what images are allowed and if there are any restrictions on photography of the field mission and related work.

H3.0 FIELD PHOTOGRAPHY PROCEDURES: Generally, photographs must be taken beginning when the team arrives at the field site until the team departs.

H3.1 **Documentary Versus Non-Documentary Images:** For the purposes of this SOP, images may be documentary or non-documentary. Documentary images usually have probative value, and are thus relevant to the field mission, and may be useful in the subsequent identification process. All documentary images are recorded in using the written photo documentation process discussed below.

Images taken during a field mission that are not germane to documenting the operation (e.g., photographs taken for the DPAA PAO), or not supporting the arguments and conclusions made in the report, are not considered documentary images.

Documentary images are taken and maintained separately from all other images. Documentary and non-documentary images should be taken by different cameras. If this is impractical, documentary and non-documentary images should be taken on separate memory cards and transferred to separate CDs or DVDs. If this is the case, switching cards should be noted in the photographer's field notebook (see below).

Documentary photography always has priority over non-documentary photography.

H3.2 **Photographic Media:** All documentary images are made using a digital-based system.

H3.3 **Responsibilities:** All photography at field sites, to include personal use cameras, is supervised and performed under the direction of the SRE. The SRE should tell the team photographer what they are photographing and ensure the appropriate entries are made in the written photo documentation (see below).

In general, the team photographer (or simply the photographer), using SOP guidance from the Forensic Imaging Center (FIC), is responsible for:

- Deploying and maintaining all photographic equipment. A list of suggested field photography equipment is found in Annex C (Investigation & Recovery Scene Equipment) to this SOP.
- The technical aspects of photography. At any field site:
  - Accurately represent details and color.
  - Capture overall, intermediate, close up, and examination images with accurate spatial relationships.
  - Adjust for and adapt to varying lighting and physical conditions.
  - Advise the SRE on these matters, as appropriate.
- Maintaining written photo documentation as images are taken or soon after.
- Securing and protecting the integrity of images and written photo documentation until they are transferred to and authenticated by the SRE at the DPAA (see below).

H3.4 **Subject Material:** In terms of goals and purpose, documentary images provide a means of visually documenting the recovery scene in terms of:

- Site location.
- Site conditions.
- Site contents.
- Position, context, and associations of evidence.
- Relevant relationships.
- Methods and techniques employed.
- Work progress.
- Soil/sediment formation and disturbance processes.
- Evidence that cannot be returned to the CIL (e.g., weapons and ordnance).

Additionally, documentary images may serve to:

- Provide or document investigative leads.
- Refresh memory.
- Substantiate future testimony.
- Clarify understanding of the site.

Whenever possible, documentary images should be taken of:

- Important contextual relationships (e.g., among remains, artifacts, strata, and features) in which evidence is discovered or if used to support the arguments and conclusions that are made in the written report.
- Select aircraft or other vehicle wreckage to show the extent of the damage and to assist in recording the identity of the specific vehicle.
- Relevant features (e.g., burial pits, trash pits).
- Remains, features, and material evidence as they are found *in situ* and prior to removal in select sites (e.g., a recovery involving a burial feature). Both close-up photographs and positional photographs are required for *in situ* remains, evidence, and features.
- Stratigraphic profiles encountered during excavation.

H3.5 **Preparation for Photography:** A reasonable attempt should be made by the SRE to prepare an excavation area for photography before the image is captured. Specifically:

- Exposed sediments should be cleaned to allow color and texture to be observed.
- Stratigraphy, artifacts, and remains should be cleaned sufficiently to be clearly visible in the images. Water sprayers can be employed to moisten subject materials where conditions are extremely dry.
- Objects being photographed *in situ* do not have their relative positions changed and are not altered in any manner other than minimal cleaning before photography.
- Use of a gray card as a color standard is highly recommended unless it is impractical.
- The use of a north arrow with a scale (see below discussion on scales) on its surface is highly recommended. Using some other indicator for north (e.g., a trowel) is discouraged.

H3.6 **Technical Aspects of Photography**: The technical aspects of photography are found in the most current version of the FIC SOP located on the DPAA network.

H3.7 **Use of Scales**: Prior to deployment, scales should be performance checked in accordance with DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability).

In general, the need for a scale may increase as the photographic documentation of subject matter descends from broad based (e.g., panoramic views of the site, multiple excavation units) to topics that are more limited or circumscribed (e.g., evidentiary items *in situ*, a burial feature).

As such, scales are required when:

- Photographing evidence or suspected evidence *in situ* (e.g., dog tag, grave pit).

- Evidence is the primary subject of the photograph, whether it is collected or not.
- Shooting from either an appropriate sized (i.e., undistorted) full plan (top-down) or section (side) perspective.

A scale is not required when:

- Photographing broad, oblique overviews of a site using a short focal length lens (however, including subjects such as people, trees, or machinery throughout the scene is encouraged for general reference).
- Taking close-up or detailed photographs of evidence or sites that have already been photographed to scale.
- People and/or activities are the primary subject of the photograph.
- Items of known size (e.g., 4x4 meter grid) are already included in the image provided they are undistorted.

The physical size of a scale, when included, should be appropriate to the size of the subject matter being photographed.

Whenever scales are used they should be positioned on the same plane as the evidence or subject they are associated with.

H3.8 **Documentary Image Processing:** Figure 1 below summarizes documentary image processing. In general, images are generated in a digital format from digital cameras, and archived on a DVD(s) or CD(s) as originals and elsewhere (e.g. network drives) as copies. In the field, images are downloaded from storage media to a laptop for processing, storage, and burning to DVD/CD(s) for eventual transport back to the CIL.

Processing of documentary images is always conducted with traceability, authenticity, integrity, and security in mind.

The following procedures apply for processing documentary images:

H3.8.1 **Primary Image Capture:**

- Photographers are required to synchronize all cameras with date and time of local time zones prior to taking images.
- All documentary images are taken on a designated camera expressly reserved for documentary images. The photographer should use a separate camera for all other images.
- Photographers reset the file numbering system of the primary camera used for documentary photography prior to taking images. The camera is reset so that the first file name assigned indicates the first image taken (e.g., DSC_0001.NEF and DSC_0001.JPEG), and subsequent files are numbered sequentially until field activities are concluded at the site. In the event that the primary camera's file naming convention is not reset at the commencement of field activities the camera should no longer be reset, but instead the file name of the first image should be noted in the field notebook.
- In the event that images from another camera are included by the team photographer as additional documentary images, ensure that they follow an alternative naming convention so that redundant file names are not used.
- Images are captured in RAW and JPEG formats.
- The files captured by the camera are considered the "primary" images and are not deleted or altered in any way.
- Photographers produce notes in their field notebook (see below) for all probative and useful subject matter as images are captured or as soon as possible thereafter. The notes correlate to the captured images as they appear in the camera and are used (in collaboration with the SRE) for selecting documentary images and producing a photographic management log (CIL Form 3101, see below).
- Do not erase capture media (e.g., CF or SD cards) containing primary images until returning from the field to DPAA, if possible. If this is not possible, verify that the images are burned onto the original image CD/DVD(s) (see below) prior to erasing.
- If the SRE, or anyone other than the team photographer, captures images as part of the documentary record in the absence of the team photographer, the SRE ensures that the images and any written photo documentation are:

  - Turned over to the team photographer as soon as possible.
  - Processed, completed, and secured in accordance with this annex.
  - Processed and maintained separately from the images and any written photo documentation generated by the team photographer, but otherwise in accordance with this annex.

H3.8.2 **Establishing the Original Image**: Original images are established after image capture. Original images are archived on an authenticated DVD/CD(s) along with original authenticated written photo documentation. Specifically:

- All of the images are downloaded from the camera in two formats (RAW and JPEG). The images remain unaltered and are transferred to a medium that prevents tampering or permanent alteration. Usually, images are securely stored by burning them onto a non-rewritable CD or DVD. **The images must be preserved in their original file formats exactly as they came from the digital camera.**
- Once the images on the DVD/ CD(s) become permanent (i.e., the images cannot be deleted or altered in any way), the images on the DVD/CD(s) become the "original" images in forensic digital imaging terms, and comprise the archival documentary photographs.

H3.8.3 **Image Management:** The SRE and photographer may manage images using copies of the original images from copies of the original CD/DVDs provided the original images are not deleted or altered in any way. Copies of original images and original image CD/DVDs are known as "working copies," "working discs," "working images," etc. and, when finalized, will eventually comprise the official documentary images of record.

Managing aspects of documentary images is an ongoing process. As such, all original and working CD/DVD(s) and all written photo documentation are made available to the SRE, as needed. It is highly recommended that the SRE and the photographer manage documentary images by periodically meeting (daily, if possible) in order for the SRE to:

- Review, select, and manage useful and probative documentary images on the original image DVD/CD(s) that fulfill the above stated goals and purposes. Transfer these images to working DVD/CD(s) and activate the photographic management log (CIL Form 3101, see below). Sorting images into folders on the working DVD/CD(s) is permissible and encouraged.
- Review the sufficiency and quality of documentary images previously taken. Images must constitute a fair and accurate representation of the subject material captured in terms of:

    - Exposure.
    - Color accuracy.
    - Focus.
    - Distance relationships/depth of field.
    - Size and scale, if applicable.

- Replace documentary photographs from the working CD/DVDs. As new images become available, those previously selected may be replaced by the SRE based on redundancy, improved quality of subsequent photographs (see above), etc. (Note: images are never discarded from the original image DVD/CD).
- Reconcile the original photographer field notebook (see below).
- Enhance documentary images, if needed and as appropriate. The following apply when enhancing field documentary images:

    - All enhancements are in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).
    - The original image is preserved. All enhancement processes must be performed on a copy of the original image regardless if the image is Category 1 or 2.
    - Start with the best possible image.
    - The SRE is ultimately responsible for proving the authenticity and integrity of the enhanced image.

- Give feedback to the photographer.
- Discuss other appropriate issues.

H3.9 **Written Photo Documentation:** The traceability of images relies on the preparation, completion, and long-term association of written photo documentation, to include photo logs, with the imagery. Such photo documentation provides contextual information about images as determined by the SRE and/or the photographer.

All written photo documentation constitutes examination documentation and are handled in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). As such they are subject to all of the provisions applying to analytical notes as to corrections, authenticity, etc. There are two types of written photo documentation:

H3.9.1 **Photographer Field Notebook**: This is the original documentation that documents the images captured in the camera and subsequently transferred onto the original image DVD/CD(s).

The photographer field notebook has two intents and purposes:

- Integrate original observations of the photographer into DPAA remote operations. Original observations in the photographer field notebook can be reviewed in such a context alongside other written photographic documentation (e.g., the SRE field notebook) for traceability of documentary images.
- Standardize the methods used in taking field notes by DPAA photographers.

Entries into the photographer field notebook, as applicable, include:

- Make, model and unique identification number of camera.
- Date the image was captured (if not included in the file/frame number (see below).
- File/frame name or number, as assigned by the camera.
- View, in terms of cardinal directions (e.g., view is facing north).
- Short description of the subject of the photograph.
- An entry for the activities conducted for each day the photographer is on site. It can be a narrative statement but should include some reference to file numbers (e.g., "dsc_2467 to dsc_2485 shot today").

For the sake of expediency and simplicity, documentation in the photographer field notebook should be streamlined and abbreviated whenever possible. Examples include:

- Multiple sequential images of like content can be grouped under one entry or heading in this field notebook (e.g., shots 11-14—unit 500/500 view facing east, shots 80-88, test shots after changing battery, shots 50-52 out of focus, etc.).
- Images whose content are self evident (e.g., a screening station, a unit stake with a unit number on it) may be described in the photographer field notebook at the discretion of the photographer.

Photographer field notes may be recorded as events occur (preferred) or shortly after capture (e.g., during a break, at end of day). The photographer should be able to account for all images and sequences during and following the mission as well as when they were taken and, when necessary, what the image depicts.

A separate photographer field notebook is generated for each recovery scene processed. Similarly, on IT missions a separate photographer field notebook is generated for each site investigated.

H3.9.2 **Photographic Management Log (Form 3101)**: The photographic management log (CIL Form 3101) is a management device used to assist the SRE and photographer to account for and track useful and probative documentary images selected for use from the original image DVD/CD(s).

Entries into the photographic management log, as applicable, include:

- Make, model and unique identification number of camera.
- CD number (1 of 3, 2 of 3, etc.).
- File name or number, as assigned by the camera.
- View, in terms of cardinal directions (e.g., view is facing north).
- Short description of the subject of the photograph

H3.10 **Site Departure & Travel:**

- The SRE verifies the accuracy and sufficiency of documentary images and written photo documentation prior to departing the field site. Any remaining images that are needed should be taken prior to departure, if possible.
- The documentary images and written photo documentation are secured at all times by the photographer during field missions and during return travel to the DPAA.

H4.0 PROCEDURES AFTER RETURN TO THE DPAA: Upon return to the DPAA, processing of documentary images and finalization of written photo documentation are given top priority. Priority cases are completed first.

H4.1 **Responsibilities:** The following apply:

H4.1.1 **Photographers & FIC:** As soon as possible after returning from a mission (usually within three working days), the FIC NCOIC ensures that photographers perform the following:

- Complete the final preparation and processing of the original image DVD/CDs. Documentary images on multiple original image DVD/CD(s) may be consolidated onto fewer DVD/CDs provided there is no deletion or alteration of the images (i.e., they remain original images). The final original image DVD/CD(s) should be burned onto the pre-labeled discs.
- Label and authenticate the original image DVD/CD(s). The DVD/CD(s) is authenticated when the photographer adds the CIL number and then dates and signs the original image DVD/CD(s). The SRE does not authenticate the DVD/CD(s). Do not load the images on the original image DVD/CD(s) to the network.
- Complete and authenticate the photographer field notebook. The notebook is authenticated when the photographer adds the CIL number and then dates and signs the notebook. The SRE does not authenticate this notebook.
- Coordinate with the SRE on the method for supplying him/her with select documentary images and commensurate photo management logs. There are two options for the SRE to obtain these items for use in preparing the reports and case packet. In

either case these items do not constitute the official record.

- Prepare working DVD/CD(s) (see below). Photographers should not use the pre-labeled DVD/CD(s) at this time since the SRE may detect problems needing subsequent corrective action. Multiple DVD/CD(s) from the field may be consolidated, as appropriate, when preparing the working DVD/CD(s).
- Upload the digital images from the field DVD/CD(s) and the photographic management logs onto the DPAA network.

- Notify the SRE when the above tasks are completed.

H4.1.2 **SRE:** The SRE is ultimately responsible for the traceability and authentication of the documentary images. SREs perform the following:

- Obtains the original DVD/CD(s) and photographer field notebook from the photographer. The DVD/CD(s) should be on the pre-labeled DVD/CD(s). If not already done, have the photographer complete the labeling and authentication of the items at this time (see below).
- Obtains the select documentary images and photographic management log from the photographer using one of the two options above. If the SRE uses a working DVD/CD(s) it does not have to be on the pre-labeled DVD/CD(s) at this time.
- The SRE opens the working DVD/CD(s) or accesses the appropriate folder on the DPAA network and verifies that:
  - The images are all documentary photos and, as a whole, form an adequate visual documentation of the field mission.
  - Individual images constitute a fair and accurate representation of the subject material captured.
  - The correct version of the photographic management log is present and prepared in accordance with this annex.
  - The images match those in the electronic photographic management log.
  - Images match those on the original image DVD/CD(s) (Note: if the match was done in the field, it need not be repeated).

- If corrective action is required the SRE may fix the problem directly (usually when the DPAA network option is used) or refer the problematic items to the photographer for resolution (usually when the CD/DVD(s) option is chosen), as appropriate. Any substantive SRE corrections to the photographic management log should be communicated to the photographer.
- Place the original image DVD/CD(s), documentary images, and photographic management log into the case file and submit the case file for peer review. The photographic management log may be included in the DVD/CD(s) with the documentary images. If a DVD/CD(s) is not used, the peer reviewer is referred to the appropriate network folder. The original image DVD/CD(s) is peer reviewed only for proper labeling and authentication. It is consulted during peer review, as needed, in order to verify the traceability of the documentary images and photo management log
- When the SRE and peer reviewer are satisfied with the images and photographic management log, the SRE notifies the photographer to finalize the working DVD/CD(s). The final working DVD/CD(s) is prepared by burning it onto a pre-labeled DVD/CD(s).
- This DVD/CD(s) is now the terminal working DVD/CD(s) and returned to the SRE. The SRE:
  - Ensures the terminal working DVD/CD(s) is on the pre-labeled DVD/CD(s) and the label is properly completed. Either the SRE or photographer labels the DVD/CD(s) with:
    - Type of DVD/CD (The appropriate box is checked. The terminal working DVD/CD(s) is checked as "record" while the original image DVD/CD(s) is checked as "original").
    - CIL number (if assigned).
    - JFA or other unique mission name.
    - Site Designator (REFNO, MACR, DPAA or CARIS site number, etc.).
    - Recovery Team or Investigation Team number.
    - Country and province (or the equivalent).
    - Photographer's full name.
    - SRE's full name
    - Any other appropriate information
  - Authenticates the terminal working DVD/CD(s) using the following procedures:
    - Verifies the correct CIL number (or other unique mission identification number) appears on the terminal working DVD/CD(s).
    - Signs (or initials) and dates the terminal working DVD/CD(s). The photographer is not required to authenticate the terminal working DVD/CD(s). **Once the terminal working DVD/CD(s) is authenticated, the contained images become the official and documentary images of record and are referred to as such.** The terminal working

DVD/CD(s) is then referred to as the DVD/CD(s) of record.

Note: Traceability and authenticity of the documentary images are established once the terminal working DVD/CD(s) is signed (or initialed) by the SRE.

Note: The authenticated images on the DVD/CD(s) of record are the official documentary images of record, subject to CIL records control and release procedures outlined in DPAA Laboratory Manual, SOP 1.7 (Case File Management).

Note: For some missions (e.g. site investigations or surveys) where there are a low volume of images, the original image DVD/CD may also serve as the DVD/CD of record provided none of the original images are altered. In such instances the DVD/CD is labeled with all of the information for the original image DVD/CD AND the DVD/CD of record, to include authentication by both the photographer (if applicable) and the SRE. The combined DVD/CD must also contain the photographic management log. The photographer field notebook (if applicable) is still submitted as a separate document for each site (see above).

- Submits the DVD/CD(s) of record to the peer reviewer who verifies that it is properly labeled and authenticated.

H4.2 **Storage & Use of Images:** Using digital images in official documents and reports is subject to the following procedures:

- Copies of probative and useful digital images are stored in the digital version on the DPAA network for each individual mission.
- Hard copies of photographic management logs and photographer field notebook, as well as contact sheets, may be prepared in order to assist the photographer and SRE in managing and maintaining quality assurance of the images and written photo documentation. Contact sheets and copies of hard copy written photo documentation used in this manner are working papers rather than analytical notes and may be destroyed after use.
- Digital images used in reports are embedded in the computer file containing the report narrative.
- The SRE inspects the images embedded in their report for accuracy before signing the report. The images are judged accurate when they faithfully and accurately illustrate the aspects of the subject matter the SRE intended to portray when the photograph was taken.

H4.3 **Use of the VIRIN or Other Numbering Protocols:** There may be situations where the FIC photographers may eventually have to rename the file(s) using a VIRIN or other numbering protocol provided (e.g., for approved release to non-CIL DPAA sections and/or agencies external to DPAA). This is permissible provided the above numbering convention and overall traceability of the images are maintained (e.g., for approved release to non-CIL DPAA sections and/or agencies external to DPAA).

H4.4 **Contingencies & Special Instructions:**

H4.4.1 **Missions Without FIC Representation:** There may be some missions where a DPAA FIC photographer is not assigned or otherwise absent (either temporarily or permanently). In such instances, the SRE ensures that the images and written photo documentation are processed, completed, and secured in the field in accordance with this annex.

As soon as practical after return from the field, the SRE prepares and authenticates the DVD/CD(s) in accordance with this annex. The SRE is allowed to seek assistance from the FIC; however, the role of the FIC is advisory. The FIC advises the SRE on how to prepare photography products in accordance with this annex to the maximum extent possible.

H4.4.2 **Unilateral Turnover of Imagery:** It is permissible to accept imagery by non DPAA persons or agencies that may be germane to the case at hand. In such instances the SRE records the circumstances of the turnover and any other pertinent information (e.g., name of person, contact information, content of imagery) in his/her field notes.

The imagery, regardless of media, are authenticated and treated as analytical notes by the SRE in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation) and placed in the case file once the SRE returns to the DPAA. Such media includes, but is not limited to:

- Hard copy photos.
- Photo DVD/CDs.
- Flash drives.
- Destination media of downloaded email attachments and cloud derived imagery.

In the case of flash drives, these are turned over to the FIC upon return from mission for downloading onto government authorized media, usually a DVD/CD. Treat and process the images on the flash drive as primary images and the destination disc as

the original DVD/CD in accordance with this annex to the fullest extent possible.

H4.4.3 **Problems with FIC Augmentees:** While on mission, problems with FIC augmentees that cannot be resolved through additional training and instruction by the SRE are brought to the attention of the Team Leader and/or Laboratory Management, as appropriate.

Augmentee related problems encountered by the SRE after re-deployment to DPAA (e.g., improperly prepared deliverables, departing DPAA prior to completion of deliverables) are reported to FIC Quality Management and, if appropriate, Laboratory Management.

Note: Only FIC Quality Management personnel are authorized to correct deliverables (or assign corrective action to other FIC staff) on behalf of the mission photographer (augmentee or organic staff) in cases where he/she is unavailable.

H4.4.4 **Multiple Photographers & Photographer Turnover:** If there is more than one photographer at a scene (either concurrently or sequentially), separate and distinct bodies of documentation are kept by each photographer.

Occasionally, a photographer may not be able to complete the mission (e.g., illness, injury, emergency leave) and is replaced by another photographer. In such instances, the original photographer should process and complete written photo documentation and images in accordance with this annex before departing the scene, whenever possible.

If not possible, the photo documentation and images are processed and completed at DPAA at the earliest opportunity. If the original photographer is permanently indisposed, have FIC Quality Assurance process and complete the documentation after redeployment to DPAA in accordance with the above guidance.

In either instance the documentation and imagery is left with the relieving photographer as it is needed for mission use. The relieving photographer secures the previous photographer(s) documentation and imagery in accordance with this annex and turns it over to the FIC after re-deployment to DPAA.

In accordance with this annex, the relieving photographer opens and manages subsequent documentation and imagery for the remainder of the mission or until he/she is also relieved.

If the SRE assumes duties as the photographer (either temporarily or permanently), the mission becomes one without FIC representation for that period of time. As such, during that period, the SRE follows the above guidance for missions without FIC representation

H5.0 SAFETY: The photographer may have to be positioned in precarious locations (cliff edges, excavation-pit edge, swamps, trees, etc.) in order to get the most appropriate image. The photographer should be cognizant of his/her location at all times so that potential injury is avoided.

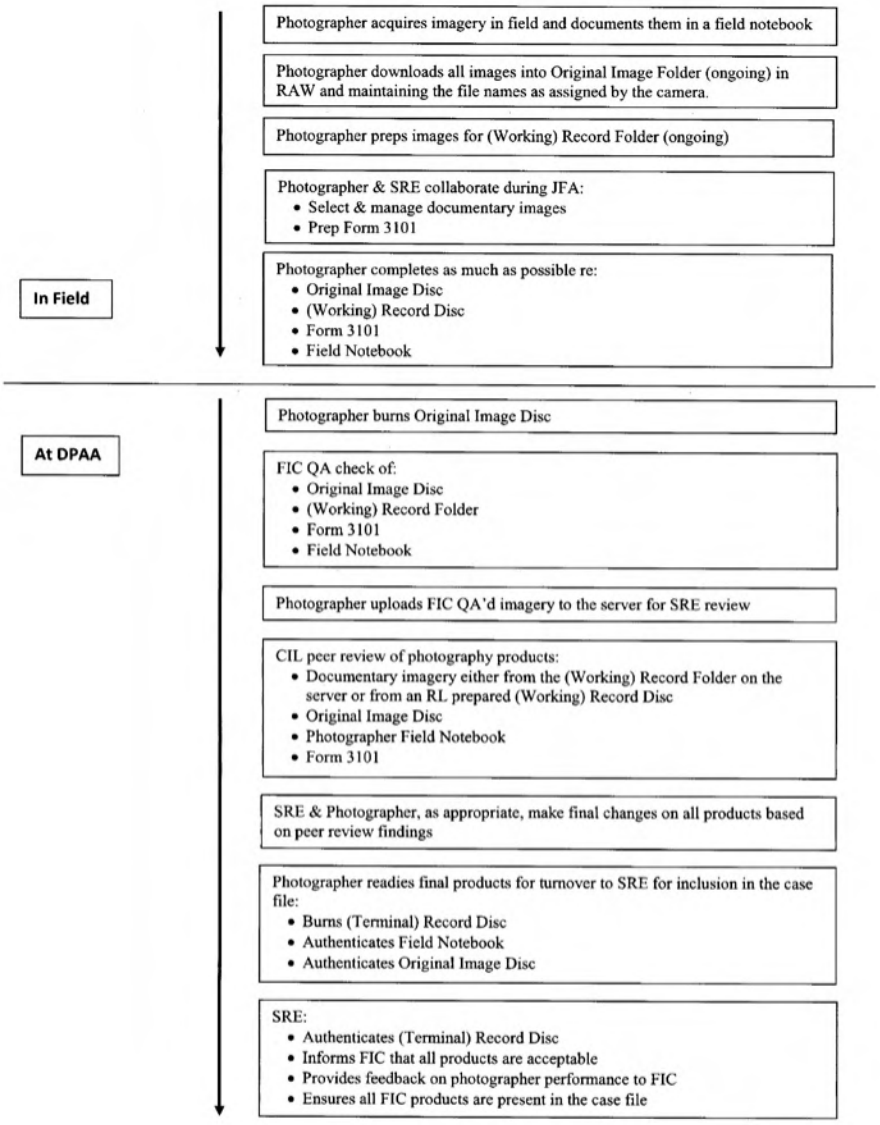


Figure 1. Summary of documentary image processing.

Annex I (Preparation of the Search and Recovery Report) (A5.10.1, A5.10.2a-k)

I1.0 PURPOSE & SCOPE: This annex provides guidance for preparing final field reports for recovery scene survey (these do not result in bulk excavations or recoveries) and search and recovery (SAR) missions conducted by the DPAA. Included are reporting standards on all recovery scene processing activities, including inventory, collection, and excavation activities.

Although the audience for full-length SAR reports is diverse (e.g., other professionals, family members, casualty officers), its first goal is to provide a competent and professional presentation of the field results. However, with such a diverse audience, analysts should avoid excessive and unnecessary use of jargon or obfuscating technical phrases.

Only the basic content and style protocols needed to complete the SAR report are discussed here. DPAA Laboratory Manual, Appendix 5.2 (Style Guide) provides detailed guidelines for format and style. If exceptional circumstances dictate, deviations from the Style Guide are allowed.

I2.0 GUIDELINES FOR COMPLETING SAR REPORTS: Actual scene processing takes place throughout the world and report writing generally is conducted either in foreign staging areas or in the CIL. The following guidance applies:

I2.1 **CIL Number:** Upon returning from a mission, the SRE should obtain a CIL number from the Evidence Coordinator. This number should have an "R" suffix and acts as the SAR report number.

I2.2 **Interim & Final Reports:** The SRE typically generates a SAR report each time a recovery scene is inventoried or excavated. For example, if a recovery scene is excavated once, then one SAR report is written. If a scene is excavated five times, then it is possible that four interim and one final SAR reports may be completed. For example, interim reports are titled "Interim Search and Recovery Report CIL 2006-000-R."

When the recovery scene is closed, the final report is titled as described below (e.g., Final Search and Recovery Report CIL 2006-000-R…..). When a site is excavated and closed in a single mission the report is titled as Search and Recovery Report CIL 2006-000-R.

I2.3 **Stand Alone:** All SAR reports are written as stand-alone reports.

I2.4 **Submission & Routing:** The following procedures, in sequence, apply:

- All SAR reports should be completed within 9 working days after return from TDY. SREs writing final SARs and/or multiple SARs may negotiate a longer suspense date. Typically, ASSFs take no more than 1-2 days per survey. As such they are written in the field and turned in upon return to DPAA. If the SAR is the priority, ASSFs are turned in shortly after the SAR.
- SAR reports should be submitted loose in a folder for internal peer review (see the Surety section in the body of this SOP) with the appropriate peer review form. When submitting a hard-copy report for internal peer review, the SRE should make an electronic copy available on the DPAA network. Until a case file undergoes CFC (see DPAA Laboratory Manual, SOP 1.7, Case File Management), the SAR reports are stored in the case files folder under the appropriate CIL number.
- The SRE should also make an electronic copy of the plan map available in the same location. For interim SARs, an electronic copy of the hand-drawn sketch map is acceptable if the map is not digitized provided it is clear and legible. If the sketch map is digitized, the digital copy should be saved on the network.
- After the peer reviewed copy of the SAR report is returned, take the following action:
    - Make the appropriate changes to the electronic version and print a new copy.
    - Replace the original SAR report text with the revised copy in the folder.
    - Retain the original (edited) copy in the same folder.
    - Attach the edited report to the inside of the original folder.
    - Deliver the completed report and folder to the appropriate Laboratory Manager
- Upon completion of the internal peer review process, the completed report, all field notes, field maps, and other ancillary documentation are delivered to a Laboratory Manager who forwards the materials to Laboratory Administration for inclusion in the case file. SAR reports that result in closed sites with no recovered remains may ultimately be forwarded to DPAA Records Section for archiving.

I3.0 SAR REPORT FORMAT: The SAR report typically consists of the below elements **(A5.10.8)**. Report formats and contents (e.g., customer address

[A5.10.2d]) may have to be adjusted for consult cases (see DPAA Laboratory Manual, SOP 1.8, Consult Case Management, for more details).

An example of each SAR report type is found on the DPAA network. The analyst should start with a clean report template for each new report to ensure the currency of the template.

I3.1 **Title Block:** The title block on the first page is in Times New Roman Font and contains:

- Report title at the top centered, bold, 16 pt, all caps. The title should reflect the type of testing reported and accession number.
- Organization centered, bold, all caps, 14 pt.
- Date (month and year) centered, bold, with the first letter in caps, 14 pt. Because a final report details excavations from several missions; all dates of previous reports and the final excavation must be detailed in the Introduction.
- When the SAR report (regardless of format) contains results of tests performed by subcontractors, this is identified in the heading (see below) **(A5.10.6).** This most commonly occurs when reports are written by augmentee SREs.

An example of the above guidance **(A5.10.2a-c, g, A5.10.6)**:

Search and Recovery Report CIL 2007-121-R, a Ground Loss Site (VM-XXXX) Associated with REFNO 1040, Lang Vei Special Forces Camp, Huong District, Quang Tri Province, Socialist Republic of Vietnam, 3 June Through 10 July 2007

DPAA LABORATORY

22 January 2007

This report contains the results of subcontracted work.

I3.2 **Body of the Report:** The body of the SAR report is typically written using the below format. Besides text, the body of the report includes maps, line drawings and photographs (collectively known as figures), and appropriate tables. The body ends with the references cited following the SRE's signature block.

The below format and section headings follow the preferred order of presentation and should be followed closely; however, situations may arise that may require certain adjustments for greater clarity. For example, at recovery scenes that require multiple excavations, an interim search and recovery report may be generated, and the final report should be completed at the site. This may be done either in the form of an introductory preface or within the body of the report.

I3.2.1 **Introduction:** This section summarizes the contents of the report that follows. The introduction replaces the abstract.

I3.2.2 **Background:** This section serves to establish the historical context of the operation under discussion and generally is not exhaustive in detail. Included in this section are:

- A brief summary of the historical information about the loss incident, such as name and rank of personnel involved, vehicle/aircraft type and serial/tail number (if any), and date of loss incident if known (see below example).
- Any additional paragraphs used to summarize any previous work associated with the site, including any post-hostility/pre-DPAA/CILHI recovery scene excavations, investigations or attempted excavations, as well as any subsequent recovery scene surveys and/or excavations. When appropriate, these recovery scene surveys and/or excavations typically are cited by their mission number and CIL number.
- Sufficient pertinent data to adequately inform the reader of the circumstances leading to the work reported along with conclusions and recommendations offered.
- A review of the case number/REFNO provided by the MDT.
- Any witness statements recorded by the SRE or by other team members.

I3.2.3 **Recovery Scene Location:** This section includes all appropriate location data including:

- Prominent geographic features and political organizations (e.g., hamlet, village, district, province, and country).
- MGRS grid coordinates and method of determining site location (e.g., Global Positioning System or GPS), type of receiver used, and the number of satellites recorded). The datum is typically WGS-84.
- If site location was determined using latitude /longitude, so indicate, but in such cases also include the UTM reference (if possible) since it is the most common means for relocating ground sites. In some areas of the world, legal location or resection may be the most appropriate method of reporting locations.

- Map name, sheet, series, edition, scale, and horizontal datum as shown on the map edition.
- The Falconview Program may be used to produce country and local topographic maps. Falconview may not contain all maps that are required for a report and other sources may be used.
- A north arrow, scale on the digital image, map names, datums and other pertinent information pertaining to topographical maps in the figure caption. Topographic maps should be oriented with the north to the top of the page.

I3.2.4 **Description of Recovery Scene:** This section describes the physical setting of the recovery scene. It should include information regarding the scene's relative position with respect to large, easily distinguishable topographic and/or cultural features **(A5.10.2f)**. Additional information may include, but is not limited to the following:

- Local terrain, elevation, vegetation, soil conditions, etc.
- Extent of the loss area and recovery scene.
- Recovery scene perimeter within a larger site.
- Any apparent disturbance and/or formation processes—natural and/or man-made.

Certain elements of the recovery scene description may have specific relevance to the organization of the work and may be more appropriately addressed in the section on the field methods (see below). If so, this should be made clear to the reader.

I3.2.5 **Field Methods:** This section details the strategy and various methods and techniques used to inventory, establish the recovery scene perimeter, excavate the recovery scene, and all pertinent recovery techniques. All methods and techniques used to process the scene for evidence must be included in this section **(5.10.2e)**. Additionally, describe:

- The initial reconnaissance and/or recovery scene surveys and what was observed.
- How the recovery scene perimeter was determined.
- How the site was cleared for mapping.
- Detail any surface collections (if necessary).
- Excavation methods (e.g., grids, or natural stratigraphic units versus arbitrary levels).
- Areas and depths excavated.
- Screening and other methods used for evidence recovery.
- Any specialized location or recovery techniques used at the recovery scene (e.g., metal detector or cesium magnetometer).
- Deviations from, additions to, or exclusions from the field methods, and information on specific test conditions, such as environmental conditions that may affect the field methods **(A5.10.3.1a)**. Where relevant, a statement of compliance/non-compliance with requirements and/or specifications may be needed **(A5.10.3.1b)**.
- Additional information which may be required by specific methods **(A5.10.3.1e)**.

I3.2.6 **Archaeological Findings:** This section describes what was found as a result of the archaeological investigations outlined in the previous section, as well as the distribution and location/depth of evidence and includes **(A5.10.2i)**:

- Possible human remains, (including permanent prosthetic appliances).
- Material evidence such as personal effects.
- Life-support or other equipment, and/or diagnostic incident-specific aircraft/vehicle wreckage.
- Any other material evidence that has temporal, spatial, or contextual relevance.
- Section Drawings.

In case of large assemblages, each class of evidence should be addressed separately. Material evidence should be presented in a table listed by provenience and/or depth. Given that the DPAA's primary role is to recover and identify human remains and material evidence that is directly related to those human remains, classes of material evidence should be presented as fully as field conditions permit.

I3.2.7 **Conclusions & Recommendations:** This section of the report describes interpretations and opinions in the form of conclusions and recommendations **(A5.10.3.1d)**. The conclusions portion is intended to factually assess:

- Evidence of previous disturbance of the site.
- Recapitulate the means of site identification, (e.g., aircraft or vehicle type, serial number, factory data plate), personnel identification media, or other kinds of material evidence.
- Discuss any other conclusions that are indicated by the site or the distribution of evidence.

The recommendations portion defines what should be done when the current phase of work at the site is completed. If the reported work was a search and recovery mission (recovery scene excavation), recommend that either the site be closed or that further recovery work should be undertaken. Support the recommendation with a discussion of the facts surrounding the case and the fieldwork.

If additional recovery is recommended, discuss:

- Any revisions of the original excavation plan that may be necessary, including the need for special equipment.
- Protection measures left in place and the potential for further disturbance of the recovery scene.
- Special considerations regarding team composition.
- Planning duration for the additional effort.

I3.2.8 **Signature Block:** The name(s), function(s) and signature(s) of the person(s) authorizing the SAR report are indicated **(A5.10.2j)**.

I3.2.9 **References:** Include all citations as appropriate.

I3.2.10 **Appendices:** Utilize appendices in accordance with the above guidance.

I3.2.11 **Miscellaneous Considerations:** The following are considerations relating to the SAR report text organization, structure, and inclusions:

- Use DPAA Laboratory Manual, Appendix 5.2 (Style Guide) to complete the report.
- Correct and consistent nomenclature and terminology should be used throughout the SAR report including section headings, figure captions, and in the descriptive text.
- Avoid using the REFNO or other case information in the captions or text to describe the site location; instead, the CARIS site number should be used. For example, avoid using REFNO 0001 site, Case 0001 site, or "the site associated with REFNO 0001. Instead use "Site VM-0000" or the VM-0000 site (note the use of capitalization).
- Section headings should be in 14 pt font while descriptive text should be in 12 pt, all in Times New Roman.
- Photographs: See DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging). Because it is ultimately scanned, authors should avoid putting images on the signature page of the SAR report since a significant decrease in image quality occurs.
- Figure & photograph captions: An example of a caption includes:

Figure 1. Battle of Ch'ongch'on 25-28 November 1950. Arrow denotes the recovery scene location on Hill 219 (Mossman 1990).

I3.2.12 **Special Instructions for Maps, Figures & Tables:** Maps and figures in the body of the SAR report minimally include the following:

- Country map illustrating general location of recovery scene (typically Figure 1).
- Topographic map plotting the general recovery scene area (typically Figure 2).
- Recovery scene plan map (depending upon its relative complexity, this map may be subdivided into sectional maps).
- Stratigraphic soil profile line drawing and plan and profile maps of any and all features prepared in accordance with the body of this SOP.
- All figures should be appropriately referenced in the body of the text as Figure X or Figure Y.
- Digital or scanned photographs, taken in accordance with this SOP, are included in the SAR reports. The photographs are selected at the author's discretion and should illustrate pertinent aspects of the recovery scene and specific points made in the text (e.g., field methods, soil conditions, disturbance processes, etc.).
- Tables are included anytime extensive lists of materials are presented. Where pertinent, tables should include provenience information.
- Because it is ultimately scanned, authors should avoid putting images on the signature page of the SAR since a significant decrease in image quality occurs.

I4.0 INTERIM SAR REPORTS: The intent of the Interim SAR report is to provide documentation of pertinent information for an audience that consists primarily of scientific personnel; specifically the subsequent Laboratory SRE who continues excavation at the site. Therefore, the Interim SAR report omits information that a Laboratory SRE would reasonably be expected to know. Additionally, the Interim SAR report is limited to pertinent information that a Laboratory SRE would need to know to continue recovery operations with.

The omission of some information (*e.g.* the background details of previous investigations, team matrix, field methods) in the Interim SAR report does not absolve the SRE from including that in the field notebook. It simply is not included in the Interim SAR report. As such, the Interim SAR report form is used for documentation of recovery operations at sites where a subsequent excavation is a reasonable expectation. The Interim SAR report form may not be used if the SRE closes the site.

The Interim SAR report must contain the same information as the standard SAR report with these exceptions:

- Acronyms commonly used in the DPAA lexicon do not need to be spelled out (*e.g.* S.R.V, RT2, MGRS, etc).

- Previous investigative and recovery work should be mentioned, but details of each activity and references are not needed.
- Field methods are limited to pertinent and relevant information specific to that site. Generalizations (such as how a bucket line functions or the duties of each team member) are not needed.
- A conclusion section is not needed.
- Figures are placed at the end to expedite report writing.
- Figures are limited to only those needed to illustrate details for the subsequent SRE.
- Sketch maps and section drawings do not need to be digitized as long as they are clear and legible.

Use DPAA Laboratory Manual, Appendix 5.2 (Style Guide) to complete the report.

I5.0 FINAL SAR REPORTS: Often a scene requires multiple visits to completely process and complete the recovery process. The SRE that completes the excavation is required to complete a final SAR report that is comprehensive in scope and detail and reports all activities that have occurred at a specific scene.

The final SAR report contains all sections and all information as outlined above. However, specific instructions for the completion of a final SAR report are as follows:

- These reports are a single-authored report.
- Citations throughout tie in the work of the previous excavators.
- Final SAR report is entitled Final (see above for examples)
- The mission dates are found in the Introduction along with the list of the SREs involved and the initial report citations.

The intent is to discuss the scene as a whole and not by mission or chronological order of excavation. This can cause confusion. Instead, the SRE should write a summary of the work, state the location of evidence, and summarize the general patterns that are observed in a spatial sense. The findings should be organized by geographic areas or features (crash craters, western slope). Altogether, this approach allows a more comprehensive discussion of the site as a whole.

The following instructions pertain to individual sections of the final SAR report.

I5.1 **Introduction:** This section includes an executive summary of the entire excavation--what was dug, when it was dug, how many square meters were dug. This section also lists the previous SREs, mission designations, mission dates, and appropriate report number. A statement that the following final report is summarized from these reports as well as the final SRE's field notes is mandatory.

I5.2 **Background:** This section includes a short one or two sentence summary of the incident. A very short description on the sequence of excavations and time periods involved is required.

I5.3 **Recovery Scene Location:** This section contains the standard information as outlined above. Substantial changes in the topographic or coordinate location, if any, are addressed here.

I5.4 **Description of Recovery Scene:** This section includes an overall initial description, land-use history, etc. which should be the primary focus of this section. If substantial changes have occurred between various missions, this should be described and addressed herein. However, do not state "At the beginning of JFA X, the site looked like…." unless there have been major changes (such as the erosion of a huge gully through the excavated areas).

I5.5 **Field Methods:** The field methodology section should not substantially deviate from mission to mission. A summary statement such as "Throughout the excavation history of this recovery scene, similar/identical methods were used to process/excavate…" If different areas of the site required substantially different strategies, describe by geographic area and not by mission.

I5.6 **Archaeological Findings:** This section contains the information as outlined above, although it should summarize in equivalent detail all the findings from all excavations. However, it requires a more complete summary, particularly in the form of tables and graphics:

- **Tables:** Include all tables of material evidence and remains from all of the reports or generate a single, comprehensive table, but ensure that all tables are identical in column format and information content. Tables should incorporate all information from previous excavations and a new column should be added to indicate the JFA when items were recovered. The JFA should be cross referenced with a note at the bottom of the table citing the appropriate SAR.
- **Graphics:** Include a single comprehensive map that may be colored or patterned to show excavation sequence through mission sequence. If necessary, use a separate map to show distribution of material evidence and remains. Section

drawings should include an example of all the different areas of a site if substantially different.

I5.7 **Conclusions and Recommendations:** This section should summarize the excavations and the only final recommendation can be "No further excavation is recommended for this recovery scene." This section should not include every previous conclusion and recommendation unless there is some substantial deviation from those (such as the site was previously closed, etc.).

I6.0 SAR REPORT SHORT FORMAT: The SAR report short form can be used in limited circumstances. The SAR report short form may not be used to complete interim reports as DPAA personnel may not have the opportunity to return to a recovery scene. SREs that would like to use the SAR report short form must obtain prior permission from the appropriate Laboratory Manager. Situations where the report may be used are:

- Recovery efforts that consist of short duration recovery scene inspections (one day or less), where no substantive inventory or recovery efforts occur.
- Documenting activities on non-recovery scenes. That is, visits to locations that exhibit no evidence of loss (some Korea missions to fictitious sites are an appropriate venue for the short form).
- Situations where work was performed by non-DPAA personnel and the DPAA is asked to report on others' efforts.

- The SAR report short form reports must contain the following information:
- Dates of activities.
- Short statement of case background.
- One paragraph on location including GPS location (if available) and topographic map name.
- Description of area investigated including:
    - Topographic setting.
    - Vegetation.
    - Features.
    - Other relevant observations.
- Description of activities conducted at site and statement of total time spent at site.
- Archaeological findings, if any.
- Summary and conclusions.

The SAR short report should have the following graphics embedded in the text:

- Country map (typically Figure 1).
- Topographic map depicting recovery scene location (typically Figure 2).
- At least two photographs of recovery scene location.
- Photographs of relevant wreckage or features.
- General photograph of any work activity.

Use DPAA Laboratory Manual, Appendix 5.2 (Style Guide) to complete the report.

Enclosure 1 (Guidance for Describing Biological Material in SARs)

I1E1.0 PURPOSE & SCOPE: This enclosure provides guidance for reporting biological remains in the SAR reports. While reporting numbers or identifying remains as human is generally inappropriate within the SAR report, a reasonable description of remains as human is sometimes necessary. This guidance is relevant for SAR reports and does not apply to other types of message traffic reports (e.g., SITREP, ESR, DRI) where more strict external reporting guidelines apply.

Since this type of information may be vital during the subsequent identification process, field notes can be more detailed than what is either in the message traffic reports or in the SAR report, but not necessarily appropriate for inclusion in the SAR report.

I1E2.0 REPORTING GUIDELINES: The following guidelines and definitions apply to reporting or not reporting biological material in SAR reports.

I2E1.1 **Remains from Primary or Secondary Burials**: In either case, do not include any counts or details of specific skeletal element identifications. Additionally:

- Primary burials are defined as either relatively complete articulated skeletons or articulated portions of skeletal segments (limbs, torso, etc.). For primary burials, containing one or multiple individuals the following apply:
  - The SAR report can use the term "human remains." Within these contexts, discuss specific elements (humerus, tibia, etc.). Such field designations can be crucial information for later resolving commingling. However, do not attempt to address issues normally covered in the FAR, rather report information necessary to the SAR report but does NOT contradict the FAR.
  - Alignment and position may be described, such as left arm under head, etc.
  - Packaging of skeletal body portions is often crucial for later element identification, such as all bones from "left hand" packaged separately. Severely eroded elements may not be as identifiable without this information. It is not, however, included in the SAR report.
- Secondary burials are defined as secondary inhumations of disarticulated skeletal elements, usually within a conscribed location (i.e., a pit feature, etc.). If the remains are sufficiently diagnostic, they may be reported as "human remains." If sufficient diagnostic markers are not present on the remains, they should be termed "possible human remains." Do not include any counts.

I2E1.2 **Scattered Remains**: Scattered remains usually are the result of aircraft impacts. The following apply:

- If the remains have sufficient diagnostic characteristics, the term "human remains" can be used.
- If the scattered remains lack any diagnostic features (i.e., the remains are shaft fragments only), then the term "possible human remains" should be used.
- As with burials, do not include any counts or details of specific skeletal element identifications.

I2E1.3 **Dental Remains:** The following apply:

- Teeth having restorations may be mentioned in the report; however, ensure that this determination is made only after the teeth are cleaned.
- Do not identify any specific tooth with restoration in the report. For example, "tooth #16 has an occlusal restoration" is beyond an acceptable level of detail in the SAR report.
- Obvious dental material evidence can be termed "dental prosthesis/appliance." Do not attempt to identify the item beyond this level in the SAR report.

I2E1.4 **Miscellaneous:** The following should be considered:

- Any SRE who is uncomfortable making any sort of identification of remains or items may err on the conservative and use "possible human remains," "possible human dental remains" or "possible dental prosthesis/appliance," as appropriate.
- Consistency is required. Referring to a "primary burial" in the SAR report means that the contents of that burial cannot be described as "possible human remains" (it would have to be called a "possible burial" to be consistent in this case).
- Do not exceed your level of expertise.

SOP 2.1: UNDERWATER RECOVERY SCENE PROCESSING

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 6 February 2015
Citation: DPAA Laboratory Manual, SOP 2.1

CONTENTS

0.0 PRINCIPLE, SPIRIT & INTENT:
Underwater recovery scenes are processed in an organized manner conducive to the replication and verification of the work performed.

1.0 PURPOSE & SCOPE: This SOP provides Recovery Leader/Anthropologists (RLs) with the guidance and standards of operation needed to process underwater recovery scenes in a manner that is scientifically sound, legally defensible, and ethically above reproach.

These procedures are considered unique to underwater environments and are intended to supplement those outlined in DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing). SOP 2.0 is not restated throughout this document, unless it is superseded and/or contradicted due to any special requirements unique to underwater environments.

Deviations and exclusions from, and/or additions to, this SOP are permitted in exceptional circumstances and, if applicable, only when technically justified, authorized, and accepted by Laboratory Management or the customer (e.g., consult cases, see below) **(A5.4.1)**. The circumstances, as well as information on specific field conditions, including environmental conditions, are thoroughly documented. Where relevant, a statement of compliance/non-compliance with the requirements and/or specifications of this SOP is provided **(A5.10.3.1a, A5.10.3.1b)**. In the absence of specific procedures, or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 GENERAL PRINCIPLES & THEORETICAL FRAMEWORK: Underwater recovery scenes are locations where human remains and associated material evidence (e.g., identification media, personal effects, aircraft and vehicle debris, data plates from mechanical parts, military hardware, clothing) have been, or are believed to be, deposited beneath a body of water (e.g., rivers, lakes, reservoirs, oceans), or which otherwise require hydrographic survey, life-support breathing apparatus, and/or dredge/airlift sediment removal tools to effect their documentation and recovery. Associated materials include, but are not limited to, identification media, aircraft and vehicle debris, data plates from mechanical parts, military hardware, clothing, and personal effects.

DPAA processes underwater recovery scenes using a unique blend of archaeological and criminal investigative methods and techniques. Evidence recovered typically has been deposited many years ago. Consequently, most sites require excavation using archaeological techniques. Likewise archaeological principles provide the basis for interpretation of the context in which remains are found, and permit the association of material evidence and/with remains to a loss incident in a scientifically sound manner. All underwater recovery scenes, whether related to a criminal case or not, must be treated as analogous to a crime scene and managed according to the appropriate forensic principles and procedures that provide for the security of evidence and maintenance of the chain of custody.

Underwater archaeology is an unavoidably destructive process. Through the collection and removal of evidence from recovery scenes, actual spatial relationships and associations between transportable and non-transportable evidence are permanently lost. All DPAA recovery scene personnel have the responsibility for ensuring that the loss of these physical relationships is mitigated as far as possible **(A5.4.1)**. Accordingly, the goals of any operation are:

- To select a strategy that maximizes data recorded and physical evidence recovered from a scene in order to minimize the loss of physical evidence and other pertinent data.
- To establish and fully document the context in which all evidence is found. The recording of all spatial and contextual associations should be such that any subsequent identification process is not hindered or compromised.
- To recover all relevant evidence from the recovery scene.
- To secure, store and stabilize evidence from the point of its recovery to its accession to the CIL.
- To maintain a chain of custody through documentary and photographic records that links the recovered evidence to the recovery scene.
- To ensure that the evidence is safely and securely transported to the CIL.

Successful attainment of these goals ensures that the DPAA can demonstrate, post-operation:

- Any direct associations between physical evidence and a recovery scene.
- The association of non-biological evidence to any potentially recovered individuals.
- The formation processes and event history of not only the loss incident, but all subsequent activity at that recovery scene.

3.0 RECOVERY PERSONNEL: DPAA, in conjunction with military dive detachments, performs survey, testing and evaluation, and recovery operations in a variety of underwater environments. Accompanied by a RL, the remaining team members are comprised primarily of active duty military personnel led by a Team Leader (TL) and an Assistant Team Leader (ATL) **(A4.1.5a)**.

Additionally, all diving related activities are overseen by a qualified Watchstation Diving Officer and/or Master Diver, as per U.S. Secretary of the Navy Instruction and the U.S. Navy Dive Manual (Rev. 5). For brevity, these sources are hereafter cited as simply SECNAV Instruction and the Navy Dive Manual, respectively. A minimum personnel matrix for an Underwater Investigation Team (UIT) as well as for an Underwater Recovery Team (URT) is presented below and in Annex A (UIT/URT Personnel) of this SOP.

3.1 **Underwater Investigation Team (UIT):** An Underwater Investigation Team (UIT) is typically comprised of a DPAA TL, RL, and ATL, with a contingent of augmentees from an active duty dive detachment capable of manning a military dive side. UIT personnel are also crosstrained in the use of various remote-sensing technologies, such as side-scan sonar, magnetometry, and remote and/or automated underwater vehicles. In addition a Dive Medical Technician and Explosive Ordnance Disposal (EOD) Diver are required. Examples of dive detachments commonly tasked include, but are not limited to:

- U.S. Army 7th Engineer Detachment (Dive), 29th Engineer Battalion (Topographic).
- U.S. Navy Mobile Diving and Salvage Unit—One.
- U.S. Navy Mobile Diving and Salvage Unit—Two.

3.2 **Underwater Recovery Team (URT):** An Underwater Recovery Team (URT) is typically comprised of a DPAA TL, RL, and ATL, with a contingent of augmentees from an active duty dive detachment that is capable of manning a military dive side for underwater operations involving salvage and construction. In addition a Dive Medical Technician, Explosive Ordnance Disposal (EOD) Diver, and a Combat Camera Diver are required. Examples of recommended detachments include, but are not limited to:

- U.S. Navy Mobile Diving and Salvage Unit—One.
- U.S. Navy Mobile Diving and Salvage Unit—Two.
- U.S. Navy Underwater Construction Teams.
- U.S. Navy Consolidated Divers Unit.
- U.S. Navy Experimental Diving Unit.
- U.S. Navy Submarine Development Squadron.

3.3 **Personnel Qualifications & Responsibilities:** Planning and assembling the above teams involves assigning the personnel to the specific requirements of the operation at hand based on their respective qualifications and experience, per the Laboratory Manual, SECNAV Instruction, and the Navy Dive Manual. Typical duty positions for a UIT and URT include:

3.3.1 **Recovery Leader/Anthropologist (RL):** The RL is a DPAA civilian employee who works with a variety of teams. RLs work directly under the Laboratory Director and for the Scientific Director.

The RL is the technical and subject matter expert for archaeological operations and is thus responsible for all aspects of survey, testing and evaluation, and/or recovery. The RL ensures that this work is conducted to the highest possible scientific standard. The RL makes all of the scientific and technical decisions related to the recovery scene and all procedures that may impact the scientific integrity of the recovery.

In addition to the duties and responsibilities outlined in SOP 2.0, the RL, if required to dive with the military dive detachment supporting the underwater operation, must be qualified in accordance with SECNAV Instructions and the guidelines set forth in the Navy Dive Manual. This means a minimum qualification of SCUBA Diver (CIN A-433-0023) or Second Class Diver Course (CIN A-433-0022, MASL P179101), which is also known by the rate ND (i.e., Navy Diver).

Law enforcement agencies occasionally request DPAA support to recover evidence from underwater scenes believed to be associated with a crime (e.g., when bodies, vehicles, and/or weapons used in criminal activity have been dumped in a body of water). The DPAA can also provide support in the recovery of victims from mass fatality incidents, such as overwater aircraft crashes or natural disasters. Such cases are deemed consult cases and their management is detailed in DPAA Laboratory Manual, SOP 1.8 (Consult Case Management). RLs assigned a consult case should review SOP 1.8 once assigned a consult case.

Note: No underwater recovery activities or investigations, or related underwater activities or investigations, are conducted unless a CIL RL trained in underwater recovery is present.

3.3.2 **Team Leader (TL):** The TL is the ranking military team member responsible for the following:

- Overall team safety.
- Movement of personnel.
- Budgeting.
- Communications with embassy officials.
- Negotiating with foreign officials.

The TL typically holds the military grade of an O-3 or higher. TLs involved in underwater operations should be graduates of the Basic Diving Officer Course (CIN A-4N-0024, MASL P179148). When underwater operations are not underway, the TL is considered the ranking Safety Officer. The TL is under the direction of the J-3 (Operations Officer) during deployments.

3.3.3 **Assistant Team Leader (ATL):** The ATL (usually the military grade of E-6 or higher; also known as the Team Sergeant) is the foreman of the recovery operation. ATLs are responsible for the following:

- Controlling the rank and file team members.
- Creating and maintaining safe work conditions.
- Ensuring that proper archaeological tools and equipment are available throughout the operation.

On dive watchstation (see below), the ATL works in conjunction with the Master Diver. The DPAA ATL is under the authority of the DPAA TL and assumes his/her duties in their absence.

3.3.4 **Watchstation Diving Officer (WDO):** The WDO is responsible for the safe and successful conduct of daily diving operations. The WDO is responsible for the following:

- Overall supervision of diving equipment, systems, and operations.
- Ensuring strict adherence to the procedures and precautions set forth in the Navy Dive Manual.

A qualified WDO or Master Diver (MDV) may be assigned WDO duties. While the dive watchstation is in operation, the ranking WDO and/or MDV are the leaders ultimately responsible for dive safety, per SECNAV Instructions and the guidelines set forth in the Navy Dive Manual.

3.3.5 **Master Diver (MDV):** The MDV is the most qualified person on the dive watchstation and is responsible for supervising air and mixed-gas diving operations, as well as recompression treatments. The MDV is ultimately responsible, via the WDO, for the following:

- The safe conduct of all phases of diving operations.
- Managing both preventive and corrective maintenance on diving equipment, support systems, salvage tools and machinery, handling systems, the recompression facility, and rescue equipment.
- Appointing dive supervisors from qualified enlisted personnel.
- Overseeing the efforts of dive supervisors and providing advice and technical expertise.
- Relieving (if circumstances warrant) any diving supervisor and assuming control of the dive watchstation.
- Assume the duties and responsibilities of a WDO, in the event of the WDO's absence from the dive watchstation.

Leadership Responsibilities: Leadership during underwater operations is balanced between the TL, RL, ATL, WDO, and MDV. The RL is responsible for developing and organizing all aspects of an effective recovery strategy, in order to maintain the overall scientific integrity of the operation and its results. The TL, ATL, WDO, and MDV typically handle the discipline of military team members, make purchases with unit funds, make arrangements for travel, etc. The RL cooperates with the team leadership in ensuring safe working conditions and freely communicates safety concerns to team leadership and members. Regular communication and planning among these leaders is essential to a successful mission.

3.3.6 **Remainder of the Team:** Ideally, remaining team composition is tailored to best fit the circumstances of the operation at hand. Typically, the remainder of the team consists of the following personnel:

- Dive Medical Technician.
- Explosive Ordnance Disposal (EOD) Diver.
- Underwater Combat Camera Photographer.
- Life Support Investigator (LSI).
- Linguist.
- Mortuary Affairs Specialist

4.0 RECOVERY SCENE PROCESSING: The following are the procedures for underwater recovery scene processing which are presented in approximate chronological order.

4.1 **Mission Planning & Pre-Deployment:** Missions that involve dive operations are inherently risky. Therefore, planning is essential in order to optimize the safety, capability, and overall success. Planning should take place prior to departure and data should be checked and updated constantly to allow the team to arrive at the project area with current and detailed background knowledge for the task at hand. Team members should still be prepared, however, to face actual on-the-ground conditions that differ from the original expectations developed. Mission planning includes, but is not limited to, the following:

4.1.1 **Background Research:** Background research constitutes the foundation upon which archaeological operations are planned. Arrival at any recovery scene location, whether the current project is intended as a preliminary survey or a full-scale excavation, must be preceded by thorough research into the background of the case at hand. RL background research should be directed at:

- Gaining the fullest possible understanding of the circumstances of loss, the location and other physical aspects of the site, and how all of these variables ultimately affect recovery strategy, methods, and techniques. This research should include, at a minimum, a review of the standard recovery packet supplied by the R&A Section. In addition, other sources of information may be reviewed, as deemed necessary.
- Understanding local statutes and regulations. In many countries (including the U.S. and the past trust territories) there are statutes, regulations, and guidelines detailing the protection and treatment of cultural resources and the possession and transport of human remains. RLs are responsible for statutory compliance, regardless of site location. RLs must also ensure that the operations section has identified local regulations and laws prior to the start of fieldwork. Lastly, RLs have the professional responsibility to cease illegal (i.e., non-compliant) field operations.

Note: When the CIL uses information supplied by any other party as part of the investigation process, it shall verify the integrity of such information. This may be done by considering the trustworthiness of the source.

4.1.2 **Defining a Search & Recovery Strategy:** An underwater search and recovery strategy should be developed by the RL. This includes a thorough review of all available information on the recovery scene, and, under some circumstances, providing a pre-deployment briefing to Laboratory Management. The RL subsequently provides the team with a pre-deployment briefing (formal or informal) on the requirements needed to successfully process the recovery scene. An underwater search and recovery strategy, at a minimum, should include:

- A clear and concise statement of the overall mission objective.
- A list of the specific operational tasks to be accomplished, as well as a brief summary of the methods, techniques, and equipment proposed for use.
- A description of the recovery scene and a dive plan deemed appropriate for the scene. This plan should be designed, in conjunction with the augmenting dive detachment, in order to maximize diver safety, capability, and effectiveness.

The nature of any dive operation must always comply with the scope of the search and recovery strategy developed by the RL.

4.1.3 **U.S. Navy Diving Environmental Assessment Checklist:** Identifying and assessing surface and subsurface (underwater) environmental conditions is the key to mitigating potential hazards for divers and support facilities. These conditions affect both the divers and topside members of a team. Some of the most important variables that must be addressed during planning include:

- Geographic location of the scene.
- Season of year and prevailing weather patterns.
- Winds and waves.
- Tides and currents.
- Air and water temperature.
- Depth.
- Visibility.
- Bottom composition.
- Flora and fauna.
- Local shipping traffic.
- Local territorial waters boundaries.

A Navy Diving Environmental Checklist is presented in Annex B of this SOP. These conditions also have direct bearing on the selection of personnel, tools, and equipment, as well as any specialized training that may be required.

4.1.4 **U.S. Navy Diving Emergency Assistance Checklist:** In any diving operation, emergency assistance may be required in the event of an accident or serious illness. Therefore sources and availability of any needed assistance, and methods for obtaining it, must be determined in advance. The location of the nearest recompression chamber and its operators, sources of local emergency transportation available (air and/or sea), and evacuation response times are required information. An example of a Navy Diving Emergency Assistance Checklist is presented in Annex C of this SOP.

4.1.5 **Special Equipment Requirements:** The proper tools and equipment are critical to success. Mission objectives and/or environmental conditions can both influence equipment requirements. A survey, for example, often requires a remote-sensing package (e.g., side scan sonar, magnetometer) while an excavation involving seabed removal should have an airlift and/or venturi dredge. Other factors that have to be considered include:

- Water temperature (which may or may not require diver thermal protection).
- Depth.
- Visibility.
- Current strength and direction.
- Bottom composition (which can dictate the use of different types of diving rigs and technologies).

Although the RL is responsible for determining what equipment is required to process each recovery scene, it is the WDO and/or MDV that select the dive rig and associated equipment, per the guidance set forth in the Navy Dive Manual. Examples of approved equipment request lists for a UIT and URT are presented in Annex D (Underwater Recovery Scene Equipment) of this SOP.

Underwater recovery scene equipment should be maintained and performance checked with these documented, as appropriate prior to deployment **(SA5.6.1.1, SF5.6.1F-38)**. Performance checks are conducted in accordance with Annex D of this SOP and DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability).

4.1.6 **Special Training Requirements:** Special training may be required based on the search and recovery strategy chosen for the scene, the proposed depth and duration of working dives, the type of work to be performed, and/or surface and subsurface environmental conditions. Dive operations that may require specialized training include, but are not limited to, the following:

- Zero visibility.
- Extreme warm and/or cold water temperatures.
- Contaminated water.
- Mixed-gas, deep diving.
- Altitude diving.

The TL and the RL should determine if conditions exist at the recovery scene that may require special training, and inform the WDO and MDV accordingly.

4.2 **Underwater Investigations:** Underwater investigations are comprised of two phases: an area reconnaissance and survey that identifies potential targets of interest and a testing and evaluation phase that determines their significance and depositional integrity. Targets of interest can include geophysical features, wreckage, and debris related to the original loss incident, biological remains, and other material evidence deemed germane to the identification process and casualty resolution. At a minimum, underwater investigations should address the following questions:

- Are there potential targets of interest within the designated search area?
- If there are targets present, are they artifacts and/or ecofacts that possibly correlate to a known loss incident associated with an unaccounted-for individual(s)?

- Are these artifacts and/or ecofacts isolated finds, or are they contained in an archaeological deposit that should be designated a recovery scene?
- If the deposit constitutes a recovery scene, what are its horizontal and, to a lesser degree, vertical boundaries?
- What is the depositional integrity (if any) of the recovery scene?

4.2.1 **Area Reconnaissance & Survey:** The first phase of underwater investigation is reconnaissance and survey. This is a non-intrusive process (i.e., not intended to disturb the actual floor of the body of water being surveyed). Only standard underwater archaeological procedures—designed to preserve the depositional integrity and maximize the recovery of data and physical evidence in its spatial context—are to be used. The following tasks may be undertaken during a typical area reconnaissance and survey:

- Locate witness, or witnesses, and bring them to the proposed survey area (if possible) for an interview.
- Use witness statements to identify a starting point and compare that location to the documentary and/or cartographic data generated by the background research into the case.
- Delineate an initial survey area based on witness statements, background research, environment, and other potentially significant factors.
- Conduct a systematic remote-sensing survey, using a differential global positioning system, acoustic imaging technology, and/or magnetometry.
- Process and interpret the data collected via remote-sensing instrumentation and identify potential targets of interest.
- Conduct diver reconnaissance to relocate and visually inspect targets of interest.
- Establish a preliminary estimate of the horizontal extent of these targets.

4.2.2 **Testing & Evaluation:** The second phase of underwater investigation is testing and evaluating the significance and depositional integrity of a target, or concentration of targets identified during the initial area survey. This is generally an intrusive process that employs subfloor techniques, such as probing, coring, and/or light sediment removal. The limited collection of evidence may be necessary in situations where there is a danger of it being disturbed or lost between the time of discovery and a future recovery activity. Only standard underwater archaeological procedures are used. The intent being to always preserve depositional integrity and maximize the recovery of data and evidence in its spatial context. The following tasks may be undertaken during the testing and evaluation of targets:

- Conduct subfloor metal detector sweep and/or probing in order to better refine the horizontal boundary of the recovery scene.
- Conduct subfloor probing, core sampling, and/or test pit excavation and trenching in order to assess stratigraphy, diagnostic formation and disturbance processes, and an estimate of the vertical boundary of the recovery scene.
- Collect a representative sample of evidence to determine the presence of biological and/or non-biological evidence that can be correlated to a known loss incident (i.e., one involving an unaccounted-for individual or individuals).
- Process and interpret all of the evidence collected to determine whether it constitutes an isolated find or an intact archaeological deposit that should be designated a recovery scene.
- Develop a plan view and profile assessment of the recovery scene perimeter, to include any intrasite patterning of evidence observed and a description of the surrounding environmental context (e.g., geology, geomorphology, hydrology, bathymetry).
- As necessary, update the pre-deployment draft of the Environmental Assessment Checklist in order to better reflect dive and work conditions at the recovery scene.

4.3 **Underwater Recovery Scene Excavations:** The excavation of recovery scenes underwater follows the spirit and intent of the archaeological principles used for terrestrial missions (i.e., the Law of Association, the Law of Superposition, and Stratigraphy). These principles are still the basic foundation that supports all relevant and accurate descriptions of evidence context. However, some of the equipment, methods, and techniques employed are unique to processing recovery scenes in underwater environments.

Underwater excavation procedures must be flexible and adaptable. The protocol for any given recovery scene is determined by the circumstances of the loss, geographic location, surface and subsurface water conditions, depth, the composition of the floor and subfloor, bathymetry, and a host of other factors. A few of the basic strategies and techniques employed are listed below.

4.3.1 **Site Location & Datum:** Where feasible, it is required to use a Global Positioning System (GPS) to determine the recovery scene location. However, no readily available positioning system can send a signal from the bottom of a body of water and communicate with a hyperbolic radio station on shore or a satellite in space. Instead, a surface buoy is used to mark the recovery scene, typically attached by a line to the site datum situated down below on the project area. The buoy is pulled into a vertical position by a diver, thus

allowing a surface swimmer to mark its location with a simple handheld GPS.

More accuracy requires the use of remote-sensing instrumentation in conjunction with Differential GPS. The horizontal position of the recovery scene can be determined using either of the above techniques.

On land the elevation of the site datum (above mean sea level) is also recorded using a GPS. With underwater scenes, however, the vertical position of the site datum would be its depth below the air-water interface, as taken by a diver with a pneumofathometer and/or an analogue or electronic depth gauge.

Note: Map datum systems are reference standards; however, being beyond the control of the CIL, the provisions of ISO 17025 do not apply **(A5.6.3.1)**. Laboratory Management monitors external agencies regarding the status of map datum systems. Problems or caveats reported by external agencies (especially the USGS Mapping Standards and the US National Map Standard) should be factored into CIL operations, as appropriate.

4.3.2 **Site Bench Mark & Datum Plane:** Bench marks used by land surveyors are typically not available inside or around bodies of water. Therefore a temporary bench mark has to be used for most underwater work. Particularly, the depth of the recovery scene below the air-water interface can change depending on surface and/or subsurface currents, season of the year, local tides, and a number of other variables.

This temporary marker should be secured into a stable, fixed object, preferably close to the air-water interface. Once in place, it can be used for taking levels and later tied into the nearest official bench mark on land.

In effect, the temporary bench mark defines the uppermost extent of datum plane (i.e., the invisible ceiling that extends out over the entire recovery scene and provides a line of reference from which bathymetric data and the levels of stratigraphic layers, structures, features, artifacts, and ecofacts can all be measured).

4.3.3 **Site Grid System:** Grid systems are ideally suited for covering large underwater areas that have a manageable terrain with minimal obstructions. In limited visibility situations, this particular system can help reduce the risk of divers becoming disoriented by providing multiple reference points throughout the recovery scene.

Underwater grid systems typically consist of a set of squares, or "units," assembled in either a rigid (i.e., interlocked units fashioned from adjustable metal scaffolding, two-inch-diameter plastic pipe, or one-inch-diameter metal gas pipe) or a flexible (i.e., iron rebar or plastic corner stakes connected by string) configuration.

Rigid grids can be problematic. It is common for distortion and/or movement to occur due to environmental and human impacts, such as shifting sands and divers accidentally knocking the grid off level with an air umbilical or a dredge hose. It also takes a great deal of time and expense to initially set up and level this type of grid system. A network of corner stakes is often easier to assemble and manage, as only the unit or units being worked at any given time require stringing and leveling.

Mapping systems that can be used effectively at an underwater scene, in conjunction with a grid, include the following:

- Perpendicular offsets, using a baseline and an underwater compass and tape.
- Triangulation and/or trilateration, using multiple fixed points, tapes, and a plumb bob.
- Planning frames, typically a 1-x-1-m square with adjustable legs, subdivided into either 10 cm or 20 cm squares.
- Tracing frames, typically a transparent 1-x-1-m sheet of rigid plexiglass with adjustable legs, used for 1:1 recordings.
- Bathymetric survey (i.e., the contour of submerged terrain) of original floor at each grid corner stake, using a plane table, stadia rod, and digital ground modeling program such as Surfer 8.0.

4.3.4 **Direct Survey Measurement System:** This mapping system is an alternative to triangulation in situations where there is a significant third dimension and a grid is not feasible. This method avoids the inherent difficulties that divers face while trying to coordinate the operation of multiple tapes and a plumb bob in midwater just to find the position of a single point.

Direct survey measurement uses multiple, fixed datum points set at various locations and elevations throughout the recovery scene. These points are all tied into each other and the master site datum. Divers then measure from any four of these points in line of sight with the object being mapped. This type of measurement is sometimes called "slant range." A computer program is then used to plot the points using 'best fit' calculations. If such a program is not

readily available, the measurements can be calculated by hand.

4.3.5 **Acoustic Mapping Systems:** Acoustic positioning systems use sonic signals to measure distances and angles between points. It is necessary to have an unobstructed line of reflection between the instrument and the object. Acoustic systems can be rendered useless at a recovery scene, however, under certain environmental conditions, such as water with high turbidity or the presence of heavy coral growth. Single and multi-beam echosounders are also useful, but are primarily for large scale mapping. As such they are not as useful for documenting the provenience of individual artifacts and ecofacts contained within a small area, such as an excavation grid.

4.3.6 **Optical Mapping Systems:** Green and blue range lasers, along with other optical illumination systems, such as Laser Line Scan (LLS) and Light Detection and Ranging (LIDAR), are useful for underwater mapping, but none of these instruments have the survey grade precision of a theodolite or a total station on land. An unobstructed line of sight between instrument and target is required in order to effectively use any type of through-water optical mapping system. Many of these systems are also limited to large scale mapping, and they are further restricted in use by depth.

4.3.7 **Excavation and Recovery Techniques:** Standard underwater excavation methods and techniques are discussed below:

4.3.7.1 **Core Samplers:** Corers are devices that gather cross-sectional samples of the floor across a recovery scene for interpreting stratigraphy. These samples assist in the understanding of site formation and/or disturbance processes, as well as any intrasite evidence patterns and concentrations present. Corers are typically either hand or mechanically-driven. A basic style of corer is fashioned from a section of rigid, plastic tube. End caps are used to secure the sample in place within the tube. At the surface the tube is cut open (longitudinally) and the stratigraphic sequence is then documented.

4.3.7.2 **Hydraulic Probe:** A hydraulic probe is a lance that uses a water jet pumped through a small-diameter conduit in order to penetrate the floor and force upward any materials contained within the subfloor sediments. This is typically only used for gross detection of deposit areas. It is not commonly employed, due to the potential for disturbing the recovery scene.

4.3.7.3 **Venturi Dredge Excavation:** A venturi suction dredge is an educting tool (perijet) that uses the venturi principle to generate suction and remove sediment and other deposited materials. This tool is powered by a water pump that forces water through the metal 'head' of the dredge at a high pressure, thus creating suction. Excavated materials pass through a flexible working hose and are captured in either a screen box, bag, or lift basket lined with one-quarter-inch wire mesh and connected to the discharge end of the dredge. If the task is only to remove overburden, no catch system is required.

4.3.7.4 **Airlift Excavation:** An airlift is a tool that uses high pressure air to create an updraft of water sufficient to remove sediment and other deposited materials. These tools are powered by a large air compressor that forces air through a high pressure hose. They typically require a secondary manifold to control airflow to the tool and are only recommended for midrange depths of operation. With an airlift excavated materials are transported to the surface where they can be screened. If the airlift is being used to remove overburden, screening at the surface may not be necessary.

4.3.7.5 **Hand Excavation:** Hand excavation uses hand tools including, but not limited to, trowels, dental picks, bamboo picks, paint brushes, and other small plastic tools, in conjunction with a modified dredge or airlift. The suction hose should be reduced in diameter for precision work and the air or water feed at the surface must be monitored closely in order to make power adjustments. Hand excavation should be employed under the following circumstances, when:

- Examining stratigraphy.
- Defining and/or examining grid unit floors and walls.
- Exposing and/or pedestaling diagnostic evidence.
- Excavating in a confined space (e.g., internal compartments of an aircraft or between coral growth) or in areas of limited subfloor depth.
- Only small amounts of the floor have to be excavated (e.g., a known burial feature) or there is a strong *a priori* suspicion that evidence will be encountered.
- Excavating complex structures and/or features.

4.3.8 **Excavate to Sterile Strata:** A sterile stratum is defined as being free of significant incident-related wreckage, life-support equipment, personal effects, possible human remains, and/or other materials that are deemed to be contemporaneous with the event in question and therefore germane to the identification process.

4.3.8.1 **Wet Screening:** All excavated soils and sediments should be wet screened through one-quarter-inch wire mesh upon reaching the surface. Notable exceptions are when overburden caps the incident deposit or when sites lack soils/sediments. The decision to forgo screening must be supported by subsurface testing.

It is possible to secure the dredge or airlift outfall directly onto a screening platform at the surface. However, in cases where a crane is readily available, a lift basket lined with one-quarter-inch mesh is ideal, as excavated material is wet screened twice—once on its passage through the water column (i.e., from the project site to the surface) and a second time upon being transferred from the basket to a wet screening station.

Additional rules for wet screening matrix from underwater recovery scenes include:

- Thorough cleaning of matrix from corals, shells, and other encrustations.
- Breaking open all concretions and/or encrustations that have unnatural form (i.e., the shape appears consistent with something human made).
- Preventing the drying out of evidence from the time of its recovery to its discovery in the screens.

4.3.9 **Recovery & Stabilization of Evidence:** When recovering evidence from an underwater recovery scene it is crucial that it be kept in a water medium from the time of its recovery until such time that it can be assessed and stabilized for testing at the CIL.

A secured area with water tanks of sufficient volume must be arranged for the wet storage of materials recovered. The RL must evaluate all materials for evidentiary value in the field. Only materials and/or information deemed germane to the identification process should be returned to the CIL.

5.0 DOCUMENTATION: The documentation of underwater recovery scenes mirrors that of conventional land recoveries (see DPAA Laboratory Manual, SOP 2.0, Recovery Scene Processing) **(SA5.9.1.1)**. One exception, however, is the taking of fieldnotes on plastic films, such as mylar, and/or plexiglas tracing frames. The pencils and grease pens used to record notes on these surfaces are not considered permanent, unless coated over with a preservative such as krylon spray. All notes taken in pencil or grease pen on a plastic surface must be photographed immediately following every working dive, prior to their transfer into fieldbooks, maps, and other types of documentation in accordance with SOP 2.0.

Observations, data, and calculations are recorded at the time they are made, or in exceptional circumstances as soon as reasonably possible, and are identifiable to the specific task to ensure accurate and pertinent data **(A4.13.2.2)**.

6.0 SURETY: All documentation, including field notes and photographs, that is relevant to processing a recovery scene is peer reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review) and is subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits). The maintenance, performance checks, and serviceability of key remote-sensing survey equipment are discussed in Annex D (Underwater Recovery Scene Equipment).

Uncertainty of measurement is reported in accordance with DPAA Laboratory Manual, SOP 4.0 (CIL Surety) when it may have a significant impact on traceability regarding the processing of the recovery scene.

Where applicable, a statement on the estimated uncertainty of measurement and/or information on uncertainty is needed when it is relevant to the validity or application of the field results, when a customer's instruction so requires (see DPAA Laboratory Manual, SOP 1.8, Consult Case Management), or when the uncertainty affects compliance to a specification limit **(A5.10.3.1c)**.

In general, if the underwater recovery scene cannot be easily located in subsequent missions, then uncertainty of measurement should be addressed in the field notes and SAR.

7.0 SAFETY: Diving operations are inherently risky. Consequently, safety is an issue that receives considerable attention during both the planning and operational phase of any recovery. UITs and URTs include a Safety Officer and a Watchstation Safety Officer. Trained medical personnel are also present to help create and maintain safe working conditions.

- **Inclement Weather:** Diving must be temporarily suspended during inclement weather involving electrical storms, heavy winds and waves, zero visibility, unusual tides and currents, or any other environmental conditions at the surface that, in the opinion of the WDO, MDV, or Diving Supervisor, may jeopardize the safety of divers or topside personnel.
- **Surface/Subsurface Vessel Traffic:** The presence of surface and/or subsurface vessels, such as boats and submersibles, can be serious problem for divers in the water. It may be necessary to close off an area or otherwise limit the movement of

such vessels around the recovery scene. At any time that diving operations are being conducted topside support should always be flying signal flags indicating divers are in the water (i.e., a civilian Sport Diver flag and a military Code Alpha). Approaching vessels can also be notified by radio that divers are in the water. All hazards associated with vessel traffic are intensified under reduced visibility surface and/or water conditions.

- **Cranes and Heavy Lift Operations:** Various heavy lifting operations involving a crane, cables, baskets, etc., pose a risk to both divers and topside personnel. The following precautions are taken:

  - Clear communications between divers and topside are required in order to properly direct crane operations in a safe and efficient manner.
  - Divers should ensure that they and their life-support equipment (breathing apparatus) are free and clear of all crush and/or entanglement hazards before signaling the crane the commence lifting.
  - Topside personnel receiving baskets at the surface should have a direct line of sight to the crane operator and they should never allow the basket to pass overhead.
  - Hard helmets are required for the above personnel during a lift.
  - Underwater lift bags fall into the category of heavy lifting and they should always have fully-functional safety (dump) mechanisms and be operated by experienced personnel.

- **Multi-Point Mooring Systems:** A stable topside dive support platform is required, particularly with surface-supplied diving. Work platforms must be capable of setting in a three- or four-point mooring system and be monitored closely throughout each dive rotation for shift or movement. A platform that breaks free of its moorings poses a serious hazard to surface-supplied divers. The legs of this type of mooring system are typically large gauge metal cables that are often under heavy strain and thus may pose a risk to topside personnel on the platform.
- **Water Temperature:** Hypothermia/hyperthermia are the two greatest safety risks associated with water temperature, and both can result in death. Warm and cold temperature can negatively affect divers working in the water. A diver's physical condition, body fat, and thermal protection all play a role in determining safe limits of exposure time. While working in extremely warm conditions (>88°F) divers can experience weight losses in excess of 15 lbs, due to fluid loss. This causes mental and/or physical disorientation, and in some cases a loss of consciousness. In cold water (<70°F) diver ability to work and concentrate decreases rapidly. Wet suits (65°-80°F), dry suits (40°-65°F), and hot water suits (<40°F) should be employed in order to protect divers.
- **Water Visibility:** Poor visibility can significantly influence the dive and recovery techniques employed at a scene, and it can greatly increase the time required for a diver to complete a given task safely. Visibility underwater fluctuates depending on depth and turbidity. Horizontal visibility is typically good in tropical waters and can range greater than 100 feet. Generally, the visibility through the vertical water column is better than it is horizontally. Visibility is often poorest in harbors and rivers due to the presence of silts, sewage, and even industrial wastes. Agitation of the bottom, caused by divers and/or equipment, can also affect visibility (e.g., the position of a dredge outflow during excavation can reduce the visibility to zero across an entire recovery scene).
- **Water Contamination:** Biological and chemical contamination are serious hazards that may require pre-deployment consultations with various medical personnel and special protective diving rigs. Gear and equipment, as well as preventative medical procedures, are employed in a manner that gives divers the maximum level of protection consistent with the threat. In situations involving oil or fuel leakage through the water column from a wrecked aircraft, or a recovery scene that happens to be situated near a sewage outlet where biological contamination is high, there are special resources and technical advice in the U.S. Navy's *Guidance for Diving in Contaminated Waters*, SS521-AJ-PRO-010.
- **Flora/Fauna:** Underwater recovery scenes are often inhabited by a wide variety of unfamiliar and potentially dangerous organisms. Examples include fire corals, venomous snakes and fishes, and large predatory species of marine life. Steps taken to reduce the risk of encounter and injury include:

  - Chafing gear and coveralls should cover most of the body in order to minimize skin contact with corals and plants, and rugged gloves should cover the hands and preferably the wrists.
  - Special precautions such as full-face masks, helmets, and 'bang sticks' may be necessary for some scenes.
  - Contact with unfamiliar underwater organisms (including their handling and/or consumption) is generally prohibited.

- **Bottom Composition:** The type of bottom, or floor, may have a significant impact on the ability of a diver to move and work efficiently and safely at a recovery scene. Advance knowledge of

bathymetry (terrain), any underwater obstructions present, and the composition of the bottom (i.e., sand vs. silts) is critical to the selection of the best dive rig and technique. This information also helps the team anticipate possible hazards. Bottom conditions have the greatest affect on visibility and diver mobility at the recovery scene.

- **Diving Related Injuries:** There are a number of potential injuries related to diving. These include:

  - Drowning.
  - Thermal injuries (hypothermia and hyperthermia). Barotrauma.
  - Central nervous system toxicity.
  - Carbon dioxide and carbon monoxide toxicity.
  - Decompression sickness.
  - Lung overpressure (air embolism).
  - Mechanical injury (punctures, abrasions, lacerations, etc.) from wreckage and other sharp objects or from tools being used at a recovery scene.

- **Underwater Construction Dives:** Underwater construction is the construction, inspection, repair, and removal of in-water support facilities and structures, such as a stabilization cradle for a submerged aircraft or shipwreck. The safety considerations are numerous and such work often requires special diving rigs, techniques, training, and equipment. References for underwater construction should be consulted by experienced personnel prior to attempting such work at a recovery scene. Some of these sources are the *UCT Conventional Inspection and Repair Techniques Manual* (NAVFAC P-990) and *Expedient Underwater Repair Techniques* (NAVFAC P-991). Safety procedures during the construction and installment of structures needed at a recovery scene must be tailored to meet the special requirements of that particular scene.
- **Enclosed Space/Wreckage Dives:** Diving and working inside enclosed or confined spaces, such as in and around aircraft wreckage, requires the use of a surface-supplied breathing apparatus. Some acceptable rigs include the MK20 MOD 0 (Aga Mask), the EXO BR MS (Full Face Mask), and/or the MK21 MOD 1 (Superlight). An Emergency Gas Supply (EGS) is also required for all enclosed spacing diving. As the risk of disorientation and entrapment is greater in enclosed and/or confined space diving, it is critical that divers are not using a finite air sources, such as SCUBA. In addition to the EGS, it is recommended that low-visibility navigation lines be used, along with a buddy diver positioned outside the enclosed area to help tend the umbilical of the working diver. Appropriate safeguards must be employed during this type of diving in order to prevent entrapment.
- **Mixed-Gas and Saturation Dives:** On occasion, recovery scenes may require diving operations at depths in excess of 200 feet below surface. Mixed gas, instead of air, may have to be used in these situations, depending on the depth and the optimal bottom time needed to efficiently complete the job at hand. Depth and the duration of a dive are the two key factors to consider when selecting both diving personnel and apparatus, as they impact the overall decompression profile of any dive. In certain instances, the depth and duration may preclude standard decompression diving and saturation dives may be necessary. This is highly-specialized diving involving mixed gases, qualified divers, a saturation system, and a greater number of topside support personnel. This is one of the most dangerous diving techniques and it should only be performed when circumstances warrant.
- **Altitude Dives:** Hypoxia and decompression sickness are serious concerns in altitude diving. Diving in bodies of water at higher altitudes requires the use of specialized decompression tables adjusted to address the effects of atmospheric pressures that may be much lower than those at sea level. U.S. Navy Air Decompression Tables are not authorized for use at altitudes greater than 300 feet above mean sea level without corrections. Transporting the divers out of the site area by land or air may also have to be considered if it involves movement into even higher elevations.
- **Airlift/Dredge Sediment Removal:** Excavation into the substrate at a recovery scene may cause its destabilization and result in shifts, slump, or a total collapse. These situations, coupled with the use of high-pressure hydraulic tools (e.g., probes, corers, airlifts, dredges), pose a danger to divers. Should a tunnel, trench, or excavation wall suddenly collapse, a diver can become buried and immobilized. Therefore, all sediment removal operations using hydraulic tools must be carefully planned and executed and only by experienced dive personnel. Communications between the diver on the recovery scene and topside support personnel are also required during these operations. It is further recommended that surface-supplied, rather than self-contained, breathing apparatus be used. In some cases, stabilization cradles, cofferdams, and/or caissons may have to be employed in order to mitigate the threat of collapse.
- **Equipment Hazards:** Equipment-related electric shock and explosions can result in serious injury and even death. Shock hazards are present when using electric welding or other power equipment underwater. The following precautions are taken:

- Electrical equipment should be in good repair and inspected before diving.
- Electric umbilicals need to be protected to reduce the risk of being abraded or cut when pulled over sharp wreckage and/or natural features such as coral growth.
- Rubber suits and gloves are recommended when working with this equipment.
- Unintentional explosions are also a possibility with certain types of welding and cutting torches, as gas can build up in confined working spaces and be accidentally ignited by the torch.

Annex A (UIT/URT Personnel) (A4.1.5a)

A1.0 PURPOSE & SCOPE: This annex provides guidance to ensure that appropriate personnel are tasked for both UITs and URTs.

In certain situations augmentees may have to be used to fill a position typically filled from within the DPAA—e.g., Linguist, Explosive Ordnance Disposal Diver, and/or Life-Support Investigator.

Additional personnel may be required for missions to Southeast Asia, usually a second Linguist and/or LSI.

A2.0 UIT PERSONNEL: The following matrix is considered the minimum team for an underwater investigation conducted by the DPAA.

DPAA Personnel:

- 1 Team Leader
- 1 RL
- 1 Team Sergeant
- 1 Linguist (Southeast Asia; 2 Linguists)
- 1 Explosive Ordnance Disposal Diver
- 1 LSI (Southeast Asia)

Military Dive Detachment Augmentees:

- 1 Watchstation Dive Officer and/or Master Diver
- 1 Dive Medical Technician
- 1 Small Boat Operator (Bosun's Mate, etc.)
- 3 Divers crosstrained in remote-sensing operations (e.g., side-scan sonar, magnetometry, ROVs and/or AUVs).

A3.0 URT PERSONNEL: The following matrix is considered the minimum team for an underwater recovery conducted by the DPAA.

DPAA Personnel:

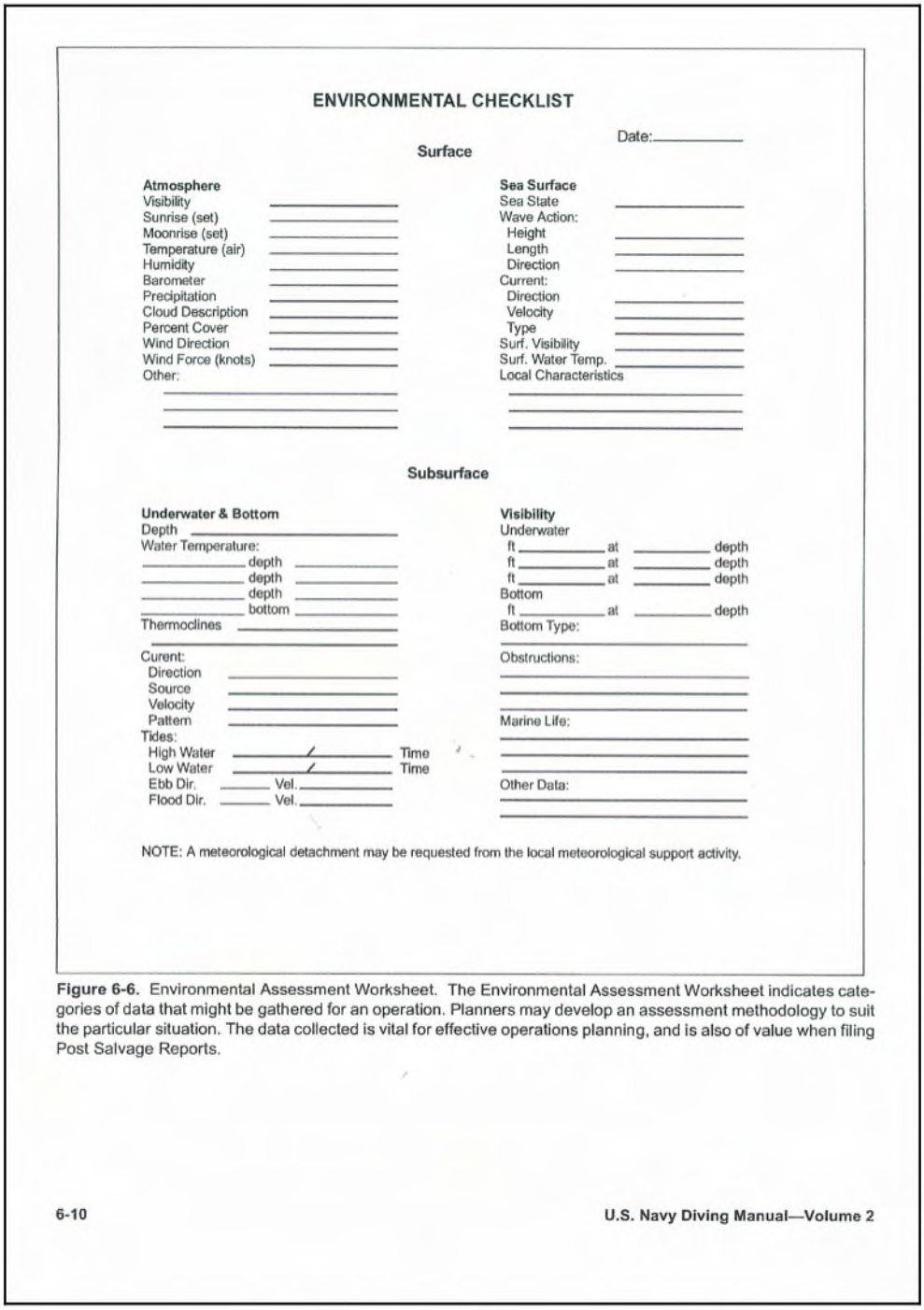
- 1 Team Leader
- 1 RL
- 1 Team Sergeant
- 1 Linguist
- 2 Explosive Ordnance Disposal Divers
- 1 LSI (Southeast Asia)
- 1 Topside Photographer

Military Dive Detachment Augmentees:

- 1 Watchstation Dive Officer
- 1 Master Diver
- 1 Dive Medical Technician
- 1 Combat Camera Underwater Photographer (strongly recommended to provide underwater photographs of evidentiary quality during recovery scene processing)
- 12 Salvage Divers

Annex B (U.S. Navy Dive Manual Environmental Assessment Checklist)

B1.0 PURPOSE & SCOPE: This annex provides an example of a Navy Dive Manual Environmental Assessment Checklist. This document is initially completed as a preliminary document during an underwater investigation and updated during subsequent recovery efforts that may or may not span multiple JFAs.



ENVIRONMENTAL CHECKLIST

Date:_____

Surface

Atmosphere
Visibility _____
Sunrise (set) _____
Moonrise (set) _____
Temperature (air) _____
Humidity _____
Barometer _____
Precipitation _____
Cloud Description _____
Percent Cover _____
Wind Direction _____
Wind Force (knots) _____
Other:
_____
_____
_____

Sea Surface
Sea State _____
Wave Action:
Height _____
Length _____
Direction _____
Current:
Direction _____
Velocity _____
Type _____
Surf. Visibility _____
Surf. Water Temp. _____
Local Characteristics
_____
_____
_____

Subsurface

Underwater & Bottom
Depth _____
Water Temperature:
_____ depth _____
_____ depth _____
_____ depth _____
_____ bottom _____
Thermoclines _____
_____
Curent:
Direction _____
Source _____
Velocity _____
Pattern _____
Tides:
High Water _____/_____ Time
Low Water _____/_____ Time
Ebb Dir. _____ Vel. _____
Flood Dir. _____ Vel. _____

Visibility
Underwater
ft _____ at _____ depth
ft _____ at _____ depth
ft _____ at _____ depth
Bottom
ft _____ at _____ depth
Bottom Type:
_____
Obstructions:
_____
_____
_____
Marine Life:
_____
_____
_____
Other Data:
_____
_____

NOTE: A meteorological detachment may be requested from the local meteorological support activity.

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Figure 6-6. Environmental Assessment Worksheet. The Environmental Assessment Worksheet indicates categories of data that might be gathered for an operation. Planners may develop an assessment methodology to suit the particular situation. The data collected is vital for effective operations planning, and is also of value when filing Post Salvage Reports.

Annex C (U.S. Navy Dive Manual Emergency Assistance Checklist)

C1.0 PURPOSE & SCOPE: This annex provides an example of a Navy Dive Manual Emergency Assistance Checklist. This document is initially completed prior to the deployment of an underwater operation that plans to conduct dives (i.e., one that involves Phase II Testing and Evaluation and/or Phase III Recovery). Any changes in the emergency action plan or points of contact that occur during the course of a mission should be updated on this checklist as well.

EMERGENCY ASSISTANCE CHECKLIST

Location	Location
Name/Phone Number	Name/Phone Number
Response Time	Response Time
AIR TRANSPORTATION	**COMMUNICATIONS**
Location	Location
Name/Phone Number	Name/Phone Number
Response Time	Response Time
SEA TRANSPORTATION	**DIVING UNITS**
Location	Location
Name/Phone Number	Name/Phone Number
Response Time	Response Time
HOSPITAL	**COMMAND**
Location	Location
Name/Phone Number	Name/Phone Number
Response Time	Response Time
DIVING MEDICAL OFFICER	**EMERGENCY CONSULTATION** **Duty Phone Numbers 24 Hours a Day** **Navy Experimental Dive Unit (NEDU)** Commercial (850) 234-4351 (850) 230-3100 DSN 436-4351 **Navy Diving Salvage and Training Center (NDSTC)** Commercial (850) 234-4651 DSN 436-4651
Location	
Name/Phone Number	
Response Time	

Figure 6-22. Emergency Assistance Checklist.

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Annex D (Underwater Recovery Scene Equipment) (A5.5)

D1.0 PURPOSE & SCOPE: This annex describes essential underwater recovery scene equipment. Additional information dealing with the storage, transport, field use, and functions of this equipment is provided. Maintenance procedures and surety and safety considerations are summarized to guide field operators in the proper functioning of this equipment and to prevent its misuse or deterioration.

Provisions in this annex parallel those in DPAA Laboratory Manual, SOP 3.2 (Measurement and Observation Traceability), as appropriate and applicable. SOP 3.2 should be consulted in the event additional guidance pertaining to equipment is required.

Essential underwater recovery scene equipment is defined as that which requires special maintenance (e.g., mechanical cleaning and upkeep, software updates) and/or performance checks in order to ensure the equipment is providing accurate measurement data during recovery scene processing.

As such, other equipment commonly used at such scenes (e.g., airlifts, dredges, lift baskets, pumps, screens) and underwater life-support apparatus and equipment maintained outside of the DPAA by dive detachments (e.g., all air and mixed gas systems, diving rigs, portable recompression chambers) does not meet these criteria and therefore are not addressed. Essential recovery scene equipment (hereafter referred to as "underwater equipment") discussed in this annex includes, but is not limited to:

- Garmin Ltd. Handheld Global Positioning System (GPS) receivers (various models, including "GPS IIIplus," "GPSmap 60CS," "276c Navigator") and associated Garmin "MapSource" navigational software programs.
- Trimble Navigation Ltd. "Pathfinder ProXRS" Differential Global Positioning System (DGPS) receiver with capability to receive signal enhancement via ground-based transmitters or commercial satellites.
- Marine Sonic Technology Ltd. (MSTL) "Centurion" and "Neptune" Side-Scanning Sonar Systems and associated MSTL "SeaScanPC" and "SeaScanPC Review" software programs, with towfish of various frequencies, and JRC GPS receiver.
- Geometrics Inc. "G-882" Cesium Vapor Marine Magnetometer System and associated Geometrics "MagLogNT"/"MagLogLite," "MagMap," and "MagPick" software programs, used in conjunction with Garmin GPS receiver and/or Trimble Pathfinder ProXRS Differential Global Positioning System (DGPS) receiver with capability to receive signal enhancement via ground-based transmitters or commercial satellites.
- Coastal Oceanographics Inc. "HYPACK MAX" hydrographic survey software program, used in conjunction with Garmin GPS receiver or Trimble Pathfinder ProXRS Differential GPS (DGPS) receiver with capability to receive signal enhancement via ground-based transmitters or commercial satellites.
- Chesapeake Technology Inc. "SonarWeb PRO" sonar processing and mosaicking software program.
- Nobeltec "Tides & Currents Pro" tides and tidal currents prediction software program.
- U.S. Army Topographic Engineering Center/National Geospatial Intelligence Agency "Geographic Translator" coordinate conversion software program.
- Blue Marble Geographics "Geographic Calculator" coordinate conversion software program.
- VideoRay "Scout" remotely operated vehicle (ROV) system.

D2.0 GENERAL PROCEDURES: Measurements are usually necessary in recovery scene processing and they must be traceable as to their accuracy and reliability. As such, the following guidance pertains to underwater equipment used by the CIL **(A5.5.1)**:

- Underwater equipment is normally controlled by the CIL. In those cases where the CIL needs to use equipment outside its permanent control, it ensures that the requirements of this annex are met **(A5.5.1)**.
- Underwater equipment and its software used for fieldwork are capable of achieving the accuracy required and must comply with specifications relevant to the field problem at hand **(A5.5.2)**.
- Each item of underwater equipment and its software used for testing are, when practicable, uniquely identified **(A5.5.4)**.
- Underwater equipment is performance checked (see below) and operated by authorized personnel. Current instructions on the use and maintenance of these instruments (including any relevant manuals provided by the manufacturer) are readily available for use by the appropriate personnel. Special training for operating/handling underwater equipment is conducted according to the manufacturer's manuals, prior to its use. Such training may be part of the Competency Program outlined in DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education) **(A5.5.3)**.

- All underwater equipment, including that for subsidiary measurements (e.g., assessing environmental conditions) affecting, or potentially affecting, the accuracy and therefore the validity of the result is performance checked before use **(A5.6.1, A5.6.1.1, SF5.6.1F-38)**. Specifics of performance checks are included in DPAA Laboratory Manual, SOP 2.0, Annex C (Recovery Scene Equipment).

D3.0 UNDERWATER EQUIPMENT PROCEDURES: When not in use, the above equipment is stored at the CIL. The following section provides a brief description for each instrument, its associated operating system and/or software package, and any maintenance and/or performance check requirements that may exist. In addition, the appropriate user's manual for each is located in the CIL Library.

D3.1 **Garmin Handheld Global Positioning System (GPS) Receivers:** Garmin handheld GPS receivers are used to provide the geographical location of the recovery scene and its components. They may also be used to map the perimeters of large recovery scenes.

The Garmin GPS receivers require communication with at least three satellites to be able to triangulate and determine its position, but they are most effective when tracking at least five. Field, weather, terrain, vegetation, and, at times, host government restrictions may prevent use of GPS receivers at certain locations. Performance check procedures include initialization of the receiver to the geographic region in which it is used, when required. Periodic performance checks against similar devices are recommended in order to ensure that received navigational data is accurate.

D3.2 **Trimble Navigation Ltd. Pathfinder ProXRS Differential Global Positioning System (DGPS):** The Trimble ProXRS DGPS is used to provide the location of recovery scenes. It is designed with the capability to receive signal enhancement via ground-based transmitters or commercial satellites, in order to achieve greater accuracy than with uncorrected GPS receivers. This can be significant when attempting to relocate certain targets of interest, or groupings of targets underwater, as depth and visibility severely restrict the investigative abilities of a diver.

Trimble DGPSs come with an operating system as well as their own navigational and positional data post-processing software. However, DPAA typically uses the ProXRS receiver unit only, and integrates it into its magnetometer configuration.

Performance check procedures include any required initialization of the receiver to the geographic region in which it is used, and ensuring that any differential signal corrections are being recognized and applied by the receiver. Periodic performance checks against similar devices are recommended in order to ensure that received navigational data is accurate.

D3.3 **Marine Sonic Technology Ltd. Side-Scanning Sonar Systems:** A towed side-scan sonar system allows the user to make acoustic images of the bottom surfaces within a body of water, capturing the relief of this terrain (bathymetry) and any other objects (biological and/or non-biological) that may have sufficient enough profile above the floor to be detected. The sonar also has the capability to integrate with a positioning and navigation system, such as GPS and DGPS.

The MSTL systems employ an integrated JRC 12-channel Marine GPS receiver. Transducers of variable frequencies may be used (MSTL typically manufacturers towfish using transducers of 150, 300, 600, 900, and 1200 kiloHertz). Side-scanning sonar typically operates in conjunction with collection and reviewing components that have their own software.

MSTL's SeaScanPC software program functions as the data collection program and allows the user to note the transducer frequency employed and to adjust the signal range settings, time-varied gain settings, offset and layback computations, and to add annotations or markers to the sonar records. MSTL's SeaScanPC Review software program provides a means of reviewing the data on a computer other than the processing unit employed during the data collection.

There are no performance check procedures required for using this system, however, proficiency is required regarding which transducer frequency, altitude, range setting, and gain setting are best-suited for each specific survey environment. A topside rub-test of the transducers is recommended prior to each use of the system in order to ensure they are functioning properly.

All cable connections should be connected as specified by the manufacturer. The navigational data received via the GPS should be periodically compared to that of a separate device to ensure the received data is accurate. Safety procedures include operating within acceptable environmental conditions, employing an appropriate cable management system, and ensuring clear communication between the boat driver, cable/towfish tender, and sonar analyst.

D3.4 **Geometrics Inc. G-882 Cesium Vapor Marine Magnetometer System:** The G-882 towed marine magnetometer system allows the user to detect ferrous anomalies and measure relative magnetic intensity over the surface and beneath the floor of a body of water. Readings could indicate deposits of wreckage and/or other material evidence associated with a recovery scene.

Magnetometer systems typically operate in conjunction with a software program that collects the data in the field, and a software program that assists in the processing and interpretation of the data being collected. The G-882 uses Geometrics' MagLog NT or MagLogLite software for data collection, and Geometrics' MagMap and/or MagPick software for processing and rendering the collected data for analysis.

Performance checks include rotating the sensor to the appropriate attitude for the magnetic region being surveyed, performance checking the depth sensor and altimeter to specific survey area conditions using the scale and bias settings and adjustment methods outlined by the unit's manufacturer, and ensuring the accuracy of any GPS or DGPS receiver employed in conjunction with the equipment (as outlined separately in the procedures for those devices).

Safety procedures include operating within acceptable environmental conditions, employing an appropriate cable management system, and ensuring clear communication between the boat driver, cable/towfish tender, and magnetometer analyst.

D3.5 **Coastal Oceanographics Inc. HYPACK MAX Hydrographic Survey Software Program:** HYPACK MAX is a hydrographic survey software program that allows the user to design survey areas and manage data collection in real time. It has the capability to interface with external navigational devices (GPS or DGPS) and bathymetric data collection devices (depth sounders). Performance check considerations include ensuring the accuracy of any GPS or DGPS receiver employed in conjunction with the software (as outlined separately in the procedures for those devices), and ensuring the accuracy of any depth sounder employed in conjunction with the software.

D3.6 **Chesapeake Technology Inc. SonarWeb PRO Sonar Processing & Mosaicking Software Program:** SonarWeb PRO is a software program that provides capabilities for the management, analysis, and mosaicking of sonar image files. Performance checks are not required, although the program does require a relatively high level of positional accuracy relative to the data being processed.

D3.7 **Nobeltec Tides & Currents Pro Tides & Tidal Currents Prediction Software Program:** Tides & Currents is a software program that uses historical data collected from specific tidal gauges at certain locations to predict tides and tidal currents within the regions of these gauges. Performance checks are not required, although accuracy in rendering predictions depends upon identifying the closest tidal gauge.

D3.8 **U.S. Army Topographic Engineering Center/National Geospatial Intelligence Agency Geographic Translator Coordinate Conversion Software Program:** Geographic Translator is a coordinate conversion software program that permits conversion between specific coordinate systems, formats, values, and datums. This software does not require performance checks.

D3.9 **Blue Marble Geographics Geographic Calculator Coordinate Conversion Software Program:** Geographic Calculator is a coordinate conversion software program that permits conversion between specific coordinate systems, formats, values, and datums. This software does not require performance checks.

D3.10 **VideoRay Scout Remotely Operated Vehicle (ROV):** The VideoRay Scout is a small, lightweight ROV that allows the user to visually inspect an underwater target, or grouping of targets, and feed the images real-time via video to the operator topside. There is no software associated with this program; however, imagery may be optionally recorded using a portable recording device.

Visibility is the limiting factor when deciding whether or not to deploy an ROV. If conditions are favorable and appropriate navigational capabilities are available, an ROV can conduct bottom surveys in areas surrounding investigative targets, be guided along pre-determined transects, and monitor work being carried out by divers.

Performance checks of ballast weight are required for properly ballasting the device. Visual inspection and performance checks are required prior to each deployment of the ROV.

D4.0 DOCUMENTATION: Records are maintained for each item of essential underwater equipment and its software that document all field tests performed. The contracted service provider performs and documents all as-needed maintenance

for equipment, including any repairs, replacement of parts and/or components, factory performance checks, cleaning, and/or software updates. Quality Assurance retains all such maintenance and service records. These records include, when applicable, the following information **(A5.5.5a-h)**:

- The identity of the item of equipment and its software.
- The manufacturer's name, type identification, and serial number, or other unique identifier.
- Checks that equipment complies with specifications.
- The current location, where appropriate.
- Dates, results and copies of reports and certificates of all performance checks, adjustments, acceptance criteria, and the due date of next performance check.
- The maintenance plan, where appropriate, and the maintenance carried out to date.
- Any damage, malfunction, modification, or repair to the equipment.

Additionally, whenever practicable, all equipment under the direct control of CIL that requires performance checks, are labeled, coded, or otherwise identified to indicate the status of the check. This documentation includes the date when the equipment item was last checked and when another check is due **(A5.5.8)**.

D5.0 SURETY: Surety is maintained through training, as-needed maintenance of equipment, and the use of appropriate forms to document the said maintenance. The provisions of this annex are subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

D6.0 SAFETY: Consult the user's manual for any safety hazards associated with the equipment listed.

Enclosure 1 (Dive Detachment Special Equipment Request Lists)

Dive detachments supporting underwater operations provide specialized equipment. The basic equipment for processing an underwater recovery scene depends on the team being deployed (i.e., a UIT vs. a URT). Some of the items listed, such as the remote-sensing instruments, may not be available at all military dive detachments; therefore, it may be necessary to purchase or lease these instruments on a project-to-project basis.

Below are suggested equipment lists for the UIT and URT. Quantities are in parenthesis and precede the item description.

Dive Detachment Equipment List (UIT):

(1) 20-Foot CONNEX
(2) F470 Inflatable Boats
(2) Honda 50 HP Outboard Engines
(4) Boat Batteries
(2) Anchors and Line
(2) Mouse Ears
(2) Plastic Fuel Cans
(1) Rubber Fuel Bladder
(1) Emergency Hyperbaric Stretcher System (EEHS)
(2) Bauer Compressors
(9) Twin 80 SCUBA Cylinders
(2) Single 80 SCUBA Cylinders
(6) SCUBA Buoyancy Compensators
(6) SCUBA Regulators w/ Octopus
(4) MK 20 Masks, SCUBA Mode (demand regulator)
(1) OTS Through-Water COMMS System (6 Pieces)
(1) OTS COMMS system battery charger set
(1) Marine Sonic Centurion SSS & 150, 300, and 600 kHz Towfish
(1) Spare SSS Computer w/ Peripherals & Cables
(1) Magnetometer Towfish w/ Peripherals & Cables
(2) Handheld GPS Receivers
(1) Differential Global Positioning System (DGPS)
(2) U/W All-Metals Detector
(1) U/W ROV (Video Ray) or Camera w/ Housing
(1) Portable 1K Generator Set
(1) Emergency Medical Kit
(1) Collapsible Canopy Shelter
(5) 5-Gallon Water Containers
(5) 5-Gallon Fuel Containers
(1) Code Alpha (Dive Flags)
(4) Surface Buoys (Large, Orange)
(2) Surface Buoys (Medium, Yellow)
(4) Life Vests
(4) Lift Bags
(2) Diver Recalls
(1) Lost Diver Buoy w/ Line
(3) Tending Lines
(24) Personal Cargo boxes
(25) Boxes of Meals Ready to Eat (MREs)
(5) Dive Bags (Personal Dive Gear/Equipment)
(10) Lead Pellet Weight Bags (30 lbs)
(1) Cargo Box (Boat Repair Parts)
(1) Pelican Case (w/ MK-20 Spare Parts)
(1) Pelican Case (w/ SCUBA Repair Parts)
(4) Carabineers
(1) Spool Parachute Cord
(1) Spool 1/2-Inch-Dia. Line
(1) Spool 1-Inch-Dia Marlin
(1) Extension cord
(5) Rolls Polykem Tape
(2) Rolls Electrical Tape
(6) Tents & 12-Inch Tent Spikes
(4) Plate Shackles
(2) Boxes, AA Batteries
(4) Boxes Chem Lites, Zip Ties, Ziploc Bags, Grease Pens, etc.

Dive Detachment Equipment List (URT): Note: Quantities requested are in parenthesis and precede the item description.

(6) MK 21 SSD Hats
(1) MK 21 Repair Parts Box
(1) MK 21 Toolbox
(4) EGS Bottles
(4) EGS Regulators
(2) Non-Return Valve Test Sets
(2) EGS Relief Valve Adjustment Sets
(1) MK 21 Tech Manual
(1) MK 21 R-Check Sheet Set
(1) MK 21 PMS
(1) MK 21 PRE/POST Dive Sheet Set
(25) MK 21 Mission Sheets
(4) Diving Harnesses
(4) Deep Sea Boots
(20) Coveralls
(8) Chaffing Gear Sets
(6) SCUBA Tanks (Twins)
(6) SCUBA Regulators w/ Octopus
(1) SCUBA Repair Kit; Spare Parts; Toolbox
(6) MK 20s (W/ Through Water Comms)
(6) Weight Integrated BCDs
(1) Set Personal Dive Gear and Dive Knife Per/Diver
(4) Sets of Diver Thermal Protection
(3) Diver Benches
(2) Hydrocom Boxes
(2) Amron Comms Boxes
(1) Ducts Camera System
(1) Camera and Comms Repair Kit
(1) Electrical Repair Kit (General)
(1) Descent Line
(2) Clumps
(10) Surface Buoys
(1) Ladder
(6) Dive Lights

(6) Compasses (Wrist or Board)
(2) Depth Sounders
(1) Medical Kit
(2) O2 Kits
(1) Stretcher
(1) Sup Kit
(1) Dive Charts Set
(1) Dive Manual
(1) Dive Sup Watches, Set
(1) Code Alpha
(2) Water Cooler
(1) Toolbox (General)
(2) Boxes of Trash Bags
(4) Tubes of Tri-Lube
(4) Wash Buckets
(3) Fox Tails
(1) F470 Boat and Cover
(1) BF40A Engine
(8) Gallons of Engine Oil
(2) Fuel Bladders
(8) Jerry Cans
(4) Paddles
(17) PFDs
(1) Anchor and Line
(2) Batteries, Marine
(1) Battery Charger
(1) Boat Sling
(2) Quarts of Gear Oil
(1) Shop Vac
(2) Gallons of Saniside
(20) Rolls of Polychem Tape
(20) Rolls of Electrical Tape
(1) Dive Bill
(1) Hazmat Spill Kit
(10) Cans of WD40
(1) Dive Side Canopy
(1) Compressor (Highstar 5000)
(1) Compressor (Mako 3000)
(1) Compressor (Portable)
(3) Charging Whips
(5) MKIII Air Racks
(1) MKIII Console
(1) MKIII Volume Tank
(3) Air Hoses W/ Reels
(2) Venturi Dredge Systems
(2) Venturi Dredge Associated Parts/Equipment Sets
(3) 3-Inch-Dia Water Pumps (25HP)
(3) Salvage Baskets
(10) Various Kevlar Slings
(25) Various Size Shackles
(25) Various Size Wire Rope Pennants
(2) Generators
(5) Extensions Cords
(5) Power Strips
(1) Hurricane
(1) LSSV
(1) 20-Foot CONNEX
(4) ISU90s
Underwater Cutting Rods and Equipment
Underwater Metal Cutting Tools (Hydraulic)
Rigging, Various Sizes and Quantities

Enclosure 2 (DPAA Equipment Lists)

The following equipment is typically utilized by the DPAA for underwater recovery scene processing. Quantities are in parenthesis and precede the item description.

DPAA Equipment List (UIT):

(1) Box Batteries (9 Volt)
(1) Box Batteries (AA)
(1) Box Batteries (AAA)
(3) Box Batteries (C)
(3) Box Batteries (D)
(2) Battery Charger
(1) Bolt Cutters
(24) Team Boxes (Black Rubbermaid)
(6) Surface Buoys (Medium; Yellow)
(4) Surface Buoys (Large; Orange)
(2) Fuel Can (5 Gallon)
(2) Water Can (5 Gallon)
(5) C-Clamps (4 Inch)
(5) C-Clamps (6 Inch)
(1) Box Chem Lites
(5) Clipboards
(2) Cold Chisel 3-Piece Set
(1) Combat Life Saver Bag
(1) Cooler (Ice Chest)
(2) Roll 550 Cord
(4) Roll Poly Grid Unit String (No Cotton String)
(1) Crowbar
(3) Box Document Protectors
(5) Box DVD RAM
(1) Box Ear Plugs
(2) Case of Engine Cleaner Bottles
(1) Roll Engineer Tape (Cloth; White)
(1) Extension Cord (Outdoor; 100 Foot)
(2) Extension Cord (Outdoor; 30 Foot)
(2) Fire Extinguisher
(2) Flashlight
(2) Funnel (Heavy Duty)
(1) 1K Generator
(1) 5K Generator
(1) Hacksaw
(5) Hacksaw Blades
(1) Hammer (Claw)
(1) Sledge (Mini, Handheld, 5-Pound)
(1) Sledge (Regular, Two Hand)
(1) Handsaw
(1) Hatchet
(1) Pack Index Cards (3x5)
(1) Pack Index Cards (5x8)
(1) Case Insect Spray Cans
(1) Label Maker
(1) Roll Label Maker Tape
(5) String Level
(10) Combination Padlocks
(3) Case WD40 Lubricant Cans
(1) Measuring Tape (100 Meter)
(1) Measuring Tape (50 Meter)
(1) Measuring Tape (25 Meter)
(1) Fuel Can Nozzle
(4) Quarts 2-Cycle Oil
(8) Quarts Engine Oil
(1) Box Paint Pens
(1) Box Paper Clips
(3) Pelican Case (Large 1650)
(2) Pelican Case (Medium)
(1) Pelican Case (Small)
(1) Box Standard Lead Pencils
(2) Box Mechanical Lead Pencils
(2) Box Grease Pencils (Black)
(1) Box Colored Pencils
(2) Box Ballpoint Pens
(2) Box Sharpie Markers
(2) Metal Planning Frames (1-x-1-Meter)
(5) Plastic Mesh Baskets (Blue)
(5) Plastic Mesh Baskets (Red)
(2) Clear Plastic Tub (24 Inches Long x 18 Inches Wide x 12-18 Inches Deep)
(10) Sheets Plexiglas (.25 Inches Thick; 12-x-12 Inches)
(2) Pliers
(2) Powerstrip
(1) Printer
(2) Printer Ink Cartridges
(2) Pack Printer Paper
(1) Prybar
(10) Rain Jackets
(5) Ratchet Straps
(1) Box Razor Blades
(25) Rebar (.25 Inch)
(1) Record Logbook
(1) Retractable Tape Measure (25 Meter)
(2) Roll Nylon Poly Rope (Braided)
(2) Pack Rubber Bands (Large)
(2) Pack Rubber Bands (Small)
(2) Ruler (12 Inch, Metal)
(2) Ruler (18 Inch, Metal)
(1) Scissors
(1) Pack Scotch Tape
(1) Roll Black Plastic Awning Mesh
(1) Screwdriver Set
(1) Box Seal (Metal) Security
(2) Sun Shower
(1) Box Plastic Dinnerware
(1) Box Hand Sanitizer
(5) Bars Hand Soap
(1) Socket Set
(1) Stapler
(1) Staple Remover
(1) Box Staples

(1) Staple Gun (Heavy Duty)
(1) Box Staple Gun Staples (Heavy Duty)
(1) Stretcher
(2) Surge Protectors
(6) Roll Duct Tape
(1) Roll Mylar Drafting Film
(3) Roll Polykem Tape
(1) Bundle of Tarps
(2) Tin Snips
(2) Handheld Wire Cutters
(2) Tin Shears
(1) Transit/Theodolite
(1) Tripod
(1) Stadia Rod
(1) Box Trash Bags (Small)
(4) Claw Trowels
(4) Mason's Trowels
(1) Utility Knife
(1) Monkey Wrench
(5) Packs Zip Ties (Large)
(5) Packs Zip Ties (Medium)
(5) Packs Zip Ties (Small)
(25) Ziploc Bags (12 x 12)
(25) Ziploc Bags (10 x 10)
(25) Ziploc Bags (6 x 6)
(25) Ziploc Bags (4 x 4)

DPAA Equipment List (URT):

(25) Aprons
(1) Axe
(4) Band It Strap (5/8 Inch)
(200) Band It Clamps (5/8 Inch)
(6) Band It Tool
(2) Batteries (12 Volt)
(1) Box Batteries (9 Volt)
(1) Box Batteries (AA)
(1) Batteries (AAA)
(3) Batteries (C)
(3) Batteries (D)
(1) Battery Charger
(1) Skill Saw Blade
(30) Bolts, Washers, Nuts (1/2 Inch)
(2) Bolt Cutters
(10) Pair Rubber Boots
(50) Team Boxes (Black Rubbermaid)
(5) Broom (Upright Push)
(5) Broom (Wisk)
(12) Brushes (Hand)
(20) Brushes (Wire, Large)
(20) Brushes (Wire, Medium)
(20) Brushes (Wire, Small)
(100) Buckets (Black, Plastic)
(6) Surface Buoys (Small, Yellow)
(4) Surface Buoys (Large, Orange)
(12) Cam Lock (3 Inch Female)
(12) Cam Lock (3 Inch Male)
(12) Cam Lock (4 Inch Female)
(12) Cam Lock (4 Inch Male)
(50) Cam Lock (4 Inch Washers)
(50) Cam Lock (3 Inch Washers)
(3) Cam Lock (4 Inch Male Caps)
(3) Cam Lock (4 Inch Female Caps)
(3) Cam Lock (3 Inch Male Caps)
(3) Cam Lock (3 Inch Female Caps)
(4) Cam Lock (3 Inch Double Male)
(4) Cam Lock (3 Inch Double Female)
(5) Fuel Can (5 Gallon)
(5) Water Can (5 Gallon)
(2) Sun Canopy (20-x-20-Foot)
(12) C-Clamps (4 Inch and 6 Inch)
(1) Roll of Chain
(8) Folding Chairs
(1) Box Chem Lites
(10) Clipboards
(2) Cold Chisel Set (3 Piece)
(1) Combat Life Saver Bag
(2) Cooler (Ice Chest)
(3) Roll 550 Cord
(6) Roll Poly Grid Unit String (No Cotton String)
(2) Crowbar
(4) Box Document Protectors
(1) "Donkey" Fuel Dispenser
(1) Drill Bit Set
(1) Drive Belt (AX78 80IN)
(1) Droplight
(1) Dry Erase Board
(1) Box Dust Masks
(5) Dust Pan
(5) Box DVD RAM
(1) Box Ear Plugs
(1) Electric Grinder
(4) Cases Engine Cleaner Bottles
(4) Roll Engineer Tape (White; Cloth)
(3) Extension Cord (Outdoor, 100 Foot)
(3) Extension Cord (Outdoor, 30 Foot)
(2) Fire Extinguisher
(3) Flashlight
(2) Funnels (Heavy Duty)
(1) 1K Generator
(1) 5K Generator
(1) Pack Surgical Gloves
(100) Pairs Cotton Gloves
(1) Box Glue Sticks
(1) Hacksaw
(10) Hacksaw Blades
(3) Hammer (Claw)
(2) Sledge (Mini, Handheld, 5-Pound)
(2) Sledge (Regular, Two Hand)
(1) Hand Saw
(1) Hatchet
(2) Hose, Garden
(1) Roll Wetscreen Pump Water Hose (2-Inch-Diameter, 100 Foot, Non-Collapsible, Flexible)
(1) Roll Wetscreen Pump Water Hose (3-Inch-Diameter, 100 Foot, Non-Collapsible, Flexible)

(1) Roll Venturi Dredge System Extra HP Water Hose (3-Inch-Diameter, 300 Foot, 200 PSI, Collapsible Firehose)
(1) Roll Venturi Dredge System Extra Suction Hose (4-Inch-Diameter, 150 Foot, Non-Collapsible, Flexible, Clear)
(1) Roll Venturi Dredge System Extra Suction Hose (6-Inch-Diameter, 150 Foot, Non-Collapsible, Flexible, Clear)
(30) Hose Clamps (2-Inch)
(30) Hose Clamps (3-Inch)
(30) Hose Clamps (4-Inch)
(30) Hose Clamps (6-Inch)
(6) Hose Splicing Sleeve (4-Inch) for Dredge Hose
(1) Pack Index Cards (3 x 5)
(1) Pack Index Cards (5 x 8)
(24) Cans Insect Spray
(1) Jig Saw
(10) Jig Saw Blades
(1) Label Maker
(1) Roll Label Maker Tape
(1) Box Seals (Metal) Security
(10) String ('Spirit') Levels
(20) Combination Padlocks
(1) Lube Stick for Skill Saw
(10) Cans WD40 Lubricant
(1) Case Lysol
(2) Measuring Tape (100 Meter)
(2) Measuring Tape (50 Meter)
(2) Measuring Tape (25 Meter)
(1) Box Nails (4-Penny)
(2) Fuel Can Nozzle
(2) Quarts 2-Cycle Oil
(8) Quarts Engine Oil
(2) Quarts Bar Oil
(2) Cans Paint (Spray, White Rustoleum)
(2) Cans Paint (Spray, Red)
(2) Cans Paint (Spray, Green)
(2) Cans Paint (Spray, Yellow)
(1) Box Paint Pens
(1) Box Paper Clips
(1) Case Paper Towels
(3) Pelican Case (Large 1650)
(3) Pelican Case (Medium)
(3) Pelican Case (Small)
(1) Box Standard Lead Pencils
(2) Box Mechanical Lead Pencils
(5) Box Grease Pencils (Black)
(1) Box Colored Pencils
(2) Box Ballpoint Pens
(2) Box Sharpie Pens
(1) Pack Dry Erase Markers
(75) Pitons (Mountaineering)
(2) Pipe Wrench (Large)
(2) Pipe Wrench (Medium)
(2) Pipe Wrench (Small)
(2) Metal Planning Frames (1-x-1-Meter)
(10) Plastic Mesh Baskets (Blue)
(10) Plastic Mesh Baskets (Red)
(10) Plastic Mesh Baskets (White)
(10) Plexiglas Sheets (.25-Inch Thick, 12-x-12-Inch)
(10) Plexiglas Sheets (.25-Inch Thick, 24-x-24-Inch)
(4) Clear Plastic Tub (24 Inches Long x 18 Inches Wide x 12-18 Inches Deep)
(2) Pliers
(35) Sheets Plywood (.5-Inch or .75-Inch Thick)
(1) Power Drill
(5) Power Strips
(2) P-Ring
(1) Printer
(2) Printer Ink Cartridges
(4) Packs Printer Paper
(3) Propane Tank
(3) Prybar
(3) Water Pump (25 HP)
(2) Water Pump (5 HP)
(50) PVC "Elbows"
(50) PVC "T" Joints
(40) PVC Pipe (2 Inch, 7 Foot Long)
(40) PVC Pipe (2 Inch, 12 Foot Long)
(40) PVC Pipe (2 Inch, 18 Foot Long)
(4) PVC End Caps
(2) PVC Cement and Primer Cans
(20) Rain Jackets
(10) Ratchet Straps
(1) Box Razor Blades
(80) Rebar (.25-Inch, Any Lengths < 20 Foot)
(1) Record Logbook
(2) Reducer to Gar Hose (3 Inch)
(4) Cans Raid
(2) Retractable Tape Measure (25 Meter)
(5) Rolls Plastic Ribbon (Blue)
(5) Rolls Plastic Ribbon (Orange)
(5) Rolls Plastic Ribbon (Red)
(5) Rolls Plastic Ribbon (White)
(5) Rolls Plastic Ribbon (Yellow)
(1) Rivet Punch Set
(1) Rivet Set
(3) Rolls Rope (Poly, Braided)
(2) Pack Rubber Bands (Large)
(2) Pack Rubber Bands (Small)
(50) Rubber Seals
(5) Ruler (12-Inch, Metal)
(5) Ruler (18-Inch, Metal)
(10) Safety Goggles
(5) Bundles Sand Bags
(1) Scissors
(3) Pack Scotch Tape
(1) Roll Black Plastic Awning Mesh
(50) Screens
(1) Screwdriver Set
(20) Seal (2-Inch Hose)
(20) Seal (3-Inch Hose)
(20) Seal (4-Inch Hose)
(3) Shovel (Short-Handle, Round)
(3) Shovel (Short-Handle, Square)

(5) Sun Shower Kits
(1) Box Plastic Dinnerware
(1) Skill Saw (Electric Circular Saw)
(3) Skill Saw Blades
(5) Box Hand Sanitizer
(20) Bars Soap
(1) Socket Set
(2) Stapler
(1) Staple Remover
(1) Box Staples
(1) Staple Gun (Heavy Duty)
(1) Box Heavy Duty Staples
(1) Stretcher
(5) Surge Protectors
(4) Folding Tables
(6) Rolls Duct Tape
(2) Roll Fiberglass Tape
(1) Roll Mylar Drafting Film
(1) Roll Packing Tape
(10) Rolls Polykem Tape
(4) Bundles Tarps
(2) Tin Snips
(2) Tin Shears
(2) Wire Cutters (Handheld)
(1) T-Level
(40) Rolls Toilet Paper
(25) Towels (Bath)
(1) Transit/Theodolite
(1) Tripod
(1) Stadia Rod
(1) Box Trash Bags (Large)
(1) Box Trash Bags (Small)
(12) Trowel (Claw)
(12) Trowel (Regular Mason's)
(1) Utility Knife
(2) Venturi Dredge Systems (1 System = 1 Metal Eductor; 1 Suction Hose Nozzle; 1 Section 3-Inch-Diameter, 150-Foot Collapsible 200PSI Fire Hose; 1 Section 4-Inch-Diameter, 150-Foot Non-Collapsible Flexible Suction Hose; and Associated Couplings, etc.)
(1) Extra Nozzle for Venturi Dredge Suction Hose
(5) Wash Tubs (Composite; 7 Feet Long x 4 Feet Wide x 2 Feet Deep)
(3) Water Pump Seal Kit
(16) Wet Screen MIP Adapters
(20) Wet Screen Spigots
(1) Wet Screen Kit
(3) Rolls Steel Wire Mesh (.25-Inch Screen)
(12) Wire Twists
(25) Wooden Studs (2 x 4)
(10) Wooden Beams (4 x 4)
(2) Wrench (Grip, 2-Piece)
(1) Wrench (Monkey)
(1) Wrench (2-Inch Hose)
(5) Packs Zip Ties (Large)
(5) Packs Zip Ties (Medium)
(5) Packs Zip Ties (Small)
(100) Ziploc Bags (12 x 12)
(100) Ziploc Bags (10 x 10)
(100) Ziploc Bags (6 x 6)
(100) Ziploc Bags (4 x 4)

SOP 2.2: FORENSIC REVIEWS

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 6 February 2015
Citation: DPAA Laboratory Manual, SOP 2.2

0.0 PRINCIPLE, SPIRIT & INTENT: *Joint Forensic Reviews are conducted in an organized manner conducive to verification. The integrity of examined evidence is, at all times, above reproach.*

1.0 PURPOSE & SCOPE: This SOP outlines procedures for evaluating the evidentiary value of remains suspected or known to be those of missing U.S. service members and civilians recovered (i.e., joint recovery) or received (i.e., unilateral turnover) while in a host nation. In general, forensic review procedures are modeled on those used in Socialist Republic of Vietnam (S.R.V.)

For nations other than the S.R.V., the anthropologist may have to modify the below procedures depending on the host nation requirements and desires. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 FORENSIC REVIEWS: The following pertains to forensic reviews regardless of location:

2.1 **Intent & Purpose:** The intent of forensic reviews is to:

- Determine if remains recovered by joint U.S./host nation teams or received from host nation citizens are human. In this SOP the term "remains" describes both human and non-human osseous and dental elements.
- Ascertain their evidentiary value (e.g., possible cultural affiliation) in terms of identifying missing Americans.
- Select and document the condition and approximate number of remains for repatriation to the U.S. for further analysis.

2.2 **Types of Reviews:** Remains recovered or received are subject to the following types of evaluations to determine their evidentiary value:

2.2.1 **On Site Field Forensic Reviews (FFR):** Field Forensic Field Reviews (FFR) can be conducted in a variety of locations, often in a field setting including excavation sites, hotels, and other host nation facilities. In Vietnam, forensic anthropologists and forensic odontologists attending FFRs are assigned by the Laboratory Director in consultation with the Director Forensic Science Academy (FSA). In the event the Laboratory Director and FSA Director are unavailable, other members of Laboratory Management may make the assignments. Human remains examined and believed to be those of a missing U.S. service member(s) are forwarded to the site of the next JFR. Disposition of remains determined to be non-human or non-U.S. are determined by the host nation (e.g., the Vietnamese Office for Seeking Missing Person [VNOSMP]).

2.2.1.1 **Evidence Transport & Handling:** Evidence typically is received for analysis at field examinations in a variety of containers that may or may not be locked or sealed, and with or without a chain of custody form (e.g., unilateral turnovers).

- Evidence selected at an FFR for transport to the U.S. or to the JFR, if applicable, is normally placed in containers, sealed and authenticated in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).
- The anthropologist should attempt to maintain custody of the evidence at all times in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security), however, host nation officials may retain custody of evidence examined at the FFR (e.g., if selected for further analysis, transported to a JFR).
- If the chain of custody form cannot be completed at the FFR one should be initiated by DPAA personnel as soon as possible.
- Evidence not selected for transport to the U.S. or the JFR may be retained by the host nation officials for further analysis or final disposition, or by host nation citizens purporting "ownership."

2.2.1.2 **Documentation:** The disposition of documentation is as follows:

- For FFRs conducted in association with a subsequent JFR, the anthropologist and odontologist (if present) jointly compile documentation. For FFRs not conducted in association with a JFR, only the anthropologist compiles documentation.
- A copy of the final report, which typically consists of a Memorandum for Record, is transmitted to the CIL Science Director and Laboratory Director upon completion of the field examination, if possible.

- If applicable, the signed original FFR report, analytical notes (including photographs) are filed along with the findings of the JFR corresponding to the mission when the FFR took place.
- Portions of the results of the FFR may be included in the DPAA Daily SITREP and/or may be conveyed to the DPAA via telephone, e-mail, or fax.

2.2.2 **Remote Field Forensic Reviews:** Situations may arise when remote operations have potentially exceeded the parameters of the DPAA mission (i.e., have exposed remains and material evidence not associated with a U.S. loss). Such encounters may include, but are not limited to:

- Infants.
- Subadults.
- The elderly.
- Possible clandestine burials related to crime scenes.
- Cultural sites.
- Other contexts that clearly indicate that the recovery is not aligned with the DPAA mission (i.e., material evidence associated with the remains that are consistent with enemy combatants of the targeted conflict or appear to be a local civilian burial).

In such cases, the RL may or may not have the broad-based osteological and/or political-legal experience needed to make on-site management decisions. For example, Forensic Archaeologists are precluded from making final field assessments of the biological profile as they are not competency certified to do so.

Note: Competency certification aside, RLs should become familiar with determining biological profiles; as well as U.S., enemy combatant, and local material evidence so they can assess the evidence and context relevant to the situation at hand.

Even competency certified anthropologists may require guidance from Laboratory Management. The RL may lack political and legal experience. Many countries and polities have legal requirements governing recovery of human remains and cultural artifacts. The RL must be aware of, and operate under, the imposed requirements and restraints. Otherwise, recovery of items outside of the scope of the DPAA mission can create adverse legal and political situations that may affect or preclude additional recoveries in that locality. Further, return of items as "evidence" that are outside the DPAA mission can cause an undue resource burden on DPAA.

In these instances, the decision on whether to continue the recovery of human remains and/or material evidence must be made in a timely manner and most often requires guidance from Laboratory Management.

Prior to deployment, Laboratory Management briefs RLs accordingly if the mission has the potential to yield non-U.S. human remains and/or material evidence. While in the field, RLs use their training, experience and judgment to determine when it is appropriate to reach back to the CIL and request a remote FFR.

The below guidance details the conduct of the remote FFR and the actions required when a RL inadvertently exposes human remains and/or material evidence potentially unassociated with the DPAA mission:

- Generally, if there is any question of whether the items apply to the DPAA mission, the items are not removed from the *in situ* location if at all possible. If a RL must remove items for any reason (e.g., documentation), only remove items that suggest non-association with U.S. service members. In such instances the removed items are treated as evidence and all provisions of the DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security) apply.
- The RL documents the items and context with high quality digital photographs and a written description.
- Forward that documentation to Laboratory Management via email and request a remote FFR.
- Initial assessment may be completed via telephone but followed up by an email request for assessment and a response. The efficacy of Laboratory Management's response depends on the quality of documentation provided.
- After reviewing the documentation, Laboratory Management provides the RL with guidance on how to proceed. The email traffic generated through this process serves as the documentation of the activities and the management decision. The email traffic is subject to the provisions of DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation) and is included in the case file with other field related documentation.
- If Laboratory Management indicates that the items are not within the scope of the mission, local authorities are informed of the decision as well as the location of the items in question.
- The RL recommends that local authorities assume responsibility for the items. Local authorities may request that:
    - The recovery be completed and the items turned over to them.

- Items are returned to the site and any excavation is backfilled.
- Other appropriate action is taken.

- Closing out the site typically is the only action the RL needs to complete. Any request by local authorities for analysis or other work must be approved by Laboratory Management.
- Provide local authorities with **copies** of photographs, maps, any other documentation, and the emails that are the basis of the Laboratory Management assessment.
- Always maintain security of the recovery scene throughout this process. Continue to document all activities per the Laboratory Manual.
- The RL still completes a SAR report on the recovery that includes a description of interaction with local authorities. The remote FFR emails are referenced as the justification for the termination of the recovery.

2.2.3 **Joint Forensic Review (JFR):** Joint Forensic Reviews (JFRs) are usually held at a host nation facility and attended by a team of host nation specialists in anthropology, medicine, and/or anatomy, a DPAA anthropologist and possibly a DPAA odontologist, and non-CIL members of the DPAA. JFRs are most often conducted in the S.R.V. where procedures outlined in Annex A (The Vietnam JFR Process) are followed. For other nations, the below procedures modeled on those used in the S.R.V., are to be used and may be modified by the anthropologist depending on host nation requirements and desires.

2.2.3.1 **Evidence Transport & Handling:** The following procedures apply to evidence selected for repatriation (at the JFR) to the U.S. (i.e., the CIL) for further analysis:

- Whenever possible, remains should be received for examination at the JFR in locked and/or sealed containers and accompanied by a chain of custody form in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).
- Items are placed in containers (usually plastic bags), sealed with evidence tape, and typically returned to the same outer container in which they were received at the JFR.
- The host nation officials may retain custody until evidence is signed over (via a chain of custody form) to a U.S. representative. Subsequently, the U.S. representative signs the evidence over to the custody of a CIL representative for repatriation to the U.S. (i.e., the CIL).
- When only material evidence (i.e., no remains) known or suspected to be associated with a missing American is to be transported to the U.S., it may skip the JFR and be brought back to the CIL by the anthropologist or odontologist accompanied by the completed chain of custody form.
- Evidence not accompanied by sufficient indicators or information suggesting it is associated with a specific loss incident, missing American service member or civilian may occasionally be retained by the host nation, pending additional information or confirmation. Such information should be included in the appropriate reports provided to the DPAA and host nation at the conclusion of the JFR.

2.2.3.2 **Reporting & Documentation**: Analytical notes are typically filed by the JFR name or number and stored in binders in the Laboratory Administration File Room. A copy of the final report, which typically consists of a Memorandum for Record, is is delivered to the Science Director and Laboratory Director at the conclusion of the JFR, if possible. The signed original report, analytical notes (including photographs which may appear on a CD), and copies of the chain of custody documentation are filed in a separate section of the same binder containing the material from the corresponding JFR.

3.0 DOCUMENTATION: Results from forensic reviews are recorded by analyst in his/her analytical notes in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). The notes typically include observations and photographs relevant to final determinations including the analyst's opinion concerning the nature of the material, (i.e., osseous versus non-osseous, dental versus non-dental), the nature of the remains, (i.e., human versus non-human), and a recommendation as to whether the remains should, or should not be repatriated to the DPAA for further analysis.

4.0 SURETY: When the JFR participants return from the JFR they turnover their documentation, to a Case Coordinator who assembles the JFR binder, administratively reviews the documentation for SOP compliance, and provides the appropriate feedback to the participants regarding corrective action. The Case Coordinator places a memo in the JFR Binder attesting to the completion of the review. The audit checklist for this SOP should be used for the review.

Additionally, all forensic review materials are subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

Since they contain analytical notes pertaining to evidence, FFR/JFR binders are be secured in the Laboratory Administration File Room in the same manner as case files.

5.0 SAFETY CONSIDERATIONS: There are no inherent safety hazards involving the analysis of dry-bone and dental remains. Wet-bone and dental remains, (i.e., remains with fresh adherent soft tissue) are handled with appropriate caution as detailed in the DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

Annex A (The Vietnam JFR Process)

A1.0 PURPOSE & SCOPE: The JFR is most commonly conducted in the Socialist Republic of Vietnam (S.R.V.). In addition to the procedures given above this annex details procedures used during JFRs in the S.R.V. These procedures apply to typical DPAA cases. In situations where unusual circumstances preclude the application of these standard procedures, the results will indicate why the standard procedures could not be performed, the alternative procedures that were performed, and an opinion of how these alternative procedures affect the accuracy and reliability of the resulting determination(s).

A2.0 THE VIETNAM JFR PROCESS: The Joint Forensic Review (JFR) is held at various locations throughout the S.R.V. (e.g., the Institute of Forensic Medicine (IFM), Hanoi). The JFR is attended by a team of Vietnamese specialists in anthropology, medicine, and anatomy, a DPAA anthropologist and odontologist, and one or more members of Detachment 2 (DET2). At the JFR remains and material evidence are examined, findings discussed, and recommendations made by the U.S. and Vietnamese teams, followed by the signing of the final reports. The following is the procedure for conducting the JFR in Vietnam:

A2.1 **Evidence Transport:** To avoid accountability problems and confusion at the JFR, RLs should ship remains from each REFNO in a separate transport container (i.e., one REFNO per Pelican case). Transport containers at the JFR are maintained under the custody of the Vietnamese (see above) and usually will be at the JFR when the odontologist and anthropologist arrive.

A2.2 **Document Sealed Container:** Prior to opening, each shipping container should be photographed with the Co-Examination (CE) number supplied by the Vietnamese in the frame. Initial photographs should be the unopened shipping container illustrating the condition of the seal(s) or lock(s). If a container is found unsecured or a lock/seal is found open, photograph and note its condition in writing on the JFR form.

A2.3 **Opening Containers:** A Vietnamese scientist or a U.S. representative unlocks the container or uses scissors to cut the seals. If a container is secured with a seal(s), photograph the scissors held "in position" just prior to cutting the seals. The CE number should be visible in the photograph.

A2.4 **Document Contents:** Photograph the opened shipping container and its contents, along with the CE number. Typically, a Vietnamese or U.S. scientist will remove the contents of each container and lay the bags out on the examination table where they are photographed with the CE number by both the Vietnamese and U.S. teams. Photos should be of sufficient quality to depict the CE number and the general arrangement of the bags. Care must be exercised to ensure that evidence stays with its respective evidence container.

A2.5 **Conduct Analysis:** The U.S. and Vietnamese scientists will examine the evidence and draw independent conclusions as to the evidentiary value of the items. The odontologist may also conduct a preliminary evaluation of prosthetic devices and appliances. Procedures discussed in Part III (Trace Evidence Analysis) of this Laboratory Manual regarding specimen handling, cleaning, analytical techniques, etc., will be followed as closely as possible by DPAA scientists.

The availability of exemplars, analytical equipment and facilities may be limited which may hinder analysis. Other factors that have a demonstrable effect on the ability to conduct the analysis properly will be described in the field notes and report which will indicate the conditions under which the determinations were made. Evidence that cannot be adequately analyzed should be repatriated.

A2.6 **Disposition:** When all of the CE cases have been examined, members of the JFR will meet to discuss their findings and recommendations. The U.S. anthropologist and odontologist will present their findings to the Vietnamese team with the recommendation that the evidence be:

- Repatriated to the U.S. for further analysis.
- Retained by Vietnamese officials pending additional information.
- Retained by Vietnamese officials for final disposition.

Members of the Vietnamese team will then provide their findings, opinions, and suggestions. Any questions are discussed and the Vietnamese Team Representative provides a final opinion on the disposition of the evidence

After being documented by U.S. and Vietnamese scientists, cases that consist entirely of non-human remains will be retained by the Vietnamese and a U.S. team member annotates removal of these items

on the chain of custody form and retains the forms for the JFR binder. This decision is made during the joint discussion following the JFR examination. Cases containing both human and non-human remains are forwarded to the CIL for sorting.

A2.7 **Repackage**: Upon completion of the examination, remains known or suspected to be American, along with identification media and personal effects, will be returned to their respective plastic bags resealed in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

A2.8 **Document Chain of Custody:** For evidence from unilateral turnovers, an American Team member will initiate a DPAA chain of custody form and include all information (e.g., incident, location, etc) provided as well as note the JFR number at which the items were received. Custody is then transferred from the American Team member to the Vietnamese official. An example of a completed chain of custody form for a unilateral transfer is included as Enclosure 1 (Example of a Chain of Custody Form for JFR Unilateral Turnovers) to this Annex.

For evidence recovered during DPAA missions, custody remains with the Vietnamese officials. Consequently, no custody transfers for this evidence is noted on the custody documents

A2.9 **Prepare Containers:** Upon completion of the examination, the sealed evidence containers are put into the shipping container with the CE number. This process may be photographed. The chain of custody documents are affixed to the outside of the shipping container using a document protector. Copies of the custody documents are placed inside the container, which will remain unlocked and in the custody of Vietnamese officials until the repatriation ceremony occurs in the host nation.

A2.10 **Prepare Reports:** Upon completion of the examination and discussion between the two teams, the U.S. anthropologist and odontologist compile the following documents:

- Memorandum for CIL Science Director, "Results of the [#] Joint Forensic Review."
- Report of the [#] Joint Examination of Remains which is prepared, in English and Vietnamese by the Vietnamese scientist(s).

A2.11 **Signing of Documents:** The U.S/S.R.V. team sign copies of the two documents after both representatives check them for accuracy. The U.S./S.R.V. team discusses any discrepancies and, if necessary, new documents are prepared. The U.S. representative (anthropologist or odontologist) and the Vietnamese representative sign the documents. The U.S. team keeps one signed original for their records at the DPAA and turns over four signed originals to the Vietnamese for their records.

A2.12 **Transmit the Report:** Upon completion of the document signing the U.S. team transmits the "Results of the [#] Joint Forensic Review" to the CIL Science Director and Laboratory Director. Under normal circumstances, this completes the DPAA team responsibilities at the JFR.

A2.13 **Departure Ceremony:** Operational control (OPCON) of the departure ceremony in Vietnam resides with the DPAA. The following activities are inherent in the departure ceremony:

- Prior to receiving the evidence at the ceremony, a DET2 representative, usually the DET2 Commander, inspects the contents of each shipping container. This inspection ensures that the proper number of evidence containers, as noted on the chain of custody form, is present and that each is unopened (i.e., the evidence tape is unbroken). In the unlikely event that a container is missing or an evidence-tape seal is broken, this condition must be noted on the chain of custody form and a photograph of the containers must be taken.
- If all of the evidence containers are present, the DET2 representative must annotate the appropriate blocks on the chain of custody form in accordance with DPAA LAB Laboratory Manual, SOP 1.3 (Evidence Management & Security) and note the box number corresponding to each case on the upper portion of the chain of custody form.

The Vietnamese representative signs in the "Transferred From" block and the DET2 representative signs in the "Transferred to" block. The DET2 and Vietnamese representatives should each retain a copy or photocopy of the chain of custody form. The original chain of custody form must be forwarded with the evidence for accession by the CIL.

Enclosure 1 (Example of a Chain of Custody Form for JFR Unilateral Turnovers) to Annex A

Joint POW/MIA Accounting Command
Central Identification Laboratory
Chain of Custody

Unique Mission Identifier 10-5VM RT-2
CIL _____

Evidence obtained from: UNILATERAL Mr. Tran Nguyen, Hamlet 6 Quang Tri City, Hai Long District Quang Tri Province, S.R.V.	**Evidence transferred to:** JPAC/CIL 310 Worchester Ave. Bldg 45 JBPHH, HI 96853
Obtained By: Dr. Robert Mann	**Date Obtained:** 15 December 2010
Seal Number(s): N/A (if used)	**Village/District/Province or Equivalent:** Quang Tri City, Hai Long District, Quang Tri Province
Associated Incident/Site: REFNO 1234 **Conflict:** SEA **Country:** S.R.V.	**Grid Coordinate:** N/A (Full MGRS and datum)

Item Number	Bag/Container Label and Description Provide Terminus Statement Following Last Entry, e.g., "Nothing Follows," Number all evidence bags / containers
1	One sealed plastic bag labeled "Unilateral Turnover, from Mr. Tran Nguyen, Possible REFNO 1234, Quang Tri Province, S.R.V., RWM, Possible Human remains, Bag 1 of 2" containing possible human remains.
2	One sealed plastic bag labeled "Unilateral Turnover, from Mr. Tran Nguyen, Possible REFNO 1234, Quang Tri Province, S.R.V., RWM, Possible Human remains, Bag 2 of 2" containing possible human remains.
3	One sealed plastic bag labeled "Unilateral Turnover, from Mr. Tran Nguyen, Possible REFNO 1234, Quang Tri Province, S.R.V., RWM, Possible Material Evidence, Bag 1 of 1" containing possible material evidence.
*****	**********NOTHING FOLLOWS**********

SAMPLE FORM:
JFR UNILATERAL TURNOVERS

Item(s)	Transferred from:	Transferred to:	Date	Reason for Transfer
1 - 3	SIGNATURE: Robert W Mann PRINT NAME: Dr. Robert Mann	SIGNATURE: Tran Thanh Huan PRINT NAME: Tran Thanh Huan	15 December 2010	Transfer to VNOSMP to await Repatriation Ceremony
	SIGNATURE PRINT NAME	SIGNATURE PRINT NAME		
	SIGNATURE PRINT NAME	SIGNATURE PRINT NAME		
	SIGNATURE PRINT NAME	SIGNATURE PRINT NAME		

CIL Form 1301 dtd 31 July 2007
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Previous editions may be used until exhausted

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DPAA Laboratory Manual

(Current and Updated Version Located on DPAA Intranet)
Last Revised: 4 April 2017
Citation: DPAA Laboratory Manual, Part III Cover Page

PART III: LABORATORY ANALYSIS

Evidence testing at the CIL is categorized into the following disciplines and sub-disciplines:

- Anthropology:
  - Osseous
  - Histology
  - Chest Radiograph Comparison (CXR)
  - Photographic Superimposition
- Odontology
- Biology
  - Sampling Evidence for DNA
- Materials (Trace)
  - Material Evidence
  - Life Support Investigation
  - Scanning Electron Microscope (SEM)

Part III is organized to first present the SOPs that govern the basic procedures for documenting evidence undergoing laboratory testing regardless of discipline and sub-discipline. These include preparation of general analytical notes (textually and graphically recording observations, printouts of analytical techniques, etc.), photographic documentation and measurement and observation traceability. .

Following documentation procedures, SOPs dealing with analytical techniques common to all of the sub-categories are presented including:

- Recognizing osseous/dental remains from non-osseous/dental material.
- Recognizing human osseous/dental remains from non-human osseous/dental material.
- Recognizing taphonomic phenomena.
- Reconstructing evidence.
- Conserving evidence.
- Segregating commingled remains.
- Determining the minimum number of individuals (MNI) present in an assemblage.

The final portion of Part III consists of SOPs that present techniques unique to the disciplines and sub-disciplines listed above.

As such, CIL personnel participating in trace evidence analysis will be required to competency certify in Part III, as appropriate.

SOP 3.0: ANALYTICAL NOTES & DOCUMENTATION

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 16 November 2016
Citation: DPAA Laboratory Manual, SOP 3.0

0.0 PRINCIPLE, SPIRIT & INTENT: *Case records are prepared in a systematic and organized manner conducive to authentication and verification. The integrity of analytical notes, in particular, should, at all times, be above reproach.*

1.0 PURPOSE & SCOPE: This SOP outlines procedures for preparing analytical notes, test reports, and other case records for typical CIL cases. This SOP applies to hand-written and computer-generated notes taken during the course of field work and laboratory testing (forensic anthropology, forensic odontology, and material evidence analyses), and test reports prepared from those notes.

Some unique procedures and exemptions for compiling field notes are covered in DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing) as well as in DPAA Laboratory Manual, SOP 2.1 (Underwater Recovery Scene Processing). In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 ANALYTICAL NOTES: Standardizing the methods used in taking analytical notes (also called examination documentation) provides consistency in recording the results of tests and in maintaining case file records, and preserves the integrity of the documentation. Analytical notes are taken in a laboratory or field setting. In situations where unusual circumstances preclude the application of these provisions, indicate in the results why the standard analytical notes could not be prepared, the alternative procedures that were implemented, and an opinion of how these alternative procedures affect the accuracy and reliability of the resulting tests **(SA5.9.1.1)**.

2.1 **Adequacy:** Records of original observations, derived data, and sufficient information is prepared and retained for each test report issued. The records for each test contain sufficient information to facilitate, if possible, identification of factors affecting uncertainty, and to enable the test to be repeated under conditions as close as possible to the original. The analytical notes include the identity of personnel responsible for the performance of each test, and the case file indicates who checked the results **(A4.13.2.1)**.
Each page of every document in the case record is traceable to the examiner and, where appropriate, to a uniquely identified case. The case record clearly demonstrates when each stage of investigation, analysis, and/or examination was performed **(SF4.13.2.1F-2f)**.

Analytical notes prepared to support conclusions are such that in the absence of the analyst, another competent analyst or supervisor could evaluate what was done and interpret the data **(SA4.13.2.5, SF4.13.2.1F-2a)**.

Altogether, the documentation should establish a clear audit trail that facilitates the traceability and replication of case work.

2.2 **Definitions:** The following definitions apply:

- **Case Record:** Also called a case file, a consolidated file or folder containing administrative and examination documentation, generated or received by the CIL, pertaining to a particular case.
- **Analytical Notes:** Generally, any examination items created or used during the testing process are considered analytical notes, to include, but not limited to:

    - Field notes (including maps, hard copy database sets for maps, and diagrams) made during a scene recovery.
    - Laboratory notes (including inventories, observations, diagrams and charts) documenting tests undertaken by a DPAA odontologist, anthropologist or technician in the performance of case testing.
    - All photographs and radiographs contained in the case file.
    - Computer printouts (e.g., FORDISC) used in testing.
    - Copies of medical and dental records, items of personal correspondence (i.e., email messages), and other documentation contained in the case file are considered analytical notes if they formed the basis for analysis by, or for analytical conclusions reached by, an analyst.

- **Page:** An analytical note "page" is a surface of a document, chart, graphic, or similar medium that contains original test observations or information from which original test observations were derived. In practical terms this means that each side of a sheet of paper may consist of one page—if only one side contains "original analytical observations or information from which original analytical observations were derived," or two pages—if both sides contain "original analytical observations or information from which original analytical observations were derived" **(SA4.13.2.10)**
- **Administrative Documents & Material:** Administrative documents and materials in a case file (e.g., messages, emails relating to the case, reports from outside agencies) are not analytical notes. Such material must carry a unique case file designator to associate the materials to the correct case file but do not require an analyst's initials, signature, date, etc. **(SA4.13.2.8)**. In order to avoid marking the surface of an original administrative document, the case-file designator may be placed on the back of the document's surface.

2.3 **Procedures**: The following guidance pertains to preparing analytical notes:

2.3.1 **Timeliness in Recording:** Observations, data, tests, calculations, etc. are recorded as analytical notes at the time they are made **(A4.13.2.2).** This includes operating parameters when instrumental analyses are conducted (e.g., SEM, radiography, variable light source) **(SA4.13.2.5.2, SF4.13.2.1f-2b).** Parameters do not have to be recorded if they are captured elsewhere, e.g.:

- They are standard and/or recurring "settings" specified by SOP.
- The parameters appear in the image or printout generated by the instrument (e.g. VSC-6000).

The start and end dates of analysis relevant to the observations, data, tests, calculations, etc. reflect the actual period of recording and not, for example, when the case was assigned, when the entire duration of the testing activity commenced, etc. **(A5.10.2g, SA4.13.2.2.1)**. For example, stature tests conducted from 14-15 May 2008 are recorded as a start date of 14 May and a completion date of 15 May even though the analyst was assigned the case on 10 May.

The intent of reflecting the actual period of recording is to be able to trace problems with equipment, laboratory environment, software, etc. to the narrowest temporal window possible and thus be able to institute more precise and appropriate corrective action.

2.3.2 **Task Specific:** Analytical notes are identifiable to a specific task **(A4.13.2.2)**.

2.3.3 **Forms:** Proper forms must be used for analytical notes. The full body of current and official forms is located on the DPAA network **(A4.3.2.2a)**. To ensure the use of the most current form, CIL Staff should avoid using uncontrolled downloaded or desktop copies whenever possible.

Forms and their control are discussed in detail in DPAA Laboratory Manual, SOP 4.0 (CIL Surety). Additionally, the following applies to analytical forms:

- Information entered onto forms may be textual in nature (e.g., numerals in the osteometry form) or graphic (e.g., preparation of the homunculus).
- Analytical forms may be contained in packets or may exist as stand alone forms. Non-applicable forms may be deleted from the packets, however, if retained, non-applicable pages or sections should be marked accordingly.
- The blank spaces in forms are for sketching and noting observations. Electronic images derived from other media, such as radiographs, FORDISC results, tables, photographs, etc., should not be imported into forms, rather they should be printed out in high resolution and included as stand-alone products. Exceptions are homunculi where the sketch may first have to be electronically prepared on a "clipboard" and then pasted into the form. The-stand alone products are then authenticated in accordance with this SOP (see below).
- The form date in the headers or footers of analytical forms should not be confused with the dates the analyst enters as part of analysis.
- The document stop on analytical forms is not to be confused with the optional page number fields of some forms that are filled in by the person completing the form (see below).

2.3.4 **Recording Media:** Notes must be made in ink. It is inappropriate to use a non-permanent medium for analytical notes that become part of the permanent record. The exceptions are recovery-scene sketch maps **(SA4.13.2.11)**.

2.3.5 **Use of Abbreviations & Symbols:** When abbreviations or symbols specific to the CIL are used in the analytical notes, the meaning of the abbreviations or symbols are clearly documented or referenced **(SA4.13.2.13, SF4.13.2.2F-6)**.

2.3.6 **Authentication & Completeness:** Analytical notes are discoverable by legal authorities and thus need to be authentic. False, deceptive, or otherwise intentionally misleading statements, regardless of the nature and content, are **never** acceptable. Each page of notes is traceable to the examiner and, where appropriate, to a uniquely identified case **(SF4.13.2.1F-2f)**. As such, an analyst authenticates notes by annotating each page with:

- CIL number, REFNO, or other unique case identifier on each page **(SA4.13.2.6)**.
- Analyst's signature or initials **(SA4.13.2.6)**.
- Date(s) of examination **(SA4.13.2.2.1)**.

The analytical notes are considered complete (i.e., "closed out") when the analyst affixes his/her signature or initials to the notes and dates them. The notes are completed prior to submitting them for peer review **(SA4.13.2.3.2).**

Completed notes that are returned to the analyst for amendment (e.g., as a result of the peer review process) reflect the completion date of the latest amendments. Amended completion dates need only appear on the pages of notes where amendments were made.

Additionally, to avoid future challenges to the authenticity of notes:

- Do not write on the original copies of other analyst's notes.
- Do not sign analytical notes you did not prepare. In other words, there is no signing "for" someone as with reports. Wait until the individual is available and then collect their signature/initials.
- When examination documentation is prepared by an individual(s) other than the analyst who interprets the findings, prepares the report and/or testifies concerning the documentation, the initials of that individual(s) appear on the page(s) of examination documentation representing his/her work **(SA4.13.2.7)**. This situation most often applies to specialized tests (e.g., SEM analysis, histomorphological analysis) where a super-user conducts a test as part of a broader analysis under the auspices of another analyst. It should be clear in the analytical notes who performed each stage or component of the test.
- Do not destroy original analytical notes no matter what the reason. There is no such thing as "draft notes." **Notes found to be inadequate or problematic are amended—not redone**.

2.3.7 **Computer Generated Notes:** Computer generated analytical notes are allowed. The following guidance applies:

- Electronic changes to computer generated analytical notes do not have to be tracked and may be made until the notes are complete. A page is complete (i.e., "closed out") when the analyst signs or initials in ink. Once computer generated notes are complete, changes, corrections, deletions, or additions on a page can only be made by handwritten annotations on the hard copy (see below).
- Digital radiographs are treated as computer generated notes. Hard copies of radiographs placed in the case file must be annotated accordingly.
- The analysts must initial all handwritten changes, corrections, deletions, or additions to computer generated notes, completed or not (see below).
- Some tests (e.g., preparation of the ante- and postmortem dental charts) may be a combination of handwritten and computer generated notes. In such instances, the handwritten/drawn portions must be treated as a correction/addition by the analyst and initialed accordingly.

2.3.8 **Changes & Corrections to Analytical Notes:** The following procedures are used to correct analytical notes:

- Any deletions or corrections to handwritten analytical notes are made by placing one line through the undesired text, entering the correct annotation alongside, and initialing. Handwritten deletions, corrections, or changes to computer generated notes, completed or not, are similarly annotated on the hard copy **(A4.13.2.3)**.
- Write-overs as corrections are never acceptable. As with any correction use one line to cross out the write-over, insert the desired text, and initial.
- Handwritten additions or insertions to analytical notes have to be initialed by the analyst. Handwritten additions or insertions to computer generated notes, completed or not, are similarly annotated on the hard copy **(A4.13.2.3)**. Dating the addition/insertion is not necessary **(SA4.13.2.3.1)**.
- Masking agents such as blank labels, white-out, correction tape, etc. are **never** used to correct analytical notes.
- Graphic portions of sketches (e.g., the skeletal homunculus) made in ink or other permanent media are corrected by:
    - Lining out, circling, or otherwise annotating the incorrect portion.

  - Using a line, arrow, asterisk or similar device to direct the reader to an adjacent textual explanation of the correction.
  - The textual explanation is part of the analytical notes and is prepared in accordance with guidance in this SOP.
  - Corrections/additions to the textual explanation, if needed, are annotated in accordance with this SOP.
- Do not make block corrections to notes. This prevents subsequent truthful annotations of correction to the notes. For example, do not make multiple strike-throughs and then annotate "all corrections/changes made on 13 Oct. 2005" since anything amended after the block change would not be on 13 Oct.

2.3.9 **Use of Original Documents:** Avoid writing on original documents (e.g., medical or dental records). Instead, work from legible and accurate copies. Copies should be plainly annotated "COPY" and authenticated as described above. By authenticating the copy(s), the analyst acknowledges that it is a fair and accurate representation of the original record **(A4.13.1.1)**.

Do not allow original documents to leave the CIL in pursuit of casework (e.g., documents in need of translation by R&A personnel) or any other activity (e.g., in response to a court subpoena) unless permission is granted by Laboratory Management. Further guidance for transferring original documents to individuals outside of the CIL is found in DPAA Laboratory Manual, SOP 1.7 (Case File Management).

2.3.10 **Documents Pertaining to Multiple Cases:** Occasionally, a document generated by an analyst must be copied and placed in multiple case files (e.g., dental comparison tables in a series of sub-accessions, -I-01, I-02, -I-03). In such instances the original document can be authenticated prior to copying **(SA4.13.2.7)**. The original document is placed in the group remains case file. If no group remains case file is present, the original is filed in the first sub-accession folder (e.g., -I-01, -D-01). The copies are prepared in accordance with the above guidance and placed in the subsequent sub-accession folders.

In instances where documents must be copied and placed in case files having different baseline CIL numbers (e.g., 2004-008, 2005-061, 2005-155), consult Laboratory Management or the Lead Quality Coordinator as to the best placement of the original documents.

When data from multiple cases are recorded on a single document, the unique identifier for each case for which data was generated are appropriately placed on the document **(SA4.13.2.9)**. Copies of the document are then placed in the case files, as appropriate, using the above guidance.

2.3.11 **Attachments:** It is permissible to include additional notes such as text and sketches. Attach any additional notes to the packet and include the above required authentication annotations on each additional page.

2.3.12 **Subcontracted Work:** Occasionally, expertise from individuals external to the CIL is sought in the course of a test (e.g., linguists translating wording on a coin, optical technicians examining lens fragments). A written report or documentation of the work must be produced by the subcontractor either in writing or electronically **(A5.10.6)**. In addition to the findings of the subcontractor, the analyst should include the following in the analytical notes **(A4.5.4)**:

- Name, rank, title/job description, as appropriate, of the subcontractor or person utilized.
- Date of the test.
- Where the test was performed (e.g., 15th Medical Clinic Optical Clinic).
- Any other pertinent information.

2.3.13 **Additional Instructions:** *The following are not required but strongly encouraged*:

- Written termini (for example: "--------- NOTHING FOLLOWS ---------") may be used to denote the ending of all notes. This ensures that additions cannot be added to the notes after you have completed your note taking. For termini requirements in the field notebook see DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing).
- Numbering pages to include the page number and number of pages (i.e., ___of___). Pages in the entire packet of notes can be sequentially numbered, or individual tests can be separately numbered. For example, the skeletal notes package may have one set of numbers, the FORDISC printout another set, and the SEM notes a third set of numbers. Numbering should be systematic and common sense should apply (i.e., do not number every page as 1 of 1).
- Odd sized, small, or easily lost items (e.g., receipts, optical prescriptions, business cards), deemed to be analytical notes, should be affixed with tape or staples to a larger sheet of paper (preferably 8.5" x 11") prior to inclusion into the case folder. This

keeps the items from being lost and makes them easier to inventory. As with all analytical notes, such items must be authenticated by annotating with the above required information.
- Use computer generated notes whenever possible.
- Handwriting must be legible. Analysts with poor or illegible penmanship are encouraged to hand print their notes or to prepare computer generated notes whenever feasible **(A4.13.1.2)**.
- Once complete, notes are checked for SOP compliance prior to forwarding for peer review. An audit/compliance checklist for analysts is available on the DPAA network. Quality Assurance is also available to answer questions pertaining to analytical notes.

2.3.14 **Special Instructions for CDs & DVDs:** There are some instances when hard copy images, or other files, considered analytical notes per the above definition, are of insufficient quality to provide traceability of analytical work and/or are too numerous to be practical to file in the case folder. Examples may include, but are not limited to:

- Histomorphology images.
- Chest x-ray comparison images and radiographs.
- Dental radiographs.
- Images from a recovery scene or other remote activity (see DPAA Laboratory Manual, SOP 2.0, Remote Operations, for specific guidance).
- Extensive data sets (e.g. total station data).

In such instances CDs and DVDs holding such files can be prepared for inclusion into the case file taking into account the following provisions:

- The disk is of a permanent nature (i.e., no rewritable discs).
- In order to conserve time and material resources, final disks can be authenticated and "burned" after the peer review process. As with any other computer generated notes, any disks can be revised with the previous version discarded prior to authentication. Overall, this process avoids keeping defunct disks in the case file and saves time by minimizing the back and forth between analysts, photographers, and other parties. The authentication and peer review process for disks is as follows:
  - Once problems with the **internal** file content, detected during peer review, have been corrected, the analyst then authenticates the disk in accordance with this SOP for notes in general.
  - The disk is then resubmitted to the peer reviewer who then checks the disc **externally** for labeling and authentication in accordance with this SOP.
  - The peer reviewer documents any internal or external problems with the disk during this process on the peer review record form.
- Mindful of the above provision, subsequent revisions of an already authenticated disk require that the superseded CD(s) be marked as such and retained in the case file.
- Images and other files on the CD must comply with any other provisions stipulated in the Laboratory Manual.

3.0 REPORTS & CASE RECORDS: The results of each test, or series of tests carried out by the CIL are reported accurately, clearly, unambiguously, objectively, and in accordance with any specific instructions in the test methods **(A5.10.1)**.

Test results are reported, usually in a retrievable test report, and include all the information requested by the customer necessary for the interpretation of the test results, and required by the method used **(A5.10.1)**.

In the case of tests performed for internal customers, or in the case of an agreement with the external customer, the results may be reported in a simplified way. Any information listed below which is not reported to the customer must be readily available in the CIL **(A5.10.1)**.

3.1 **Exclusions:** Analytical work, unrelated to a case, not requiring a test report includes **(SA5.10, SA5.10.1.1)**:

- Research activities.
- Training exercises or testing not involving actual case work (see DPAA Laboratory Manual, SOP 4.2, Training, Tests & Continuing Education) for an explanation of these programs).
- Validation studies.
- Activities involved with constructing an individual characteristic database or maintaining the quality and/or effectiveness of information in such a database.
- Any advisory activity that does not result in the findings, conclusions, opinions, and interpretations being used as testimony in open court, deposition, or any other jurisprudence proceedings (see DPAA Laboratory Manual, SOP 1.8, Consult Case Management for a discussion of advisory activities). For example, a customer emails photos of skeletal material to the CIL with the intent on using the conclusions to decide whether to deploy an evidence response team to a remote location.

3.2 **Required Information:** Accrediting bodies recognize that forensic laboratories may not be able to include all of the items in test reports detailed in ISO 17025. Forensic laboratories may therefore elect to adopt one or more means, outlined in accrediting body supplemental requirements for meeting the requirements in ISO 17025. As such the CIL ensures that the case file, if not the test report, relating to a specific investigation contains all of the relevant information required by ISO 17025 **(A5.10.1, SF5.10.2F-54)**.

Each test report includes at least the following information, unless the CIL has valid reasons for not doing so **(A5.10.2a-k)**. If omitted from the test report, the information should be included elsewhere in the case file.

- Title (e.g., Forensic Anthropology Report, Forensic Odontology Report).
- The CIL name and address (usually in consult cases only).
- The location where the tests were carried out, if different from the CIL location.
- Unique identification of the test report (usually the CIL number). The unique identification must be included on each page of the test report in order to recognize the page as a part of the test report.
- A clear identification of the end of the test report (usually accomplished by page numbering, e.g., page 4 of 4).
- The name and address of the customer (for consult cases only, see DPAA Laboratory Manual, SOP 1.8, Consult Case Management).
- Identification of the methods used.
- A description of, the condition of, and unambiguous identification of the item(s) tested.
- The date of receipt of the test item(s) where this is critical to the validity and application of the results, and the date(s) of performance of the test.*
- Reference to the sampling plan or procedures used by the CIL or other bodies where these are relevant to the validity or application of the results.*
- The test results.
- Where appropriate, the units of measurement*
- The name(s), function(s), and signature(s) or equivalent identification of person(s) authorizing the test report (this is usually the signature of the analyst who authors the report).
- Where relevant, a statement to the effect that the results relate only to the items tested.

*If this information does not appear in the report, it must be reflected elsewhere in the case file, usually in the analytical notes.

In addition to the requirements listed above, test reports or the case file, where necessary for the interpretation of the results, include the following **(A5.10.3.1a-e)**:

- Deviations from, additions to, or exclusions from the test method, and information on specific test conditions, such as environmental conditions.
- Where relevant, a statement of compliance/non-compliance with requirements and/or specifications.
- Where applicable, a statement on the estimated uncertainty of measurement. Information on uncertainty is needed in test reports when it is relevant to the validity or application of the test results, when a customer's instruction so requires, or when the uncertainty affects compliance to a specification limit (see the CIL Uncertainty of Measurement Policy, DPAA Laboratory Manual, SOP 4.0, CIL Surety).
- Where appropriate and needed, opinions and interpretations (see below).
- Additional information which may be required by specific methods, customers, or groups of customers.

In addition to the requirements listed above, in rare instances where test reports or the case file contain the results of sampling, they include the following, where necessary, for the interpretation of test results:

- The date of sampling **(A5.10.3.2a)**.*
- Unambiguous identification of the substance, material, item or product sampled **(A5.10.3.2b)**.
- The location of sampling. This may be depicted in diagrams, sketches or photographs, but must be clearly identified as such **(A5.10.3.2c)**.*
- A reference to the sampling plan and procedures used **(A5.10.3.2d)**.
- Details of any environmental conditions during sampling that may affect the interpretation of the test results **(A5.10.3.2e)**.
- Any standard or other specification for the sampling method or procedure, and deviations, additions to or exclusions from the specification concerned **(A5.10.3.2f)**.

*If this information does not appear in the report, it must be reflected elsewhere in the case file, usually in the analytical notes.

3.3 **Authorship:** In all situations it is possible to identify the person accepting responsibility for the verification and release for the test report. This is done by authorship of the report. The author(s) of a test report have conducted, participated in, observed or supervised the testing, or technically reviewed the

examination documentation. This includes those whose authorship constitutes signature by proxy.

Test reports are signed or otherwise approved by staff members who are competency certified in the testing being reported in accordance with DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education).
CIL personnel who issue findings, including writing and signing reports, and provide testimony, based on examination documentation generated by another person(s) (both internal and external to the CIL), reviews and documents the review of all relevant pages of examination documentation contained in the case record **(SA5.10.3.4)**.

The review of the testing and/or examination documentation is acknowledged when the reviewer signs the report. In the absence of a signed report, an MFR signed by the reviewer is appropriate.

3.4 **Report Formats:** A format exists to accommodate each type of test carried out and to minimize the possibility of misunderstanding or misuse **(A5.10.8)**. The various formats are found with the respective DPAA Laboratory Manual SOP governing the test (e.g., FAR formats are discussed in DPAA Laboratory Manual, SOP 3.4, Determining Biological Profiles).

3.5 **Amendments to Test Reports:** Substantive or material amendments to a test report after its formal issue are made only in the form of a further document, which includes the statement:

> "Supplement to (Insert Type of Report, e.g. MER, FOR, FAR), CIL number… [or otherwise identified]", or an equivalent form of wording.

Such amendments are considered test reports and meet all the requirements of this SOP.

In most cases a report is considered to be formally issued when all post analysis reviews are completed, as applicable, e.g.:

- Peer review.
- QA review by Quality Assurance.
- Administrative reviews by the appropriate Laboratory Manager(s).
- Scientific Director's identification memorandum for record is affixed to the identification packet (for cases leading to identification only).

When it is necessary to issue a complete new test report, it is uniquely identified and contains a reference to the original that it replaces **(A5.10.9)**.

4.0 SPECIAL INSTRUCTIONS FOR ANALYTICAL NOTES & TEST REPORTS:

4.1 **Results, Opinions & Interpretations**: When results, opinions and interpretations are included in the test report, the basis upon which they have been made are documented. Opinions and interpretations are clearly marked as such in a test report **(A5.10.5)**. Additionally:

- When associations are made, the significance of the association are communicated clearly and qualified properly in the report **(SA5.10.3.5)**.
- When no definitive conclusions can be reached (e.g., results are "inconclusive"), the reason(s) are documented in the report or elsewhere in the case record **(SA5.10.3.7)**.
- When comparative examinations result in the elimination of an individual or object, the test report clearly indicates the elimination **(SA5.10.3.6)**. Caveats to this provision include:
  - The overall intent of this provision is to ensure that exonerating evidence is not concealed.
  - Listing eliminations does not apply beyond short lists. In other words, initial eliminations from extensive databases and other electronic processes do not have to be individually listed.
- When an investigation or analysis eliminates a possible sequence of events based on lack of conformity between the scene and/or evidence and the proposed sequence of events, the reason is documented in the case record**.**
- When an examination result or observation is rejected, the reasons are recorded in the case record **(4.13.2.1F-2e).**
- When the test report contains results of tests performed by subcontractors, these results are clearly identified. The subcontractor reports the results in writing or electronically **(A5.10.6)**.

4.2 **Release of Information:** CIL reports and related case materials are not released, whole or in part, to agencies outside of the DPAA without the consent of the Science Director, the Laboratory Director, or Deputy Laboratory Director. All requests for information in this regard are directed toward these individuals. For non-governmental agencies, the provisions of the Freedom of Information Act (FOIA) apply **(SA5.10.3.3)**.

All analytical notes, test reports, and related case materials prepared on or after 5 August 2011, are designated "For Official Use Only" (FOUO for short) and marked accordingly. The meaning of and provisions for use of the FOUO designator as well as marking instructions are detailed in the DPAA Laboratory Manual, SOP 4.0 (Surety).

Inactive or dormant case materials prepared prior to 5 August 2011 are excused from being marked FOUO (it is too labor intensive to go back and mark everything). However, these materials are still designated FOUO for purposes of handling and information release as detailed in SOP 4.0.

Should a case be reactivated and/or its materials circulated outside of Laboratory Administration for any length of time (usually in excess of 72 hours or at the discretion of Laboratory Management) they should be stamped For Official Use Only in accordance with SOP 4.0.

4.3 **References & Citations:** The methods used, as well as their subsequent results, findings, opinions, conclusions, interpretations, etc., are recorded in the analytical notes, but do not always need to be included in the test report; such decisions are at the discretion of the analyst. However, when the analyst chooses to include the above items in the test report, these must also be cited in the analytical notes.

References included in the test report as a matter of academic "good form," such as general taphonomic observations (e.g., coffin wear) or morphological observations (e.g., frequency of occurrence of a skeletal anomaly), do not always need to be included in the analytical notes. When used in this manner, such references do not require management approval for inclusion in the analytical notes or test report.

Analysts are not required to include references that support observations and interpretations generally considered baseline professional knowledge (e.g., overall skeletal robusticity in support of sex determination; copper staining) in the analytical notes or test report. When used in this manner, such references do not require management approval for inclusion in the analytical notes or test report.

5.0 DISPOSITION: To facilitate peer review and case file management, analytical notes, test reports and other case records, to include oversize items such as radiographs, should be kept together in one package until the case file is forwarded to Laboratory Administration. All original case records are retained in the Laboratory Administration File Room and accompany the case file once it is retired to the R&A for archival storage.

6.0 SURETY: Surety of case materials takes place on multiple levels. Specifically:

- Analytical reports and notes are peer-reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). All relevant documentation is made available to the peer reviewer at the time of review.
- During the routing process, reports and note taking are reviewed. Problems with case materials that are found during reviews are referred to the appropriate personnel for corrective action. Reviews may be conducted by:
  - Quality Assurance.
  - Case Coordinators.
  - Laboratory Management during various management reviews.
- Case records are subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

7.0 SAFETY: There are no inherent safety considerations involving note taking and preparing test reports.

SOP 3.1: FORENSIC IMAGING

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 28 July 2016
Citation: DPAA Laboratory Manual, SOP 3.1

PRINCIPLE, SPIRIT & INTENT: *Trace evidence is imaged in a manner conducive to authentication and verification. Images accurately represent, illustrate, and depict the evidence being tested. The integrity of test images should be, at all times, above reproach.*

1.0 PURPOSE & SCOPE: This SOP deals with the standards and guidelines for the film-based and digital imaging of trace evidence in the CIL, including dental and osseous radiography, video/photographic superimposition techniques, and the use of variable light sources to produce and enhance images.

This SOP does not always detail the specific technical aspects of imaging rather it focuses on guidance in the selection of what should be imaged, standards for image content and quality, and the ultimate disposition of images.

Deviation from this SOP should be explained in the analytical notes and the report. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 PHOTOGRAPHY: Trace evidence analyzed in the CIL is typically photographed to create a routine photographic illustration of the specimen(s) undergoing testing and, subsequently, described in official reports. These types of photographs are not considered evidence.

Less typically and only under certain conditions do photographs themselves constitute real evidence **(SA5.8.4.4)**. Examples include:

- When images are made of an object (e.g., a weapon data plate) that cannot be returned or made available for testing in the CIL.
- Testing of images are considered to be evidence items in themselves (e.g., photos of remains purported to be those of U.S. soldiers) when the actual evidence is unavailable for testing.
- Images used to support (rather than illustrate) tests, interpretations and conclusions drawn in case reports that cannot be replicated (e.g., destructive testing of an item of evidence).
- Images documenting a destructive process where the original evidence will no longer be available for examination.

Regardless of their purpose, CIL photographs serve to illustrate aspects of the testing reported by the analyst. As such, photographs are considered to be analytical notes.

2.1 **General Provisions:** The following applies to the photography of all forms of trace evidence in the CIL:

- **Responsibility:** Photography of evidence is performed by DPAA photographers or the CIL Staff **(A4.1.5a)**.
- **Photographic Media:** Photographs of evidence can be film-based or digital images.
- **Enhancement of Digital Photography:** Digital photographs may be enhanced to improve image quality (see below).
- **Verification:** The analyst inspects the photographs embedded in their report for accuracy before signing the report. Signing the report affirms that the images contained therein represent an accurate and faithful illustration of the aspects of the subject material the analyst intended to portray when the photograph was taken.

2.2 **Documenting Receipt of Evidence:** Photographic documentation of the receipt of evidence is covered in the DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

2.3 **Quality of Photographs:** Image quality can vary dramatically depending upon the equipment used and what particular settings are employed. However, the image quality should also be appropriate for the purposes for which the image was created. Where the purpose of a photograph is to provide the basis for further testing (e.g., when an object cannot be available for testing in the CIL), the image should be of the highest quality available.

2.3.1 **General Guidance:** The following general practices are highly recommended in order to enhance the professional quality of digital and film based photographs. Photographs should:

- Be of sufficient size for printed documents.
- Clearly illustrate the item(s) being tested.
- Possess clean backgrounds, free of stains, dirt and particles.

- Be free of extraneous shadows.

2.3.2 **Preparation of Evidence:** All items to be photographed should be cleaned and stabilized as thoroughly as possible. If the analyst determines that there is some evidentiary value to adhering soils and roots on an item, then those materials should be photographed *in situ* in order to document the association. Once photographed, the materials should be carefully removed, placed in a container with appropriate labeling (e.g., provenience, recovery scene, artifact number), and analyzed accordingly.

2.3.3 **Image Type:** CIL reports typically contain at least one documentary photograph depicting the specimen(s) being tested. Additional photographs, illustrating the specific characteristics of selected specimens, may be required.

2.3.4 **Use of Scales:** Primary documentary photographs should include a scale (typically metric) that can be used to measure any item in the photograph. The following guidance applies:

- Use scales that are clean, undamaged, legible, and present a professional appearance.
- The scale increments (e.g., mm, cm) should be depicted on the scale in the photograph or explained in the figure caption.
- If using a scale bar, the increment specified is decimeters, or the scale bar can be identified as one meter.
- To accurately measure the subject matter in the image, the scale in the image must be in the same plane as the subject matter.
- Scales are never photo-shopped beyond brightness and contrast adjustments that are applied to the entire image. For example, scales cannot be digitally cut and repositioned in the image, paint brushed, etc.

2.3.5 **CIL Number:** The CIL number should appear in the documentary photograph as a label taken with the evidence or can be added later using electronic methods. Alternately, the CIL number may appear in the photographic caption. Placing the CIL number in subsequent (non-documentary) photographs or the captions is optional.

2.4 **Photography of Human Remains:** The following guidance applies to human skeletal and dental remains:

- The primary documentary photograph included in the FAR is the skeletal layout, which typically includes the entire set of remains being tested in one frame. The FOR typically includes at least one photograph of the dentition being tested.
- When applicable, remains should be laid out in anatomical position on the analysis table.
- Partial sets of remains may be placed on a smaller photographic board.
- Individual skeletal elements (e.g., vertebra, sacrum, talus) should be photographed in anatomical position.
- If remains consist predominantly of numerous fragments, unidentifiable to element, then they may be placed on a table or smaller photographic board to be photographed. The order of placement is at the discretion of the analyst.

2.5 **Photography of Material Evidence:** The following guidance applies to material evidence:

- When possible, material evidence should be presented in the primary photograph in a position of normal use (i.e., the "top" of the item should be positioned at the top of the photograph).
- If material evidence consists of several fragments of the same item, the materials should be placed in the photograph as close to their original configuration as possible.
- Do not fit several small photographs into a plate style figure if there is not a seamless background. Plate style figures with multiple items should be shot collectively. Alternately, photographs may be embedded in a table cell.
- Provide close-up photographs of important attributes of items (e.g., monograms, names, manufacturers, decorative motifs). These do not require scales.
- Multiple different items in the photograph should be referenced with a letter (preferably with text box letter in Arial font).
- Use a graphic indicators (e.g., colored arrows, boxes) to illustrate specific elements of evidence detailed in the report.
- Graphic indicators and letters should be in a color contrasting with the background of the photo, and explained/referenced in the figure caption.

2.6 **Documentation:** Photographic negatives (when applicable) of evidence used in the tests and test reports are be placed in the case file(s). The devices used to hold the negatives (e.g., plastic protectors, envelopes) are labeled with the case number, date, and analyst's initials. Do not write directly on the negatives.

In most instances the digital images embedded in the report are considered the official photographic record. These images should typically be high quality JPEG file format. Only the images selected

for use in testing and reporting are required to become part of the official record. Digital images used in reports are embedded in the computer file containing the report narrative.

The Digital Image Enhancement (DIE) form is typically used to document enhancements of digital images that are non-routine, non-illustrative and/or evidentiary in nature. Where applicable, the DIE is completed as part of the analytical notes in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation) and stored in the case file. The following guidance pertains to the use of the DIE:

- The original image should be preserved along with any enhancements made to electronic copies of the image.
- Since digital photographs typically require adjustment of contrast and brightness, these changes can be quickly documented by checking the appropriate box on the form.
- For photographs that have been further enhanced (e.g., cropping, arrows added, lines drawn), the DIE should include the image designation (e.g., Figure 1) and the nature of the enhancement.
- Questions regarding when to use the DIE or its proper completion should be directed to Laboratory Management or Quality Assurance.

3.0 RADIOGRAPHY: Dental and osseous radiography produce images that are instrumental in a multitude of test and testing activities in the CIL. Dental radiography is detailed in Annex A (Dental Radiography) while osseous radiography is detailed in Annex B (Osseous Radiography) to this SOP.

4.0 PHOTOGRAPHIC SUPERIMPOSITION: Superimposition techniques at the CIL are adapted from Meehan and Mann (2006) and compare skulls to facial photographs by applying quantitative scoring criteria to blind photo "line-ups." Superimposition at the CIL is not used as a positive identification method, but as a supplementary technique to help create a short list by eliminating possible missing individuals who may be represented by the remains. Results are optimized when the technique is used with multiple photos of the same individuals depicting various angles. This allows more visibility of facial features, helping to discern any discrepancies not apparent when using one photo angle.

Superimposition, to include preparation of images, is conducted in accordance with Annex C (Photographic Superimposition) to this SOP.

5.0 VARIABLE LIGHT SOURCES: A variable light source is typically used at the CIL to bring visible, non-visible, damaged, or illegible watermarks, inks, stamps, and other items of interest into a visible, more easily identifiable form. Typical trace evidence testing includes imaging badly damaged or faded writing, or photographs on documents (e.g., military identification cards). Since the CIL does not employ trained questioned documents analysts, a variable light source is not used to ascertain exact handwriting matches or forgeries, though comparisons of a known sample and an item in question are possible.

Operation of the VSC 6000 is discussed in Annex D (Variable Light Sources) to this SOP. Detailed explanations of the capabilities, processes, and test selections and instructions are available in the VSC-6000 program in the computer, in the user's manual in the binder located next to the instrument, as well as in the library.

Should an analyst experience difficulty using the equipment and/or obtaining desired results, a super-user should be consulted. Various personnel are trained as super-users for the VSC-6000. A list of super-users is posted adjacent to the VSC-6000.

6.0 SCANNING ELECTRON MICROSCOPE (SEM): The SEM has the ability to capture magnified images of trace evidence. Since the SEM has multiple capabilities, its use, to include imaging, is covered in DPAA Laboratory Manual, SOP 3.2 (Measurement Observation & Traceability).

7.0 SURETY: Surety is provided in the peer review process in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). If deficiencies in trace-evidence images are noted, the analyst recaptures the images. Final acceptance of images into the official record is at the discretion of Laboratory Management **(A4.1.5a)**. Forensic imaging is also subject to audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

Surety for dental radiography is discussed in DPAA Laboratory Manual, SOP 3.5. Surety for osseous radiography is further discussed in Annex B (Osseous Radiography) of this SOP.

8.0 SAFETY: Safety for dental radiography is discussed in DPAA Laboratory Manual, SOP 3.5. Safety for osseous radiography is discussed in Annex B (Osseous Radiography) of this SOP. Safety for the VSC-6000 is discussed in Annex D (Variable Light Sources) to this SOP.

Annex A: (Dental Radiography)

A1.0 PURPOSE & SCOPE: This annex outlines dental radiographic techniques that are used for the testing of dental remains accessioned into CIL-HQ and CIL-OF.

A2.0 APPARATUS & MATERIALS: Dental radiographs in CIL-HQ are typically exposed using the Schick CDR System located in Room 310. Room 310 has capabilities for digital radiography and digital scanning of conventional dental radiographs. All equipment is turned off when not in use. Dental radiographs may also be exposed in Room 327 (Morgue).

Dental remains are usually radiographed using digital imaging media. The standard x-ray unit is the Aribex Nomad dental x-ray unit. The Nomad system is a portable x-ray device which may be used in a remote setting but for typical CIL casework it is utilized in Room 310. A Computed Dental Radiography (CDR) sensor is the most commonly used sensor. The Schick CDR sensor is an electronic diagnostic system, consisting of both hardware and software components that acquire, display, print, and store digital radiographic images.

The x-ray machines and x-ray room are surveyed annually in accordance with the appropriate maintenance guide. The Medical Maintenance staff (Tripler Army Medical Center) evaluates the x-ray unit and performs all preventive maintenance requirements.

A3.0 DENTAL RADIOGRAPHY PROCEDURES:

A3.1 **Definitions:** For the purpose of this annex, the following definitions apply:

- **Paralleling (Right-Angle) Technique of Film Placement/Cone Angulation:** Where radiographic film is placed parallel to long axis of the teeth, and the central beam is directed at right angles to the teeth and film. To achieve this parallel orientation for maxillary teeth, it is often necessary to position the film away from the tooth, toward the midline of the palate.
- **Cone:** An accessory device on a dental x-ray machine, designed to indicate the direction of the central axis of its x-ray beam and to serve as a guide in establishing a desired source-to-film distance.
- **Radiolucent:** The portion of the radiograph that is dark or black due to passage of radiant energy with relatively little attenuation of the x-ray beam. The radiographic image of radiolucent materials ranges from shades of gray to black.
- **Radiopaque:** The portion of the radiograph that is light or white. The x-ray beam is either absorbed or its passage is resisted by the radiopaque structure. The image on a radiograph of such materials is relatively light because less radiation passes through, which prevents the exposure of the film in the area.

A3.2 **Radiographic Procedures:** The following procedures apply:

- For digital radiographs, the Nomad system is typically set for 2.3 mA, 60 kVp, and an impulse between 0.06-0.12 seconds. The condition of the remains (e.g., density) may require alterations in these exposure parameters.
- The dental remains should be placed on/near the Schick sensor in an anatomically correct manner.
- Whenever possible, the paralleling technique of positioning the sensor/ subject/cone is recommended (Figure 1). This technique involves placement of the sensor parallel to the long axis of the tooth (teeth) with the radiation source (cone) placed perpendicular to the long axis of the tooth/sensor. The x-ray source should be located relatively close to the teeth to minimize the magnification and increase the definition.

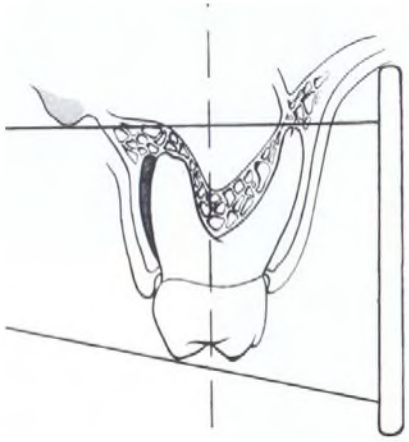


Figure 1. Paralleling technique aligning the long axis of the tooth parallel to the film surface. Cone (source) is to the left, with the x-ray beam directed perpendicular to the long axis of the tooth and the film surface.

- The dental remains are positioned between the X-ray cone and digital sensor in a manner that approximates the alignment of the remains in a living individual. Alignment and position of the remains may be stabilized by any available radiolucent medium (usually dental wax) that can

safely hold the remains in a stationary position. The digital sensor is then exposed and the resulting image is displayed on the attached computer screen.

- Loose teeth or prosthodontic appliances may be radiographed by placing the remains on the sensor. If necessary, stabilize the position of the remains (see above).
- Images should be stored in the Schick Computer Digital Radiograph (CDR) Program in a manner consistent with contemporary policy (i.e., the examiner is facing the "patient"). This places the decedent's right teeth on the left side the radiographic survey. This positioning also applies to scanned antemortem radiographs.

Annex B (Osseous Radiography)

B1.0 PURPOSE & SCOPE: This annex outlines standard radiographic techniques that are used for the testing of skeletal remains accessioned into CIL-HQ and CIL-OF. Radiographic techniques in this annex are limited to those using the medical radiographic systems at CIL-HQ, CIL-FSA, and CIL-OF.

Occasionally, osseous radiography is conducted using the dental systems. In such instances DPAA Laboratory Manual, SOP 3.5 (Forensic Odontology) and Annex A (Dental Radiography) to this SOP should be consulted.

B2.0 APPARATUS AND MATERIALS: The CIL uses digital technology in the preparation and interpretation of radiographs. Equipment needed for preparing osseous radiographs is available in different areas of CIL-HQ, CIL FSA, and CIL-OF.

The digital x-ray system used by CIL-HQ is located in Room 311 (the "X-ray Room") and consists of the following components:

- The GE Proteus XR/a Digital X-ray Unit, including the control panel, image receptor and x-ray table (Figures 2 & 3).
- The GE tablet, computer monitor, trigger, and stand-alone CPU used for the set-up and control of digital radiographs (Figure 4).

The digital x-ray system used by CIL-FSA is located in or adjacent to Room 128 (the "X-ray Room") and consists of the following components:

- The RADEX digital x-ray unit in Room 128.
- The HOLOGIC computer station, used for the set-up and control of digital radiographs, is immediately adjacent to Room 128.
- Once exposed, digital radiographs are analyzed and enhanced at the CATELLA computer station located inside Room 128.

The x-ray system at CIL-FSA serves as a back-up x-ray capability for CIL-HQ.

Equipment needed for preparing osseous radiographs at CIL-OF is available in Room 112 (the "X-Ray or Imaging Room") and consists of the PowerMax 1260 Portable X-ray System comprised of the following components:

- X-ray panel.
- X-ray generator/tube housing.
- X-ray control module (panel/chassis).
- Opal Viewer computer station.
- Portable x-ray stand.

Note: The above systems for CIL-FSA and CIL-OF are non-secure. User ID numbers and passwords can be posted on equipment and shared among users. Computers connected to the digital x-ray systems should NEVER be connected to the network.

THIS SOP IS NOT A SUBSTITUTE FOR TRAINING. ANALYSTS WHO HAVE NOT BEEN TRAINED BY A SUPER-USER SHOULD NOT OPERATE X-RAY EQUIPMENT!

B3.0 OSSEOUS RADIOGRAPHY PROCEDURES FOR CIL-HQ: The following procedures are used to prepare and analyze digital radiographs using the GE Proteus XR/a Digital X-ray System.

Figure 2. GE Proteus XR/a Digital X-ray System

GENERAL WARNING!!!

The GE Proteus XR/a Digital X-ray System is a sophisticated, fragile, and expensive piece of equipment. Numerous instructions and warnings are posted around the equipment and in this SOP. Failure to heed these may result in catastrophic damage to the equipment and liability for such imposed on the user.

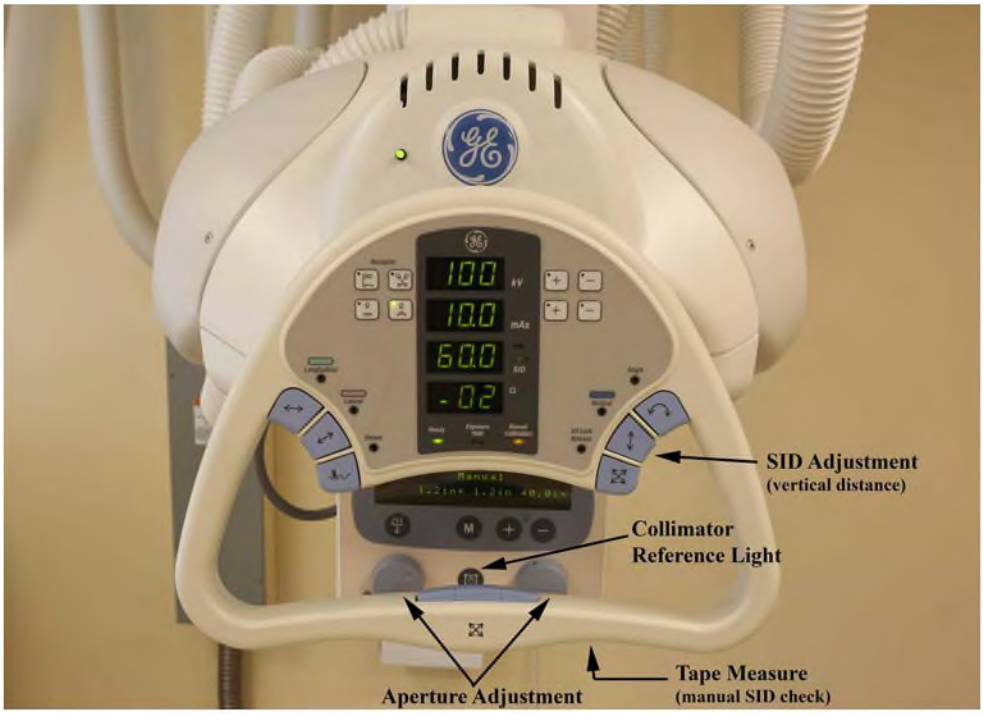


Figure 3. GE Proteus XR/a Control Panel

Despite the delicacy of the equipment, trained users should not be intimidated into avoiding its use. When warnings are heeded and instructions followed, the GE Proteus XR/a Digital X-ray System is a valuable analytical tool.

There are numerous personnel within the CIL who have had additional training on how to use the GE Proteus XR/a Digital X-ray System. A roster of these "super-users" is posted in Room 311. When in doubt regarding how to perform radiographic procedures, always consult a super-user.

B3.1 **Preparing the Equipment:** A super-user performs numerous maintenance and calibration functions that are recorded in the system's maintenance/calibration binder.

The following procedures are used to prepare the equipment to take a radiograph:

- Ensure that the "**Do Not Enter: XR/CT In Use**" signs are posted in the window and on the door of the x-ray room.
- At the GE tablet, press the "|" button to power on the tablet. DO NOT touch the computer monitor, the GE tablet will power it up (Figure 4).
- When both screens are powered up, log in on the computer monitor. Login information is located on a document posted next to the monitor.
- The x-ray tube must first be warmed up:
  - Prior to warm up, the image receptor must be moved out of range of the collimator (place at the end of the table). **Be careful with this piece of equipment as it is fragile and expensive.**
  - **Do not tamper with any of the other controls on the Proteus XR/a unit! Contact a super-user for any adjustments to the system other than those described above.**
  - **Ensure that everyone in the room is behind the lead lined wall.** At the monitors, first click the "CASSETTE" button on the computer monitor. Ensure there are no warnings at the bottom of the computer monitor. If there are any messages at the bottom of the screen, you will not be able to warm up the unit.
  - Select "Tube Warm Up" on the GE tablet (default of 70 kvp, 200mAs, 100mA, and 2.00 sec).
  - Click on "EXP 1" and hold down the exposure 'trigger' until the exposure (beeping) is complete. Do not take your finger off of the exposure trigger until the beeping has stopped. Wait 30 seconds, select "EXP 2", and repeat. This results in the x-ray tube being warmed to the proper temperature range.
  - Select "Home" on the GE tablet. Then select "Back to Digital" on the computer monitor. You are now ready to begin your study.

Figure 4. GE Proteus XR/a Work Station.

B3.1 **Shooting the Radiograph:** Once the Proteus XR/a unit is in the proper temperature range, radiographs can be prepared using the following procedures:

- Click on the Add patient button (+ ) located at the bottom left of the Computer Monitor. Add:
  - CIL (XXXX-XXX)*.
  - Sub-accession (I-01, I-02, etc.).
  - Study description (FAR, CXR, etc). This is recommended.
  - Comments.
  - Time and date will auto-populate.

  *Mandatory entries.

- Click "Start Exam" on the Computer Monitor.
- Select, *Proteus Protocols…Dry_Bone…[relevant category]*, on the Computer Monitor. Next, select *DRY BONES…[relevant category]*, on the GE tablet. Each category (cranial, dense, etc.) has optimal default settings that will auto-populate (including the table top position of the image receptor and small focal spot size). Defer to these settings.
- Approach the *Proteus* unit (Figure 2). Image receptor should remain on the tabletop for all osseous radiography. Place the image receptor directly under the collimator with the cord and handle closest to the wall. To center the receptor, turn on the collimator reference light (Figure 3 identifies items on the control panel) and line the laser up with the white dashes on the face of the image receptor.
- The Sensor to Image Distance (SID) should always appear as "60" (inches). This is the optimal distance from the x-ray sensor to the image receptor (specimen platform) surface. To check that the SID is set at 60, pull the tape measure out of the right corner of the collimator and manually measure to the top of the image receptor. If the SID is not set to 60", use the vertical arrow button on the Proteus control panel to reset.
- Turn on the collimator reference light and position the specimen in the center of the platform. Use the knobs on either side of the collimator reference light to adjust the aperture to dimensions that are relative to the specimen being captured. The amount of empty gray space around the specimen affects the quality of the image, so ensure that empty space around the elements is minimized.

Contact a super-user for any adjustments to the system other than those described above.

- **Ensure that everyone in the room is behind the ion lead lined wall**. Additional protect is available and located in the x-ray room (lead aprons with thyroid guards, eye protection, and mobile lead barrier).
- Push the x-ray trigger to shoot the x-ray. The x-rays have discharged when a beep is emitted from the Proteus station. Do not release the trigger until after the beep is complete.

B3.2 **Enhancing the Image:** While the image processes, a "Preview" of the image appears on the Computer monitor (this is the "Raw" file of the image that was just taken). The system will automatically process the raw image.

- To further process the image, select the right tab (image of a six panel window with an eye).
- Manipulate the image as desired by clicking on the icons on the right edge of the monitor as well as the different categories from the drop-down menu.
- To take a second image, DO NOT click "Close". Click on the left tab (icon with an individual on an x-ray table). You are now ready to capture your next image.
- Once you have completed your study, select "Close" and "Save" your processed images.

B3.3 **Saving the Image:** You are now back on the 'Home' screen on the computer monitor.

- To save your images, click on the second button at the top left of the computer screen (image of an x-ray and computer monitor with arrows). Select the images you wish to burn to a disc (using the 'shift' or 'ctrl' keys on the keyboard).
- Place a CD (the system will not burn onto DVDs) in the CPU. Once your images are selected, click on the 'CD1" button at the bottom of the screen. Then click on "Write". The CD will eject once the system has finished burning the disc.

B3.4 **Shutting down the Proteus System:**

- Click on the button at the top left of the computer screen (image resembling a list) to return to the 'Home' Screen.
- To Log Off, click on the button second from the top right of the computer screen (resembling a door and arrow).
- Once you are logged off of the computer screen, click the "O" button on the GE Tablet. This will power down the Proteus System.

B3.5 **Retrieving an Existing Image:** After the images are saved on the desk top, they can still be burned onto a CD. To retrieve these images, click on the second button at the top left of the computer screen (image of an x-ray and computer monitor with arrows) and scroll until your study has been located. Follow the directions outlined above.

Note: The CPU has a 500 image capacity. Once the spool is full, the oldest images are automatically purged from the memory and are forever lost.

B3.6 **Completing Radiography Procedures:**

- Clean up the workstation.
- Place the image receptor on either end of the x-ray table, not directly under the collimator.
- Remove the warning signs from the window and door.
- Ensure your evidence is collected from Room 311 and properly secured and accounted for in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

B4.0 OSSEOUS RADIOGRAPHY PROCEDURES FOR CIL-FSA: The following procedures are used to prepare and analyze digital radiographs using the HOLOGIC RADEX Digital X-Ray System.

GENERAL WARNING!!!

The RADEX digital x-ray unit is a sophisticated, fragile, and expensive piece of equipment. Numerous instructions and warnings are posted around the equipment and in this SOP. Failure to heed these may result in catastrophic damage to the equipment and liability for such imposed on the user.

Despite the delicacy of the equipment, trained users should not be intimidated into avoiding its use. If warnings are heeded and instructions followed, the HOLOGIC RADEX Digital X-Ray System can be a valuable analytical tool.

There are numerous personnel within the CIL who have had additional training on how to use the HOLOGIC RADEX Digital X-Ray System. A roster of these "super-users" is posted in Room 128. When in doubt regarding how to perform radiographic procedures, always consult with a super-user.

B4.1 **Preparing the Equipment:** A super-user performs numerous maintenance and calibration functions that are recorded in the system's maintenance/calibration binder.

When the system is on and working properly, the default screen on the HOLOGIC station appears after moving the mouse.

WARNING: If the default screen is not present consult a super-user. NEVER TURN THE HOLOGIC COMPUTER STATION ON OR OFF!

The following procedures are used to prepare the equipment to take a radiograph:

- At the HOLOGIC station, log in on the default user's screen using the pull down menus. The password is posted on the monitor. Once logged in, the user's screen should become available.
- The RADEX x-ray tube must first be warmed up. This is done by:
  - Clicking on the "conventional mode" button on the user's screen. Default instructions appear. Ensure the settings outlined in the instructions (75 kvp, 200mA, and .200 secs.) match those on the screen.
  - There should be nothing on the "bucky" plate. Items on or near the plate cause the tube warming procedure to alarm and stop functioning. If this happens accidently, contact a super user immediately
  - At the RADEX x-ray unit, turn on the collimator light and then completely close the collimator (refer to Figure 5 for identification of these controls). **Do not tamper with any of the other controls on the RADEX x-ray unit!**
  - Evacuate Room 128 (make sure no one is in the room) and close the door. Unlike the CDR system, **it is never permissible to shoot radiographs using the RADEX with the door open!**
  - Ignore the warning on the monitor screen regarding the lead apron.
  - Using the x-ray button (a "beep" sounds), shoot an x-ray every three seconds until the heat indicator shown on the monitor reads 7-9%. This results in the x-ray tube being warmed to the proper temperature range. Note: The RADEX x-ray unit needs the three seconds between exposures to reset. When the yellow "X" disappears from the radiation symbol on the screen, the system has reset and is ready to shoot another exposure. The HOLOGIC station also beeps when the x-rays discharge.

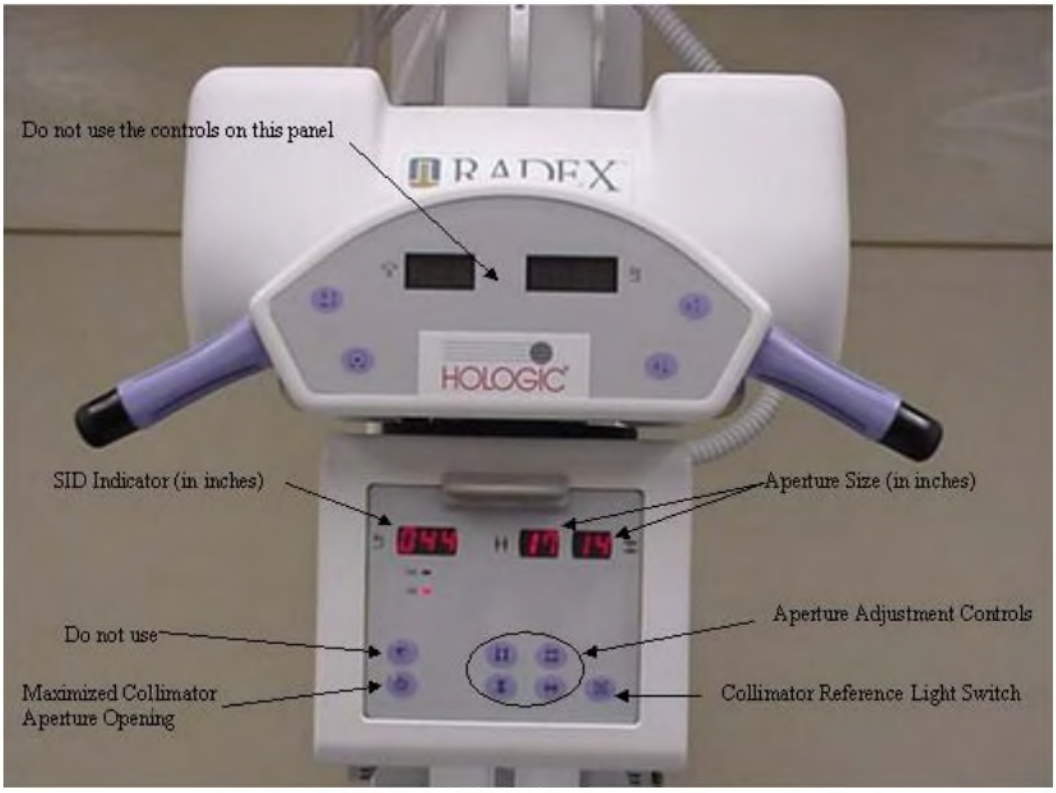


Figure 5. RADEX Digital X-ray Control Panel.

B4.2 **Shooting the Radiograph:** Once the RADEX unit is in the proper temperature range, radiographs can be prepared using the following procedures:

- Using the "end conventional mode" button, switch back to the user's screen on the HOLOGIC station monitor. Under the "patient" tab, click the "new" button and enter the "patient" information, e.g.:

  - CIL# (XXXX-XXX)*.
  - Sub-accession (I-01, I-02, etc.).
  - Date-time group (e.g., 01Oct20041630)*.
  - Comments.

  *Mandatory entries.

- Enter the "Procedure Description," which consists of two pull down menus. The first should be set at "special studies" and the second at "dry bones_no grid." Select the latter menu. (Use of the grid is a super-user operation conducted in the event scatter on the radiograph interferes with its diagnostic quality.)
- Click on "accept" and a new screen should appear.
- Click on the "bucket" that best applies to the case at hand (small, medium, large, skull, pelvis). For example, a large bone, such as the femur would need a large bucket. Note: The command "add view" can be used if many x-rays need to be shot and all pre-set buckets have already been used.
- The "focal spot" setting should be on its default setting of "small." Do not touch the "AEC" settings.
- Select "patient" size. "Medium" is the default and works best in most cases.
- Defer to the default settings of 50 kvp, 100 mA and time of 0.04 on the screen. If these are not producing the needed results, alter patient size first (probably to "small") before altering these settings.
- Approach the RADEX unit. Figure 2 identifies items on the control panel). The Sensor to Image Distance (SID) should always appear as "44" (inches). This is the optimal distance from the x-ray sensor to the bucky (specimen platform) surface.

WARNING: Do not adjust the SID without the help of a super-user. You may put the x-ray unit through the ceiling and rupture the sprinkler pipe, thus causing catastrophic damage to the RADEX unit!

- Turn on the collimator reference light and position the specimen on the platform. Note: The HOLOGIC symbol on the bucky assists in orienting the radiograph by always representing the original upper left corner of the image. Despite its actual position in the image after manipulation, the HOLOGIC symbol always marks the original upper left corner.
- Rotate the bucky if necessary. Apply gentle pressure clockwise if the bucky is in portrait mode, and counterclockwise if it is in landscape mode.

WARNING: No other adjustments of the bucky or control unit (e.g., to provide angulation exposures) are permitted without super-user assistance!

- Using the appropriate controls, adjust the aperture (Figure 2) to frame the specimen. For better diagnostic quality, the specimen should be "cropped" by the aperture to maximum extent possible. Back-and-forth readjustment of the specimen and aperture may be required to achieve adequate framing.
- Close the door to Room 128. Push the x-ray button to shoot the x-ray. The x-rays have discharged when a beep is emitted from the HOLOGIC station.

B4.3 **Selecting or Rejecting the Image:** While the image processes, the "preview" screen appears on the HOLOGIC monitor. This screen allows you to review the radiograph that was just taken. To accept or reject the radiograph:

- Review the draft image on the HOLOGIC monitor. Manipulate the image as desired by clicking the buttons in the top left of the preview screen. Note: The system at this point only allows minimal manipulation (crop, flip, rotate, etc.) and to add the body side and/or desired orientation in space (L, R, AP, etc.) to the image. Additionally, the quality of the image shown may be substantially less than the one eventually depicted on the CATELLA monitor (see below).
- Check to ensure the gateway computer, collocated with the CATELLA system, is on and log in. The gateway user name and password are posted at the gateway terminal.
- Select or reject the image. If rejecting, the HOLOGIC asks for a reason. Note: Rejected images are maintained on the spool (see below) for a limited period to allow retrieval, if desired.
- Once the image is selected, the HOLOGIC computer should automatically send it to the gateway computer, which should indicate that it received your case and the number of images associated with it.
- If the HOLOGIC computer fails to automatically send the image:

- Return to the HOLOGIC station and close the current study (use the "close study" button). Using the drop down "admin" menu, select "spool management."
- Find the missing case using the "search" function. Select the images you wish to send to the CATELLA work station and click on the "resend selected images" button.
- The HOLOGIC computer should indicate that the images have been sent and they should appear at the gateway computer.

- Once the image is at the gateway computer, log off of the HOLOGIC computer.

WARNING: When logging off, use the "sign out" button located immediately to the right of your name. Do not use the "file" drop down menu. Using the latter may initiate system shut down which, if done improperly, damages the equipment.

- Clean up the workstation, and proceed to the CATELLA computer station. Note: Ensure your evidence is collected from Room 128 and properly secured and accounted for in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

B4.4 **Enhancing the Image:** At this point, the gateway computer has sent the image to the CATELLA computer station. This may take some time depending on the number of images sent and how busy the system is. The following procedures allow the analyst to enhance radiographs to maximize their testing value:

- Log on to the CATELLA computer station (the user name and password are posted on the monitor) and right click on the mouse to view the menu.
- Use the menu buttons to enhance the image as required. The system can add graphics, text, measurements (distance and angles), as well as flip and rotate the image. Note: You can always judge the orientation of the image in space since the HOLOGIC symbol always denotes the original upper left corner of the image as taken on the RADEX x-ray unit. Despite manipulation, the original orientation is maintained.
- Clicking the mouse wheel changes the cursor and function. Holding down the left mouse button and dragging allows the analyst to zoom in and out of the image, reposition it on the screen, and adjust the window/level.

B4.5 **Saving an Image:** To save an image from the CATELLA, click on the radiograph image to be saved. Select "annotate" and then the "change file name" option. Select the appropriate drive and input the desired file name and click on "save."

B4.6 **Retrieving an Existing Image:** After the images are saved on the desk top, they can be burned onto a CD.

Apart from the archival system on the CATELLA computer, the RADEX images are also saved on a spool in the HOLOGIC computer. The spool has a 500 image capacity. Once the spool is full, the oldest images are automatically purged from the memory and are forever lost. You can resend images still on the spool to the CATELLA using the resend procedures from "spool management" outlined above.

B4.7 **Scanning Film Based Radiographs:** The capability exists to digitize film-based radiographs into the HOLOGIC RADEX Digital X-Ray System. Consult a super-user to perform this operation.

B4.8 **Completing Radiography Procedures:**

- Clean up the workstation.
- Ensure your evidence is collected from Room 128 and properly secured and accounted for in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

B5.0 OSSEOUS RADIOGRAPHY FOR CIL-OF: The following procedures are used to prepare and analyze digital radiographs using the PowerMax 1260 Portable X-ray System. Figure 6 shows the configuration of the system.

The PowerMax 1260 Portable X-ray System is a sophisticated, fragile, and expensive piece of equipment. Numerous instructions and warnings are posted around the equipment and in this SOP. Failure to heed these may result in catastrophic damage to the equipment and liability for such imposed on the user.

Despite the delicacy of the equipment, trained users should not be intimidated into avoiding its use. If warnings are heeded and instructions followed, the PowerMax 1260 Portable X-ray System can be a valuable analytical tool.

A roster of personnel within the CIL who have had additional training on how to use the PowerMax 1260 Portable X-ray System (i.e., "super-users") is posted in Room 112. When in doubt regarding how to perform radiographic procedures, always consult with a super-user.

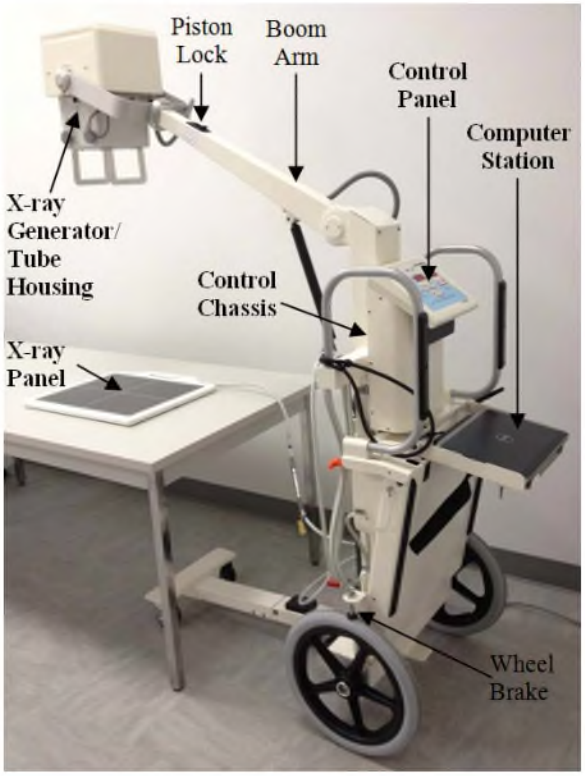


Figure 6. PowerMax 1260 Portable X-ray System.

B5.1 **Preparing the Equipment:** A super-user performs numerous maintenance and calibration functions that are recorded in the system's maintenance/calibration binder.
The following procedures are used to prepare the equipment to take a radiograph:

- Ensure that the x-ray stand is in position and connected to a power source. Lock the wheel breaks using the manual levers.
- Remove the x-ray panel from the storage compartment below the computer station and place it on the table. Ensure that the x-ray panel cable is not pulled or bent; use the cable cuff as necessary.
- Turn on the two rocker type switches that control the primary power into the system and the power to the laptop computer/control panel (located on the back and to the right of the control chassis). Note: if you are moving or otherwise unplugging the equipment, ensure that both switches are in the off position before unplugging the unit.
- Adjust the boom arm height to the desired distance from the x-ray panel by releasing the piston lock to allow movement of the boom arm. The x-ray generator has an integrated retractable tape measure to determine SID (source to image distance) accurately.
- Ensure that the x-ray generator is parallel to the x-ray panel using the "level-o-gage" on the side of the generator (refer to Figure 7 for identification of the features). **Do not use the skin guards as handles**. Press the collinator lamp button on the x-ray generator to activate the lamp. The laser crosshairs indicate the x-ray field; these are automatically extinguished after approximately 15 seconds. Center the laser crosshairs over the point of interest. Rotate the shutter knobs to adjust the size of the x-ray field.
- At the control panel select the desired kVp, mA and exposure time (see Figure 8). To adjust kV output, use the KVP up and down arrows accordingly. To adjust exposure time, use the Time up and down arrows accordingly. To adjust tube current press the "MA" button to toggle between mA low and high settings. It is recommended that the mA is always kept on the low setting. If you are unsure what settings to use, consult the manuals available on the desktop of the attached computer.
- To access the laptop unhook the rubber cord from the right rail on the portable x-ray unit. Re-attach the hook onto the left side rail that contains the loop end to prevent the cord from getting in the way during operation of the unit. To bring down the laptop tray pull the handle located to the right of the workstation towards you (counterclockwise) and gently open the tray. To close, push up on the tray and turn the handle away from you (clockwise). When not in use it is recommended that the laptop be secured with the rubber cord.

Figure 7. X-ray Generator Description.

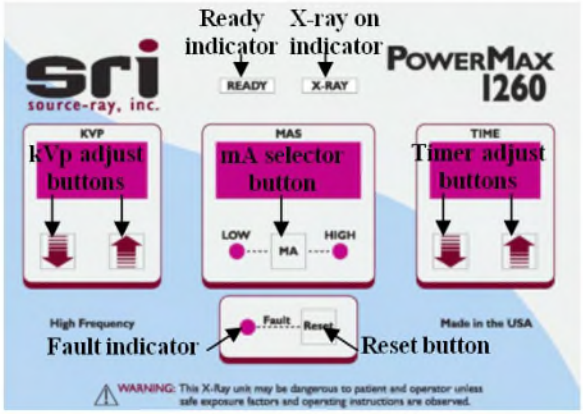


Figure 8. Control Panel Descriptions.

- The PowerMax 1260 x-ray tube must first be warmed up. If the equipment has been powered off for an extended period of time, it is necessary to warm up the unit slowly so that the high voltage circuits are not damaged. The following procedures are used to warm up the x-tray tube:

  - Set the control panel to 60 kVp, Low mA, and 0.99 seconds.
  - Ensure that there is nothing on the x-ray panel.
  - At the computer station, turn on the laptop and double click on the OPAL StudyList icon located on the desktop. The User Name and Password are posted on the computer. Once logged in, the user's screen should become available.
  - On the "Study List" tab, click on a study labeled as "Test" under the Patient Name column.
  - Click on the "Add New Image" at the bottom of the window.
  - Once the x-ray preparation window is open click on "Acquire" at the bottom of the page (see Figure 9).
  - While holding the remote exposure control (joystick and button located right of control panel), step at least 6 feet to the rear or side of the x-ray generator. Wearing the lead apron is not mandatory, but it is recommended.
  - Press the x-ray switch on the exposure control to the first position (prep). The "READY" light goes off and comes back on when the unit is fully prepped.
  - Press the x-ray switch to the second position for immediate exposure. An audio tone sounds and the "X-RAY" indicator light illuminates for the duration of the exposure. Releasing the x-ray switch prior to the pre-selected time interval terminates the exposure, and the "Fault" indicator illuminates. If this occurs, press the "Reset" button to clear the fault and reset the timer.
  - Once an exposure is taken, an automatic inhibit circuit allows the x-ray tube to cool in proportion to the exposure time to prevent damage to the x-ray tube from overheating. At the end of this cycle the "READY" light illuminates indicating an exposure can be taken.
  - Take 2-3 exposures.
  - Increase kV by ten and take 2-3 exposures.
  - Repeat the above steps until you reach the 120 kV setting.

B5.2 **Preparing the Specimen:** Once the x-ray unit is in the proper temperature range:

- Cover the x-ray panel with a protective sheet, plastic, or foam. Ensure the panel is on a flat surface. Bending or flexing the plate can cause the glass to crack or shatter.
- Securely position the specimen and the radiographic scale on the x-ray panel over the protective material.
- If the remains are fleshed always keep them in a biohazard bag during radiography procedures.
- Do not exceed 330 lbs over the entire area of the panel or 220 lbs on an area less than 1.5" in diameter.
- Adjust the SID and x-ray focal point using the tape measure, collimator reference light, and shutter knobs.
- Adjust the kVp, mA, and exposure time to the desired settings.

WARNING: Never pull on the x-ray panel cable or bend it tighter than a 1 3/16" radius. This could cause damage to the cable and may result in fire or electric shock.

B5.3 **Configuring the Image Destination:** The Opal Viewer computer station is non-secure and is only used for radiographic purposes. Remember, this computer cannot be connected to the network.

- If not already done, turn on the computer and double click on the OPAL StudyList icon. Enter the User Name and Password posted on the computer.
- On the "Study List" tab, click on the "Create New Study" button at the bottom of the window.
- Enter the "patient" information:

  - "Patient ID": CIL# (XXXX-XXX)*.
  - "First Name": . (*period*)*.
  - "Last Name": Sub-accession (I-01, I-02, etc.)*.
  - "D.O.B.": 01/01/1900*.
  - "Gender": Select Male, Female, or U/K.

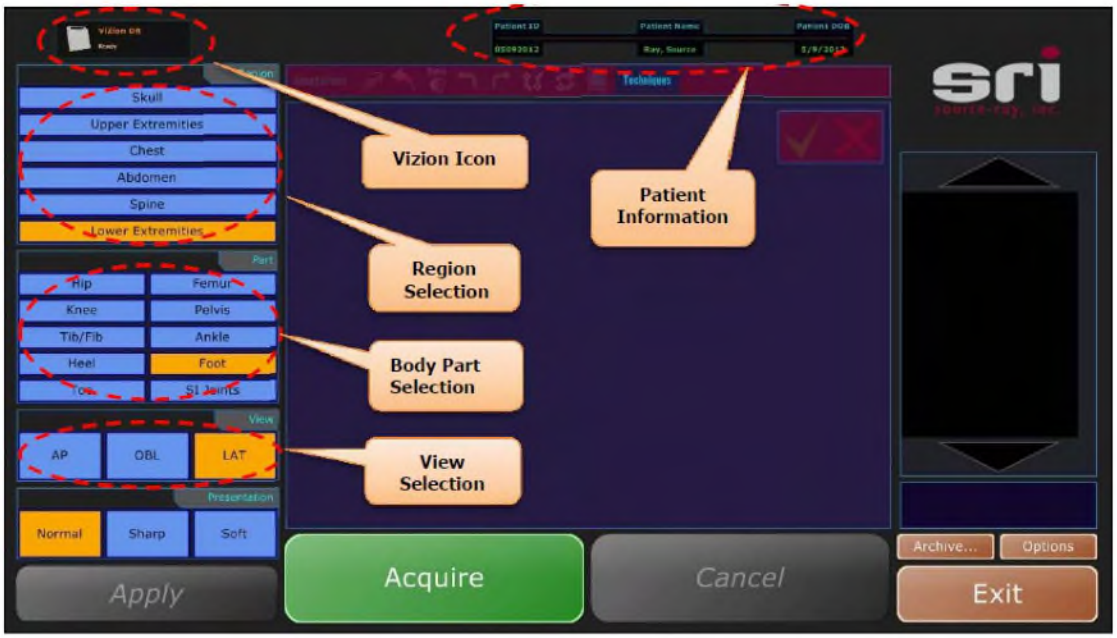


Figure 9. X-Ray Preparation Window.

- "Study Description" and "Body Part": Select type from pull down menus or add new descriptions using the "ADD" button next to each category. Note: once added these descriptions cannot be deleted.
- "Referring Physician": Type user's name.

* Mandatory software entries.

- Click on "Acquire" button to proceed with the x-ray acquisition.

B5.4 **Shooting the Radiograph:** There is a required 120 second time delay to prepare the Control Panel each time it is powered off and back on. Shooting during this time may result in noisy images.

- Confirm that the "Patient Information" is correct at the top of the screen (see Figure 9).
- Observe the ViZion icon in the top left hand corner and confirm that it is on the "Ready" status.
- Select Region, Part, View, and Presentation accordingly. This process establishes the appropriate filter and algorithm for the radiograph you are taking.
- Click the "Acquire" button at the bottom of the screen.
- Wait for the "Ready for Exposure" prompt to appear in the center of the window.
- Re-check the exposure techniques (kVp, mA, time), position of remains, and x-ray panel.
- Proceed to take the x-ray by pressing the exposure half way down and wait for the "READY" light on the Control Panel to illuminate.
- Move away from the generator and press the switch all the way down to take the x-ray.
- A "Transferring data" message should appear, and the x-ray image should be displayed approximately 5 seconds after pressing the exposure switch. Occasionally there is a communication error between the software and the source. If the "Transferring data" screen and image do not appear, simply re-take the x-ray by repeating the above steps. The communication error is visible next to the ViZion icon while taking the x-ray.

B5.5 **Manipulating the Image:**

- Manipulate the image as desired by clicking the buttons at the top of the preview screen. The system at this point only allows minimal manipulation (crop, flip, rotate, etc.). Note: It is recommended that the shutter box region is "cropped" to the maximum extent possible.
- Adjust brightness and contrast by holding down the left mouse button and dragging your finger up/down on the touchpad.
- To zoom in and out of the image, click the central mouse button above the touchpad and move the scroll button on the keyboard.
- To reposition the image on the screen, holding down the left and right mouse buttons simultaneously and move the cursor using the touchpad.

- Click on the "Apply" button to save these changes.

B5.6 **Adding & Customizing Annotations:**

- Click on the "Annotations" button at the top of the window to access annotation options. Select one of the options (e.g., Arrow; L/R; AP/PA; Lateral/Oblique) and place inside the purple shutter box; you can only select one at a time. The annotation can be then manipulated inside the shutter box.
- For custom input, click on the "Free Text" button at the bottom of the annotations window. A pop-up window appears to allow for user input of free text and manipulate font size. Be sure to place the annotation text within the purple shutter box, otherwise the annotation is not sent with the x-ray image.
- The x-ray settings (i.e., kVp, mA, time), the user's initials, date, and the "FOUO" annotation can be added as text and sent with the X-ray image if placed within the shutter box. If this information is added here rather than in the OpalViewerLite the program saves it with the image.
- To modify text height or customize annotation settings, click on the "Options" button in the bottom right hand corner of the window.
- Click "Apply" to save changes and then press "OK".

B5.7 **Selecting, Rejecting & Saving the Image:** To accept or reject the radiograph:

- When satisfied with the image, presentation, and annotations click on the green check mark at the top right-hand corner of the window.
- The thumbnail icon changes status from a yellow question mark to a "Done" status with a green check mark.
- To reject an image click on the red "X" button in the top right hand corner.
- Select one of the rejection options from the pop-up window or select the custom option. For a custom reason for rejection, click on the "Custom" button.
- After selecting "Reason for Reject" or "Custom Text" and clicking "OK", the thumbnail status changes to a rejected status with a red "X" and is labeled according to the selected entry.
- Continue to take exposures as needed, accepting or rejecting images accordingly.
- Click the "Exit" button to exit.
- All images that were "Accepted" are processed and saved to the image store. Once this is complete "Study List" screen reappears.

B5.8 **Enhancing the Image:** At this point, the software has stored the images which can be accessed from the "Study List" tab. The following procedures allow the analyst to further manipulate the radiographs:

- Select the newly acquired study by double-clicking on the study.
- A window appears in the OpalViewerLite software program.
- Select an image from the left side of the screen.
- Manipulate the image as desired by selecting the appropriate button from the QC toolbar at the top of the screen. The system can add graphics, text, measurements (distance and angles), as well as flip and rotate the image. Note: Changes at this stage cannot be saved with the image; changes appear on the screen and can only be copied as "Print Screen" shots or "Snipping" shots (using the Snipping tool).
- Once finished, close the study by clicking on the "X" in the top right corner.

B5.9 **Exporting Existing Images:** To export an image from the x-ray workstation onto a CD or DVD, select the study to be saved, click on "CD Burn" and then on the "Start Burning" button. Prior to burning ensure that the destination drive is correct and that the CD or DVD is burned with a copy of OpalViewerLite (ensure box is checked). The default setting is to include this program, and it is required to view the radiographs. Once the disk has finished burning, run OpalViewer to view the image(s) and make sure the data has transferred. Note: Ensure the CD is properly labeled and scanned for viruses before using it on a network computer.

The archival system on the Opal Viewer has a limited image capacity. Once the memory is full, the oldest images are automatically purged and are forever lost. All radiographs must be copied onto a CD at the time they are captured. Once the disk has been burned, log out of the software and shut down the computer.

WARNING: When closing the software, it is imperative to utilize the "Logoff" button, as opposed to clicking on the X. Failure to logoff correctly can cause a software lockout situation!

B5.10 **Completing Radiography Procedures:**

- Clean up the workstation.
- **Unless the x-ray generator is going to be immediately used again, the "Power ON" switches should be turned off.**
- Ensure your evidence is collected from Room 112 and properly secured and accounted for in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

B6.0 DOCUMENTATION: Once radiographic images have been transferred from the radiographic workstation, they can be further manipulated using existing software and embedded in test reports as needed. Permanent stand-alone hard copy images must be prepared for the case file. Hard copies are prepared as follows:

- Print and retain only the radiographs that are used for your tests. These should be printed out in the highest resolution possible and placed in the case file.
- Retained radiographs are considered analytical notes and are annotated and handled accordingly in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).

If an outside opinion from a radiologist or other expert is sought, their name, title, place of business (e.g., Tripler Army Medical Center), credentials and any other pertinent information should be obtained and noted in the case file. If possible, request a copy of their report to include in the case file.

B7.0 SURETY: Radiographs should be of diagnostic quality. Diagnostic quality is defined as imaging which clearly defines the characteristics of the element necessary for the testing. Difficulties in obtaining the desired quality in a radiograph should be reported to a super-user.

B8.0 SAFETY: The following safety precautions, to protect personnel and the digital x-ray system, apply:

- X-ray rooms are designated with standard radiation hazard signs and are shielded to eliminate x-ray exposure to the adjacent work areas.
- A radiation survey should be performed every three years, in accordance with Tripler Army Medical Center and the Offutt AFB health clinic guidelines, as appropriate. Quality Assurance keeps the results of these surveys.
- Do not operate x-ray systems in the presence of flammable gases, fumes, or suspended dust particles. Fire or explosions could result from electrical arcing.
- Do not perform any unauthorized modifications to the systems.
- Heed all posted warnings and those in this annex.
- Women that are pregnant or suspected of being pregnant should take appropriate precautions against radiation exposure.
- **This annex is not a substitute for training. Analysts who have not been trained by a super-user should not operate the equipment!**

Annex C (Photographic Superimposition)

C1.0 PURPOSE & SCOPE: This annex outlines standard radiographic techniques that are used for the testing of skeletal remains accessioned into CIL-HQ and CIL-OF.

C2.0 APPARATUS & MATERIALS: The superimposition equipment consists of:

- Two Sony HD Handi Cam video cameras suspended on Kaiser RS1 video stands that separately image the skull and photograph.
- The Edirol HD LVS-400 video mixer that merges the camera images.
- The merged photo product is viewed on the Sony 32" HD monitor.
- Computer with Pinnacle Studio (Version 8) software program that digitally records a movie of the comparison and a single frame capture option to print or save as a JPEG file.

C3.0 SUPERIMPOSITION PROCEDURES:

C3.1 **Alignment Procedures:** The following procedures are used to align a skull to a photograph:

- Prepare the skull: Use care in handling the skull if it has undergone extensive reconstruction and/or if the bone is in a fragile condition.
    - Place "ear pegs" into the external auditory meatus. These are needed later in the alignment process.
    - Place black foam in the eye orbits. These are used to accentuate the contours of the eye and to block background osseous structures.
- Scale the skull on the video monitor. The camera is pre-set at the 28" level on the right hand camera stand. This provides a crown to chin view of the remains on the monitor when placed on the cotton or cork donut.
- Scale the photograph on the left side video monitor by turning the camera positioning knob. Size the photograph on the monitor so the photographed individual is seen with the same crown to chin view filling the monitor.
- Select MIX on the video menu board, sliding the bar to approximately 50% for each camera image.
- Adjust the skull position to match the angle in the photo using the below procedures. The photograph may require several adjustments to achieve the proper alignment.
- Angle the skull on the stand to face the same direction as the photograph while always maintaining the nasion positioning alignment in the sagittal plane (Figure 10).
- Adjust the alignment in the sagittal plane (Figure 10) as follows:
    - Move the skull to line up the skull nasion with the nasion on the photograph. It is important to maintain this point while making all other adjustments.
    - Tilt the skull forward and backward gradually lining up the base of the nasal spine (nasospinale) as the second point of congruity.
    - Adjust the alignment in the transverse plane (Figure 11) as follows:

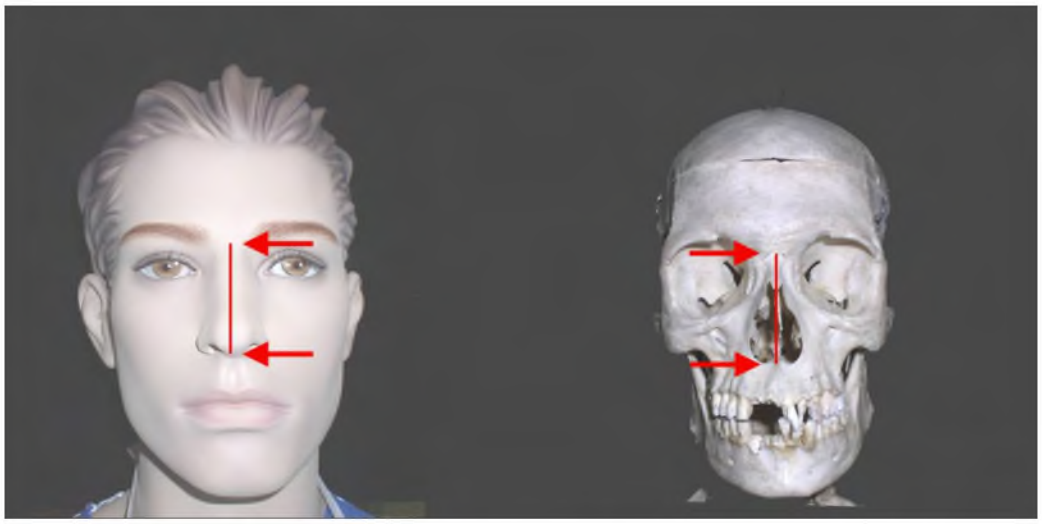


Figure 10. Sagittal (vertical) alignment of the skull with the photograph.

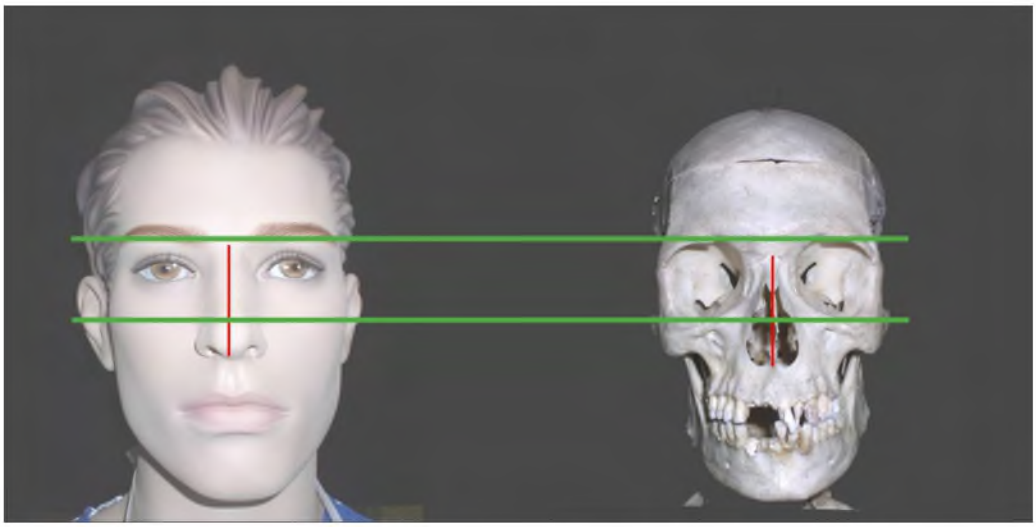


Figure 11. Transverse (horizontal) alignment of the skull with the photograph.

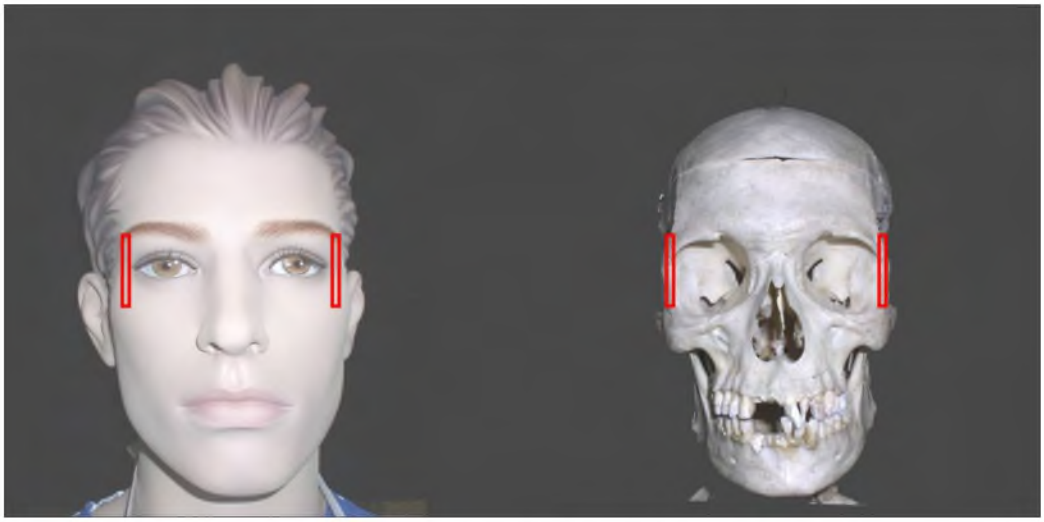


Figure 12. Fitting the superior zygomatic ridge.

- Tilt the skull from side to side lining up the orbits with the appropriate location on the photograph (while maintaining the nasion position).
- Align the malars/zygomatics with the photograph cheek bones.
- Fit the superior zygomatic ridge (defined by the red boxes in Figure 12) from the skull within the corresponding ridges shown in the photograph. This should automatically align the ears with the red pegs in the auditory canals.
- Electronically record the final alignment (using the fading features, etc., from the mixer). The Pinnacle Studio 12 method allows a single image mix capture as well as recording the video of the alignment. An image of each comparative photo must be recorded as part of the notes.
- Repeat the alignment procedure with multiple photos of the same individual, as appropriate.
  - Different angles.
  - Smiling (showing teeth vs. no teeth).
  - Hair/hat variations.
- Repeat the procedure with the skulls of different individuals, as appropriate.

C3.2 **Comparison & Scoring Procedures:** Comparison and scoring are recorded on the Photographic Superimposition Analysis form for each photograph compared. The form is found on the DPAA network. Table 1, below, is an excerpt from that form. The procedures are as follows:

- The select points of congruence are listed in Table 1. Using the below protocol, in the appropriate box in the comparison table score the quality of the match or fit between the skeletal and the photographic features. The points available may vary depending on the photograph clarity, angle of the subject, and the presence of clothing, hair, eyeglasses, etc.

  - +1 = Lines up easily with good fit.
  - -1 = Does not fit, alignment not possible while maintaining other established points.
  - 0 = Undetermined (to be used for trauma areas of the skull or unable to compare due to photograph clarity)
- Calculate the total comparison score for the photograph (i.e., sum of the column totals).

  Example: +1, +1, +1, -1, 0, -1, +1 = 2

- Repeat the comparison procedures with multiple photographs of the same individual, showing, as appropriate:

  - Different angles.
  - Smiling (showing teeth versus no teeth).
  - Hair/hat variations.
- Repeat the comparison procedures with different individuals, as appropriate.

The superimposition analysis conclusion should be reported with a comparative graph and an explanation of the results. For example:

Table 1. Comparison Table for Superimposition.

Photo #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Comparison Criteria																				
Vault height																				
Vault width																				
Mandible length																				
Mandible shape fit with chin shape																				
Orbit fit to photograph's eyes																				
Position of the ears pegs																				
Nasal aperture length																				
Nasal aperture width																				
Mouth/teeth/lip alignment																				
Total overall fit (ease of alignment)																				
Column total																				

No unexplainable negative comparison points. Specifically: "Individuals in photos __-__ and ____ cannot be ruled out as possibly being the unknown individual as there are no apparent discrepancies between the superimposed remains and photographs", or

Negative comparison areas duplicated on multiple photo angles. Specifically: "Individuals in photos __-__ and ____ are unlikely to be the unknown individual represented by the skeletal remains as comparison discrepancies cannot be explained by multiple view photos."

Note: It is very important to look for and note additional distinguishing facial or osseous characteristics.

C4.0 DOCUMENTATION: Superimposition images are recorded as specified above and stored in the case file when recorded on CD, or when hard copy prints are produced. Original MPEG files are stored on the DPAA network. Other documentation, such as comparison forms, graphs, and other notes are also stored in the case file. All test products for superimposition are prepared and annotated in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).

Annex D (Variable Light Sources)

D1.0 PURPOSE & SCOPE: This annex outlines standard radiographic techniques that are used for the testing of skeletal remains accessioned into CIL-HQ and CIL-OF.

D2.0 APPARATUS & MATERIALS: The principle item of equipment used to generate variable light sources is the Foster + Freeman VSC-6000, located in CIL-PH and CIL-OF. The VSC-6000 is a high-resolution video spectral comparator that uses multiple light wavelengths, to include infrared and ultraviolet, to emphasize the reflective or absorptive properties of various inks. Further, the VSC-6000 has high and low magnification abilities (see below).

The VSC-6000 is also used as a digital camera with adjustable magnifying power from approximately 1:1 to 130:1.

D3.0 VLS PROCEDURES: The analyst should apply the following procedures to use the VSC-6000:

- Turn on the computer, the monitor, and the VSC-6000 (the power switch is located on the back left of the machine).
- Wait until the Windows Desktop is displayed on the monitor, and then double click on the VSC-6000 Shortcut Icon to start the VSC-6000 software.
- In the login window, click on the Default (C:\Cases) Tab.
- A live image, which can then be manipulated by the analyst, appears automatically on the screen.
- When operating the VSC-6000 as a variable light source, a performance check should be completed prior to the start of the day's use. The analyst should use the tutorial sample sheet provided by Foster + Freeman, which contains three exhibits and a 5 Euro note to test. Compare the performance check results to the expected results sheets, and complete the performance check log. The expected results sheets and the performance check log can be found in the VSC-6000 binder located next to the instrument.
- After performance checking the instrument, illuminate and conduct testing of the test object, as appropriate. The type of light used for a test is at the analyst's discretion. Image controls are located on the computer screen. The following tests may be conducted:

    - Standard lighting methods, such as UV or IR, are available on the bottom right hand side of the screen. More sophisticated test methods are available on the upper menu bar.
    - Contrast, positive and negative images, and flipping the vertical and horizontal frames of the screen are possible.

- For help at any time, place the cursor over the item in question and press the F1 key. Additionally, go to the Help Menu and click on Tutorial.
- To save an image, create an appropriate case folder using the CIL accession number and save it in the C:\Cases Folder. The image may be saved as any of a number of file types (e.g., JPEG, JPEG 2000, Bitmap, TIFF). However, note that saving an image as a standard JPEG file results in a slightly modified copy, with the loss of some detail. The image must also be saved with the test settings (light wavelength data) displayed at its base. The analyst is prompted if the VSC settings should be saved (answer yes). A step by step procedure for saving the photograph with the VSC-6000 settings is contained in the binder next to the instrument.
- At the completion of the test session, close out of the program, shut down the computer, and switch off the monitor and the VSC-6000. All equipment should be covered with the appropriate dust covers when not in use.

D4.0 DOCUMENTATION: Images produced via variable light sources are printed out in high-resolution hard copy, along with the light wavelength data (saved with the image on the lower portion of the screen), annotated in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation), and placed in the case file. Only the images selected for use in testing and reporting are required to become part of the official record. Digital images used in reports are embedded in the computer file containing the report narrative.

D5.0 SAFETY: The VSC-6000 utilizes UV light. The analyst should illuminate the evidence only after the doors to the chamber are closed (the analyst is prompted to close the doors when a UV light source is chosen, and, in fact, the VSC only works if the doors are fully closed). There are no other inherent safety considerations involving forensic imaging.

SOP 3.2: MEASUREMENT & OBSERVATION TRACEABILITY

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 27 April 2016
Citation: DPAA Laboratory Manual, SOP 3.2

0.0 PRINCIPLE, SPIRIT & INTENT: *Trace evidence equipment and supporting materials are operated, maintained, serviced, and performance checked in a systematic manner in order to ensure the integrity and traceability of test results.*

1.0 PURPOSE & SCOPE: This SOP describes procedures relating to trace evidence equipment and supporting materials used by the CIL and discusses their location, uses and functions, maintenance and performance check procedures, and surety and safety considerations.

In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met **(A5.5.6, A5.6.1, SF5.5.2F-37)**.

2.0 GENERAL: Measurements and comparisons are often necessary in the testing and evaluation of evidence and must be traceable as to their accuracy and reliability. As such, the following guidance pertains to trace evidence equipment and supporting materials in the CIL **(A5.5.1)**.

2.1 **Definitions:** The following definitions apply:

- **Trace Evidence Equipment:** Equipment comprised of moving and/or electronic parts and/or components used in the testing of trace evidence. Trace evidence equipment (or simply "equipment" for the purposes of this SOP) and instruments are synonymous terms. Equipment used to test trace evidence includes, but is not limited to:

  - Microscopes.
  - Scanning electron microscope (SEM).
  - Radiographic equipment.
  - Calipers.*
  - Balances.*
  - Mandibulometers.*
  - Osteometric boards.*
  - UV crosslinkers.
  - Variable light sources.
  - Histomorphological equipment.
  - Hand held x-ray fluorescence units.*

- **Trace Evidence Supporting Materials:** Materials used in support of trace evidence testing includes, but is not limited to:

  - Human and non-human anatomical specimens and exemplars.*
  - Casts or reproductions of non-human anatomical specimens and exemplars.*
  - Hair and fiber exemplars.*
  - Material evidence synoptic specimens.
  - Posters and other graphic exemplars.*
  - Photographic scales and decimeter bars.*
  - Tape measures.*
  - Ring sizers.*

* Performance checks & maintenance are conducted by Quality Assurance (see below) **(A4.1.5a)**.

- **Items:** For the purposes of this SOP, a collective term for trace evidence equipment and trace evidence supporting materials.
- **Calibration:** The process of determining the relationship between the readings obtained by a measuring item and the applicable units of some defined system of measurement; whereas the measuring item's readings are compared to the values of a measurement standard under **controlled and specified conditions**. As such, calibration is not:

  - Preventive or corrective maintenance of an item.
  - Adjusting the instrument, using reference standards, such that the results of the measurement are equal to the expected outcome (e.g., a balance indicates 200g when a 200g mass is placed on the balance pan). Operations of this nature are often (mistakenly) referred to in the CIL as "calibrations," however, the proper and preferable term is performance check.

Note: The CIL performs no calibrations as defined above. However, given the history and evolution of maintenance programs in the CIL, the terms "calibration" and "performance check" are often used synonymously by the CIL Staff. The CIL, however, recognizes the distinct differences between performance checks and calibrations.

- **Performance Check:** An assessment of the performance of equipment and supporting materials relative to the test being performed. The types and nature of performance checks are discussed below.
- **Traceability:** An unbroken chain of comparisons to an approved or accepted standard with each metric comparison having stated uncertainties. Traceability often times is likened to a chain of custody in terms of continuity.

- **User's Manuals:** Documentation, whether in hard copy or electronic form, supplied by the manufacturer, that informs or instructs the user on the proper operation, maintenance, and safety hazards/precautions associated with items.
- **Unique Identifying Number:** A unique combination of alpha-numerics assigned by the CIL to equipment and select supporting materials which is designed to facilitate tracking, documentation, and traceability of that item. Manufacturer's serial numbers may serve as unique identification numbers.

2.2 **Location:** Typically, equipment and supporting materials are used in various designated analytical areas in the CIL.

Additionally, excess or "float" items may be stored in storage rooms, and/or cabinets and lockers at each CIL location. Some equipment (e.g., caliper sets) may be hand-receipted to individual analysts.

Do not remove equipment, supporting materials, and user's manuals and/or related documents from the immediate vicinity or work area where they are used. Only remove user's manuals and/or related documents from the CIL Library for duplication purposes. Return them to the library immediately after duplication.

2.3 **Users & User's Manuals:** Equipment, supporting materials, and related software, are operated/handled, by authorized users in accordance with the relevant user's manuals, instructions, and related documents. Special training required to operate/handle trace evidence items are conducted in accordance with the user's manuals prior to allowing users to utilize the items unsupervised (e.g., SEM). Such training may be part of the Competency Program outlined in DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education) **(A5.5.3)**.

The CIL has instructions on the use and operation of all equipment and supporting materials, where the absence of such instructions could jeopardize the results of tests. All instructions, manuals and software essential to the work of the CIL are kept up-to-date and made readily available to appropriate personnel **(A5.4.1, A5.5.3)**.

User's manuals/and or related documents are located (when not in use) with, or in close proximity to, the item and/or in the CIL Library.

Protocols for unique identifying numbers and inventories for supporting materials are typically maintained on the DPAA network and in close proximity to the items. These materials are updated as necessary **(5.5.5e)**.

2.4 **External Calibration Services:** All items used for tests, including those used for subsidiary measurements (e.g., for environmental conditions) **affecting, or potentially affecting, the accuracy or validity of the result of the test** may be calibrated before being used **(A5.6.1)**.

Normally, it is not required to calibrate the trace evidence equipment used in the CIL for the following reasons:

- Most of the trace evidence equipment is used to take measurements for illustrative or accountability purposes.
- Most methods utilized by the CIL involve statistical models whose error terms account for uncertainty of measurement contributed by trace evidence equipment. As such, when used in testing, the trace evidence equipment normally contributes little to the uncertainty of measurement. Data to support this assertion are available in the CIL.
- The nature of CIL casework does not typically produce "measurements that matter" (see DPAA Laboratory Manual, SOP 4.0, CIL Surety).

In the event external calibration services are required, traceability of measurement is assured by the use of calibration services from laboratories that can demonstrate competence, measurement capability and traceability. The laboratory should hold an appropriate accreditation, if possible **(A5.6.3.1)**.

When a calibration has been subcontracted, the laboratory performing the work issues a calibration certificate to the CIL for each item calibrated. The calibration certificates issued by these laboratories contain the measurement results, including the measurement uncertainty and/or a statement of compliance with an identified metrological specification **(A5.6.2.1.1, A5.6.2.2.1, A5.10.6)**.

In accordance with ASCLD-LAB guidance, calibration expiration dates, due dates, or similar nomenclature on calibration certificates issued by a calibration laboratory have no bearing on the item calibrated. It is within the discretion of the CIL to determine such dates.

Additionally, the CIL should obtain a copy of the calibration laboratory's accreditation certificate if the laboratory is not ASCLD-LAB accredited.

2.5 **Performance Checks**: Where calibration is not warranted, performance checks are conducted on

select items of CIL trace evidence equipment to ensure the traceability and accuracy of results **(SF5.5.2F-37a)**. The following provisions apply:

2.5.1 **Items Requiring Performance Checks:** In general, any item that is used, or can be potentially used to obtain, or influence, a test result requires a one time or periodic performance checks (see below) **(A5.6.1)**.

Items meeting the above definition but are not placed into use are exempt from performance checks. To be exempt from performance checks the items must be secured from inadvertent use (e.g., locked up in the Quality Assurance cabinet) or otherwise unavailable for use. Examples include, but are not limited to items:

- Retained in storage (e.g., being held in reserve or as float items).
- On display in display cabinets.
- Sent out for maintenance, repair, or other service.
- Retired and/or awaiting disposal.
- On loan to other organizations.

Prior to being placed into use, such items must be performance checked in accordance with this SOP and performance check schedules adjusted accordingly.

2.5.2 **Types of Performance Checks:** The types of performance checks, differentiated by time, are described below. Additionally, performance checks vary in nature. For example, they may be a matter of record (i.e., the results are recorded and documented by Quality Assurance) or non-record. Performance checks may also be metric in nature (e.g., a balance being checked with a NIST traceable 200g mass) or non-metric (e.g., a visual check of pubic symphysis casts for damage conducted during an inventory), or a combination of both **(SF5.6.1F-38)**.

- **One-time:** Conducted prior to placing select items into service in order to ensure they meet manufacturer's and CIL specifications. The following apply:
  - Due to their sheer volume and lack of moving and/or electronic parts, supporting materials such as photographic scales and tape measures are subject to one-time metric performance checks. For large numbers of like items, performance checks may be further restricted to a sampling strategy. In other words, a fair representation from each shipment/batch/lot, etc. is checked rather than 100% of the items in the assemblage. Typically, the above items are performance checked prior to release for general use by the CIL Staff. Should the performance of these items become suspect, they should be discarded and new items ordered in accordance with DPAA Laboratory Manual, SOP 1.5 (CIL Support).
  - Certain exemplars may be subject to one-time non-metric performance checks prior to being released for general use by the CIL Staff.
  - One-time checks are usually a matter of record.

- **Periodic:** Conducted on a set interval or schedule in accordance with this SOP. Usually applies to equipment (e.g., calipers, mandibulometers), however, select supporting materials (e.g., pubic symphysis casts) may be checked periodically. The following apply to periodic checks:
  - Always a matter of record.
  - May be metric, non-metric, or a combination of both depending on the nature of the item.
  - In general, performance check intervals are not less stringent than the existing manufacturers' recommendations **(SA5.6.1.1)**.
  - There is a grace period after the "performance check due" date has passed. Performance checks must be conducted no later than the last day of the month for which the check was due. For example, if a performance check label on a caliper indicates that performance check was due on 15 January, Quality Assurance has a grace period extending until 31 January in which to conduct the performance check. The item in need of a performance check may still be used during the grace period.
  - Quality Assurance may temporarily or permanently adjust performance check dates for the benefit of the CIL. In adjusting dates performance checks are not allowed to lapse. For example, if the June performance checks of caliper sets prove to be consistently inconvenient due to deployments, the performance checks may be permanently re-scheduled to April. If the dates are to be rescheduled forward to August, the June checks would still have to be done as well as the initial August check.

- **Interim:** Supplementary performance checks conducted, for whatever reason, on items subject to periodic checks but prior to the performance check due date. Interim checks are:
  - Usually non-record in nature.
  - May be metric, non-metric, or a combination of both depending on the nature of the item.
  - Performed the same as the periodic check for the particular item.

- Independent of the periodic check. In other words, an interim check, when conducted, does not establish itself as a periodic check. For example, if an interim check is conducted in May, and the periodic check expires in August, the periodic check is still due in August.

- **Per-Use:** Some items (e.g., UV crosslinkers, select equipment used in histomorphological testing) may require a performance check prior to a day's use. These are detailed below.

2.5.3 **Who Conducts Performance Checks:** Anyone on the CIL Staff competency certified to utilize an item may conduct a performance check on that item. Such checks are usually interim and not a matter of record, except when analysts are using UV crosslinkers and select equipment used in histolomorphological testing as specified in the relevant sections of this SOP. Otherwise, Quality Assurance performs one time and periodic performance checks for record on items (denoted by an asterisk in the above lists) not subject to annual contracted maintenance.

Analysts should verify the currency of recorded performance checks prior to using items by checking the performance check label affixed to applicable items (see below). Items having past due performance checks beyond the grace period should be reported to Quality Assurance.

2.5.4 **Performance Check Metric Tolerances:** Equipment and its software used for testing and sampling is capable of achieving the accuracy required and complies with specifications relevant to the tests concerned **(A5.5.2)**.

The following tolerances apply for performance checks having a metric component:

- Non-digital (analogue) performance check tolerances are set to one-half of the smallest unit of measurement. For example, a sliding caliper measuring to the nearest millimeter, a range of 10.0 mm +/- 0.5 mm, or 9.5-10.5 mm, represents an acceptably performing instrument when a 10.0 mm standard is measured.
- Digital performance check tolerances are usually the final significant figure of the measurement interval when measured against a standard. For example, a balance that determines mass to the nearest tenth of a gram, a range of +/- 0.1 gram, or 9.9-10.1 grams, represents an acceptably performing instrument when a 10.0 gram standard is measured.

2.5.5 **Performance Check Reference Standards:** The CIL maintains calibrated reference standards for use in metric performance checks of its items. These standards are subject to the following provisions:

2.5.5.1 **Traceability:** Performance checks are conducted using appropriate NIST (National Institute of Standards and Technology) traceable standards, traceable to the International System of Units (SI) of measurement, or to certified reference materials whenever possible **(A5.6.3.2)**.

Performance checks and measurements made by the CIL are traceable to the SI. The CIL establishes traceability of its own reference standards and measuring items to the SI by means of an unbroken chain of calibrations or comparisons linking them to relevant primary standards of the SI units of measurement **(A5.6.2.1.1)**.

The link to the SI units can be achieved by reference to national measurement standards. National measurement standards may be primary standards, (which are primary realizations of the SI units or agreed representations of SI units based on fundamental physical constants), or they may be secondary standards which are standards calibrated by another metrology institute.

There are certain performance checks that currently cannot be strictly made in SI units. In these cases performance checks provide confidence in measurements by establishing traceability to appropriate measurement standards such as **(A5.6.2.1.2, A5.6.2.2.2)**:

- The use of certified reference materials provided by a competent supplier to give a reliable characterization of a material.
- The use of specified methods and/or consensus standards that are clearly described and agreed by all parties concerned.
- Participation in a suitable program of inter-laboratory comparisons, where appropriate.

2.5.5.2 **Performance Check Kit:** Quality Assurance maintains a performance check kit comprised of the appropriate reference standards needed to conduct performance checks. The kit includes, but is not limited to, the following externally calibrated standards:

- Mitutoyo 1.0 cm gauge block (for checking linear measurements provided by calipers (inverted jaws), osteometric boards, and madibulometers). The 1.0 cm block may be supplemented by other blocks of varying length. This block is from a calibrated

Mitutoyo gauge block set. When other than the 1 cm block is used as the standard for the performance check of an item, the block size must be listed on the maintenance summary form for that item.
- Stage 0.01mm micrometer (for checking linear measurements provided by microscopic grids and reticules) **(SF5.5.2F-37b & d)**. Due to the frequency of its use by histology, the stage micrometer may be hand receipted to a histologist.
- Precision 90.0 degree square (for checking angles provided by the mandibulometer).
- Custom weight set (for checking masses and weights provided by balances and scales, respectively).
- Mitutoyo 6 inch digital sliding caliper (for checking linear measurements provided by calipers (inverted and everted jaws), osteometric boards, tape measures, photographic scales, decimeter bars, and mandibulometers).
- Tape measure or ruler (for checking linear measurements provided by calipers (inverted and everted jaws), osteometric boards, tape measures, photographic scales, decimeter bars, mandibulometers, and digitizers).
- Elemental standards for the hand-held XRF elemental analysis device. These include:
    - Steel disc (Steel 316).
    - 'Soil' samples comprised of:
        - SiO_2 (silicon dioxide).
        - NIST 2710a (Montana I Soil—Highly Elevated Trace Elemental Concentrations).
        - NIST 2711a (Montana II Soil—Moderately Elevated Trace Elemental Concentrations).

Checks needed to maintain confidence in the calibration status of the above reference standards are conducted prior to using these standards in performance checks of equipment and supporting materials in the CIL **(A5.6.3.2, A5.6.3.3)**. Standards should be checked for the following:

- Presence of corrosion, rust, pitting, etc. These particularly affect the accuracy of weights and gauge blocks.
- Presence of warping, bending, nicks, dings, scrapes, tears or other disfigurements or mutilations beyond normal wear and tear.
- Digital calipers unable to hold a zero (indicator of an electronic problem).

Performance check reference standards should be protected from loss, damage, degradation and deleterious change at all times. Standards should be kept in suitable containers that prevent the above conditions from occurring. Typically, the kit, as a whole, is kept in a Pelican case, or similar container to further protect the standards. The "kit" container should be adequately marked as to its contents and any handling precautions.

Additionally, when in use, standards should be:

- Exposed to air for the shortest time possible.
- Protected from fumes, extreme temperature variances, or other potential adverse or abnormal environmental conditions.
- Handled with gloves.
- Protected from being dropped or otherwise mis-handled.
- Wiped off with a clean lint-free cloth or paper towel prior to being returned to their storage containers. However, avoid excessive cleaning.
- Protected from general constant use and handling.

CIL performance check reference standards are used for performance checks only and for no other purpose, unless it can be shown that their performance as reference standards would not be invalidated **(A5.6.3.1)**.

CIL performance check reference standards may be periodically sent to a calibration laboratory for calibration in accordance with the above guidance **(A5.6.3.1)**. The typical period is once every ASCLD-LAB accreditation cycle. Any due dates or expiration dates on the calibration certificate imposed by the calibration laboratory can be ignored (see above).

The period may be shorter if the accuracy and/or viability of the standards are suspected of, or known to be, compromised (see above) **(A5.6.3.3)**. The period may be extended for extenuating circumstance (e.g., influx of large quantities of new equipment, budgetary constraints) provided the viability of the standards are suspected of, or known to be, compromised (see above) **(A5.6.3.3)**. The decision to extend or contract a calibration period for reference standards is at the discretion of the Lead Quality Coordinator.

Reference standards are transported in a manner that prevents deterioration and protects their integrity. Standards are transported in their approved containers (see above) and afforded suitable additional protection against extreme environments and conditions as appropriate. When reference standards are shipped via the US Mail or FedEx, they are insured and tracked **(A5.6.3.4)**.

2.6 **Maintenance:** Quality Assurance ensures scheduled maintenance is completed on time for the appropriate items. Quality Assurance and/or the Support Coordinator is notified of unscheduled maintenance needs for malfunctioning or damaged items (see below) and are responsible for contacting appropriate service providers and completing the necessary documentation. Any documentation that is generated is forwarded to Quality Assurance for archival storage in accordance with DPAA Laboratory Manual, SOP 1.5 (CIL Support) once maintenance is completed.

Note: The global war on terrorism has placed unprecedented burdens on military medical maintenance shops. While the CIL strives to maintain an annual maintenance schedule, shortages of maintenance personnel often make this impractical. More realistic schedules of 14-18 months are the norm.

2.7 **New Items:** New, repaired, or refurbished items received at the CIL are not used until inspected and processed by Quality Assurance in accordance with DPAA Laboratory Manual, SOP 1.5 (CIL Support).

For items where measurement traceability is required (see above list), a variety of tasks must be accomplished prior to placing the item into service (i.e., "under control") in the CIL. These tasks include, as appropriate, but are not limited to:

- Adding a discussion of the item in the relevant DPAA Laboratory Manual SOP(s).
- Adding the item to the relevant CIL inventories, maintenance and performance check schedules, and any other roll-up documentation, as appropriate.
- Establishing a maintenance summary form in accordance with the guidance in this SOP (see below).
- Conducting and recording initial performance checks to establish that the item meets the manufacturers and the CIL's specifications and requirements **(A5.5.2)**.
- Adding the relevant user's manuals and other documentation citations to the DPAA Laboratory Manual, Appendix 5.0 (References).
- Having the CIL Librarian add the user's manuals and other relevant documentation to the CIL Library and Library inventory.
- Obtaining safety and other certifications.
- Completing any needed support agreements related to the items.
- Completing improvements and/or upgrades to facility infrastructure (e.g., utilities, lighting).
- Adding NIST traceable standards to the performance check kit, if any.
- Adding calibration certificates and information and any other relevant traceability documentation to the body of CIL laboratory standards documentation.
- Appointing and training super-users.
- Conducting staff training.

For refurbished or repaired items, not all of the above list may apply.

2.8 **Loaned Items:** When, for whatever reason, items go outside the direct control of the CIL Staff, the CIL ensures that their function is performance checked and shown to be satisfactory before the items are returned to service **(A5.5.9)**.

2.9 **Damaged or Malfunctioning Items:** Do not use any item suspected of being, or known to be/have been **(A5.5.7)**:

- Mishandled.
- Defective.
- Inaccurate.
- Performing outside of tolerances or specified limits.
- Overloaded.
- Providing suspected results.
- Malfunctioning.
- Damaged.
- Unsafe (e.g., safety devices in some way compromised).

Cease operations and notify the Quality Assurance and/or the Support Coordinator as soon as possible.

Interim performance checks may be conducted by Quality Assurance when any of the above conditions are reported. Interim checks for a particular item are conducted the same as periodic checks **(A5.5.10)**.

Items not performing as desired are isolated to prevent their use or clearly labeled or marked as being out of service **(A5.5.7)**. For example, secure smaller items (e.g., calipers, anatomical specimens) from usage, as appropriate. For larger items (e.g., radiographic equipment) place a sign warning against usage, as appropriate. The item remains out of service until repairs are made and performance checks indicate the item is functioning correctly.

If the performance of items becomes suspect due to damage or the length of time in service, items should be repaired or refurbished, if economical to do so, or discarded and new items ordered in accordance with DPAA Laboratory Manual, SOP 1.5 (CIL Support).

The CIL examines the effect of the defect or departure from specified limits on previous tests and institutes the "control of nonconforming work" procedure in accordance with DPAA Laboratory Manual, SOP 4.0 (CIL Surety) **(A5.5.7)**.

2.10 **Correction Factors:** Should an item of measuring equipment show a consistent deviation from the expected measurement (e.g., an osteometric board consistently measures items as 2 mm too short across the entire length of the ruler), correction factors may be applied. Correction factors are only applied should an item of equipment be otherwise non-repairable or the repair is impractical or not cost effective. The following pertains to applying correction factors:

- Clearly explain the correction factor (e.g., add 2 mm to any measurement taken with this instrument [using the above example]) on a suitable label.
- The label is affixed to the item of equipment in such a manner as it is starkly noticeable to the operator.
- The presence of the label and its readability is verified as part of any performance checks.
- The correction factor is annotated on the maintenance summary form for that particular item of equipment.
- The CIL staff is notified by email when a correction factor is applied or withdrawn. The email includes the correction factor as it appears on the label, the type of equipment (e.g., osteometric board) and its unique identification (e.g., OS 0001).

2.11 **Rounding Guidance:** Rounding of numbers in the CIL follows the Excel rules for rounding. Numbers ending in five or greater are rounded up while numbers ending in four or less are rounded down. Do not truncate numbers.

3.0 EQUIPMENT: The following pertains to the use, care, maintenance, performance checks, and storage of specific items of equipment.

3.1 **Calipers:** Calipers are used to measure evidence during casework. The calipers most commonly used include the sliding calipers and spreading calipers. Coordinate and other specialized calipers may also be utilized. Calipers are subject to annual performance checks by Quality Assurance using a gauge block, tape measure or ruler, and/or digital caliper. Inverted and everted jaws are checked. Performance checks are conducted after changing batteries on digital calipers. Calipers need no other maintenance unless damaged.

3.2 **Mandibulometer:** The mandibulometer is used to provide measurements of the mandible. The mandibulometer is performance checked once a year using the same process as the calipers for the length measurement and via a precision square for the angle measurement components.

3.3 **Osteometric Board:** The osteometric board is typically used to obtain measurements of various osseous elements, when appropriate, during casework. Osteometric boards are performance checked once a year using the same process as the calipers.

3.4 **Radiographic Equipment:** The function of radiographic equipment is to:

- Aid in identification by producing postmortem records to compare with antemortem records
- Identify radio-dense particles not visible with the naked eye
- Confirm the presence or absence of healed fractures or other pathological conditions not easily visible from gross morphological examination

Radiation surveys are conducted every three years for the X-Ray Room and the radiographic equipment.

3.4.1 **Dental Radiographic Equipment:** Radiographic equipment commonly used in dental testing at CIL-HQ includes the:

- Schick Digital X-Ray.
- Epson Scanner.
- Aribex Nomad Portable Dental Unit.

All scheduled maintenance for CIL-HQ dental radiographic equipment is through contracted annual service with a private vendor or through Tripler Army Medical Center.

The CIL-OF currently uses the DENT-X ENDOS AC and Schick/Sirona Sensor Systems.

Both CIL-HQ and CIL-OF use the Aribex Nomad, a portable x-ray device used to take dental images in a remote setting, such as an ME office. The Aribex Nomad also has limited applications to osseous radiography. Operation and safety instructions are found in the user's manuals.

The Aribex units at CIL-OF undergo annual performance checks by a private vendor.

Always follow proper safety instructions.

Additional aspects of dental radiography are discussed in the DPAA Laboratory Manual, SOPs 3.1 (Forensic Imaging) and SOP 3.5 (Forensic Odontology).

3.4.2 **Osseous Radiographic Equipment:** Osseous radiography is typically performed at:

- CIL-FSA (Room 128) using the Hologic Radex Digital X-Ray system.
- CIL-OF (Room 112) using the PowerMax 1260 Portable X-ray System.
- CIL-HQ (Room 311) using the GE Proteus XR/a X-ray System.

Typically, osseous radiographs are taken by the individual analyst; however, specially trained CIL Staff (i.e., "super-users") are available to assist analysts at their request.

Maintenance of the x-ray systems is two tiered. The first tier of maintenance, in-house maintenance, is conduced by the super-users. Typical maintenance procedures include:

- Power-up and power-down operations.
- Tube warm up.
- Computer maintenance.
- Performance checking the grids.

These operations are conducted in accordance with the schedules and instructions found in the system maintenance manuals and recorded in a maintenance log kept by Quality Assurance. Untrained individuals are prohibited from performing these operations.

The second tier of maintenance is performed annually by the contractor or the medical maintenance office of Tripler Army Medical Center, or the Medical Clinic at CIL-OF, as appropriate.

Additional aspects of osseous radiography are discussed in the DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).

3.5 **Microscopes:** Various microscopes are used in casework and are maintained through annual contracted service, which typically includes necessary cleaning and maintenance. When measuring devices (e.g., optical field scales, reticules, stage micrometers, grids) are involved in testing, they require an annual performance check. Annex A (Microscope Performance Check) details the process for performance checking microscopes equipped with measuring devices **(SF5.5.2F-37b & d)**.

3.6 **Scales/Balances:** Various scales and balances are used to weigh or determine the mass of trace evidence, respectively, including remains sampled for DNA testing.

Note: Balances use mechanical leverage to compare the mass of objects. Scales use gravity to determine weight. The results (weight versus mass) should be reported according to the instrument used. The units of measurement (e.g., milligrams, grams) are the same in both instances.

The following guidelines apply:

3.6.1 **General Operation:** Initialization procedures and instructions for standard use are described in detail in the user's manual. Most importantly, the balance must be set on a stable, even surface. If a leveling system is part of the balance, check the level bubbles to ensure the balance is level. If the balance is out of level, adjust the leveling mechanism until leveling is achieved. Prior to testing evidence, ensure that the desired unit of measurement is set. Zero the balance by pressing the "Tare" or "Zero" key.

3.6.2 **Maintenance & Performance Checks:** All analytical balances are electronically self-adjusting. The analyst may electronically adjust the balance at any time using the instructions in the user's manual. Quality Assurance electronically adjusts the balance and then conducts the performance check using the appropriate standard at least annually. The standard(s) that is used (e.g. 200g mass) are recorded on the maintenance summary form at the time of the performance check. Scales are performance checked in the same manner, minus the electronic self adjustment.

To ensure accurate readings, take the following precautions:

- Although unlikely in a climatically controlled facility such as the CIL, transferring the balance to an area with a drastically warmer ambient air temperature requires the balance to be conditioned for approximately two hours at room temperature, leaving it unplugged from AC power. Afterwards, keep the balance connected continuously to AC power.
- After a relatively long power outage, the balance should be allowed to warm up for approximately 30 minutes in order to reach the required operating temperature.

3.7 **UV Crosslinker:** The UV crosslinker is used to decontaminate tools used to sample remains for DNA testing. Osseous and dental remains are sampled for DNA using separate and distinct procedures;

however, the osseous and dental crosslinkers are inter-changeable. In the event of a breakdown of either device, the other may be used for decontamination.

The UV crosslinker is factory set at 254 nm. If the intensity (chamber output) falls below 1,500 $\mu W/cm^2$, it is recommended that the complete set of bulbs be replaced. Quality Assurance should be notified in the event the bulbs need to be replaced.

3.7.1 **General UV Crosslinker Operation (Osseous):** Instructions are posted near the osseous UV crosslinker and should be utilized during osseous DNA testing. In summary:

- Sterilization of osseous DNA equipment is based on an energy output of 1 joule from the osseous UV crosslinker. Per the manufacturer's instructions, this is obtained by pressing "Energy" entering "9999" and pressing the "Start" button.
- No performance check worksheet is required as the energy output of 1 joule has a known constant (e.g., 9999); however, the osseous UV crosslinker must be checked for bulb intensity prior to each day's use. To do this, press "Intensity" and "Start" on the keypad. The display begins to count down. Under normal operation the display plateaus and stays at that level. At this point, press the "Reset" and discontinue the intensity check. If the countdown cycles below 1500, or if the display reads "bulb," then the bulb intensity is too low and indicates the need for replacement. Should this occur, **do not use the UV crosslinker until the bulbs have been replaced** (see below).
- The date and intensity output should be recorded on the Intensity-Check form located in the Osseous Sampling book in the drawer adjacent to the osseous UV crosslinker.

3.7.2 **General UV Crosslinker Operation (Dental):** Instructions for the use of the dental UV crosslinker are the same as for the osseous UV crosslinker with the following additions:

- The date and intensity output should be recorded in the Dental DNA Sampling book located in the drawer adjacent to the dental UV crosslinker
- The dental UV crosslinker must be performance checked prior to use. The step-by-step worksheet for performance checking of the amount of time required to deliver 6 joules of energy is located in the Dental DNA Sampling book.
- A completed performance check worksheet is required for each day the UV crosslinker is used. The performance check time required for sterilization of dental equipment (obtained when the worksheet is completed) is good for that day of activity only. If the UV crosslinker has been used for all or part of a day since the last performance check, a new intensity check and performance check must be performed.

3.8 **SEM:** The SEM allows for the testing of evidence through magnified imaging and elemental x-ray microanalysis, as necessary.

Chain of custody must be maintained for all evidence requiring SEM testing. Typically, evidence requiring testing should not be left in the SEM Rooms overnight.

Details regarding the operation of the SEM at CIL-HQ and CIL-OF are discussed in Annex B (Scanning Electron Microscope) to this SOP.

3.9 **Foster & Freeman VSC-6000 Variable Light Source:** The VSC-6000 is a high-resolution video spectral comparator used to bring visible, non-visible, damaged, or illegible watermarks, inks, stamps, and other items of interest into a visible, more easily identifiable form. When used as a variable light source, the VSC-6000 should be performance checked on a daily use basis. Instructions can be found in DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging), and are also located in the VSC-6000 binder located next to the instrument. This equipment does not have any special maintenance requirements. A super-user or Quality Assurance should be contacted in the event of problems with the equipment, who then requests a service call from the vendor.

3.10 **Histomorphological Equipment:** Histomorphological equipment needing performance checks includes the balance and the Leica DM 2500 light microscope. Performance checks are as described above. Other specialized histomorphological equipment (e.g., sonic cleaner, vacuum desiccator, thin sectioning and grinding equipment) listed in DPAA Laboratory Manual, SOP 3.8 (Histomorphology) do not require performance checks but are subject to maintenance and service requirements listed in the user's manuals and/or SOP 3.8.

3.11 **Hand-Held X-Ray Fluorescence (XRF) Devices:** The CIL can conduct elemental component analysis using the Innov-X Delta Premium handheld x-ray fluorescence (XRF) device.

Typical applications include analyzing the elemental components of soils, material evidence, and biological samples. The XRF is a low radiation emitter and can be used safely within CIL facilities or

at remote locations by following safety instructions in the user's manuals. Although a radiation shield is included with the analyzer, this device reaches only 40kV during tests which does not require using the shield during operation.

The XRF analyzer has two settings, "Alloy" and "Soil," that provide readings for elements from magnesium (Mg) through antimony (Sb). The unit provides immediate, viewable results and can also be used in conjunction with computer software that has been downloaded onto a computer in CIL-HQ. This software allows analysts to create printable charts and tables for case files.

The XRF undergoes periodic performance checks conducted by trained CIL super-users using NIST traceable elemental standards which are found in the CIL performance check kit (see above). Performance checks are also per-use by the operators per the user manual instructions. Annual radiation safety checks are done by the Tripler Army Medical Center.

3.12 **Digitizers:** Digitizers are used during casework to capture landmark data from skeletal and dental remains for measurement calculation. Using a computer software interface, digitizers capture coordinate data (x, y, z) and translate that information into inter-landmark distances (e.g., the distance between bregma and basion is equal to BBH [cranial height]).

Digitizers are subject to annual performance checks by Quality Assurance using a ruler. Per-use performance checks are conducted by the analyst prior to data collection. Digitizers need no other maintenance unless damaged.

The digitizer currently used by the CIL is the Microscribe 3Dx. To performance check:

- Place a performance checked ruler (a performance checked photo scale is permissible) on the digitizing table and secure it using dental wax or similar adhesive.
- Turn on the digitizing computer and digitizer (the digitizer should be placed in the ready position [see the user's manual] and 'zeroed' using the trigger on the back of the device.
- Start the '3skull' program and enter "PerfTest" as the catalogue number.
- Select the 'Test' function on the main screen.
- Place the stylus on the '0' position on the ruler and depress the foot pedal.
- Place the stylus at the 60 mm position on the ruler and depress the foot pedal.
- The allowable tolerance is +/- 0.5 mm (59.5 mm to 60.5 mm).
- If the digitizer fails the performance check (i.e., erroneous readings occur or readings are outside the above tolerance), repeat the above procedure ensuring the device is properly 'zeroed' at the initial stage.

4.0 SUPPORTING MATERIALS: The following pertains to the use, care, maintenance, performance checks, and storage of supporting materials.

4.1 **Exemplars:** Forensic testing in the CIL frequently requires the comparison of unknown case specimens with known materials (collectively known as exemplars).

Such items are part of reference collections designed to support casework and are maintained for identification, comparison and/or interpretation purposes. CIL exemplars are fully documented, usually uniquely identified and properly controlled for traceability purposes in casework **(SA5.6.3.2.1, SF5.6.3.2F-41)**. In some instances, the sheer number and small size of exemplars (e.g., loose individual teeth, buttons) may preclude assignment of a unique identification number.

CIL exemplars are not evidence. The non-evidentiary status of these items, and their storage and handling with respect to evidence, are discussed in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

Exemplars in the CIL are organized as follows:

4.1.1 **Human Anatomical Materials:** These consist of actual human biological materials or depictions thereof. Protocols outlining their unique identification and numbering are posted on the DPAA network and on or near the anatomical storage cabinets. Human anatomical materials should be handled with care at all times.

Human anatomical materials are subject to one-time non-metric performance checks for general adequacy prior to being released for general use by the CIL Staff. These checks may be a matter of record. These materials usually need no periodic maintenance and/or performance checks unless damaged. Human anatomical materials are usually inventoried annually. During this inventory, the materials may also be checked for:

- Damage or deterioration.
- Unusual wear and tear.

- Illegible, faded, or conflicting labeling (especially in regard to the unique identification number).
- Proper storage (e.g., the materials are not crowded or stored in such a manner as to cause damage).
- Commingling.
- Any other conditions that may affect the integrity of the specimen.

Human anatomical materials may be used by CIL Staff for teaching and other legitimate purposes. In these instances, arrange with Quality Assurance to sign out said materials and to ensure their safe handling and transport **(A5.6.3.4)**.

Human anatomical materials include, but are not limited to:

4.1.1.1 **Anatomical Sets:** Sets usually consist of two or more human biological components. Select specimens (e.g., disarticulated specimens) may be containerized, strung together, or otherwise stored in such a manner as to prevent loss and/or commingling of components. Sets include, but are not limited to:

- Articulated/disarticulated crania/skulls, skeletons, hands, feet, limbs, pelves, etc.
- Disarticulated vertebral columns, rib sets, manubria/sterna, etc.
- Display boards depicting anatomical specimens.
- Hair and fiber exemplar kits.
- Histological slide specimen kits.
- Select anomalous, pathological, or trauma specimens (e.g., bi-partite patella).

4.1.1.2 **Individual Anatomical Specimens:** These are usually individual elements not belonging to an anatomical set nor consisting of components or sub-elements. Examples often include, but are not limited to, individual skeletal elements (e.g., ulna, femur, mandible).

4.1.1.3 **Casts & Reproductions:** Casts, cast sets, and reproductions are facsimile specimens that accurately depict human anatomical material. Some cast sets (e.g., pubic symphyses, rib ends) serve as reference materials for specific methods used by the CIL (e.g., McKern-Stewart, 1957). Items that are used to obtain a test result (e.g., pubic symphysis casts) may be subject to more stringent performance checks. Like anatomical sets, casts and reproductions may be stored in such a manner as to prevent loss, damage, or commingling. Examples of these types of materials include, but are not limited to:

- Pubic symphysis sets.
- Rib end sets.
- Epiphyseal aging sets.
- Articulated/disarticulated skeletons, and individual crania/skulls.
- Human dentition set.
- Individual elements.

4.1.1.4 **Graphic Exemplars:** Graphic exemplars are specialized graphic depictions of anatomical material, **excerpted** from the primary reference or text, and which may be used in conjunction with, or to support, a test method. An example is the auricular surface aging binder containing photographic exemplars for use in the Lovejoy et al. (1985) method. The photographs are of higher quality than those depicted in the primary text and are thus necessary for the effective use of the method. Other graphic exemplars may include, but are not limited to:

- Posters showing human dental development.
- Anatomical charts (e.g., muscle origins and insertions).

4.1.2 **Material Evidence:** The preferred material evidence exemplar (to include LSI operations) is a graphic exemplar. Graphic exemplars of material evidence exist in many forms in the CIL. All are being incorporated into an extensive data base being constructed by the CIL.

Additionally, the CIL maintains a museum collection of material evidence comprised mostly of de-accessioned evidence. Due to traceability problems, the items in the museum collection are not routinely used as exemplars. In the event a museum item is needed for use as an exemplar, traceability is established by the analyst using the following procedures:

- Obtain permission from Laboratory Management to use the item (record the assent in the analytical notes).
- Extensively document the item with high resolution digital photographs.
- Forward copies of the photographs and the resulting MER to the CIL Staff member in charge of managing the graphic exemplar data base.
- The data base manager places the photos and the MER in an electronic folder.
- These items are eventually incorporated into the graphic exemplar data base thereby establishing traceability.

4.1.3 **Non-Human (Faunal) Biological Materials:** These materials are currently being brought under control by the CIL. SOP guidance TBP.

4.2 **Photographic Scales and Decimeter Bars:**

Photographic scales and decimeter bars are subject to one-time record metric performance checks for general adequacy prior to being released for general use by the CIL Staff. These materials usually need no periodic maintenance and/or performance checks. If damaged or otherwise rendered unserviceable (e.g., stained, illegible, and/or presenting an unprofessional appearance), the items should be disposed of and new ones ordered.

Use the scale suited to the size of the trace evidence items on hand. In order not to invalidate the performance check, scales should not be cut, trimmed, labeled with the CIL number, or otherwise altered without the permission of the Lead Quality Coordinator.

Photographic scales and decimeter bars used in crime scene or other criminal case photography where the image could be considered evidence (see DPAA Laboratory Manual, SOP 3.1, Forensic Imaging) should be performance checked prior to use, if possible, or if not, as soon as the situation permits. The results of such checks are a matter or record.

4.3 **Tape Measures & Rulers:** Tape measures and rulers used in testing are subject to one-time record metric performance checks for general adequacy prior to being released for general use by the CIL Staff. These materials usually need no periodic maintenance and/or performance checks. If damaged or otherwise rendered unserviceable, the items should be disposed of and new ones ordered. If tape measures and rulers are used as expedient photographic scales, then they are subject to the conditions imposed above.

4.4 **Stuller Ring Sizer:** The Stuller ring sizer or wand is a standardized jeweler's instrument used to approximate the sizes of finger rings. The ring is slipped over the tapered portion of the ring sizer until the ring stops. The ring size is the increment on the wand that aligns closest to the center line of the ring band. Since sizes are read from the center line of the ring band, rather from an edge, the resulting ring sizes should be reported as approximate. The ring sizer does not need performance checks or any special maintenance requirements.

5.0 STAFF ROLE IN TRACEABILITY: CIL Staff complete the chain of traceability by recording in the analytical notes equipment and select supporting materials used in testing, as appropriate, in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). The intent is to be able to trace potential problems with tests back to specific equipment items or supporting materials, if required. Items subject to traceability on the part of the analyst includes, but is not limited to:

5.1 **Measuring Equipment:** For tests requiring a measurement (e.g., stature, FORDISC racial assessment), the analyst records the type of equipment (e.g., calipers, mandibulometer, osteometric board, balance) and its unique identifying number in the appropriate spaces on the test forms. See Quality Assurance in the event there are questions about unique identification numbers.

5.2 **Exemplars:** When making observations based on an exemplar, the exemplar is listed by its unique identification number in the appropriate spaces on the test forms. In rare instances (e.g., individual teeth from the tooth collection, buttons from the material evidence museum collection) where a specimen does not have a unique identification number, photograph the exemplar and include the photograph as analytical notes in the case folder. See Quality Assurance in the event there are questions about the unique identification number.

Exemplars involved in determinations that do not directly contribute to a test need not be recorded. Examples include, using specimens from the anatomical collection to side elements. Conversely, exemplars used in comparisons that lead to a differential diagnosis of reportable pathology, trauma, anomalies, etc. must be traceable and thus need to be recorded.

5.3 **Photographic Scales & Decimeter Bars:** These items are subject to traceability only if they are used to produce "measurements that matter" (i.e., a measurement that is used, or may be reasonably expected to be used, by anyone in the judicial process). Examples include scales and decimeter bars used at crime scenes and during dental identifications on behalf of the medical examiner, etc., where the photographs could be considered evidence.

Photographic scales, after clean-up, are annotated as analytical notes and placed in the case file. When involved in measurements that matter, scales and decimeter bars are performance checked in accordance with the above guidance.

6.0 DOCUMENTATION: When instrumental analyses are conducted, the operating parameters are recorded, usually in the analytical notes **(SA4.13.2.5.2, SF4.13.2.1F-2a).** Parameters do not have to be recorded in the analytical notes if they are captured elsewhere, e.g.:

- They are standard and/or recurring "settings" specified by SOP.
- The parameters appear in the image or printout generated by the instrument (e.g. VSC-6000).

Performance checks, maintenance, and other records are maintained for each item of equipment and its software, and supporting materials significant to the tests performed **(A5.5.5)**. The following records apply:

6.1 **Performance Check & Maintenance Documentation:** Various hard copy and electronic records are kept by Quality Assurance and consist of the following documentation:

- Inventory of equipment needing periodic performance checks and/or maintenance.
- Performance check schedules of equipment.
- Maintenance summary forms that summarize the performance and maintenance history for each item of equipment (identified by a unique number) needing scheduled maintenance and/or performance checks **(A5.5.4, SF5.6.3.3F-42)**. Expired maintenance and/or performance check labels from outside contractors may be posted on the reverse of these forms, as appropriate. Information on maintenance summary forms include:
  - The unique identity of the item and its software **(A5.5.4, A5.5.5a)**.
  - The manufacturer's name, type identification, and serial number or other unique identification **(A5.5.5b)**.
  - Checks that the equipment complies with specifications **(A5.5.5c)**.
  - The current location of the item, where appropriate **(A5.5.5d)**.
  - The maintenance plan, where appropriate, and maintenance carried out to date **(A5.5.5g)**.
  - Any damage, malfunction, modification or repair to the equipment **(A5.5.5h)**.
  - Any applicable correction factors.
  - Location of the user's manual if different from the provisions of this SOP.
  - Performance check standard(s) used if not otherwise specified in this SOP, user's manuals, or other documentation.

  Note: Older maintenance summary forms may reflect the term calibration. This is an artifact of pre-ISO standards in the CIL where the term "calibration" was synonymous with "performance check." Due to the historical information on them, these older forms are retained and continue to be used rather than replaced.
- Various documentation pertaining to outside contractors including, but not limited to **(A5.5.5e)**:
  - Invoices.
  - Receipts.
  - Dates, results, reports/certificates of all adjustments, maintenance actions, deviations from specifications and acceptance criteria, etc.
  - Calibration certificates.
  - Accreditation certificates for calibration laboratories performing services for the CIL.
- MFRs and/or logs detailing one-time performance checks or periodic checks of supporting materials.

6.2 **Labels & Stamps:** Whenever practical, all relevant trace evidence equipment and select supporting materials under the control of the CIL and requiring periodic performance checks are labeled, coded or otherwise identified to indicate the status of the check, including the date when last checked and the date when the next periodic performance check is due **(A5.5.5f, A5.5.8)**.

Periodic performance checks are documented through labels affixed on select equipment in order to inform the user on the equipment status. Specifically:

- Labels on equipment performance checked by Quality Assurance (e.g., calipers and balances).
- Tags and labels on equipment performance checked and regularly maintained by outside contractors (e.g., radiographic equipment and microscopes).
- Any applicable correction factors.

Supporting materials such as tape measures and photographic scales requiring one time performance checks may be marked with a stamp or similar annotation.

7.0 SURETY: Surety is maintained via:

- Training of authorized personnel **(A5.5.3)**.
- Scheduled and as-needed maintenance and performance checks of individual items and appropriate documentation of such.
- Safeguarding test equipment, including software, from tampering or adjustments which would invalidate the test, when necessary **(A5.5.12)**.
- Audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits) of the test and maintenance records and the above surety measures.

8.0 SAFETY: Refer to DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) and to individual

equipment manuals for appropriate safety precautions and procedures.

Do not use equipment and supporting materials for purposes other than what they are intended, unless approved by Laboratory Management.

Annex A (Microscope Performance Check)

There are two types of performance checks required for the Leica DM 2500 Microscope when it is used in histomorphological testing (see DPAA Laboratory Manual, SOP 3.8, Histomorphology). Performance checks are performed annually by Quality Assurance or a histological analyst. Users conduct interim performance checks, as appropriate.

The performance check is usually done using a 0.01mm stage micrometer as the standard (i.e., with an allowable tolerance of +/- 0.005 mm). The micrometer may be stored in the performance check kit or hand receipted to a histologist. The standard is periodically calibrated to NIST traceability.

Note: Other calibrated standards (e.g., 0.02 mm) are acceptable. Check with Quality Assurance and/or the histologists if there are any questions or concerns.

Performance checks are performed as follows:

- Grid performance check:
  - Place the stage micrometer onto the stage.
  - Using the 10X objective and the 10X eyepiece that contains the 1mm^2 grid, measure the X axis of the square grid. The axis should be the exact width of the stage micrometer (1mm).
  - Using the 10X objective and the 10X eyepiece that contains the 1mm^2 grid, measure the Y axis of the square grid. The axis should be the exact width of the stage micrometer (1mm).
  - Note: changing objectives result in the eyepiece grid not aligning with the full length of the stage micrometer.

- Digital performance check:
  - Place the stage micrometer on the stage.
  - Start with the 5X objective and the 10X eyepiece. Ensure that the microscope is on and the stage micrometer can be viewed clearly through the ocular lenses.
  - Open the Leica Application Suite (LAS) Program on the desktop computer. A live feed from the microscope to the computer is established. Ensure the stage micrometer is in focus by using the manual focus on the microscope.
  - Go to basic annotation (still in the acquire screen, right side, top icon) and make sure that show annotation is checked.
  - In the drop down menu select distance line.
  - Drag the line across the stage micrometer for a known distance. Read the length given above the line.
  - Repeat the process for the rest of the objective lenses (depending on microscope set-up a new magnification may have to be selected in the calibration menu for each objective).
  - Note: Ideally, the “check” line should span the length of the captured micrometer; however, when checking higher objectives (20X, 40X) this is not possible. In those cases the line should span the distance of the captured image and one must count the hash marks and compare the results to the calculated length.
  - A checked captured image should be included in the case notes if measurements are used for testing.

- Re-establishing digital accuracy:
  - In the event that an objective does not check correctly in the LAS program as determined by the steps above, or a new objective is added, a new calibration must be performed.
  - Place the stage micrometer on the stage. Start with the 5X objective (or the objective that is not properly calibrated) and the 10X eye piece.
  - Open LAS on the desktop computer. A live feed from the microscope to the computer is established. Ensure the micrometer is in focus by using the manual focus on the microscope.
  - Go to calibration settings (left side of screen) and click the menu open.
  - Click on the drop down window and select "calculated" for type.
  - Click on the "new" button
  - Enter an appropriate name for the new calibration and press OK.
  - Drag and adjust the scale bar that appears to fit perfectly (part of) the stage micrometer.
  - In the actual length window enter the length of the measured length of the stage micrometer.
  - From the drop down menu choose the appropriate unit of measurement (micron in most cases).
  - Click on save button.
  - Repeat (if necessary) for other objectives.
  - To verify the calibration just recorded use the measurement function described in the digital performance check (as the set up between CIL locations LAS is different some minor differences in how the program reacts and looks may be experienced).

Annex B (Scanning Electron Microscope)

B1.0 PURPOSE & SCOPE: This annex outlines scanning electron microscope (SEM) procedures that are used for the testing of evidence accessioned into CIL-HQ and CIL-OF.

B2.0 APARATUS & MATERIALS: As a system, the SEM consists of the scanning electron microscope, x-ray microanalysis system, and associated sample-preparation equipment.

Specifically, CIL-HQ uses the Hitachi S-3700N located in Room 310. CIL-OF the uses the Hitachi S-3400N located in Room 113.

B3.0 GENERAL CONSIDERATIONS: Only the imaging capabilities and the elemental x-ray microanalysis system of the SEM are discussed. The procedures documented here apply to typical CIL cases. In situations where unusual circumstances preclude the application of these procedures, indicate in the analytical notes why the procedures could not be followed, the alternative procedures performed, and an opinion on how the accuracy and reliability of the resulting tests were affected.

SEM testing of evidence is conducted at the request of the analyst assigned to the case. A log of the tests performed (date, times and other pertinent information) is maintained by the SEM analyst in a binder in the SEM Room.

B4.0 SEM IMAGING PROCEDURES:

B4.1 **General Considerations:** The following general considerations apply:

- SEM imaging is somewhat subjective in nature and always dependent on the sample that is being imaged. Sample-preparation methods are determined by the type of material being tested and, therefore, can vary considerably from one case to another. At the analyst's discretion, the sample may be coated with carbon or gold to facilitate better imaging.
- The size of the sample is limited by the size of the SEM vacuum chamber. Typically, only limited sample prep is required (e.g., mounting on a carbon lined stub or mounting with carbon putty).
- The sample can be imaged under high vacuum or variable pressure as necessary. When working in high-vacuum mode, either the secondary electron (SE) detector or the backscatter detector (BSD) may be utilized. When working in variable-pressure mode, only the BSD is available.

B4.2 **Imaging Procedures:** The following technical procedures are used for imaging.

- Rotate the key switch on the **EVAC** panel to **START** the Hitachi SEM.
- When the Windows desktop appears, press **Ctrl +Alt+Delete** simultaneously. The **logon** window appears. Select the user account that does not ask for a password.
- For the S-3400N, operation program starts up automatically and the **initial login** window appears. There is no password. Click the **OK** button.
- If an error message is displayed, refer to the desk guide for the SEM Hitachi S-3400N or S-3700N.
- Wearing clean exam gloves, secure the mounted sample on the specimen stub. Avoid using an excessive amount of conductive paste. Too much paste can release a large quantity of gas into the vacuum which can result in contamination.
- When using adhesive tape, use the least amount in order to minimize out-gassing.
- Measure the sample and the specimen stub together. Input the measurements into the computer. This will allow the stage to adjust accordingly. Failure to do this step may damage the backscatter detector. Ensuring that the voltage is **OFF,** load the sample stub into the specimen chamber.
- Push the specimen stage into the specimen chamber. Press the **EVAC** button located either on the EVAC panel on the front side of the unit or click **EVAC** located in the upper right section of the control panel.
- Accelerating voltage can then be energized approximately two minutes after the EVAC button is pushed. At this point, adjust the vacuum.
- Biological samples (e.g., bone) can be observed in the low-vacuum mode without prior treatment. For high magnification observation, dry the specimen using a drying method then coat the specimen with conductive material.
- When the chamber is fully vacuumed the **E. Beam** block at the left top position on the **Control Panel** are not grayed out. At this time, click the **E. Beam** block, open the **Setup** window and press the **ON** button in the **Optics** tab. Then press the **ON** button in the **E. Beam** block.
- Selecting the filament current, select the **Detail** button on the **Cond**. tab in the control panel, select **Mid**, and then press **AFS**. The Auto Filament Saturation (**AFS**) should be set to **High** for high magnification imaging and **Low** to ensure long filament life. Adjusting other areas here include the electron optical axial alignment.

- Brightness and contrast may need adjustment at this time to enhance the image. Use the joystick located to the left of the analysis screen to manipulate the sample stage in the chamber. Other settings can be adjusted as necessary to obtain the optimal image necessary for testing. The default settings are only a guide.
- When working under "high vacuum" use either the secondary electron (SE) detector or the backscatter detector (BSD). When working under "variable pressure," choose the BSD to obtain a better image.
- Remember to log off the computer when analysis is complete.

When a satisfactory image has been obtained, it is captured using the SEM or EDS software.

B5.0 SEM ELEMENTAL X-RAY MICROANALYSIS:

B5.1 **General Considerations:** The following general considerations apply:

- The EDS (Energy Dispersive X-ray Spectrometer), is typically used to reveal or confirm the elemental composition on the surface of a sample (e.g., that the surface of a metal fragment is silver in composition). Using the EDS for quantitative analysis is not recommended.
- The sample is generally processed as detailed above for imaging. For CIL-HQ, the Oxford X-Max Silicon Drift Detector (SDD) and the Aztec Microanalysis system works in conjunction with the Hitachi S-3700N SEM system although it is run from a separate computer system located next to the Hitachi S-3700N system.
- For CIL-OF, the Oxford X-Max Silicon Drift Detector (SDD) and the AZtec Microanalysis system works in conjunction with the Hitachi S-3400N SEM system.
- CIL elemental analysis is also conducted using hand held x-ray fluorescence (XRF) devices (see above).

B5.2 **EDS Procedures:** The following technical procedures are used for EDS analysis.

- On the SEM, set the Accelerating voltage (Vacc) to 20kV.
- Verify that the aperture setting is at 0 or at the widest aperture size.
- Move the sample to the site of interest and after the image is focused, set the working distance to 10 mm.
- Adjust the stage or Z-axis until the sample is focused. Typically 9.4 – 9.5 will bring the image back in focus for the Hitachi SEMs.
- On the EDS computer side, select the user account that does not ask for a password.
- Open the AZtec software and select a new project.
- Typically the Point and ID function is used for most EDS analyses.
- Observe the "Dead Time" on the far right of the AZtec window. The Dead Time bar should be set to around the green section, which is about 40% – 60%.
- To adjust the Dead Time, either increase or decrease the Probe Current on the SEM computer. Maximum Probe Current is 100, but typically 70 - 90 provides a good dead time. You may need to adjust the brightness and contrast to obtain a better image. Note: The higher the Probe current, the lower the image quality.
- When a reasonable Dead Time and image is achieved, scan an image using the AZtec computer. Do not move the sample after an image is scanned.
- Acquire spectra by selecting areas from the scanned image.
- Confirm the elements and report the results.
- A template named "CIL Report" may be used to report the data from the EDS analysis.
- Remember to log off the computer when analysis is complete.

B6.0 MAINTENANCE & PERFORMANCE CHECKS: Operator's maintenance is discussed in the appropriate user's manuals. All scheduled and as needed maintenance not performed by the operator or his/her representative is conducted by an approved outside contractor. Maintenance records are maintained by Quality Assurance.

B7.0 DOCUMENTATION:

B7.1 **SEM Binder:** This binder contains maintenance and performance check records and any other documentation related to the SEM.

B7.2 **SEM Test Records:** All SEM results used in testing are recorded on the SEM testing form. The test results may include photo-documentation of the imaged sample and/or spectrum charts and elemental quantity results from the x-ray microanalysis.

The completed SEM form, attached printouts, images and spectra are considered analytical notes and are prepared in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). The SEM technician may assist the requesting analyst in interpreting data. In these cases, the initials or signature of both individuals should appear on the analytical notes.

The SEM documentation is forwarded to Laboratory Administration for inclusion into the case file. The digital version of the report is saved into the appropriate case file on the network.

SOP 3.3: TAPHONOMIC EFFECTS & EVIDENCE CONSERVATION

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 18 May 2016
Citation: DPAA Laboratory Manual, SOP 3.3

0.0 PRINCIPLE, SPIRIT & INTENT: *Evidence is conserved in such a manner as to facilitate accurate and detailed testing. Human biological evidence is conserved only to the extent necessary for thorough and accurate testing. Taphonomic effects are documented in an organized manner conducive to testing* **(A5.8.4, SA5.8.4.5)**.

1.0 PURPOSE & SCOPE: This SOP outlines procedures for recognizing the effects of taphonomic processes and the subsequent conservation of evidence accessioned into the CIL. While this SOP applies primarily to biological evidence, its principles are applicable to material evidence.

For purposes of this SOP, the term "remains" is used to describe both human and non-human biological evidence.

These procedures apply to typical CIL cases. Deviations from this SOP resulting from unusual circumstances, and the effects on the outcome of conservation, must be fully described in the analytical notes and final report. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met **(A4.1.5a)**.

2.0 RECOGNITION OF TAPHONOMIC PROCESSES: There are various interpretations, models, and definitions regarding taphonomy, taphonomic processes, and their effects (see Haglund and Sorg (1997) for detailed discussions). In short, taphonomy is the study of the processes of death and decomposition.

For the purpose of this SOP, taphonomic processes are those peri- and postmortem forces that ultimately influence the nature of evidence but whose effects often appear only during post recovery examination. Coupled with field observations, recognizing and documenting the effects of taphonomic processes during trace evidence testing are important for a variety of reasons including:

- Providing circumstantial evidence for estimating the time and circumstances of death.
- Identifying postmortem conditions that may facilitate or complicate identification and/or the determination of the cause and manner of death.
- Systematically identifying factors influencing the preservation or decomposition of evidence thus facilitating future recoveries.
- Estimating the likelihood of extracting viable DNA samples from differentially preserved remains.

Taphonomic processes have a wide range of observable effects on evidence. While the below list is not all encompassing, when used as a checklist it alerts analysts to taphonomic effects frequently observed at the CIL. These include:

- Thermal damage.
    - Soot or smoke marking.
    - Calcined bones or teeth.
    - Melted plastic or other material on remains.
- Animal damage.
    - Rodent or other types of gnawing or chewing.
    - Trampling.
    - Boring or other insect activity.
- Indicators of curation.
    - Old tape, tags or paper.
    - Previous attempts at reconstruction.
    - Drilling, wires, glue, etc.
    - Writing, pencil or pen marks, etc.
- Adhering paper or cloth.
- Staining on bone (e.g., vivianite, red clay).
- Contact with metal (e.g., green cuprous stain, rust, aluminum oxide).
- Soft tissue (e.g., adipocere, hair/scalp).
- Adhering concretions (iron oxide, lime, salt).
- Odor (decomposition, jet fuel, formaldehyde, incense).
- Soil, sand or mud in bone.*
- Immersion in water (e.g., algae, barnacles, leeching of salt).
- Plant activity (e.g., rootlets in bone, root etching, root casts).
- Post mortem cut or saw marks on bone.
- Autopsy or surgery.
- Fragmentation.*
- Commingling.*
    - Biological with non-biological material.
    - Human with non-human biological material.

- Multiple individuals (i.e., MNI).

*Discussed below

3.0 CONSERVATION OF EVIDENCE: Analysts may first have to reverse or mitigate taphonomic effects, as appropriate, using variety of conservation practices prior to undertaking testing. Conservation may be strictly procedural (e.g., reconstructing evidence), more analytical in nature (e.g., resolution of commingling) requiring significant professional judgment and expertise on the part of the conservator, or may be stabilizing in nature to ensure the success of future tests **(SA5.8.4.5)**.

3.1 **General Principles & Guidelines:** Common conservation considerations include:

3.1.1 **Location:** Recognizing taphonomic effects and the subsequent conservation of evidence are typically performed in designated analytical areas in CIL facilities. External factors may occasionally require that testing be conducted in a field or laboratory setting other than these examination areas (e.g., Joint Forensic Review). Field conservation of trace evidence is discussed in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). For situations where the location has a demonstrable effect on the ability to conserve properly, indicate in the analytical notes the conditions under which conservation was performed.

3.1.2 **Evidence Handling & Preservation**: Generally, evidence is usually robust in nature and not easily affected by handling, or by the ambient environment in the CIL. However, special precautions or measures pertaining to specimen handling are sometimes required. Care should be used in handling more fragile evidence that could be damaged while being handled or conserved **(A5.3.1)**.

3.1.3 **Intent & Strategy:** Conservation should only be attempted if it is necessary to preserve trace evidence from deleterious change, or if it contributes to its testing. Some taphonomic effects are neutral (e.g., staining from copper salts). As such, conservation does not facilitate, and may even be counterproductive, to evidence testing.

The need for conservation may be recognized and the appropriate techniques performed at any time during the formal testing process. Conservation techniques, among themselves, or in conjunction with testing techniques, may lend themselves to concurrent operations. The analyst determines the particular sequence of operations.

The analyst should be aware that, in some instances, the timing of prior to the formal testing process conservation may affect or enhance the integrity of the evidence. For example, wet evidence should be dried upon receipt into the CIL as part of preliminary assessment. Conversely, reconstruction of remains during preliminary assessment by someone other than the analyst assigned to the case may be counterproductive in that it may complicate formal analysis at a later time.

3.1.4 **Documentation:** Since the evidence may be significantly altered, sufficient analytical notes, including photographs, should be prepared, as appropriate, describing items prior to any significant conservation.

3.2 **Conservation Techniques:** Given the wide range of taphonomic effects, techniques for conserving evidence may range from simple wet cleaning and drying of materials to elaborate methods such as the desalinization of osseous remains. Addressing all contingencies is impractical and beyond the scope of this SOP, however, general guidance is provided below for the taphonomic effects most commonly encountered at the CIL (marked by an asterisk in the above list). The scientific literature should be consulted to deal with the more unusual conservation problems that arise.

3.2.1 **Cleaning:** Evidence having adherent soil, soft tissue, clothing, etc. that precludes making a requisite observation should be cleaned using appropriate methods and, if wetted, allowed to air dry before examination.

Soft tissue should be macerated using appropriate methods adopted from the scientific literature. Annex A (Soft Tissue Removal and Maceration) of this SOP details maceration and soft tissue removal techniques used at the CIL.

The analytical notes should reflect the cleaning methods used. Special materials and apparatus needed for cleaning beyond basic washing and drying should be procured from local resources.

3.2.2 **Resolution of Commingling:** Evidence may present itself in various commingled assemblages that require segregation before testing can proceed. Once segregated, materials may be turned over to the appropriate analyst for further testing.

3.2.2.1 **Apparatus & Materials:** Commingled evidence can be compared macroscopically with exemplars that are located in the CIL, if needed.

None of these materials require calibration or scheduled maintenance.

Low-power magnification may be necessary to resolve some commingling. Various stereomicroscopes are located in the CIL for this purpose. Stereomicroscopes do not require performance checking of the stage since evidence is not being compared to standard measurements.

The scanning electron microscope (SEM) can be used when high magnification and/or elemental testing is required. Use of the SEM is discussed in DPAA Laboratory Manual, SOP 3.2 (Measurement &Observation Traceability).

3.2.2.2 **Procedures:** The procedures for segregating commingled remains from various assemblages are detailed below. Assemblages include:

3.2.2.2.1 **Biological Versus Non-Biological Materials:** The most common non-biological materials confused with biological material (normally human and non-human osseous material) are melted synthetics from aircraft crashes (e.g., plastic and rubber), botanical specimens (e.g., roots and wood), and marine coral and shell.

In most cases, biological materials are distinguished from non-biological materials based on the differences in structural and developmental morphology. These differences are observable macroscopically and under low-power magnification. A material is judged to be osseous if it displays structural and/or developmental morphology consistent with exemplars of human and/or non-human bone.

3.2.2.2.1.1 **Structural Morphology:** This refers to the physical internal and external structure of the osseous material, which exhibits structural characteristics not found in non-osseous materials. Osseous materials (excluding teeth) are characterized by a smooth, dense outer layer (cortex) of bone, of variable thickness, supported by spongy (cancellous) bone that is more prevalent at the ends of long bones and in flat bones. Specifically:

- **Cortical Bone:** Viewed macroscopically, cortical bone appears as a dense layer of bone typically exhibiting parallel (usually longitudinal) sub-periosteal striations. Under low magnification, cortical bone exhibits Haversian Canals and surrounding lamellae in cross section. The canals are distributed irregularly throughout the cortical bone and differ in size. These canals differ from vascular bundles commonly seen in botanical specimens (e.g., roots, wood) in their irregular distribution. Vascular bundles typically are more uniformly distributed as bundles near the center or core of botanical specimens.
- **Cancellous Bone:** Viewed macroscopically or microscopically under low magnification, cancellous bone appears as a disorganized latticework of branching and anastomosing strands of bone known as trabeculae. The trabeculae form irregular and imperfect ovoid shapes of different sizes. These ovoid shapes differ from gas bubbles formed in melted plastics, glass, rubber, and other synthetic materials in their basic irregularity. Bubbles formed in melted synthetic materials tend to be circular rather than irregularly ovoid. Melted synthetics also typically reflect transmitted light more effectively than osseous materials and thus tend to appear "shiny."

3.2.2.2.1.2 **Developmental Morphology:** This refers to the size and shape of the osseous element, the development of articular surfaces, and the development of bony landmarks and distinguishing features. Non-osseous materials lack these features. Specifically:

- **Articular Surfaces & Edges:** Osseous remains exhibit articular surfaces where a bony element joins (i.e., articulates) with one or more other bony elements.
  - Synovial Joints: Articular surfaces associated with synovial joints, or diarthroses, (e.g., arms, legs, fingers) typically are characterized by the following:
    - Facets or rounded areas composed of dense, fine-grained bone.
    - A slight lip, or rim, of bone circumscribing the articular area.
    - In some cases, especially those associated with older individuals, there may be evidence of degenerative changes on or around the articular sufaces, i.e.:
      - Osteoarthritis (lipping).
      - Spurring (osteophytosis).
      - Pitting or polishing (eburnation).
      - Changes in the overall structural morphology.
  - Cartilaginous Joints: Cartilaginous Joints: (i.e., symphyses and synchondroses) often are characterized by billowed and striated articular surfaces that gradually degenerate as the individual ages.

- Fibrous Joints: Fibrous joints (i.e., synarthroses) are characterized by interlocking sutures.

- **Landmarks:** Bony landmarks include areas where blood vessels and nerves enter a bone and where ligaments attach. Landmarks also include characteristic grooves, processes, spines, tubercles, and other features documented in the anatomical literature.

3.2.2.2.2 **Human Versus Non-Human Biological Material:** Human osseous and dental remains are distinguished from non-human biological material on the basis of developmental morphology, which is often best illustrated by comparison with known human and non-human exemplars. Common non-human materials confused with human remains include suids, canids, ursids, and bovids. Human osseous remains exhibit articular surfaces and bony landmarks unique to the species. Similarly, human dental remains exhibit features unique to humans.

Non-human bone is also excluded using histomorphology. Histomorphological testing is discussed in DPAA Laboratory Manual SOP 3.8 (Histomorphology).

Testing ultimately results in one of five professional opinions:

- **Match to Human:** The remains match known human exemplars to the exclusion of other reasonable possibilities. Match to human is the default category for all CIL test reports. In other words, references to remains, osseous fragments, dental fragments, etc., in test reports assume a match to human unless otherwise noted.
- **Consistent with Human:** The remains appear more consistent with known human exemplars but not to the exclusion of other reasonable possibilities.
- **Match to Non-Human:** The remains demonstrably match known non-human exemplars to the exclusion of other reasonable possibilities.
- **Consistent with Non-Human:** The remains appear more consistent with known non-human exemplars but not to the exclusion of human remains.
- **Inconclusive:** The remains lack sufficient morphological features to make a determination.

Once biological evidence is determined as non-human, the analyst is not required to make any further determinations (i.e., identification of the order or species). Exceptions are when a further determination is needed to establish an independent line of evidence. In such cases an analyst with suitable expertise is assigned to do the testng.

3.2.2.2.3 **Commingled Human Material (MNI):** Segregation of commingled human remains (CHR) in order to determine the minimum number of individuals (MNI) represented cannot be completed until all remains have been laid out in standard anatomical position. Where there is a paucity of remains or the portions are extensively fragmented so that individual elements cannot be identified, the MNI is one (1).

Large assemblages of CHR are analyzed and managed in accordance with Annex B (Segregation & Analysis of Commingled Human Remains [CHR]) to this SOP.

Multiple individuals are indicated under the following circumstances:

- **Duplication of Elements:** An inventory of all remains is necessary to determine if any elements or fragments are duplicated. An odontologist should determine if there are duplications of teeth.
- **Differences in Biological Profile:** Elements present are examined for consistency in age-at-death, sex, ancestry, and stature, when possible. A clear inconsistency in any of these indicates that more than one individual is present. Discrepancies in stature may warrant closer examination of the elements in question using osteometric sorting techniques (see Byrd and Adams 2003).
- **Differences in Condition:** Inconsistency in the pattern of wear, anomalies, or pathological condition among the unpaired osseous elements (e.g., vertebral column) in the assemblage may indicate more than one individual may be present. Care is taken to discern between true inconsistencies and differential preservation.
- **Differences in Size:** Paired elements are examined for consistency in dimensions and symmetry in the location, size and characteristics of distinctive anatomical landmarks and features. If differences do not appear to be due to pathology or natural variation, commingling is indicated. Additionally, statistical osteometric comparisons may provide quantifiable justifications for determining if multiple individuals are present.
- **Inconsistency in Articulation:** Adjoining elements that do not appropriately articulate within an acceptable range of variability indicate commingling. In some cases, postmortem plastic deformation of the remains (especially cranial fragments) may preclude the accurate matching of broken margins. If necessary, exemplars are

examined to ascertain the pattern of variability of articulation of particular elements.
- **Differences in DNA Sequences:** Portions of an assemblage may have been sampled and analyzed for DNA sequences. Differences, if any, in the sequences can be used to identify multiple individuals in the assemblage. A shared mtDNA profile does not necessarily indicate a common origin although statistical likelihood can be assessed on a sequence by sequence basis.
- **Field Provenience:** Discrete individuals or portions of individuals may be indicated by the field provenience of the remains. The analyst should be familiar with the field documentation of the case at hand.

Annex B (Segregation & Analysis of Commingled Human Remains [CHR]) of this SOP may contain supplemental guidance regarding the above techniques for detecting and sorting commingling.

3.2.2.3 **Reporting:** The analytical notes include all observations that were relevant to the segregation of remains and the formation of the final opinion. Segregation of each individual from a larger assemblage should be justified in the analytical notes using the above categories or similar methods. The intent is to document the transition from commingled remains to single sets of remains on multiple tables in the CIL. Typically the analytical notes pertaining to the individual indicate how each item or group of items were associated to the individual

The final report (FAR, FOR, MER) includes the analyst's opinion as to the nature of the material (i.e., osseous, non-osseous), and to the nature of the remains (i.e., human or non-human) and the MNI using the language approximating the methods and categories outlined above. If the complexity of the commingling warrants, it may be appropriate and useful in the report to use a table to show how commingling was resolved.

For complex and project level assemblages of CHR, specific reports are generated in accordance with Annex B (Segregation & Analysis of Commingled Human Remains [CHR]) of this SOP.

3.2.3 **Reconstruction of Evidence:** Evidence becomes fragmented as a result of either perimortem events or postmortem taphonomic forces. Reconstruction of evidence is a procedural step that may assist in testing. As such, reconstruction is undertaken when deemed useful, or potentially useful, for deriving test results.

The analyst reconstructing evidence should not reassemble evidence in a manner that may obscure relevant observations during testing (e.g., indicators of perimortem trauma, covering writing). As such, reconstruction should not be performed during preliminary assessment. See DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security) for guidance on reconstruction during preliminary assessment.

3.2.3.1 **Apparatus & Materials:** Duco Cement (or similar brand) is stored in various areas of the CIL. Acetone-soluble adhesives are preferred over water-soluble since the former are not softened by moisture. Containers of sand and crushed lava also are located around the CIL and are used to hold fragments while the adhesive sets. Exemplars of known human osseous and dental remains and material evidence are available for referencing structural morphology.

3.2.3.2 **Procedures:** The following procedures are used to reconstruct evidence:

- **Arrangement of Fragments:** All fragmented evidence believed to originate from a single individual/item or from a common incident should be laid out on one or more examination tables.
- **Identify Elements and/or Region:** Fragmented evidence is first identified as to element (e.g., left femur, combat boot sole) or region of the skeleton/item (e.g., long bone, field jacket) prior to reconstruction. These determinations are made on the basis of the analyst's professional knowledge of the evidence. For very small fragments, the analyst may need to compare the unknown fragment(s) to exemplars.
- **Search for Recent Breakage:** Once the portion has been identified as to element and/or region, the analyst examines the broken margins of the fragment for variations in color or preservation that would indicate recent breakage. If such evidence is found, the analyst should attempt to match appropriate fragments.
- **Search for Non-Recent Breakage:** For portions exhibiting non-recent breakage, the analyst should examine the fragments for similarities in:
  - Color and staining.
  - Thickness.
  - Preservation.
  - Surface texture.
  - Surface morphology (e.g., grooves, ridges, articular surfaces).
  - Inverse fracture angles that suggest a fit.

- **Clean:** Margins of suspected matching fragments are cleaned of any adherent soil or matter that would interfere with reconstruction. Adherent soil or debris are cleaned with a soft bristle brush and water, if necessary.
- **Dry Fit:** Fragments exhibiting similarities are dry-fitted to test for congruence of fit. All three surfaces—internal, external, and marginal—should exhibit congruence. Surface morphology (e.g., color and preservation) often exhibits marked differences if the two fragments were subjected to differing microenvironments. In some cases, postmortem plastic deformation of the evidence (e.g., cranial fragments, helmet liner plastic) may preclude matching all broken margins accurately. Fragments should never be re-broken, filed, sanded, or otherwise altered to obtain a fit.
- **Adhesive:** Adhesive is applied to clean, dry, margins and the fragments lightly pressed together and held until the glue sets. Fragments may be held together with tape (provided removing the tape does not damage the evidence) or can be placed in sand or crushed lava for support while the adhesive hardens. In some cases (e.g., fragile cranial reconstructions), bamboo skewers are useful to support the reconstructed fragments.
- **Assemble the Element:** As a general rule, smaller fragments should be reconstructed into larger pieces and the larger pieces then fitted together to reconstruct the element as completely as possible.
- **Check Results:** The reconstructed evidence is compared to exemplars to ensure that the reconstruction is accurate.

3.2.3.3 **Reporting:** The analytical notes and final report (FAR, FOR, MER) typically contain all observations that are relevant to the testing of the evidence and the formation of professional opinions, including:

- Identifying the item/element/anatomical region that was reconstructed.
- The approximate number of fragments used to reconstruct the item. If fragmentation is extensive, a statement and/or a sketch depicting the type and degree of fragmentation should be prepared, as appropriate.
- The total number of accessions involved.
- Any other relevant information.

3.2.4 **Desalination:** Evidence recovered from marine environments must be desalinated and dried before it can be placed into long term storage. Desalination leaches out the salt dissolved in evidence. Failure to desalinate evidence may result in the salt crystallizing which causes cracking, shrinking, or other deleterious changes in the evidence. Instructions for desalination of evidence are found in Annex C (Desalination) to this SOP.

4.0 DOCUMENTATION: Because the above procedures involve altering the nature of the evidence or potentially erasing provenience, results should be fully reported in the analytical notes as described above. Any taphonomic effects observed and special treatments of evidence should also be noted. Analytical notes are prepared in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). The final reports are prepared in accordance with the formats listed in DPAA Laboratory Manual, SOPs 3.4 (Determining Biological Profiles), 3.5 (Forensic Odontology), and 3.6 (Material Evidence Analysis). Templates for relevant reports are available on the DPAA network.

5.0 SURETY: The final test report is peer-reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). Analytical notes are made available to the peer reviewer at the time the report is reviewed. The procedures documented may also be subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

6.0 SAFETY: All evidence is handled in accordance with appropriate evidence -handling procedures. There are no inherent safety conditions involving handling of dry bone or dental remains. Wet bone and dental remains (i.e., remains with fresh or decomposing adherent soft tissue) are handled with appropriate caution as detailed in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

Annex A (Soft Tissue Removal and Maceration)

A1.0 PURPOSE & SCOPE: This annex covers general procedures and precautions regarding soft tissue removal and maceration with respect to osseous material. Specific procedures vary on a case-by-case basis depending on the condition (e.g., fresh, decomposed, burned, mummified) and type (e.g., fetal, immature, adult, osteoporotic) of remains and their final disposition (e.g., immediate analysis, storage).

A2.0 GENERAL: The majority of the CIL cases requiring maceration prior to analysis are received as consult cases. Consult case management is discussed in DPAA Laboratory Manual, SOP 1.8 (Consult Case Management). As such, participating CIL Staff need to coordinate soft tissue removal,* maceration, and other case procedures with the customer as part of the consult case management review process.

*Note: Unless otherwise specified, the terms "soft tissue" or "tissue" used throughout this annex refers to all non-osseous biological material to include: fresh or desiccated skin, muscle, ligaments, cartilage, organs, etc.

A2.1 **Locations:** In Hawaii, tissue removal and maceration is conducted at CIL-HQ. The locations in CIL-HQ and their respective functions relevant to the removal of soft tissue and maceration of remains are as follows:

- Secure walk-in refrigerator (Room #324). Prior to the start of maceration, the evidence and any biological specimens collected may be stored in the refrigerator. Following maceration, all biohazardous waste and contaminated materials are appropriately sealed, labeled, and returned to the walk-in refrigerator.
- Decomposition Room (Room 330#). Photography and preliminary assessment of cases with adhering tissue are usually conducted in the Decomposition Room. Portable autopsy carts are available for analysis, and Room #330 is equipped with VAC systems for appropriate ventilation and odor control.

At CIL-OF, maceration is conducted in the Evidence Conservation Room (Room 119).

Consult cases may require assessment and removal of soft tissue at off-site facilities, typically in a medical examiner's office.

A2.2 **Data Collection & Documentation:** The maceration process requires altering soft tissue evidence. Therefore, extensive documentation of the condition of the remains are required prior to, and throughout, the maceration process.

Observations and findings are recorded in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). Documentation should be in written, illustrative, photographic, and radiographic form. The intent of documentation is to record:

- Overall condition of the remains.
- Any apparent perimortem soft tissue trauma (perforations, lacerations, etc.).
- Identifying features (e.g., tattoos, surgical scars, birthmarks, etc.).
- Decomposition pattern(s).
- Presence of entomological specimens (e.g., maggot masses) and any other information that provides evidentiary information regarding:
    - Postmortem interval.
    - Possible perimortem trauma (atypical locations of maggot masses (away from orifices) which may indicate possible perimortem trauma.
    - Reconstruction of the original context of the death scene.

A2.2.1 **Written Documentation**: In addition to the information listed above, the analyst maintains a record of the actions taken during the maceration process, including:

- Personnel involved in the process.
- Instruments/equipment/amount of chemicals used.
- Joints manually disarticulated by sharp tools.
- The times the pots are turned on and off.
- Approximate water temperature.
- Any adverse alteration of the osseous remains that may occur during the maceration process should be noted. For example, overheating may cause the osseous remains to soften or burn and sharp instruments may leave pseudo-traumatic marks on the bones.

A2.2.2 **Charting:** When the case involves fresh or partially decomposed remains, sketch the condition of the remains on the homunculus forms, diagrams, and charts available on the DPAA network. Provide detail regarding differential decomposition, burning,

or possible perimortem trauma. Provenience information may also be recorded.

A2.2.3 **Radiography:** When maceration is conducted at the CIL, radiographic documentation is first performed on all of the remains. Casework conducted at off-site facilities should have the capability to perform radiographic documentation.

Conduct a preliminary radiographic analysis of the remains prior to maceration in order to note any biological, pathological, or traumatic anomalies that may be encountered.

For hygienic reasons, do not place the remains directly on the surface of the x-ray table or platform. Radiography is conducted while the remains are within biohazard or remains bags, or with a sanitary cover placed over the platform.

A3.0 MACERATION PROCEDURES: The following maceration procedures are widely accepted by forensic anthropologists and exist in published guidelines:

- Byers 2008:132-137.
- Fenton *et al.* 2003.
- Mairs *et al.* 2004.
- Rennick *et al.* 2005.

The process of maceration varies on a case-by-case basis. General procedures utilize hot water and detergent maceration in conjunction with manual tissue removal. This maceration process may be used for the majority of the cases and is explained in detail below.

Cases involving fetal, immature, burned, extremely osteoporotic, ossified cartilage (e.g., laryngeal cartilage), or similar remains are more susceptible to damage using the general procedures. Options for such cases or vulnerable elements include using less chemical additives or water maceration. The process of water maceration entails sealing submerged remains in room temperature water into airtight containers for a period of days or weeks, while periodically renewing the water.

Cases that may require long-term curation may need to simmer longer or use more chemical additives in order to control odor and potential leaching of grease.

A3.1 **Remains Preparation:** For refrigerated remains, adhere to the following procedures:

- Allow remains to attain room temperature prior to macerating.
- Frozen remains may have to thaw under the fume hood prior to soft tissue removal.
- Photograph the remains before and after thawing. Radiographs can be taken at any time during the thawing process.

A3.2 **Apparatus & Materials:** The following items should be on hand in order to conduct maceration and tissue removal operations:

- Personal Protective Equipment (PPE).
  - See DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) for required PPE and to review instructions for its use.
  - Two pairs of disposable gloves must be worn, preferably sterile latex surgical gloves over thinner latex examination gloves.
- Biohazard containers.
  - Biohazard bags.
  - Biohazard sharps container.
- Dissecting kits.
  - Forceps.
  - Scissors.
  - Scalpel handles and blades.
- Disposable mesh bags or cheese cloth.
  - These may be used to maintain field or anatomical provenience, especially for small or fragmented remains.
  - An identifying label may be affixed to or inserted with the bag.
- Buffet range burner (or similar non-flame heat source).
- Scientific grade pots. The slow cooker (or similar device) can be used interchangeably or in conjunction with the range burner.
- Enzyme-active powdered detergent (e.g., Biz, Alconox). Optional additives may be used depending on the case (see below). These include but are not limited to:
  - Powdered sodium carbonate (e.g., Arm and Hammer Washing Soda™).
  - Household ammonia.
- Metal tongs.
- Strainer/metal sieves.
- Wooden or bamboo scrapers.
- Soft or medium bristled toothbrushes.

- Paper towels and blue disposable surgical towel pads.
- Specimen trays and containers.
- Disinfectant cleaning solution.

A3.3 **Biological and Entomological Specimen Collection:** Use the following procedures:

- Collect soft tissue samples from differentially decomposed areas, as well as hair samples, and entomological specimens (if available) and place in labeled specimen containers. Include on the container:
  - CIL number.
  - Analyst's initials.
  - Date.
  - Location on the body from which the specimen was collected (e.g., scalp, left anterior thoracic region) on the label.
- Secure the samples (excluding any living entomological evidence) in the walk-in refrigerator.

For consult cases, sample collection may be disregarded if the samples were collected prior to the remains being received at the CIL.

A3.4 **Set-up:** The following steps are general guidance; procedures may vary depending on the case:

- Assemble the above apparatus and materials.
- Set up the range burner under a fume hood. If the slow-cooker is to be used in conjunction with the double burner it can be placed in the space adjacent to the fume hood and the end wall.
- Fill the containers with water and turn all temperature dials to high. Do not overfill. Allow for displacement of water when the remains are added in order to avoid spills.
- Add approximately 1-2 tbsp of an enzyme-active powdered detergent, such as Biz, for every 2.5 liters of water. The detergent may be supplemented with an equal amount of powdered sodium carbonate, such as Arm and Hammer Washing Soda™, which is a water softener that catalyzes the active ingredients in the laundry detergent (see Fenton *et al.* 2003). Do not use a bleach solution on the remains if histology or mtDNA sampling will be conducted*. Bleach degrades the DNA potential and the integrity of the cortical bone (see Rennick *et al.* 2005).

*Note: Consult Laboratory Management prior to using formulas not specified in this SOP.

- Label a new biohazard bag with the CIL number, and place it in the biohazard receptacle.
- Use large sealable plastic bags to contain the biohazardous waste and heavily contaminated materials (e.g., soft-tissue, paper towels, outer glove layer) for each session rather than placing the material directly into the biohazard bag. This minimizes odor, and more importantly, it provides manageable samples if post-maceration radiography or re-examination of the material is necessary. Date and label the bags sequentially. Lightly contaminated material (i.e., disposable PPE) can be placed directly into the biohazard bag.
- In order to prevent the spread of contaminants, use the blue disposable surgical pads to cover the immediate work space.
- An abundant supply of paper towels should be on hand since wet tissue and tools may prove slippery and hard to grasp.
- Be prepared to conduct spill control operations.

A3.5 **Scalpel Safety Precautions:** Consult DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program), as appropriate. Untrained individuals should not attempt to handle or use scalpels prior to receiving a proper safety demonstration. Always employ the following safety procedures when working with scalpels:

- Attaching a scalpel blade to the handle: direct the sharp edge away from your hands and only open the package far enough to reveal a portion of the handle insert. After the blade is securely on the handle then remove the package envelope.
- Removing a scalpel blade from the handle: use small forceps to pinch the dull end of the blade, nearest the handle, and remove the blade. Deposit the scalpel blade directly into the biohazard sharps container. Never put scalpel blades into waste bags.
- When handling a scalpel, always direct the cut of the scalpel away from yourself. Do not use the scalpel as a saw (quick back-and-forth cuts); instead make single, controlled incisions.
- When the scalpel is not in use, ensure that the scalpel blade is sheathed or secured in a safe and apparent location.

A3.6 **Maceration:** Use the following procedures for maceration:

- Remove the bulk of the soft tissue using the tools in the dissecting kits. Avoid firmly pulling

desiccated tissue and ligaments away from the bones as this may damage or alter the bone surface.
- When macerating a complete or a nearly complete set of remains:

  - Disarticulate the joints to facilitate space for the remains in the pots.
  - The axial skeleton may be left largely intact. Remove the skull between the second and third cervical vertebrae, and at the pelvis between the lumbar vertebrae or sacrum.
  - Be cautious when disarticulating remains with unfused epiphyses, especially the vertebral centra.

- Bring the water temperature in the pots to a simmer and add the remains. If the tall pots are being used then the long bones may not fully be submerged in the water and will later have to be turned.
- Always monitor the pots to ensure that the water does not boil or evaporate to a low level.
- Monitor the material integrity of the skeletal elements: immediately remove the remains from the solution if the skeletal elements begin to soften. The best indicators of the overall material integrity of the remains are obtained from trabecular bone elements (e.g., vertebral bodies, sternum, epiphyses).
- Take measures not to lose the provenience, seriation, or identification of the skeletal elements. Place the hands and feet into separate mesh bags or cheese cloth bundles. The digits also may be separated and bagged individually. This aids identification following disarticulation. The same holds true for osseous fragments embedded in soft tissue in cases of peri- or postmortem trauma. Separate pots or layered metal sieves also may be used to maintain the provenience of these elements.
- Provide labels or markers to identify the contents of each of the pots or bags. Labels on plastic cards in permanent marker can be placed in the water with the remains.
- After a few hours the majority of the remains should be ready for manual tissue removal. It may likely take longer for the residual tissue to fully separate from the bones. Cartilage and tendon insertion areas are the most difficult to remove and require manual scraping and sequential re-soaking.
- Renew the water-detergent solution periodically throughout the maceration process.
- Retrieve the remains in the following manner:

  - Place a strainer or metal sieve over the drain in the sink prior to empting the pots.
  - Use tongs to remove the remains from the pots.
  - Use caution as the remains are hot.
  - Refill the pots with water and detergent solution, and keep the remains simmering or soaking. If the tissue is allowed to dry it becomes more difficult to remove.
  - Remove the elements that immediately can be processed. The bones whiten as they begin to dry.

- Remove all possible residual tissue and cartilage:

  - Most of the tissue can be brushed away with a soft or medium bristled toothbrush, or removed with the dissecting tools.
  - Wooden (tongue depressors) or bamboo scrapers can be used to remove cartilage and ligaments. Avoid scraping the bone with metal tools as it may result in the production of pseudo-trauma characteristics.
  - Be mindful of remnant tissue on the bones since it may obscure identifying or traumatic features.

- Soak or rinse the bones in clean, warm water following tissue removal to leach out the detergent or chemicals that may continue to degrade the bone as it dries.
- Allow the bones to air dry on paper towels on a tray or in the drying cabinet. Do not let the bones dry in a closed and operating fume hood as the rapid air movement of the fan may cause cracking (Nawrocki 1997).
- Additional steps may be taken if the ends of the bones still retain an intrusive amount of fat and grease, especially if long-term curation is expected. For such cases, rather than allowing the remains to dry, perform the following procedures from Fenton *et al.* 2003:

  - Refill the pots with water.
  - Add approximately 150 ml of ammonia per 2 liters of water.
  - Turn the heat on low and skim the material that accumulates on top of the water.
  - Continue until the bones are fully degreased.
  - Rinse the bones in clean, warm water.

Maceration typically cannot be completed in one working day. At the end of the day, unplug the heat sources, empty the pots, rinse off the remains, and keep them submerged in water until maceration can resume. After returning to work, continue to simmer the remains in the water and detergent solution and follow the procedures outlined above, as appropriate. Place the biohazardous waste container in the walk-in refrigerator or under the fume hood overnight.

A3.7 **Post-Maceration:** After maceration, ensure the following procedures are performed:

- Add the bag number to the bag labels (e.g., Bag 1 of 2).
- Wash all equipment and contaminated surfaces thoroughly after each maceration session.
- Disinfect surfaces and equipment with either a 1% bleach solution or a germicidal disinfectant (the former can be produced by taking commercial off-the-shelf liquid bleach and diluting it with 9 parts of water per 1 part of bleach). Follow precautions for mitigating biohazard contaminants in accordance with DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).
- Dispose of all PPE and contaminated waste into the biohazard container. When full or when maceration is complete, tightly tape the biohazard bag shut, and ensure that the CIL number is visible on the bag. The bag does not have to be sealed with evidence tape. Secure the material in the walk-in refrigerator.
- For consult cases, organize the disposal of the biological waste with the customer. Otherwise, coordinate with the CIL Support Coordinator to dispose of the material through the DPAA Medical Section.

A4.0 SURETY: The following surety measures are in effect:

- Soft tissue removal and maceration is conducted only by appropriately trained analysts or concurrently with a mentor.
- All aspects of the procedure is documented in accordance with the above guidance. Analytical notes and test reports pertinent to maceration operations are subject to peer review in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review).
- New formulas for maceration are not used on evidence until reviewed by Laboratory Management and/or validated by the CIL.

A5.0 SAFETY: Recognize hazards and take precautions as detailed in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

The following safety hazards exist with the process of maceration:

- Biohazardous material with an increased potential for bloodborne pathogens.
- Sharp blades and instruments.
- Scalding hot burners, pots, and water.
- Electrical items in close proximity to wet areas.
- Chemicals.
- Wet floors (slip and fall).
- Putrid odors may cause nausea and fainting.

Consult SOP 1.4, as appropriate, and the task hazard analysis for the mitigation of the above hazards involved with maceration. Individuals involved with soft tissue removal and maceration procedures should have current vaccination records (e.g., hepatitis, tetanus, boosters) on file with the DPAA Medical Section.

Annex B: Segregation and Analysis of Commingled Human Remains (CHR)

B0.0 PRINCIPLE, SPIRIT & INTENT: Casework involving commingled human remains (CHR) focuses on the segregation of skeletal elements, the association of these elements into discrete individuals, and the correspondence of possible casualty matches with data from individual remains. Analysis of CHR is performed in an organized manner conducive to replication and verification.

B1.0 PURPOSE & SCOPE: The CIL is frequently charged with sorting and analyzing CHR. Many DPAA recoveries target complex loss incidents involving multiple individuals. Additionally, many of the skeletal assemblages unilaterally turned over to the DPAA consist of large numbers of commingled individuals, and are unaccompanied by detailed provenience information. Further, remains from a single individual are commonly found in multiple accessions.

This annex details the responsibilities of key personnel in CHR analysis and establishes guidelines for CHR analysis in a systematic, standardized, replicable manner. Goals of CHR analysis include:

- Segregating groups of related skeletal elements from larger commingled assemblages of remains.
- Isolating discrete individuals from the segregated groups of remains.
- Associating these individuals with potential casualty matches.

This annex is applicable to any large-scale CHR project.

B2.0 DEFINITIONS: The following terms and definitions apply to CHR:

B2.1 **CHR:** CHR (commingled human remains) refers to the intermixed, typically skeletal remains, of multiple individuals. The complexity of the CHR case/project depends on the amount of skeletal remains involved and the number of associated casualties.

B2.2 **Casualty:** For the purposes of this SOP, the term "casualty" or "casualty match" refers to a deceased individual who may be represented by unknown remains within a CHR assemblage. Developing and shortening a list of potential casualty matches is part of the consolidation/association process (see below).

B2.3 **Segregation & Segregation Analysis:** Segregation analyses reveal similarities and differences among skeletal elements that allow them to be segregated from the larger CHR group. Segregated groups of remains have characteristics in common (e.g., shared DNA sequence) but may represent more than one individual. Most of the anthropological analyses performed on CHR are part of segregation analyses. The methods and techniques used in these analyses are outlined in the body of this SOP and are further discussed below.

B2.4 **Consolidation & Consolidation Analysis:** In CHR analysis, the process of isolating discrete individuals from a subset of segregated remains is referred to as "consolidation" or "association."

As used here, "consolidation" has the same meaning as the term "partial consolidation" used in evidence management (see DPAA Laboratory Manual, SOP 1.3, Evidence Management & Security). Evidence is moved from its original accession, but evidence and case files are not totally closed and/or combined. This type of consolidation is the same as partially cross-leveling evidence from one accession to another.

Further, "consolidation," as used in CHR analysis, refers to the movement of skeletal elements and other evidence across accessions because of a shared DNA profile or other association.

Consolidation is especially common in commingled cases where skeletal elements in one accession may be associated with remains from another. When segregation analysis reveals these associations, remains are consolidated into a single accession.

The process of CHR consolidation also typically involves comparing characteristics of skeletal remains with possible casualty matches, noting consistencies and/or inconsistencies between the casualty and the remains (e.g., between a casualty's loss location and the purported origin of the remains).

B2.5 **Association & Association Analyses:** Association refers to similarities among skeletal elements that originate from the same individual and the same accession. The process of association is similar to that of consolidation (including isolating skeletal individuals and comparing their traits with those of casualty matches), except that remains do not move from their original accession to another.

B2.6 **X-Portion:** X-Portions are additional remains of a previously identified individual (see DPAA Laboratory Manual, SOP 1.6, General Casework Procedures).

B2.7 **Element Designator:** When dealing with large groups of commingled remains, individual designators are often assigned to each skeletal element. Individual element designators are also convenient for data entry into CHR databases. Element designators must follow the protocols for all CHR project databases.

The following is an example of an element designator system used by the K208 project:

- The designator number is comprised of the element's original accession number, followed by a slash and another number.
- If an element was sampled for DNA prior to the initial database entry, the number following the slash usually correlates with the AFDIL sample number, (a number from 1 through 100). For example, an element from the accession 1993-747 with AFDIL sample number 07A receives the designator 1993-747/7. Note that the designator is numerical: the associated letter is not included.
- If an element was not sampled prior to the initial database entry, the number following the slash is ≥500 (e.g., the first un-sampled element from 1993-747 receives the designator 1993-747/500).

B3.0 PERSONNEL: CIL personnel conducting large scale CHR analyses are typically forensic anthropologists who specialize in analyzing, sorting, and segregating CHR. CHR personnel may include:

B3.1 **CHR Project Manager:** A Project Manager may be assigned to a CHR project. The Project Manager is also the lead analyst and is responsible for the long- and short-term operation of the project and the supervision of all CHR analysts (see below). Specific duties may include, but are not limited to:

- Coordinating tasks assigned to CHR analysts.
- Directing and tracking the progress and timeliness of CHR analysis and other assigned tasks.
- Tracking the processing and reporting of DNA samples relevant to CHR.
- Assigning reports for peer review internal to the CHR project.
- Performing management review of reports.
- Researching casualty data in order to generate lists of potential matches to individual sets of remains.

B3.2 **CHR Analyst(s):** Typical CHR analyst duties include, but are not limited to:

- Performing measurements and conducting observations of CHR.
- Writing reports.
- Performing internal peer reviews of reports.
- Interpreting data results from tests (e.g., DNA).
- Conducting searches of CARIS, CHR databases, and various spreadsheets relevant to the segregation of individuals from CHR.
- Determining relevant biological profile information.
- Inputting data into specialized CHR databases.

B4.0 PROCEDURES: Figure 1 shows the CHR process. Procedures for the systematic analysis of CHR, and their association with potential casualty matches, are outlined below.

B4.1 **General Considerations:** Information such as casualty data and the type or location of loss incident is often relevant to the association of CHR with casualty matches. Thus, CHR analysts do not operate in the blind. Additionally, a CHR analyst does not write FARs for remains originating from the projects in which they perform analyses.

While external to the CHR project, Laboratory Management (typically the FAR manager) coordinates with the Project Manager and analysts to facilitate the smooth transition from the segregation of remains and the association of individuals through the assignment and completion of the FARs. Laboratory Management advises the Project Manager in making the decisions regarding:

- Types of tests to complete (e.g., mtDNA analysis vs. nuclear DNA analysis).
- When/to what extent to sample remains for DNA.
- When to utilize CXR.
- When to initiate consolidation and/or which consolidations to prioritize.

B4.2 **Apparatus & Materials:** The instruments and exemplars utilized by CHR analysts are similar to those described in DPAA Laboratory Manual, SOP 3.4 (Determining Biological Profiles), and are maintained and performance checked in accordance with DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability).

A large analytical space must be dedicated to each CHR project. Unlike typical CIL skeletal analysis, consisting of small numbers of individual remains, CHR analysis occurs on a project level. The effect is

that the unit area per individual being analyzed in a CHR project is empirically greater than in cases represented by smaller numbers of individuals.

CHR analysts employ measures to ensure that skeletal elements are not further commingled or that provenience data on segregations and consolidations are not lost. These measures may include:

- Labeling individual skeletal elements with accession and/or designator numbers.
- Dedicating multiple analytical surfaces to each CHR project.
- Subdividing analytical surfaces into relevant organizational groups, as follows:
    - According to provenience, accession, DNA sequence, etc.
    - Boundaries between organizational groups are sufficiently marked (e.g., with evidence tape).
    - Subdivisions of CHR documented accordingly.

For example, the analysis of K208 CHR occurs at a dedicated laboratory, separate from other CIL analytical spaces. Further, when remains from different accessions are analyzed in tandem, each element is labeled, and the surfaces are clearly divided with evidence tape in order to prevent cross-commingling.

B4.3 **Segregation:** In segregation analysis, molecular biology and anthropology are used to establish how elements within a specific subset of remains are related to each other, to the exclusion of the rest of the remains in a CHR assemblage.

At the completion of segregation analyses, a Report of Segregation (RoS) is generated summarizing determinations and conclusions (see below).

Segregation analyses may include the following:

B4.3.1 **Accession Analysis:** A CHR project begins when remains are accessioned into the CIL. The accession numbers assigned to the incoming containers of CHR provide the starting point for segregation analysis. These accession groupings can correspond with actual proveniences, or reflect the *in situ* placement of remains.

Before detailed segregation analyses can occur, related groups of accessions are inventoried and photographed in order to maintain control of evidence and assess the correspondence of accessions with actual proveniences.

However, in CHR cases, single accessions rarely correspond with single individuals; therefore, the below procedures (e.g., DNA sampling, anthropological analyses) are used to attribute elements across accessions to specific individuals.

B4.3.2 **DNA Sampling:** The analysis of DNA (especially mtDNA) is vital in segregating skeletal elements from a larger group of CHR. Sampled skeletal elements return sequence data that is useful in identifying groups of remains potentially belonging to the same individual. When multiple individuals are represented by one mtDNA sequence other types of DNA analysis (e.g., autosomal, Y-chromosomal) may provide the discretion needed for segregation.

Sampling and analysis of DNA are typically among the first steps in segregation analysis, although the process of sampling for DNA and using sequence data to segregate remains can be ongoing throughout a CHR project. DPAA Laboratory Manual, SOP 3.7 (Sampling Trace Evidence for DNA) provides an overview of the DNA sampling process.

Because of the primacy of DNA for segregating CHR, groups of segregated remains are typically tracked using the DNA sequence number generated by AFDIL. Consequently, the DNA sequence number forms a unique identifier for all remains sharing a sequence.

The manner in which sequence numbers are used to track related groups of remains, and the levels of subdivisions used to make CHR analysis manageable, can differ according to the nature of each CHR project. If appropriate, this identifier can be derived relative to a subdivision within the larger CHR assemblage. Alternately, the identifier can be derived relative to all sequences in the assemblage (e.g., elements are also assigned an overall CHR project sequence number, relative to the entire assemblage).

B4.3.3 **Anthropological Analyses:** Anthropological analyses complement DNA analyses of CHR. Anthropological analyses are useful to associate un-sampled skeletal elements with those that have been sampled, thereby adding remains to a grouping and thus increasing the number of elements attributed to an individual. Additionally, in cases where common DNA sequences are shared by multiple persons in a CHR assemblage, anthropological techniques are used to further segregate subsets of remains into discrete individuals.

The discussion of the below techniques supplement those presented in the body of this SOP.

- Pair Matching: Paired skeletal elements are compared with each other, and with other relevant elements within a group of CHR. The extent of the comparisons depends upon the extent of the commingling. In other words, one element need not be compared with every corresponding element in a large CHR assemblage. For example, if previous testing shows that the remains sharing a DNA sequence are only commingled with remains from their original accession, smaller-scale, intra-accession pair matching comparisons are appropriate.
- Articulation: Poor articulations may indicate that the elements are from different individuals.
- Taphonomy: Taphonomic signatures can vary between individuals, allowing segregation of elements.
- Osteometric Sorting: Metric analysis of bone size and shape can supplement gross morphological assessments of pair matching and articulation. Additionally:
    - Osteometric sorting measurements follow the standard measurements of Moore-Jansen *et al.* (1994) and the supplemental measurements of Byrd and Adams (2003) and Byrd (2008).
    - Measurements are taken for various skeletal elements within a DNA sequence grouping and compared with each other, as well as with measurements from an osteometric database.
    - The analyst chooses a statistical model appropriate to the data. Student's *t*-tests are appropriate for pair matching comparisons, or can be used in conjunction with linear regression models. The latter are appropriate for comparing the overall sizes of elements from different regions of the body.
    - Based on the resulting statistical probabilities, individual skeletal elements are accepted or rejected as being associated with remains sharing their DNA sequence.
    - More information on osteometric sorting is found in Byrd and Adams (2003), Byrd (2008), and Byrd and LeGarde (2014).

- Biological profile estimation: Estimating the biological profile of the skeletal remains may enable their association with a casualty match during consolidation/association analysis.
- Trauma Analysis: Elements originating from the same individual may show similar trauma patterns. If portions of a fractured skeletal element are refitted, the fragments belong to the same individual.

Note: While the above techniques highlight similarities and differences between skeletal elements, interpret the results with caution. Differences between skeletal elements do not always indicate multiple individuals. Nor do similarities always indicate one individual. Greater confidence is placed in test results indicating exclusion.

B4.3.4 **CHR Databases:** Databases containing information about individual commingled skeletal elements can be utilized for segregating CHR. If CHR databases are employed, protocols are developed for data entry, data surety, querying, etc.

B4.4 **Consolidation & Consolidation Analyses:** Once segregation analyses are complete, similarities and differences among elements sharing a DNA sequence are documented in the RoS, and the remains can be divided into discrete individuals. Frequently, this entails movement of skeletal elements from one accession to another. The ensuing consolidation analyses results in a Report of Consolidation (RoC) or Report of Association (RoA). This report contains:

- Lists of the associated elements (including elements which are moving into different accessions, if applicable, and those remaining in their original accession).
- Descriptions of the movement of remains from accession to accession, if applicable.
- References to the RoS for the relevant DNA sequence.
- A statement that the remains represent one individual.
- A summary of possible casualty matches (see below).

Consolidation involves research into possible casualties matching the anthropological and molecular profiles of the associated remains. As part of the consolidation analysis, the CHR personnel compile a list of possible casualty matches, and summarize consistencies and inconsistencies between them and the individual represented by the skeletal remains. The consolidation process is open (i.e., not completed in the blind). Research may include:

- Searching data provided by AFDIL (e.g., Mass Comparison sheets. These present FRS data from all relevant casualties and DNA data from all relevant CHR).
- Generating a list of potential casualty matches using the information provided by AFDIL.
- Searching CARIS and/or CHR databases for loss incident information and other data pertaining to

possible casualty matches, and documenting this information for each match.
- Shortening the list of possible matches by identifying consistencies/inconsistencies between the casualties and the remains and documenting the exclusion logic (e.g., if the remains originate 6,000 miles from the loss location of the casualty match).
- When clavicles are available and in suitable condition, a chest radiograph comparison report (CXR) may be requested in order to associate individuals. An email is sent to Laboratory Management and the CHR Project Manager with the preliminary results of the triage procedure (see DPAA Laboratory Manual, SOP 3.9, Chest Radiograph Comparison). This email is included with the consolidation/association notes for tracking purposes. If there is a potential match, the CHR Project Manager assigns to the remains the accession number of the case into which they are being consolidated (the RoC or RoA number) prior to the generation of a CXR. The CHR Project Manager also communicates the appropriate CIL number to the CXR analyst so the CXR process can be completed. In case of accession number change, previous forms must reflect that change, and remains must be checked in before consolidation, and checked out with the new number prior to proceeding further with analysis.

Note: Not all elements described in a RoC move across accessions. For example, the elements in the accession into which the remains are being consolidated stay in that accession throughout the consolidation process.

B4.5 **Association & Association Analyses:** The process of associating remains is similar to that of consolidation, except that skeletal elements do not move between accessions. Association analysis produces a Report of Association (RoA), which lists the associated elements and states that they represent one individual. Like a RoC, a RoA also includes a summary of possible casualty matches (see above).

B4.6 **Reconstruction & Conservation:** CHR can be fragmentary and poorly preserved. Reconstruction is undertaken and documented as described in the body of this SOP.

B4.7 **Reports & Documentation:** All CHR analyses are documented by analytical notes in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation) **(A5.10.1, A5.10.2a-k, A5.10.8)**.

Current report templates for CHR reports are located on the DPAA network. There are three reports associated with the processes of segregating, consolidating, and associating CHR. Typical CHR reports include:

- Report of Segregation (RoS).
- Report of Consolidation (RoC - standard and X-Portion formats).
- Report of Association (RoA).

B4.7.1 **Report of Segregation (RoS):** A RoS summarizes the anthropological analyses conducted on a group of CHR and describes how a group of skeletal elements were segregated from a larger assemblage. The RoS is written before the RoC or RoA (see below).

Note: Segregation notes and reports are not tracked using CIL numbers since these documents frequently describe the remains of multiple individuals. Instead, DNA sequence numbers are typically used as unique identifiers (see above).

A typical RoS may contain the following information, categories, and graphics depending on the needs of the project:

- Title: Located on the first page of the report, in Times New Roman font. It contains:
  - Report title at the top, centered, bold, 16 pt, with the first line in all caps and the second capitalized in title case.
  - Organization centered, bold, first letter in caps, 14 pt.
  - Date (month and year) centered, bold, with the first letter in caps, 14 pt.

For example:

REPORT OF SEGREGATION:
[CHR Project] Sequence 600

Version [X]

DPAA Laboratory

6 January 2016

- Introductory Paragraph: The DNA sequence shared by the elements in questions is discussed and other means of segregating these elements from the larger group of CHR are briefly summarized.

- List of Assessments: The analyses conducted on the skeletal elements are discussed in detail, including:
  - Minimum number of individuals.
  - The frequency of the mtDNA sequence in the AFDIL population database.
  - Pair matching (i.e., the extent of the comparisons between and among elements, and the results of these comparisons).
  - Articulation between elements.
  - Whether elements originate from the same or difference accessions.
  - Osteometric sorting (i.e., whether or not the elements sharing the sequence in question can be further segregated from each other based on their overall size.)
  - The taphonomic signature(s) of the remains including similarities/differences between and among the elements.
  - Biological analyses (such as age indicators, ancestry estimate, etc.)
  - Additional relevant information (such as similar trauma).

- Table summarizing all elements sharing the DNA sequence, or otherwise associated with the DNA sequence. The table includes:
  - Skeletal element(s).
  - Unique element designator(s).
  - DNA sample number(s) or other association (e.g., articulation).
  - Other means of associating an element with the DNA sequence (e.g., articulation).
  - The provenience of each element (if applicable).
  - The original CIL number of each element.
  - The current CIL number of each element (if consolidations/identifications have occurred previously).

Note: The elements in a RoS table are typically arranged in anatomical order, regardless of CIL number.

- Figure of all elements sharing the DNA sequence, or otherwise associated with the DNA sequence. The figure also include association method(s), specifically:
  - Pair matches are indicated with yellow font and arrows.
  - Articulations are indicated with red font and a circle.
- Osteometric Sorting, include graphs and pair matching/articulation table.
- Recommendations based on the segregation analysis, including:
  - Summary of assessments.
  - Identification potential of the remains.
  - Recommendation of CIL number (e.g., Consolidation of these remains into CIL XXXX-XXX-I-XX is recommended).

- Signature Block: The name(s), function(s), and signature(s) of the person(s) authorizing the RoS are indicated.
- References (if applicable).

B4.7.2 **Report of Consolidation (RoC):** A RoC summarizes consolidation analyses. The RoC is a releasable report written after the RoS. The RoC analyzes the consistencies and inconsistencies of all the associated individuals with the particular set of remains. Typically, a CIL number is already assigned, but a FAR author is not.

Reports of Consolidation are titled according to individual CIL number, although DNA sequence or profile numbers are also listed. A typical RoC has the following format:

- Descriptive Title: A descriptive title is necessary for tracking and evidence control. It includes all relevant case numbers as well as the individual number into which the remains are consolidated (e.g., CIL 1993-747-I-07). The title is located on the first page of the report, in Times New Roman font. It contains:
  - Report title at the top, centered, bold, 16 pt, with the first line in all caps and the second capitalized in title case.
  - Organization centered, bold, first letter in caps, 14 pt.
  - Date (month and year) centered, bold, with the first letter in caps, 14 pt.

For example:

REPORT OF CONSOLIDATION:
Consolidation of Remains Originally Accessioned as CIL 1993-747 and CIL 1993-808 into CIL 1993-808-I-01
([CHR Project] Sequence 600)

DPAA Laboratory

6 January 2016

- Introductory Paragraph: The accession of the elements is summarized and includes a description of the origin or purported origin of the remains. Second Paragraph: Statement declaring that the analysis indicates the remains listed in Table 1 and depicted in Figure 1 represent one individual. The statement includes a summary of association and the CIL number that the remains are being consolidated into (e.g., [XXXX]-[XX]-I-[XX]).
- Table 1, summarizing all elements sharing the DNA sequence, or otherwise associated with the DNA sequence. Table 1 includes:
    - Skeletal elements(s).
    - Unique element designator(s).
    - DNA sample number(s) or other associations (e.g., articulation).
    - The provenience of each element (if applicable).
    - The current CIL number of each element (pre-consolidation).
    - Thick lines separating the elements which are being consolidated into a different accession from those remaining in their original accession.

Note: The elements in Table 1 of a RoC are typically arranged in ascending order of CIL numbers (sample/element designator order within the accession). However, any elements originating from the accession into which remains are being consolidated are listed toward the bottom of the table. In other words the last entry(s) in the table are typically "non-moving" elements.

The division is usually indicated in the table by thicker lines, double lines, etc.

- Association of individuals:
    - mtDNA statement regarding the number of name associations with zero differences and one difference. This paragraph also includes information regarding the frequency of the mtDNA sequence in the AFDIL population database and references Figure 2 (loss incident location map).
    - Exclusions (e.g., Twelve individuals can be excluded based on their last known location). Reference Table 2.
    - Consistencies. Provide supportive evidence, include footnotes with references, if necessary.
    - Additional consistencies/exclusions (e.g., LCN-Y results).
    - Summarize (e.g., In conclusion, all individuals, with the exception of DOE, matching this mtDNA sequence with zero differences were excluded based on last known location and dental comparisons).

- Table 2, listing the casualties with FRS data exactly matching the DNA sequence and summarizing the consistencies/inconsistencies between the remains and the possible casualty matches (i.e., more likely individuals listed at the top of the table). This may include:
    - Information on loss location and circumstances, and whether the information corresponds with the purported provenience of the remains.
    - Information on the biological characteristics of the casualty, and whether these correspond with the biological profile generated for the remains by the CHR analysis.

In cases with no exact FRS matches, Table 2 is omitted and the introduction states that no FRS currently matches the DNA sequence.

- Signature Block: The name(s), function(s), and signature(s) of the person(s) authorizing the RoC are indicated.
- Figure depicting an overview of the associated remains.
- Figure depicting the loss incident location of the associated individual(s).

The RoC format is also used to report the consolidation of additional remains into an X-Portion. Whereas a typical RoC consolidates remains into an individual CIL number (e.g., CIL 1993-747-I-01), this variant of the report consolidates remains into an X-Portion of a previously existing individual CIL number (e.g., CIL 1993-747-X-01). For X-Portions, the report introduction states the name, rank, service number and the initial identification date of the previously identified individual.

B4.7.3 **Report of Association (RoA):** When associated skeletal elements representing a discrete individual originate from the same accession, consolidation between accessions is not necessary. In these cases, a RoA is written.

In other words, a RoA is a RoC without the description of the movement of remains between accessions. Like a RoC, a RoA is written after the RoS. A RoA includes all sections present in a RoC, but is titled as follows:

REPORT OF ASSOCIATION:
CIL 1993-808-I-01
[CHR Project] Sequence 600

DPAA Laboratory

6 January 2016

B4.7.4 **Report of Consolidation/Association (Additional Elements):** When additional skeletal elements are associated to a previous consolidation of remains, a Report of Consolidation/Association (Additional Elements [AE]) is written. The RoC/RoA AE follows the format of the RoC/RoA.

The table in the RoC/RoA includes the elements being consolidated/associated into the accession and elements already present in the accession. Elements already present within the accession are listed in the table below the additional elements and are separated by thicker lines, double lines, etc. Elements are listed in accession order and by sample number/element designator within the accession.

B4.8 **DISPOSITION:** The disposition of CHR documents and evidence is summarized below.

B4.8.1 **CHR Document Routing:** After the first draft of a CHR report is complete, the document (typically a .doc file) is saved to the appropriate CHR electronic casefile folder with the word "DRAFT" included in the electronic file title.

Hard copies of the document (including analytical notes) are routed according to the current version of the routing form for CHR reports.

CHR document routing differs from typical CIL casefile routing in that final CHR reports and notes are scanned and saved in PDF format to the appropriate electronic casefile folder on the DPAA network. Additionally:

- PDF versions of the documents are saved with the word "FINAL" in the electronic file title.
- The draft report (.doc file) is retained in the folder along with the PDF of the final draft.
- For RoCs only, the Evidence Coordinator is informed that the report is complete and saved to the network (see below).
- RoS and RoC/RoA are saved in two different locations within the electronic casefile folder dedicated to the specific CHR project. Specifically:
  - Reports of Segregation are saved to the folder labeled "Segregation Reports." In this folder, files are organized by project sequence numbers.
  - Reports of Consolidation and Association are saved to the folder labeled "Consolidation Reports." In this folder files are organized according to CIL number and individual number.
- Hard copy CHR reports and related documentation are retired to Laboratory Administration where they are maintained in accordance with DPAA Laboratory Manual, SOP 1.7 (CIL Case File Management).

B4.8.2 **CHR Evidence Consolidation:** Once the Evidence Coordinator is informed that a CHR RoC is saved to the network, the evidence consolidation process is initiated. Typically, this involves:

- Inventorying the CHR evidence.
- Transporting the remains from the CHR facility after evidence consolidation.
- Moving digital copies of the documents into the relevant electronic case files.
- Conducting the consolidation following the procedures for partial consolidation described in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).
- May notify the CHR Project Manager once the consolidation is official. Consolidations can be easily tracked via CARIS documentation.

B5.0 SURETY: CHR casework is subject to peer review in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). CHR casework is also subject to external and internal audit in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

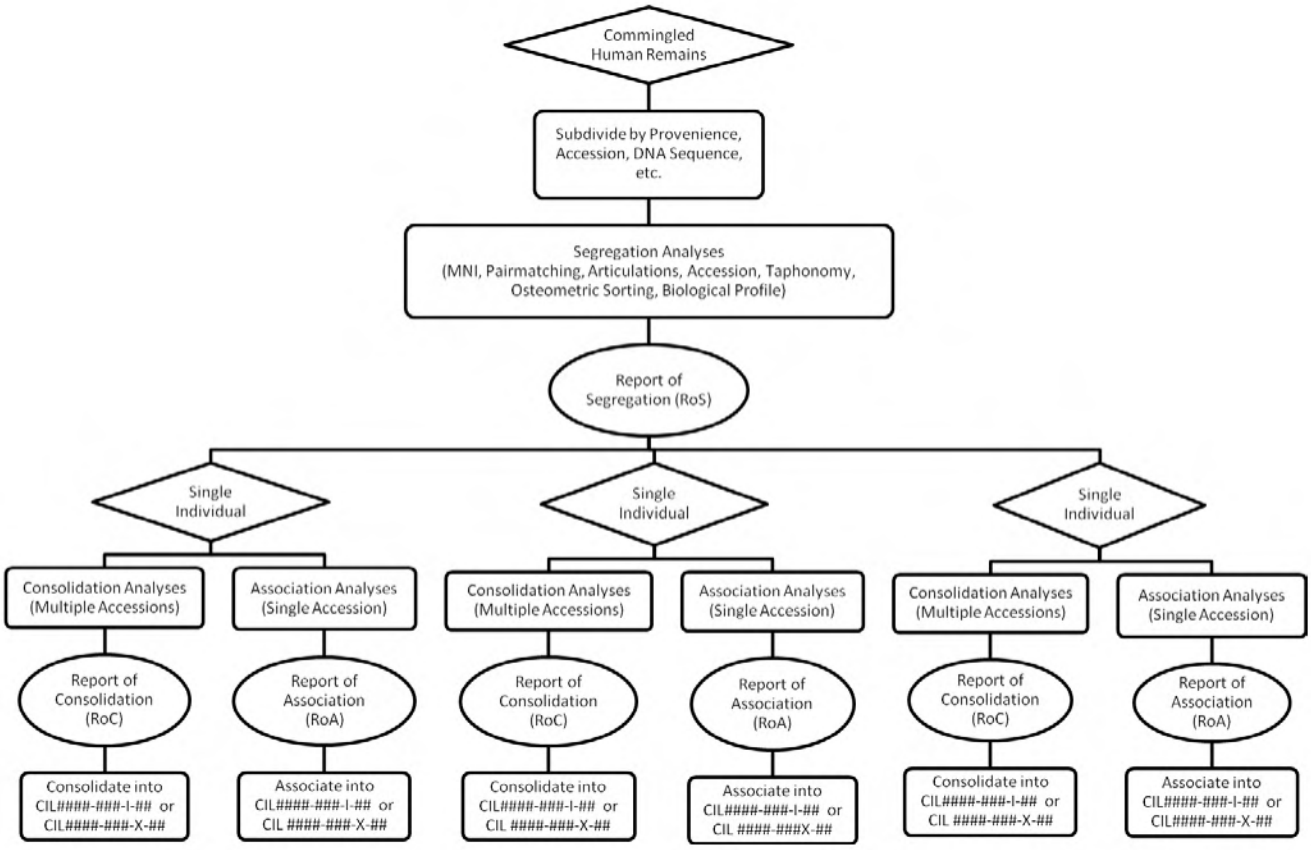


Figure 1. The CHR Process

Annex C (Desalination of Evidence)

C1.0 Purpose: This annex details the process of desalination of evidence recovered in marine environments. The purpose of desalination is to leach out the salt dissolved in evidence, in particular osseous remains that are recovered from submerged marine environments. This practice allows evidence to be removed from water and dried without cracking, shrinking, or other deleterious change.

C2.0 General:

C2.1 **Location:** Desalination typically is performed in the Desalination Laboratory (Room 377) at CIL-HQ and the Material Evidence (ME) room at CIL-OF. This practice also may occur at other locations where appropriate equipment and material support exists.

C2.2 **Definitions:** The following are definitions of terminology used in this annex:

- **Desalination**: The process of removing salts and minerals from items saturated in saline water.
- **Bath**: Fresh tap water in a suitable container used for the purpose of desalination.
- **Parts per million (ppm)**: Measurement units that express salt or other mineral concentrations. A salinity of one ppm is equivalent to one milligram of salt per liter of water (1 mg/l).
- **Total dissolved solids (TDS)**: The total amount of mobile charged ions, including minerals, salts or metals dissolved in a given volume of water.
- **Conductivity:** A means of measuring salinity based on electrical conductivity. Saline solutions contain ions which conduct electricity. Conductivity is typically measured in micro-siemens per cm (µS/cm). However, the conductivity meter automatically converts µS/cm to ppm (for further explanation, see http://www.appslabs.com.au/salinity.htm).

C2.3 **Apparatus & Materials:** The following materials are available in the CIL and may be employed during desalination:

- Eutech Instruments Oakton Waterproof TDSTestr. This is a conductivity meter used to assess the level of Total Dissolved Solids (TDS), including salinity, and water temperature (Figure 1).
- Oakton WD-00653-18 Conductivity Standard (i.e., "standard solution"). This is a NIST-traceable solution of de-ionized water and potassium chloride used as a standard to performance check the conductivity meter.
- A freshwater source.
- Sink with drain trap.
- Containers to fully submerge the evidence.

C2.4 **Evidence Handling & Preservation:** Evidence subject to desalination is usually sensitive in nature and easily affected by handling or by the ambient environment of the CIL. Evidence should be kept submerged in baths and handled with care during measurements, bath changes, and analyis to avoid damage. Evidence is particularly at risk while pouring the bath into the sink (always have the drain trap in place) and while re-filling the bath

Document any damage that occurs during these procedures.

Maintain provenience information at all times.

C2.5 **Analytical Coordination:** Desalination may be done concurrently with analysis provided analysis does not damage wet evidence or cause it to dry out before desalination is complete. Desalination and drying of the evidence must be concluded prior to the evidence being placed into long-term storage. Persons performing desalination should conduct coordination with all analysts, Evidence Coordinators, and other germane individuals.

C3.0 Desalination Process: In general, desalination is achieved by submerging and soaking evidence in successive fresh water baths for several days or weeks, thereby leaching out the salt, until the salinity of the bath has reached an acceptable low level. Better results can be achieved using distilled or de-ionized water baths. Once the evidence is desalinated, it is removed from the water and dried.

Measurements are taken on a regular basis and bath changes occur as needed (usually every several days) until the salinity of the bath reaches acceptably low levels.

Desalination typically occurs using the containers in which the evidence arrives at the CIL, if appropriate. Bath containers must be able to fully submerge evidence.

Date, salinity (ppm), and water temperature (°C) are documented for the standard solution, control solution, and each bath.

C3.1 **Maintenance & Performance Check for the Oakton Waterproof TDS Testr:**

C3.1.1 **Maintenance:** As battery life decreases (approximately 150 hours of continuous use), the TDS Testr may lose its settings; therefore, regular battery checks are required. Anytime batteries are replaced or removed the TDS Testr must performance checked (see below).

Additionally, the TDS Testr is checked regularly for cracks and salt deposits on the electrode. Before performance checking, always allow the standard solution to warm to room temperature (especially if the solution is stored in the refrigerator).

C3.1.2 **Performance Checks:** The TDS Testr requires regular performance checking. If the TDS Testr is used daily, it should be performance checked weekly. If the meter is used less frequently, it should be performance checked every two to three weeks.

In the case of desalination and chloride measurement, the TDS Testr is performance checked against the TDS sodium chloride (NaCl) ppm value. A table with the model numbers, available standard solutions, and the TDS NaCl ppm values for each solution can be found at:

http://www.4oakton.com/Con_to_TDS.htm

The standard solution used for TDS Testr Low is as follows:

		TDS Value (ppm):		
Model	Conductivity Value	NaCl	KCl	442
WD-00653-18	1413 µS/cm	702.1	744.7	1000

The standard solution has a 12 month shelf life.

When performance checked to the NaCl ppm value, the average TDS measurement of tap water at CIL-OF is 303 ppm and 301 ppm at CIL-HQ. Tap water typically is used as the fresh water source and the control solution.

To performance check the TDS Testr:

- Open battery compartment lid (end with lanyard loop, see Figure 1). The two white buttons are Increment (INC) and Decrement (DEC) adjustment keys.
- Rinse electrode in de-ionized water (or alcohol), then rinse it in standard solution
- Dip the electrode into a container of standard solution.
- Switch unit on (ON/OFF key). Wait several minutes for the display to stabilize.
- Press the INC or DEC keys to adjust reading to match the standard solution value (e.g., 702.1 ppm).
- After 3 seconds without a key press, the display flashes 3 times and then shows "ENT". The tester accepts the performance check value and returns to measurement mode.
- Replace battery cap.

Note: Performance check instructions are derived from "Waterproof TDSTestr and ECTestr Series Instructions."

C3.2 **Desalination:** Desalination is as follows:

- Complete a preliminary assessment of the evidence in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management and Security).
- Ensure the evidence is fully submerged in the bath(s).
- Performance check the TDS Testr, if necessary (see above). During performance check remember to record the salinity and temperature measurements of the standard solution.
- Place the TDS Testr in a control solution of fresh tap water, ensuring that the sensor (depicted in Figure 1) is fully submerged. Wait for the reading to stabilize. Record the salinity and temperature of the control solution.
- Place the TDS Testr in the bath, ensuring that the sensor is fully submerged. Wait for the reading to stabilize. Record the salinity and temperature of the bath.

Note: If multiple baths are present, rinse the sensor in the control solution between baths. Distilled water, alcohol, or de-ionized water can also be used to rinse the sensor.

Note: Tester automatically shuts off after 8.5 minutes of non-use.

- After the reading is recorded, remove the bath water from the container. Refill with freshwater until all evidence is submerged fully. Ensure the evidence is not damaged or disassociated from provenience information.
- Repeat steps 1-5 every several days or as necessary.

- Once salinity for the baths reach control freshwater levels (after several days to weeks), evidence is removed from the bath and laid out to dry. Drying may take several days. Place evidence on a surface lined with paper towels or brown craft paper so as to absorb moisture.
- Accession and provenience information is displayed with the evidence (usually on a label).

Note: TDS testers provide a measurement of TDS including not only salts, but also minerals, metals, and other organic and inorganic impurities dissolved. As such, the reading displayed by the TDS Testr is not just the NaCl (in ppm). Consequently, there may be cases when the TDS level stays very high (because of large amounts of other impurities) despite prolonged attempts at desalination. In such cases the NaCl level may already be very low, necessitating an alternate measurement method such as chloride titration test strips.

C3.3 **Documentation:** Forms are available on the DPAA network for recording information related to desalination.

C4.0 SAFETY: The following safety considerations are in order:

- Use caution when lifting or changing any baths involving heavy containers. Use lifting equipment of multiple person lifts, if necessary.
- Be mindful of floor conditions so as to avoid slip and fall injuries.
- Use caution when using electrical items around water baths.

Figure 1. Eutech Instruments Oakton Waterproof TDSTestr.

SOP 3.4: DETERMINING BIOLOGICAL PROFILES

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 9 March 2017
Citation: DPAA Laboratory Manual, SOP 3.4

CONTENTS

0.0 PRINCIPLE, SPIRIT & INTENT: *Skeletal remains are analyzed in an organized manner for the purpose of establishing physical characteristics. Tests are documented in a manner conducive to the replication and verification of the work performed.*

1.0 PURPOSE & SCOPE: This SOP outlines procedures for determining biological profiles (i.e., ancestry, sex, age-at-death, stature, traits of individuation) from skeletal and dental remains by comparison with standard exemplars and models derived largely from known individuals.

This SOP applies to typical CIL cases and is used by all analysts working for the CIL, or under its auspices. In situations where unusual circumstances preclude the adherence to this SOP, the results indicate why the procedures could not be followed, the alternative procedures performed, and an opinion on how the accuracy and reliability of the resulting tests was affected. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 GENERAL PRINCIPLES & GUIDELINES:

2.1 **Location:** Determination of biological profiles from skeletal and dental remains is typically conducted in designated analytical areas of the CIL. External factors may occasionally require that biological profiles be determined in a field or laboratory setting other than these examination areas. In these cases, reported results indicate the conditions under which the tests were made. Tests are stopped when conditions in these areas jeopardize the results of the tests **(A5.3.2)**.

2.2 **Apparatus & Materials**: The following materials are readily available on the Laboratory floor for use in determining biological profiles.

2.2.1 **Instruments:** Osteometric boards, mandibulometers, and sliding, spreading, and coordinate calipers are found throughout the CIL. These instruments require maintenance and performance checks in accordance with DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability). The instruments used and the degree of precision needed for any particular test procedures are those specified in the primary reference for the operation being performed.

2.2.2 **Exemplars:** In most cases, skeletal and dental evidence can be compared with exemplars of human anatomical materials that are located in the CIL. Exemplars are trace evidence supporting materials and are discussed in detail in DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability).

Exemplars, many derived from known individuals, consist of anatomical sets, individual specimens, and casts and reproductions. These include but are not limited to:

- Articulated human skeletons on stands.
- Various human cranial and postcranial skeletal elements.

- Plaster and plastic casts of human crania.
- McKern-Stewart pubic symphysis plastic cast set (manufactured by Darrell Van Buren, Inc.).
- Suchey-Brooks pubic symphysis plastic cast set for males (manufactured by France Casting).
- Suchey-Brooks pubic symphysis plastic cast set for females (manufactured by France Casting).
- İşcan-Loth Sternal rib end plastic cast sets for females and males (manufactured by France Casting).

Graphic exemplars include, but are not limited to:

- Standard dental calcification table and figures reproduced from Moorrees, Fanning, and Hunt (1963).
- *Development of Human Dentition* [Chart] American Dental Association, W300 Chart, W368 Plaque (Schour and Massler, 1941).
- Lovejoy et al. auricular aging techniques photographic set (produced by the Department of Sociology and Anthropology, Kent State University) accompanied by the original article.
- Printed reference materials located (when not in use) in the CIL Library.

2.2.3 **FORDISC:** FORDISC (Jantz & Ousley 2005) is a computer program that is used for a variety of metric tests for ancestry, sex, and stature. FORDISC is modernized periodically, usually with upgrades in databases. The latest version of the program is installed on CIL computers and the version number posted in the Identification Laboratory at CIL-HQ, the analytical area of CIL-OF, and the K-208 Laboratory at CIL-PH. Updates to the program are announced to the staff via email and changes to this SOP made, if needed. All FORDISC guidance in this SOP applies to the latest version unless otherwise stated.

2.3 **Evidence Handling & Preservation**: Generally, evidence subjected to testing is usually robust in nature and not easily affected by handling, or by the ambient environment in the CIL **(A5.3.1, A5.3.2)**. However, special precautions or measures pertaining to specimen preparation may sometimes be required prior to testing, including:

- Reconstruction of the remains in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Any special treatments of remains, to include reconstruction, that possibly affect the accuracy of the test (e.g., where numerous pieces are re-attached in succession, enough to consider a measurement "approximate") should be noted in the analytical notes and the report.
- Cleaning remains having adherent soil, soft tissue, clothing, etc. that precludes making a requisite observation. In these cases, the surface of the bone or tooth should be cleaned using appropriate methods and, if wetted, allowed to air dry before examination.
- Use care in handling more fragile evidence. Remains in a poor state of preservation can be damaged while being analyzed. For example, the jaws of metal calipers can scratch or puncture the surface of poorly preserved bone.
- DNA sampling or other destructive processes should not be undertaken unless requested or approved by Laboratory Management.

2.4 **Blind Analysis:** Unless otherwise directed by Laboratory Management, anthropologists developing a biological profile for an unknown individual from skeletal remains work in the "blind." Blind analysis means that the anthropologist does not know, *a priori*, the physical characteristics of the individual thought to be represented by the remains or other potentially biasing information. In short, blind analysis maximizes impartiality in the tests conducted at the CIL.

When cases are assigned, Laboratory Management should indicate pertinent information (e.g., conflict or era of loss) that promotes successful testing without biasing results. Information, such as conflict, type of incident (e.g., aircraft crash), or number of personnel involved in the incident may be supplied or withheld from the analysts as deemed necessary by the Laboratory Management.

The analyst should complete the primary analytical work without accessing CARIS, or other records, that may inadvertently prejudice their work. An addendum to the original report, including formal comparisons of the biological profile and any other relevant antemortem data, is eventually written and added to the initial report.

There is no control on timing of access to archival records. Analysts apply the highest ethical standards using the "honor system" when conducting blind analysis. Violations are treated as serious ethical breaches and be dealt with accordingly by Laboratory Management.

2.5 **DNA Sampling:** When cases are assigned, Laboratory Management should identify any DNA sampling requirements. Continuous awareness by Laboratory Management, analysts, and DNA personnel that the case has a DNA component is crucial for the effective management and success of the case. Analyst roles in DNA sampling are

explained in DPAA Laboratory Manual, SOP 3.7 (Sampling Trace Evidence for DNA).

3.0 TESTING PROCEDURES: The following section provides guidance and methods for determining biological profiles from skeletal and dental remains. In the event an analyst is required to use a validated method not covered by this SOP, permission must be obtained from Laboratory Management and a memorandum (typically in the form of an email) placed in the case file describing the alternate method(s) used **(A4.1.5a)**.

Biological profiles are determined by comparing the unknown evidence with various types of exemplars derived from known individuals. Often, success depends on the type, condition and amount of remains present, which also determine the specific procedures. Since methods are population and sub-population dependent, the below sequence (ancestry, sex, age-at-death, stature, and traits of individuation) is followed, whenever possible.

3.1 **Ancestry Assessment:** Ancestry refers to a group of people who historically shared a geographic origin and thus still share some common genetic material. Some consider these groups to be synonymous with the concept of "race." In other words, the human genotype, along with environmental and cultural factors, correlates to systematic and discernible patterns of phenotypic variation. Therefore, ancestry assessment (as practiced at the CIL) is the classification of a set of remains into one of several broad geographic groups based on shared skeletal morphology. These guidelines apply only to the Forensic Anthropology Report (FAR), which focuses on skeletal morphology. Other factors and reports outside the purview of the FAR are not considered herein.

Ancestry assessment is primarily conducted by analyzing the variability of nonmetric and/or metric characteristics of the cranium and mandible within and between groups. Secondarily, postcranial skeletal morphology and metrics may be used to assess ancestry. Again, the correlation between skeletal variation and geography is well documented. The methods outlined below rely on this geographically structured variation to classify an unknown individual into one of the ancestral groups.

Race is a simple classificatory term born out of biological taxonomy which is often confused with ethnicity by the lay person. Traditional "racial" categories (i.e., caucasoid, mongoloid, or negroid) have limited utility in biological or genetic research contexts. Racial categories have traditionally been used by the military, law enforcement, and other institutions to categorize individuals. For identification purposes, these categories are broadly consistent with ancestry assessments when making comparisons to antemortem records (e.g. caucasoid and European). An ethnicity, on the other hand, is a group of people whose members identify with each other through a common heritage, language, culture (often including a shared religion) and/or an ideology. Because ethnicity does not necessarily have a strong genetic component, discerning ethnicity through skeletal morphology is not generally productive.

A final assessment of ancestry in a FAR classifies the remains into one of the broad, geographical ancestral groups (i.e., African, Asian, or European). A modifier to this final assessment (i.e., probable) is left to the discretion of the analyst, but must be documented.

Analysts may also choose to include a parenthetical qualifier to the overall assessment of ancestry. This may include, but is not limited to, distinctions of social race or ethnicity. For example, an individual may be identified as European (white); European (Hispanic); African (black); Asian (SE Asian); Asian (Hispanic); Asian (Pacific Islander).

As some methods (e.g., Howell's craniometric classification functions) facilitate assessment at the population level, an analyst may, if warranted, further classify the individual to a population level (e.g., American White, Vietnamese, Hawaiian) in the body of the report. However, the three geographical ancestral groups (with a parenthetical qualifier, if warranted) are the only possibilities for the overall classification of ancestry unless otherwise permitted by management.

When an analyst cannot make a final determination, the remains are classified as 'Indeterminate'. A finding of indeterminate can reflect insufficient data, ambiguous results, or both.

3.1.1 **Cranial Nonmetric Traits:** Morphological features of the skull (cranial nonmetric traits) are heritable and vary systematically among and between human populations and are therefore useful in the assessment of ancestry. Cranial nonmetric traits are subdivided into five classes (Hefner 2009):

1) Bone shape (e.g., nasal bone structure).
2) Bony feature morphology (e.g., inferior nasal aperture morphology).
3) Suture shape (e.g., zygomaticomaxillary suture).
4) Presence/absence data (e.g., post-bregmatic depression).

5) Feature prominence/protrusion (e.g., anterior nasal spine).

By understanding the frequency of individual traits within groups, combining them into suites of significant traits, and then analyzing them within a theoretically-sound framework, patterns emerge that allow valid assessments of ancestry. Such assessments, however, require: 1) sufficient sample sizes from relevant samples and 2) replicable and standardized protocols for trait and character state recordation and coding.

Unless there is no alternative (e.g., only a fragment of the maxilla is present), analysts should make ancestry assessments from recognized trait complexes of the skull and dentition. The low heritability of single traits implies isolated traits are generally not a good indicator of ancestry. Even though some traits occur in high frequencies in some population groups, they can also occur in lower frequencies in other groups. For example, postbregmatic depression has been used to indicate African ancestry. That trait occurs in 47% (Hefner 2009) of Africans (not 100%), but postbregmatic depression is also found in all other populations, although in much lower frequencies (10% of Asians; 17% of Europeans [Hefner 2009]).

Determinations made from single traits should include a caveat in the final report and interpretations should be appropriate given the evidence at hand. Finally, a method employing scores intended to characterize major populations such as "Japanese" should not be co-opted to characterize "Asians" without explicit justification. This problem is particularly acute when applying characteristics of certain Amerindian groups to all Asians.

Table 1. Primary trait complexes of the cranium and mandible.*

Characteristic	East Asian	White	Black
Cranial form	brachycephalic	mesocephalic	dolichocephalic
Post-bregmatic depression	absent	absent	present
Cranial sutures	complex	simple	simple
Nasal aperture width	medium	narrow	broad
Nasal bone shape	plateau	triangular	low/rounded
Nasal profile	concave	straight	straight/concave
Interorbital breadth	intermediate	narrow	wide
Anterior nasal spine	medium	large	small
Inferior nasal aperture	straight	sill	dull
Molar crenulations	absent	absent	present
Incisor form	shoveled	blade	blade
Facial prognathism	moderate	reduced	extreme
Alveolar prognathism	moderate	reduced	extreme
Malar form	projecting	retreating	reduced
Zygomaticomaxillary suture	angled	curved	curved/angled
Palatal form	elliptic	parabolic	hyperbolic
Transverse palatine suture	straight	jagged	anterior bulge
Orbit shape	round	rhomboid	round
Mandible	robust	medium	gracile
Chin form	median	bilateral	median

**Modified from Gill (1998), Rhine (1990), and Hefner (2009)*
† Frequency distribution of characteristics in bold are presented in Hefner (2009)

3.1.1.1 **Skull:** Cranial nonmetric assessment of ancestry is based on gross morphology and trait complexes. Bass (2005) provides three illustrations demonstrating the gross morphology of the skull for caucasoids, mongoloids, and negroids. Rhine (1990:9-20) describes a complex of nonmetric traits commonly associated with each of the major races. Gill (1998) provides a thorough overview of the craniofacial criteria for five geographic races: East Asian, American Indian, White, Polynesian, and Black. Table 1 lists the primary trait complexes recommended for ancestry assessment. Hefner (2009) provides frequency distributions (by ancestry) for 11 of the more commonly used nonmetric traits (8 of these traits appear as bold text in Table 1).

3.1.1.1.1 **OSSA**: OSSA, or Optimized Summed Scored Attributes, utilizes six cranial nonmetric traits (Hefner and Ousley 2014) and is appropriate as a test to separate American Whites and Blacks. OSSA is a nonparametric method that compresses morphological variation into two classes using the anterior nasal spine (ANS), the inferior nasal aperture morphology (INA), the interorbital breadth (IOB), the nasal aperture width (NAW), the nasal bone structure (NBS), and the post-bregmatic depression (PBD).

The OSSA method is a simple device to maximize the between-group differences of two populations by compressing the original ordinal values of a trait (0, 1, 2, 3, 4) to a new binary score (0, 1). Optimization of the compressed trait score is achieved by ordering the original trait values in a manner that maximizes differences between groups. For each of the six traits used in the OSSA method, ordinal trait scores more common in American Blacks were optimized to a score of 0 and those more common in American Whites were optimized to a score of 1.

Table 2. Performance indicators for tests of OSSA method and likelihood ratio (LR) component.

Test	Sensitivity	Specificity	CCR	Error Rate	PPV	PVN
OSSA original (n= 280)	86.59	85.34	86.07	13.93	89.3	81.8
OSSA validation (n = 128)	87.76	89.87	89.06	10.94	84.31	92.21
ANS (single trait)	**44.9**	87.34	71.09	**28.91**	**68.75**	71.88
INA (single trait)	**67.35**	81.01	75.78	**24.22**	**68.75**	80
IOB (single trait)	81.63	78.48	79.69	**20.31**	70.18	87.32
NAW (single trait)	95.92	**31.65**	**56.25**	**43.75**	**46.53**	92.59
NBS (single trait)	77.55	82.28	80.47	19.53	73.08	85.53
PBD (single trait)	**16.33**	94.94	**64.84**	**35.16**	**66.67**	**64.66**
6 TRAIT (LR; n =104)	85.71	94.20	91.35	8.65	88.24	92.86
5 TRAIT (all possible combinations; n = 768)	73.13	89.24	83.07	16.93	80.83	84.26
5 TRAIT Combo1 (Missing PBD)	87.76	82.28	84.38	15.63	75.44	91.55
5 TRAIT Combo2 (Missing NBS)	71.43	91.14	83.59	16.41	83.33	83.72
5 TRAIT Combo3 (Missing NAW)	**59.18**	96.2	82.03	17.97	90.63	79.17
5 TRAIT Combo4 (Missing IOB)	**65.31**	88.61	79.69	**20.31**	78.05	80.46
5 TRAIT Combo5 (Missing INA)	75.51	88.61	83.59	16.41	80.43	85.37
5 TRAIT Combo6 (Missing ANS)	79.59	89.87	85.94	14.06	82.98	87.65
3 TRAIT (all selected combinations; n = 640)	70.20	86.58	80.31	19.69	76.44	82.41
3 TRAIT 1 (ANS__INA__NAW)	**57.14**	77.22	**69.53**	**30.47**	**60.87**	74.39
3 TRAIT 2 (ANS__IOB__NBS)	75.51	89.87	84.38	15.63	82.22	85.54
3 TRAIT 3 (INA__IOB__NBS)	83.67	89.87	87.50	12.50	83.67	89.87
3 TRAIT 4 (INA__NAW__PBD)	71.43	86.08	80.47	19.53	76.09	82.93
3 TRAIT 5 (IOB__NBS__PBD)	**65.31**	93.67	82.81	17.19	86.49	81.32

Note: Bold text if the performance indicator is less than 70% (with exception of Error Rate which is highlighted if >20%).

Once all traits have been transformed, the sum total of the OSSA scores is calculated. This summed score ranges from 0 to 6.

To employ the OSSA method, all six non-metric traits are scored using the original character states (original ordinal categories), and then compressed to the corresponding OSSA state (0,1). All six OSSA scores (0-6) are summed. Values of 4 or greater are classified as American White; values of 3 or less are classified as American Black.

When all six traits are not available only the likelihood ratios can be used. This is a simple heuristic device utilizing the frequency distribution of the individual traits scored using the original character states. The higher of the two ratios is considered to favor a group assignment. Once all available traits are scored, the evidence supports the majority for assignment of ancestry. Other considerations in interpretation should include the strength of the likelihood ratios (i.e., higher ratios are more definitive) and the number and strength of the traits making up the majority. Table 2 presents statistics for the OSSA and Likelihood Ratio tests.

The following, needed to apply the method, are found in the CIL:

- Appropriate data recording form.
- Scoring protocols.
- Tables annotating frequency data, according to ancestral grouping.

3.1.1.1.2 **Dentition:** The shape and size of teeth are highly heritable and correlate strongly with genetic variation in human populations. Teeth are genetically conservative and not subject to plastic changes later in life. Therefore, data from teeth yield useful information about an individual's ancestry.

3.1.1.1.2.1 **Dental Traits & Morphology:** The expression of certain dental traits and morphological characters may assist in assessing ancestry. Dental morphology is quasi-continuous; therefore, published breakpoints must be considered when assessing trait presence. For example, a score of '1' does not indicate the presence of incisor shoveling, as the score must be '3' or higher to be considered present (as determined by the breakpoints of Scott and Turner 1997).

Assessment of ancestry using dental morphology is based on known trait frequencies in various populations. Using a single dental trait for ancestry assessment should be done with caution, as the utility of single traits has not been found to be valuable in ancestry determinations (Edgar 2009). The following references may be consulted for trait frequencies and general dental information (Rhine 1990; Scott and Turner 1997; Turner 1990; Irish 1997; Hanihara 1967; Turner et al. 1991).

3.1.1.1.2.2 **Edgar (2005):** Edgar (2005) assesses ancestry (European American versus African American) utilizing non-metric dental traits. The method utilizes eight dental traits described by Scott and Turner (1997), also known as the "ASU (Arizona State University) system" (Turner et al. 1991).
Edgar (2013): Building on earlier research (Edgar 2005), Edgar (2013) uses additional dental morphological traits to distinguish European American, African American, and Hispanic American individuals.

As with the earlier method (Edgar 2005), the analyst needs the ASU dental plaques, scoring definitions according to the ASUDAS (Turner *et al.* 1991), and an appropriate scoring sheet to apply this method.

Once dental morphology is assessed, binary trait scores are placed into the appropriate discriminant function equation provided in Table 2 of the article. The selected equation (#1-9) depends on the number of observable traits available. This first equation places the individual into one of two categories: African American and European American (AA/EA) or New Mexico Hispanic and South Florida Hispanic (NMH/SFH).

If the individual falls into the latter category (NMH/SFH) analysis can end, and the individual is likely Hispanic. There is a further equation to differentiate between these two groups (provided in Table 4 of the article); however, it is not very accurate and its use is not recommended.

If the individual falls into the first category (AA/EA), binary trait scores should then be input into the appropriate equation in Table 3 of the article. This equation then differentiates the individual as either African American or European American. As part of these tables, each equation's success rate using the study sample and the test group is provided for the analyst's consideration.

The following, needed to apply the method, are found in the CIL:

- ASU dental casts, exhibiting the eight dental traits.
- Appropriate data recording form.
- Scoring protocols.
- Tables annotating frequency data and probabilities. for each trait state, according to ancestral grouping.

The tables offer two types of probability: Bayesian probabilities (BP) and logistic regression probabilities (RP). The RPs are preferred, but are not available for all comparisons. The analyst elects a threshold probability value (generally 0.85 or greater) and compares all possible combinations (two-, three-, and four-trait) followed by a tally of the number of comparisons that favor (i.e., are greater than or equal to the elected threshold) African American or European American. Edgar (2005) states that ancestry is assigned only when traits are consistently in agreement.

3.1.2 **Metric Assessment of Ancestry:** The following section outlines procedures for the metric estimation of ancestry. Regardless of the technique, success is largely dependent on the proper use of the following:

- **Models:** Ancestry estimation models are applicable to select groups and are identified in the primary references.
- **Landmarks:** Proper identification of appropriate landmarks is critical.
- **Bone Measurements:** Using the appropriate landmarks, measurements are obtained that enable metric ancestry assessment to be conducted. A basic premise of most metric methods is that the more discriminatory measurements taken, the greater the ability to discriminate between the reference populations.

3.1.2.1 **Cranial Metrics:** Measurements of the skull are routinely used in the assessment of ancestry as they have been shown to discriminate well between different populations. Metric analyses of the skull have several advantages in ancestry assessment: measurements tend to be less subjective than anthroposcopic observations, variation among groups can be maximized, and measurements can support overall visual assessments of the shape of the skull. However, there are some limitations to consider: landmarks must be understood and properly identified, remains must be relatively complete, and such analyses are generally restricted to individuals in their mid-teens or older.

The preferred tool for assessing ancestry with craniometric data is FORDISC 3.0 (Jantz and Ousley 2005) computer program. The bone measurements used in FORDISC 3.0 are taken as described in Moore-Jansen *et al.* (1994:63-71). The general operating procedures for FORDISC 3.0 are covered in the User's Guide for FORDISC 3.0 (Jantz and Ousley 2005).

Another tool for assessing ancestry (and sex) is (hu)MANid (Berg and Kenyhercz 2017). (hu)MANid is a web-based graphical user interface (GUI) that uses both metric and morphoscopic mandibular data. The bone measurements, morphoscopic scoring procedures, and general operating procedures for (hu)MANid are covered in the "About" section of the GUI. The GUI can be utilized via www.anthropologyapps.com or directly at https://anthropologyapps.shinyapps.io/humanid/.

3.1.2.1.1 **FORDISC:** The bone measurements used in FORDISC are taken as described in Moore-Jansen et al. (1994:63-71). The general operating procedures for FORDISC are covered in the User's Guide for FORDISC (Jantz & Ousley 2005).

3.1.2.1.1.1 **Analytical Process & Interpretation of Data:** Analysts should consider Figure 1 when utilizing FORDISC 3.0 during analysis (adapted from Ousley 2011) of a cranium when no other information on sex or likely ancestry is available:

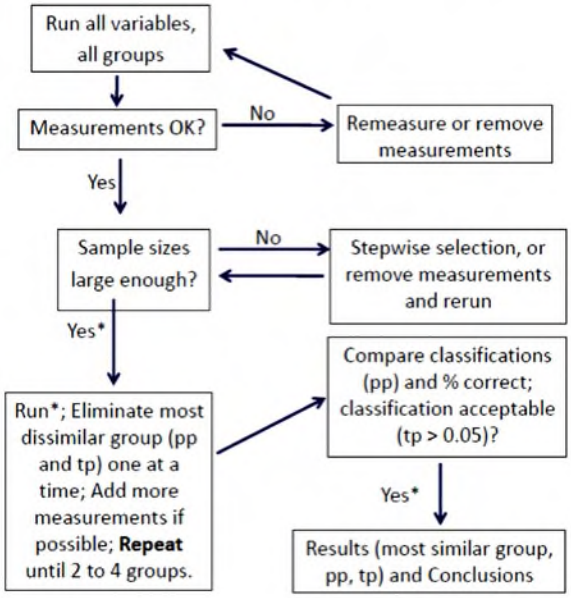


Figure 1. The analytical process in Fordisc 3 [adapted from Ousley 2011].

For any analysis, analysts should first select all available variables and all groups in order to verify measurements were taken correctly. If all measurements are accurate, next consider the sample sizes of each group. A general rule is $n > 4m$; in other words, each sample size should be greater than four times the number of measurements in your analysis.

As statistical analyses proceed, the most dissimilar group should be removed one at a time. It may be possible at this point to add additional measurements, depending on the sample sizes in the groups. Repeat analyses until only two to four groups remain. Be

sure that the typicality for each group is greater than 0.05. At this point, it is possible for results to be reported along with the analyst's conclusions.

However, note that after multiple iterations of running the discriminant analyses, there is no longer any control over or reasonable estimate of the error rates. The final result is simply the most probable answer looking only at craniometrics and under the assumption that the case specimen originates from one of the groups in the analysis.

When information external to the cranial measurements is available (e.g., robust sex determination based on hip morphology), this information should be used to narrow the scope of the discriminant analysis in terms of the groups included. Discriminant models work best when limited to as few groups as possible, and perform increasingly poorly as the number of groups is increased. This reality must be considered when conducting the FORDISC 3.0 analysis. The best practice is to utilize the best information available to develop the best discriminant models for the case at hand. The statistics should be kept as simple as possible.

3.1.2.1.1.2 **Data Sets, Statistical Models & Samples:** Ancestry assessment in FORDISC relies upon discriminant functions calculated from two reference data sets, the Forensic Data Bank (cranial and post-cranial measurements) or the worldwide craniometric data collected by W.W. Howells. The models are developed from the reference data using the measurements and reference data set chosen by the analyst.

The Howells data were collected to support research into population relationships using craniometrics, rather than for forensic applications. The intent was to systematically sample populations from geographic regions throughout the world. Sample sizes are equal by design and all measurements are available for the samples.

Note that the Howells groups are not directly representative of ancestry as understood in this SOP. Nor can close affinity to a Howells population be taken as evidence that the cranium originates in that population. As such, it is presumed that many other populations, systematically excluded due to their geographic proximity, would also exhibit close affinity to a given cranium. Results from analyses utilizing the Howells data should consider these factors.

Regarding the Forensic Data Bank, the analysts may also select from the available populations, but should be aware that not all measurements are available for every population included in the Forensic Data Bank. FORDISC drops measurements from the test rather than drop populations. It is generally the case that the more populations selected, the smaller the number of measurements that are included. Sample sizes are generally unaffected.

3.1.2.1.1.3 **Shape Analysis:** An important advancement starting with FORDISC 3.0 is the addition of the "shape function" option for discriminant analysis. This option permits partial removal of size from the craniometric data. The transformation provides a more refined representation of shape. It is generally the case that shape-only models perform more poorly than the traditional models (i.e. non-transformed data). Results from the traditional model and the shape-only model may contradict one another. For these reasons, the traditional model is favored, except where there is justification for using the shape-only model. An example of such a justification is when remains are believed to belong to a small male.

3.1.2.1.1.4 **Stepwise Measurement Selection:** Stepwise variable selection is a statistical method of reducing the variables in a model to only those that contribute most to the model's success. In discriminant analysis, stepwise selection is used to provide a smaller set of measurements that serve to separate the included groups. When the sample sizes are comparable among groups and large in comparison to the number of measurements, this procedure can help to simplify models. However, when these conditions are not met, stepwise selection will often lead to model over-fitting and very poor performance for at least some groups in the analysis. Because sample sizes are relatively small for some groups (and uneven among groups) in the FORDISC 3.0 reference data, there is seldom a good reason to utilize the stepwise selection procedure.

3.1.2.1.1.5 **Posterior & Typicality Probabilities:** The results of application of one of the discriminant models in FORDISC to a case specimen are expressed using the Bayesian posterior and non-Bayesian typicality probabilities. Posterior probabilities purportedly evaluate the probability of group membership under the assumption that the unknown belongs to one of the groups in the function. Thus the sum of the posterior probabilities equals 1.

Typicality probabilities make no such assumption, but rather measure closeness to the various group centroids in multivariate space (relative to the group variance). Since the groups are represented by limited samples, the typicality probabilities tend to be low. Further, they do not sum to one. Typicality

probabilities can be used to assess how likely an unknown is to belong to any particular group, given the craniometric data. They include the possibility that an unknown may belong to several or none of the groups in question (Jantz & Ousley 2005). When all typicality probabilities are low, erroneous measurements and other data entry mistakes should be assessed.

Both posterior and typicality probabilities must be interpreted in light of all available evidence. The most powerful application is when the analyst is confident that the case specimen belongs to one of very few groups, and all groups are represented in the reference data set. Here the posterior probability can be most clearly interpreted. Note, however, that FORDISC posterior probabilities assume equal prior probabilities, whether this assumption is reasonable or not. Since no meaningful prior probabilities are incorporated into the Bayesian calculation, the posterior probability cannot be interpreted as a reasonable probability that the cranium originated in a specific group (even if one accepts Bayesian probabilities in principle). It is more useful to view the posterior probability as more an "index of similarity" of the cranium to crania in the comparison population.

The typicality probability can also provide compelling evidence for population or ancestral affinity when one group has a markedly higher value than all others. The analysts should interpret results cautiously when multiple groups have very similar probability values.

Appropriate conservatism should be exercised when the candidates for an identification are known to have been of an unusual size (large or small) for his/her population, since size plays a significant role in the discriminant models.

3.1.2.1.1.6 **Model Performance:** Regarding measures of discriminant model performance, FORDISC provides cross-validated success/error rates as percentages. While this is the accepted means of measuring the performance of classification models, this measure does not directly report the reliability of the result of the application of the model in a specific case. It is possible to obtain a highly reliable result using a model with a high error rate, as well as an unreliable result using a model with a low error rate. This is due to the use of the posterior probability as the basis for interpretation.

When FORDISC reports an error rate, it is based on the use of the cut-off values of the discriminant scores, such that any amount above a cut-off value leads to the classification as a specific group, and any amount below leads to classification as another group. Error rates are high when the groups exhibit considerable overlap in the values of their scores.

Utilization of posterior and typicality probabilities directs one away from the draconian use of cutoff values and provides a measure of how similar the cranium (i.e., the case specimen) is to the various group centroids. To link the posterior probability of the case specimen (for example 0.90) to the measure of model performance in a meaningful way, the model error rate would have to be ascertained when classifying only individuals with a posterior probability of 0.90 or higher. Clearly, there would be few errors in this trial, though most specimens would remain unclassified.

While it is good practice to report model performance in FORDISC results, it should not be confused as to its bearing in a specific case. A better measure of the predictive power of a statistical model for an unknown individual is the "positive predictive value," which easily can be calculated from the information provided in the FORDISC output. The positive predictive value (PPV) is the probability that an unknown cranium classified into one group actually belongs to that group. To calculate the PPV, the number of correct classifications for that group is divided by that number plus the number of incorrect classifications for that group (i.e., PPV = true positives/true positives + false positives).

3.1.2.1.1.7 **Postcranial Metrics:** In instances where craniometric data are not available or cannot be appropriately applied, various postcranial metric methods are available (e.g., Jantz and Moore-Jansen 1988; Jantz and Ousley 2005; Westcott 2005); however, analysts should keep in mind the considerable amount of within-group variation in postcranial analyses.

3.1.2.1.1.8 **FORDISC 3.0 Program:** Postcranial measurements are taken in millimeters after the descriptions by Moore-Jansen *et al.* (1994). Discriminant function analyses of postcranial measurements can be derived in FORDISC 3.0 to generate probability statements about ancestral affinity; however, only White and Black male and female data are available for comparison. The distances from the group means and posterior and typicality probabilities are generated to assist in the interpretation of the postcranial measurements.

When using postcranial data to estimate ancestry, utilize measurements believed to relate to differences among human populations (size, length of upper leg versus lower leg, etc.). Examine model results with an eye toward understanding what morphological

features the discriminant model has responded to in separating the groups. Analysts should avoid a "shotgun" approach (including measurements not known to be relevant) which yields uninterpretable results. As discussed above with craniometrics, inclusion of too many measurements relative to the sample sizes will often lead to model over-fitting and unreliable results.

3.1.2.1.2 **hu(MAN)id (Berg and Kenyhercz, 2017):** To access (hu)MANid, go to https://www.anthropologyapps.com and click on the button that says "(hu)MANid." Alternatively, the analyst may go directly to the GUI at https://anthropologyapps.shinyapps.io/humanid/.

The application is used similarly to FORDISC 3.0. The analytical procedure outlined above for FORDISC 3.0 is also appropriate for how to use (hu)MANid. Prior to running an analysis, the user is encouraged to review the explicit "how to" instructions, morphoscopic character states, and metric definitions, etc., in the tabs at the top of the interface. This should ensure accurate data collection and accurate results.

This method uses mandibular measurements and morphoscopic data in order to classify mandibles into a sex category, ancestral population, or both. The application incorporates 11 metric variables and 6 morphoscopic variables. Fifteen populations are included in the reference data, and these can also be broken into regional groups/sexes, such as Pooled Males and Females (a sex only application), Northeast Asians, Southeast Asians, Pooled Hispanic, American Black, American White, etc. Alternatively, individual populations and sexes can be selected by the user for various analyses (but see general model presented above).

All mandibular measurements are taken in millimeters following the measurement descriptions in the About section of the GUI. The application can read decimal places (unlike FORDISC 3.0) and the analyst should use the measurement to the nearest tenth of a millimeter (e.g., 13.2 mm), whenever possible.

The scoring procedures for the morphoscopic variables are available in the (hu)MANid About section of the GUI. Both types of variables, metric and morphoscopic, can be used in the same analysis. Further, partial datasets (either metric, morphoscopic, or both) can be used in any analysis. The analyst may choose to use only one type of data or both.

(hu)MANid uses two types of discriminant function analysis: 1) linear (as is used exclusively in FORDISC 3.0) and 2) mixture. A Forward Wilks Stepwise procedure is also available for running in conjunction with either discriminant function.

Linear discriminant analysis (LDA) assumes that each group is mutually exclusive and normally distributed in their morphological expression. Mixture discriminant analysis (MDA), however, does not assume one normally distributed group, but that each group is actually a mixture of several normally distributed sub-groups. Thus, multiple group centroids are generated that allow for a more nuanced investigation into ancestral affinity. The distance from an individual to each of the centroids is considered in the final classification as opposed to using simply the closest centroid.

Both classification statistics has pros and cons. For example, MDA typically outperforms LDA on similar analyses using all variables by approximately 7-9% (cross-validated), but MDA has inherent bias when pooled sexes are used, leading to a much higher rate of misclassified females in the test samples (as compare to LDA). Additional discussion of MDA vs. LDA can be found in Kenyhercz and Berg (2017).

Once an analysis has been run, the following output is available: group classification, posterior probabilities, chi-square typicality probabilities, positive and negative predictive values, classification matrix, Euclidean distance to each centroid, classification plots, summary statistics by group, and the difference between each variable value to each group mean, as well as model summary analytics.

A concise version of the results is available in the "Print Report" tab for inclusion in case notes. After each analysis, the analyst should print the results, as (hu)MANid does not save individual analyses and over-writes the data.

Updates to (hu)MANid may include additional populations, samples, and analyses.

3.1.2.1.3 **Holliday & Falsetti (1999):** This method utilizes a discriminant function analysis comparing African-American, and European-American males and females based on seven postcranial measurements. The measurements are femoral A-P head diameter (FHAP), skeletal trunk height (STH), bi-iliac breadth (BIB), femoral bicondylar length (FL), humeral maximum length (HL), tibial maximum length (TL) and radius maximum length. This method incorporates measurements intended to reflect human variation based on differences in ecogeographical patterning.

3.1.2.1.4 **Stewart (1962):** Stewart (1962) provides a method for discriminating between White, Black, and Native American femora by analyzing the amount of anterior curvature and torsion. In such, the femur is leveled at the proximal end with the use of a wedge and four measurements are recorded: 1) the leveling points, 2) the point on the diaphysis exhibiting the greatest anterior curvature, 3) the highest point on the cervical tubercle, and 4) the highest point on the head. Stewart reported that Native Americans had the greatest amount of anterior curvature, while the American Black sample yielded the least amount of anterior curvature. In reference to American Whites, Stewart (1972) states that American Blacks were "more flattened antero-posteriorly in midshaft, and have less anterior twist (torsion) at the upper end" (Stewart 1979:232).

3.1.2.1.5 **Gilbert and Gill (1990):** Gilbert and Gill (1990) analyzed the subtrochanteric measurements of the proximal femur (anteroposterior diameter (APD) and the mediolateral diameter (MLD)) and provide a sectioning line that distinguishes Whites and Blacks versus Native Americans. Their original sectioning line correctly classified 61% of the Native American samples and 100% of the Black and White sample. In an attempt to better classify the Native American sample, Gilbert and Gill (1990) measured additional Native American and White femora and were able to correctly classify 78.33% of their Native American sample and 85% of their White sample.

3.1.2.1.6 **Wescott (2005):** Wescott (2005) also analyzed the shape of the proximal femur to determine if ancestry could be distinguished between Native American, Polynesian, American Black, American White, and Hispanic groups. The shape of the proximal femur is analyzed using the platymeric index (PI): subtrochanteric anteroposterior diameter (APD) divided by mediolateral diameter (MLD), multiplied by 100 (PI = APD/MLD * 100) (Wescott 2005:286). Measurements of the proximal femur are taken to the nearest millimeter based on those listed in Moore-Jansen *et al.* (1994).

Wescott provides the following PI sectioning points: platymeric <84.9; eurymeric 85 to 99.9; stenomeric >100. Although American Blacks, American Whites, and Hispanics were found to be significantly different from the Native American and Polynesian groups, Wescott cautions that each group displays considerable within-group variation making discrimination between populations difficult (Wescott 2005:288-289). Using only the PI, Wescott yielded a 75.1% correct classification rate for Native American males and a 75.4% correct classification rate for American Black/White males. Current data for East Asians is extremely limited, but suggest that this group is also platymeric (Tallman and Winburn (2011).

3.1.3 **Reporting:** The analyst indicates in the analytical notes and final report (see Annex A, (Forensic Anthropology Reports) the methods, models, exemplars, and significant observations used to make ancestry determinations. Supporting documentation (e.g., FORDISC printouts, (hu)MANid printouts) are also included with the analytical notes, as appropriate.

3.2 **Sex Determination:** Sex determination is performed by standard non-metric and/or metric assessment procedures that examine dimorphic characteristics of the pelvis, cranium, and postcranial skeleton.

Estimation of sex is typically based on two principles. The first is the generalization that males are larger (more robust) and thus display more prominent muscle attachments than females. The second is on the differences between selection-based sexually dimorphic features, usually the pelvis and skull.

When the pelvis and skull are missing or incomplete, postcranial remains, usually the humerus and the femur, may be used. In cases where other postcranial elements are used, the procedure used should be documented and referenced. Dimorphic characteristics and features are often relative, requiring the analyst to draw upon professional training and knowledge of human osteology. The key methods for sex determination are discussed below.

3.2.1 **Pelvis (Os Coxae or Innominates):** The bones of the pelvis are typically the best for the assessment of sex. Metric techniques (e.g., FORDISC) are available to determine sex in the pelvis. However, given that the remains from this region of the skeleton are often fragmentary and the landmarks in intact os coxae tend to be ill defined, non-metric determination of sex is typically used.

Non-metric sex-estimation is generally done by an initial assessment of the overall size and shape of the pelvis. Generally, the male pelvis is more robust with prominent muscle attachments. The obturator foramen is larger and more oval shaped in males, whereas in females it is smaller and more triangular. The pelvic basin in females is more spacious and less funnel-shaped than in males. The acetabulum is generally larger in males to accommodate a larger femoral head.

Several specific non-metric techniques are useful in determining sex in the pelvis. Different quasi-continuous scoring systems apply for each trait and are not statistically designed, weighted or adjusted to be uniform. Consequently, the scores of individual traits should never be averaged in an attempt to assign an overall relative value regarding sex. Rather, the analyst should examine all of the data and make a final decision as to sex based on training and experience with human osteology.

3.2.1.1 **Three Traits of Phenice:** Phenice (1969) describes three characteristic areas of the pubis and ischiopubic ramus that distinguish sex in 96% of cases. They are the 1) ventral arc, 2) the subpubic concavity, and 3) the medial aspect of the ischiopubic ramus. Figure 2 is a graphic illustration of these characteristics. Buikstra and Ubelaker (1994) devised a scoring system for these three traits.

- The ventral arc is a slightly elevated ridge of bone that takes a course across the ventral surface of the female pubis that is absent in males. The ventral arc on both sides is scored as:

  - Blank=Unobservable.
  - 1=Female.
  - 2=Ambiguous.
  - 3=Male.

- The subpubic concavity is a lateral curvature a short distance inferior to the symphysis of the female and rarely present in males. This is best observed from the dorsal surface of the bone. The subpubic concavity on both sides is scored as

  - Blank=Unobservable.
  - 1=Female.
  - 2=Ambiguous.
  - 3=Male.

- The medial aspect of the female ischio-pubic ramus presents a ridge or a narrow surface immediately below the symphyseal surface. In males the medial aspect of the ischio-pubic ramus is broad. The ischio-pubic ramus on both sides is scored as:

  - Blank=Unobservable.
  - 1=Female.
  - 2=Ambiguous.
  - 3=Male.

3.2.1.2 **Other Characteristics:** Other characteristics typically useful for assessing sex are the 1) sciatic notch, and 2) preauricular sulcus. Buikstra and Ubelaker (1994) have devised a scoring system for recording sex observations.

- The greater sciatic notch is scored with 1 representing the typical female morphology and 5 typically male with 2, 3, and 4 representing degrees of width in between, as illustrated in Figure 3. Walker (2005:387) provides empirical probabilities of being male or female for a given sciatic notch score. A score of 1 typically indicates a female, while a score of 3 or greater usually indicates a male. A score of 2 represents intermediate morphology, although a larger percentage of males than females exhibit this degree of expression. Walker (2005) also found that age-at-death and sciatic notch score are associated. Younger individuals are more likely to exhibit more feminine morphology; this effect is more pronounced in males. His sample was comprised of modern individuals of African and European ancestry and historic English individuals.

- A scoring system (Figure 4) was devised for the preauricular sulcus to reflect the amount and extent of variation, with:

  - 0 = absence of a preauricular sulcus.
  - 1 = preauricular sulcus is wide, typically exceeding 0.5 cm, and deep.
  - 2 = preauricular sulcus is wide, usually greater than 0.5 cm, but shallow.
  - 3 = the preauricular sulcus is well defined but narrow, less than 0.5 cm deep.
  - 4 = the preauricular sulcus is narrow (less than 0.5 cm), shallow, with a smooth walled depression.

3.2.2 **Skull:** After the pelvis, the skull is typically the next best indicator for sex.

3.2.2.1 **Non-Metric Analysis:** Non-metric traits useful for sex determination are listed in Table 3. Bass (2005) provides a graphic illustration of these characteristics.

The analyst assigns scores of 1, 2, 3, 4, or 5 for each of the following traits (after Buikstra and Ubelaker 1994:21): nuchal crest, mastoid process, supraorbital margin, glabella, mental eminence.

1 = little doubt that the morphology is female.
2 = probable female which means the morphology is more likely female than male.
3 = ambiguous sex which means the dimorphic features are ambiguous.
4 = probable male for the morphology is more likely to be male than female.
5 = little doubt that the morphology is male.

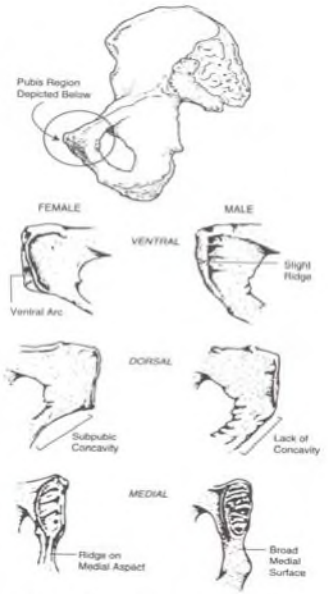


Figure 2: Sex Differences in the Sub-Pubic Region Using Phenice's Characteristics (Buikstra and Ubelaker 1994:17).

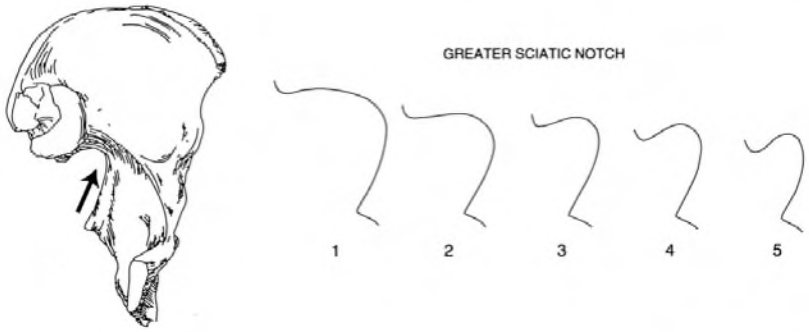


Figure 3: Scoring System for the Greater Sciatic Notch. 1 is typically female and 5 typically male (Buikstra and Ubelaker 1994:18).

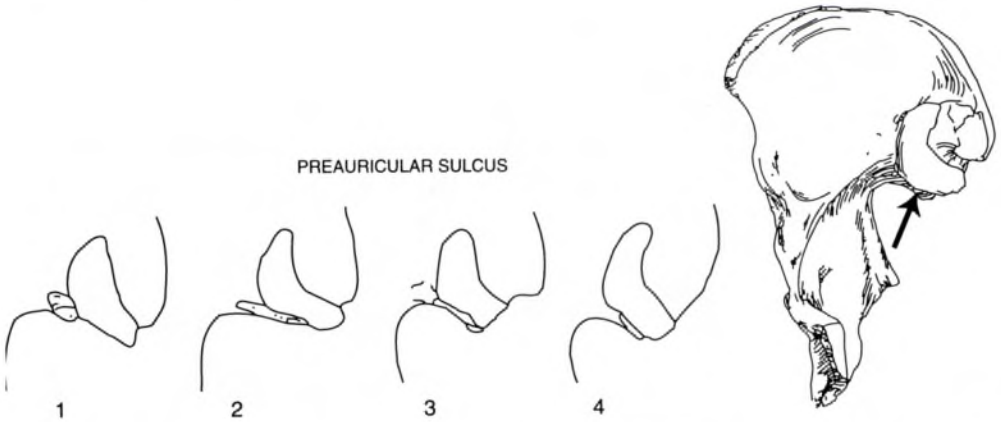


Figure 4: Scoring System for the Preauricular Sulcus. 1-4 shows the range of variation and 0 (not shown) represents its absence (Buikstra and Ubelaker 1994:19).

Table 3: Useful Dimorphic Non-Metric Cranial Traits.

Male	Female
Prominent supraorbital ridges	Smooth supraorbital ridges
Blunt upper margins of eye orbits	Sharp upper margins of eye orbits
Large palate and teeth	Small palate and teeth
Skull rugged with prominent muscle attachments, especially on the occipital bone	Skull overall small, gracile, smoother parietal and frontal bossing
Large mastoid process	Small mastoid process
Frontal sinuses large	Frontal sinuses small
Chin square	Chin rounded

Walker (2008:45) provides empirical probabilities of being male for a given score for each cranial trait based on a modern American/English sample and a Native American sample.

If multiple traits are scored, logistic discriminant equations can be used (Walker 2008:47). The sectioning point for these equations is 0; scores less than 0 are more likely to be male, and scores greater than 0 are more likely to be female. The probability of being male or female based on the value obtained should also be calculated.

The analyst should consult the percent of individuals correctly classified (Walker 2008:46-47) whether single traits or discriminant functions are employed.

3.2.2.2 **Metric Analysis**: Sex estimation from the skull uses FORDISC or (hu)MANid.

FORDISC sex estimates are based on the Forensic Data Bank at the University of Tennessee. As with ancestry, applicable models, measurements and landmarks are identified in the primary reference. The general operating procedures for FORDISC are covered in the Users Guide for FORDISC (Jantz & Ousley 2005).

The general operating procedures, applicable models, definitions, etc., for (hu)MANid are covered in the "About" section of the application (Berg and Kenyhercz 2017).

The same considerations for interpreting FORDISC for (hu)MANid (see below) results covered above apply for sex assessment, with one exception. When assessing ancestry, the cranium is compared to numerous populations represented in the reference data, with the possibility that the case specimen did not originate in any of the groups. In sex assessment, on the other hand, there are only two choices for the correct group. As such, only the posterior probability need be considered when interpreting the results. Note that very large, robust males can be atypical of the population (i.e., far from the reference sample centroid) and exhibit low typicality probabilities. Likewise, very small females can exhibit low typicality probabilities. Yet, in these cases there is no ambiguity in the correct interpretation. Reporting typicality probabilities are optional when conducting sex assessment using FORDISC.

Like FORDISC, (hu)MANid can be used for sex determination, using the same approach used in a cranial metric assessment, but using the mandible instead.

(hu)MANid has two distinct differences from FORDISC. First, a "sex only" option in the framework of the program, and second, morphoscopic data can be included with the metric data. While a "sex only" analysis is possible, this technique mixes all of the reference data, regardless of population and thus should be used with some caution. If the ancestry is known, a better approach is to use a population specific analysis (e.g. White Males and Females). If ancestry is suspected, a targeted approach could also be used (e.g. only using three ancestral groups, males and females).

Second, (hu)MANid provides MDA analysis operations.

As noted above, the posterior probabilities is the statistic necessary to report for a sex determination from (hu)MANid.

3.2.3 **Postcranial:** Postcranial indicators from the humerus, clavicle, and femur may be used when the pelvis and cranium cannot be used or, if the latter are present, used to supplement or strengthen sex estimates already made from these regions.

Table 4: Features of the Distal Humerus by Sex (Rogers 1999)

Trait	Male	Female
Trochlear constriction	Less constricted	More constricted
Trochlear asymmetry	Asymmetrical	Symmetrical
Olecranon fossa shape and depth*	Shallow triangle	Deep oval
Angle of the medial epicondyle	Flat/slightly raised	Marked angle

* Shape is more important than depth.

Table 5: Sex Based on the Vertical Diameter (in mm) of the Humeral Head.

Females	Indeterminate	Males
<43	44-46	>47

Table 6: Maximum Diameter (in mm) of the Femoral Head.

Female	Female?	Indeterminate	Male?	Male
<42.5	42.5-43.5	43.5-46.5	46.5-47.5	>47.5

Non-metric determinations, based on general size and robusticity, are made visually and most are relative, requiring the analyst to draw upon their professional training and knowledge of human osteology. Two additional non-metric techniques, by bone, are discussed below. Estimates, based on the Forensic Data Bank at the University of Tennessee, can be done using FORDISC. Additionally, univariate metric techniques used, by bone, are discussed below

3.2.3.1 **Humerus:** Rogers (1999) devised a system for scoring four dimorphic features of the distal humerus. Table 4 lists these features.
Note: In ambiguous cases (two traits scored as male, two traits scored as female), greater weight should be given to the olecranon fossa.

The greatest accuracy is achieved when all four features are present and scoreable. The analyst should consult the accuracy and frequency tables in Rogers 1999:59-60.

A common metric technique for the assessment of sex from the humerus is measuring the vertical diameter of the head of the humerus. Using a sliding caliper measure the direct distance between the most superior and inferior points on the border of the articular surface. Stewart (1979:100) reported on the range of the vertical diameter of the humeral head from dry bones for 50 males and 50 females from the Terry Collection (Table 5).

3.2.3.2 **Clavicle:** The presence or absence of a rhomboid fossa can be used to determine sex. A rhomboid fossa is defined as a pitted or depressed marking on the inferior sternal end of the clavicle (grade C or higher; see Figure 2 in Rogers *et al.* 2000:63-64); tubercles and impressions should be classified as fossa absent. Males are more likely than females to have rhomboid fossae. Posterior probabilities for presence/absence are given in Rogers *et al.* (2000:66).

3.2.3.3 **Femur:** A common metric technique to sex the femur is to measure the maximum diameter of the femoral head. Sliding calipers are used to measure head diameter from the opposing borders of the articular surface. Stewart (1979:120) reported the following values for sexing the femoral head using the dry bones of American Whites from the Terry Collection (Table 6).

3.2.4 **Multiple Postcranial Elements (FORDISC):** FORDISC can determine sex using a combination of various postcranial elements. The bone measurements used in FORDISC are taken as described in Moore-Jansen et al. (1994:63-71). The general operating procedures for FORDISC are covered in the User's Guide for FORDISC (Jantz & Ousley 2005).

3.2.5 **Other Techniques:** In instances where FORDISC may be ambiguous or the analyst may need additional results to strengthen sex estimates, various other metric methods using the cranium, humerus, femur and proximal tibia are available. Among these are Jantz and Moore-Jansen 1988 (multiple bones) and Holland 1991 (proximal tibia). Use of alternate methods should be documented in the analytical notes.

3.2.6 **Reporting:** The analytical notes and final report (see Annex A, Forensic Anthropology Reports) include the resulting calculations and any

significant observations leading to the determination of sex. Supporting documentation (e.g., FORDISC and (hu)MANid) printouts, and raw data are also included with the analytical notes, as appropriate.

3.3 **Age (Age-at-Death) Estimation:** Age estimation refers to the age-at-death of the unknown individual. Age-at-death determination is based on techniques using the jaws and/or teeth, innominate, sternal rib ends, epiphyseal growth caps, and maxillary sutures. Other age-estimation techniques may be required as determined by the type, condition, and amount of remains undergoing testing. These must be fully documented and referenced. In most methods an age estimate is derived from macroscopic observations.

Analysis of fetal remains relies on measurements of available skeletal elements. Neonatal, infant and child remains should rely primarily on dental development, when available. Secondary methods assessing skeletal maturation should also recorded to complement the dental-age estimate or in the absence of dental evidence. Adolescent remains should rely on dental maturation (primary) and skeletal maturation with an emphasis on epiphyseal union. Mature remains are assessed based on the available age indicators.

Experience is important when assessing multiple age indicators in adults, although statistical approaches can be useful as well. The final age estimate is a matter of expert judgment by synthesizing all available information. Factors considered are:

- Appropriateness of the reference data.
- Skill in using one method over another.
- Condition of the remains.
- Compatibility/incompatibility of statistical models.

The following procedures apply to the CIL:

3.3.1 **Dental Remains:** Dental remains (teeth and associated supporting jaw structures and dental prosthetic devices) can be age diagnostic. Age estimation procedures typically are confined to the process of dental eruption and dental calcification. For both procedures, the dental age and age interval are determined by the closest match between the reference standard and the observed development in the remains. The age, age interval, and standard used are cited in the report.

3.3.1.1 **Dental Development:** Tooth formation begins with the cusps and terminates in the closure of the root apices. In loose teeth the degree of dental calcification can be observed macroscopically, however, in most cases the jaw obscures the degree of dental calcification. In these cases, dental calcifications are assessed from dental radiographs. Dental radiographs are taken in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging) and SOP 3.5 (Forensic Odontology).

The third molars are the only teeth that are still developing in young adults and, as a result are those most relevant to routine CIL casework. They are compared to the standard dental calcification tables and figures of Mincer et al. (1993). Unfortunately there is a high amount of inter-individual and inter-population variability in third molar development (Harris 2007).

In general, maxillary third molars develop before mandibular ones, and African-Americans reach the same developmental stage approximately one year before European-Americans, with U.S. Hispanics in between (Lewis and Senn 2010).

In all populations, individuals who exhibit closed apices on their third molar roots (grade H) are most likely greater than 18 years of age; however, given the fact that H is the terminal grade, it is statistically invalid to provide a probability for this determination, and Stage H has been observed in individuals as young as 14 (Kasper et al. 2009). For grades prior to H, two separate interpretations can be given: What is the observed age distribution for individuals in that grade, and what is the probability that an individual in that grade was at least 18?

Mincer et al. (1993) provide a percentile distribution of ages of attainment of each grade in American whites, by sex. The range from the 10th through the 90th percentile encompasses 80% of their sample (e.g., for a mandibular third molar in grade G, 80% of males were between 15.87 and 20.79 years of age; there is a 56.0% probability of this individual being 18 years or older). Studies of American blacks (Blankenship et al. 2007) and Hispanics (Kasper et al. 2009) summarize their data in slightly different formats, but should be consulted for remains of known ancestry.

3.3.1.2 **Dental Eruption:** Eruption refers to the pattern and timing of gingival emergence of the teeth. In skeletal remains, gingival emergence can be inferred from occlusal and interproximal wear present on the teeth. Teeth are examined macro- and/or microscopically for evidence of occlusal wear and interproximal wear facets.

Dental remains, including isolated teeth and jaw fragments with and without articulating teeth, are

compared to a known standard eruption table (American Dental Association, W300 Chart, W368 Plaque, *Development of Human Dentition*).

3.3.2 **Skeletal Remains:** Various areas from the skeleton are age diagnostic. These areas are characterized by the surfaces of non-movable joints that systematically change with age. General procedures include:

- In all methods, the stage of development can be observed macroscopically.
- Normally, a clean, undamaged, and relatively complete surface is compared to known exemplars.
- The selection of the applicable standard is dependent upon the sex and the date of death of the individual being aged.
- The estimated age is determined by the closest match between the published reference and the pattern visible on the remains.

3.3.2.1 **Innominates:** Age-estimation procedures in the innominates utilize the pubic symphyses and the auricular surfaces.

3.3.2.1.1 **Pubic Symphysis:** This refers to the symphyseal surface of the pubic bone. Three-dimensional casts and graphic exemplars represent three models. Graphic representations may be used when field exigencies preclude the use of casts. The three models include:

- **McKern-Stewart (1957):** For American males who died prior to (ca.) 1960, the McKern-Stewart cast set is most applicable. The McKern-Stewart system is a 3-component system that requires that the dorsal and ventral demifaces and the rim be scored separately (each component having a 0-5 stage of development). Note: A score of 0 does not imply absence; rather it denotes no morphological changes to warrant a score of 1. The combined component score determines the estimated age.
- **"Suchey-Brooks" (Male):** For American males who died after (ca.) 1960 and all non-American males regardless of when they died, the Suchey-Brooks plastic cast set for males is most applicable. The Suchey-Brooks system (Brooks and Suchey 1990) is a 6-phase system (I-VI) that utilizes the entire symphyseal surface as one component. Two casts, exemplifying early and advanced development, represent each age phase. In cases where only a partial symphyseal face is present, the analyst uses professional judgment as to whether or not a reliable age estimate can be made. The analytical notes indicate that the symphyseal surface was not intact and any effect on the age estimate.
- **"Suchey-Brooks" (Female):** For females regardless of their date of death, the Suchey-Brooks cast set (Brooks and Suchey 1990) for females is most applicable. This system is used the same as the male technique described above.

When a male pubic symphysis is well-preserved and exhibits young morphology (i.e., McKern and Stewart combined component score of under 10), McKern & Stewart's (1957) age ranges are generally more accurate and precise than those provided by either Katz and Suchey (1986) or Samworth and Gowland (2007). For individuals with older-appearing pubic symphyses, age estimates based on McKern and Stewart may be skewed too young by the age distribution of their sample, which included only seven men older than 39.

3.3.2.1.2 **Auricular Surface:** The auricular surface corresponds to the surface of the sacro-iliac joint on the ilium. Auricular surfaces can be evaluated for age-at-death using the methods of Buckberry and Chamberlain (2002). This updated technique is based on Lovejoy et al. (1985), however it uses a component scoring system. It requires that three areas of the auricular surface and adjoining bone (i.e., apex, superior and inferior demifaces) be assessed for age related changes. These changes consist of transverse organization (billowing and striation), granularity/density, and porosity. The resulting age estimates are keyed to the sum of the component scores (the composite score). The analytical notes include observations that influenced the age assessment (e.g., component and composite scores, and resulting auricular surface stage).

Lovejoy et al. (1985) is the preferred method, particularly for younger individuals and/or if the Buckberry and Chamberlain method is inappropriate (e.g., only partial auricular surfaces are present). When the Lovejoy et al. (1985) system is used, the age intervals described by Osborne et al. (2004) can be used.

3.3.2.1.3 **Combining Pubic Symphysis and Auricular Surface:** Samworth and Gowland (2007) provide 90% prediction intervals for each combination of pubic symphysis (scored following the Suchey-Brooks method) and auricular surface (scored following the Lovejoy method) that they observed in a combined sample of 18th-century English and 20th-century Portuguese. These prediction intervals have been found to be accurate for 20th-century Americans as well (Passalacqua 2010). When both scores can be observed on the same individual, a combined age estimate may be

produced in this manner. Such a combined age estimate may be more precise than the pubic symphysis alone, particularly for individuals whose pubic symphyses are in phases 3-6.

3.3.2.2 **Ribs:** The Iscan et al. (1984, 1985) plastic cast sets for white females and males are employed, regardless of the ancestral affinity. This system is a 9-phase system (0-8) that requires that the sternal end of the 4th rib be compared to three-dimensional casts of known age exemplars. For each sex, Phase 0 is represented by one cast representing typical morphology at that phase, Phases 1-4 are represented by two casts for each phase exemplifying early and advanced development at that age, and Phases 5-8 are represented by three casts for each phase exemplifying early, average, and advanced development at each phase.

The published age-estimation procedures were developed for the 4th rib. The applicability to other ribs has not been clearly established. When the sequential position of the rib cannot be accurately determined, or is determined to be other than the 4th rib, an appropriate caveat should accompany the reported findings. Yoder et al. (2001) may be of assistance in this regard.

3.3.2.3 **Maxillary Sutures:** The sutures of the hard palate fuse in an age-related sequence, and age estimation using the maxillary sutures follows the Mann *et al.* (1991) method.

This method requires macroscopic examination of the sutures of the palate: incisive (IN), posterior median palatine (PMP), transverse palatine (TP), including the extension of this suture in the greater palatine foramen (GPF), and the anterior median palatine (AMP).

The general pattern of obliteration is first the IN suture, followed by the PMP and TP sutures, and finally the AMP suture. For the TP suture, obliteration first occurs within the GPF, followed by the lateral portion of the suture, and lastly the medial portion of the suture.

Based on visual observation of the sutures, an individual is assigned an age using Figure 2 in Mann *et al.* 1991:783; the age estimate is based on the suture displaying the oldest age.

It is important to look for any sign of obliteration (i.e., bridging) not just complete obliteration of the entire suture. Additionally, adequate lighting and a hand magnifier should be used, especially for examination of the TP suture within the GPF.

If the pattern of obliteration for an individual is observed to deviate from the general pattern, then Tables 1 (earliest partial obliteration observed by suture) and 2 (earliest complete obliteration observed by suture) may be supplemented for Figure 2 in Mann *et al.* 1991:783. The use of the ages in Figure 2 was found to be 87.3% accurate for identified individuals from the DPAA-CIL (Brown 2010).

3.3.2.4 **Growth & Development:** Early growth and development (modeling) of cranial and postcranial elements is well documented and occurs in a chronologically predictable fashion. In the final stages of development epiphyses fuse to diaphyses at predictable rates and are an accurate means of estimating skeletal age in individuals under the age of 25 years. In all bones the stage of development can be observed macroscopically. Techniques include:

- **Fazekas & Kósa (1978)** provides metric data for fetal remains. Various measurements (typically lengths and breadths) are described and can be utilized to place the unknown specimen in a fetal age category (e.g. 2.5 lunar months). Schaefer Black and Scheuer (2009) provide useful summary tables of the Fazekas & Kósa data and provide ranges for the various measurements at various lunar stages (presented as prenatal weeks). These ranges should be used to determine suitable age ranges and are preferably reported in prenatal weeks.
- **McKern-Stewart:** For males over the age of 17 years, the McKern-Stewart (1957) descriptive standards and accompanying graphic representations are appropriate. The McKern-Stewart standards require the epiphyseal growth caps to be examined for the relative stage of fusion (e.g., unfused, beginning fusion, largely fused, fused, fused with no remnant fusion line). The stage of epiphyseal fusion can then be compared to the published standards. McKern and Stewart present only raw data in tabular form. It should be noted that the reference sample consists of military males, which means that individuals below 17 years have been systematically excluded. All applicable growth centers should be used to develop a "composite" age estimate. The resulting age estimate typically is terminal (e.g., <18, <20) or presented in a narrow interval (e.g., 16-20, 17-19). Caution should be exercised when assigning the minimum end of an age interval.
- **Bass:** For females and males not covered by the McKern-Stewart standards (e.g., males less than 17 years of age) descriptive standards and accompanying graphic representations published in Bass (2005) are appropriate. These standards require the epiphyseal growth caps to be examined for the relative stage of fusion described above.

The composite age estimate is reported as in McKern-Stewart, above.

- **Scheuer & Black:** Scheuer and Black (2000) provide a comprehensive guide to aging skeletons of juveniles. This reference should be consulted for individuals believed to be 17 or younger.

3.3.3 **Reporting:** In addition to that specified in each above method, the analytical notes and final report generally include for each method, as applicable:

- The mean age estimate.
- The standard used (e.g., McKern and Stewart 1957).
- When applicable, the phase number (e.g., Suchey-Brooks Phase I). In the case of the McKern-Stewart component system, the individual component scores and the total component score are annotated.
- The appropriate interval of measurement error.

3.4 **Stature Estimation:** Stature estimation procedures are conceptually divided into two classes, 1) those designed to provide point estimates (a stature) or estimation of the most probable stature of the unknown individual, and 2) those that perform formal comparisons between bone measurements from unidentified remains and statures of candidates for the identification. There are a number of ancillary issues that impact on the accuracy of these procedures. In short, stature estimation requires the analyst to consider:

- The "type" of stature targeted by the test.
- The appropriateness of the reference data used to generate statistical models.
- The age of the person whose stature is being compared.
- The most desirable estimation model to use in the comparison.
- The proper statistical treatment of the reference data during its comparison with an unidentified specimen.

Deviation from this guidance is permissible when justified by a firm scientific argument and must be documented in the analytical notes and final report.

3.4.1 **Types of Stature:** Multiple "types" of stature are recognized by forensic anthropologists and vary according to how they were obtained. Most cases analyzed at the CIL involve military personnel and thus involve comparisons to the measured statures from personnel records. Non-military cases typically require comparison to forensic (self reported) statures, which may be biased.

3.4.2 **Estimation Models:** Estimation models used in case testing should be derived from data from an appropriate reference population. There is never a reason to estimate stature with more than one estimation model and then average the results. For example, a person of mixed African and European ancestry would not necessarily have a stature midway between the two point estimates for these groups. Stature in this case would ideally be derived from a model based on a reference population of similarly admixed individuals. However, since ideal models are typically unavailable, the analysts must select an existing model and be explicit about which population the model was based.

3.4.3 **New Models:** There are occasions when it is necessary to calculate new estimation models. New models should be indicated in the notes and the report. The source and pertinent demographic data from the reference sample, including population affinity (ancestry) and sex, should be annotated in the analytical notes and report. Reported statistics should include the correlation coefficient, the significance level of the model, and the prediction interval surrounding the point estimate for the case specimen. The same guidelines for choosing an estimation model (see below) should be employed in evaluating the appropriateness of a new model.

3.4.4 **Measurements & Statistics:** Estimation models used at the CIL use bone measurements that are clearly defined and easy to replicate. Some of these bone measurements are better for estimating stature than others (i.e., they correlate better to stature). The closeness of fit of the estimation model is often measured by the *standard error*. The smaller the standard error value is for a given model, the more precise the fit of the model. When multiple bones or measurements are available, select the estimation model with the highest correlation and the lowest standard error, all other things being equal.

Additionally, the forensic utility of stature estimates derived from bone measurements more than three standard deviations from the reference sample mean is questionable. In such instances the case specimen is either larger or smaller than 99% of the reference sample (Konigsberg et al. 1998 discuss the consequences of extrapolation in stature estimation). Occurrences of this problem should be noted in the analytical notes and report.

3.4.5 **Calculating Stature:** The estimation model is given as a formula. The resulting figure is the point estimate. Calculations are done on an electronic calculator or in FORDISC. Provide a prediction interval (see below) that reflects the variation associated with the point estimate. Typically, a 95%

prediction interval is used. The proper prediction interval is usually provided with the model used. FORDISC automatically calculates an acceptable approximation (2 standard errors) of the prediction interval to accompany point estimates.

3.4.6 **Maximum Stature (Age Corrections):**
Stature varies during life. Because the long bones do not lose length once their maximum size is reached, most estimation models predict maximum stature. The maximum stature refers to the greatest stature attained during an individual's life, and is typically a person's stature when they are in their mid-twenties. Reference data collected from military personnel are maximum statures.
Up to this period, stature increases while afterwards it declines, usually from vertebral column changes.

Where a lapse in time exists between an individual attaining maximum stature and their recorded stature at death, adjustments may have to be made to reconcile differences in the two statures. Such adjustments should be described in the analytical notes and report.

An adjustment formula for converting a recorded stature of young people to the maximum stature is provided by Trotter and Gleser (1958:108) along with an adjustment table (Table 7). To adjust a stature of record, find the age at which the stature of record was taken in the first row, and the time interval until death in the first column. The value (in inches) taken from this position should be added to the stature of record.

TABLE 7. Average Increase in Stature (in Inches) Between 17 and 22 Years of Age.

INTERVAL	AGE							
(YEARS)	**17-17.5**	**17.5-18**	**18-18.5**	**18.5-19**	**19-19.5**	**19.5-20**	**20-20.5**	**20.5-21**
0.5	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.0
1	0.7	0.5	0.3	0.2	0.2	0.1	0.1	0.1
1.5	0.9	0.6	0.4	0.3	0.2	0.2	0.1	0.1
2	1.0	0.7	0.5	0.4	0.3	0.2	0.1	
2.5	1.1	0.8	0.6	0.4	0.3	0.2		
3	1.2	0.9	0.6	0.4	0.3			
3.5	1.3	0.9	0.6	0.4				
4	1.3	0.9	0.6					
4.5	1.3	0.9						
5	1.3							

TABLE 8. Loss of Stature (in Inches) Due to Aging.

AGE	MALE	FEMALE	AGE	MALE	FEMALE
46	0.1	0	**66**	0.7	0.6
47	0.1	0	**67**	0.7	0.6
48	0.1	0.0	**68**	0.8	0.7
49	0.1	0.0	**69**	0.8	0.7
50	0.2	0.0	**70**	0.9	0.8
51	0.2	0.0	**71**	0.9	0.9
52	0.2	0.0	**72**	1.0	0.9
53	0.2	0.0	**73**	1.0	1.0
54	0.3	0.1	**74**	1.1	1.1
55	0.3	0.1	**75**	1.1	1.1
56	0.3	0.1	**76**	1.2	1.2
57	0.4	0.2	**77**	1.2	1.3
58	0.4	0.2	**78**	1.3	1.4
59	0.4	0.2	**79**	1.3	1.4
60	0.5	0.3	**80**	1.4	1.5
61	0.5	0.3	**81**	1.5	1.6
62	0.5	0.4	**82**	1.5	1.7
63	0.6	0.4	**83**	1.6	1.8
64	0.6	0.5	**84**	1.6	1.8
65	0.6	0.5	**85**	1.7	1.9

TABLE 9. Conversions From Centimeters to Feet and Inches for Some Common Statures.

cm	inches	feet, inches	cm	inches	feet, inches
165	65	5 ft 5 in	180	71	5 ft 11 in
166	65	"	181	71	"
167	66	5 ft 6 in	182	72	6 ft
168	66	"	183	72	"
169	67	5 ft 7 in	184	72	"
170	67	"	185	73	6 ft 1 in
171	67	"	186	73	"
172	68	5 ft 8 in	187	74	6 ft 2 in
173	68	"	188	74	"
174	69	5 ft 9 in	189	74	"
175	69	"	190	75	6 ft 3 in
176	69	"	191	75	"
177	70	5 ft 10 in	192	76	6 ft 4 in
178	70	"	193	76	"
179	70	"	194	76	"

Note: 1 inch = 2.54 cm

Humans begin to lose height past the age of forty (Galloway 1988; Giles 1991). Thus, stature recorded for an older person requires adjustment before it can be compared to a maximum stature predicted by an estimation model. Giles (1991:900) offers an adjustment table (Table 8) for individuals over the age of 45 years. The values (inches) given for a specific age (at which stature of record was taken) and sex should be subtracted from the maximum stature to obtain the age-adjusted stature point estimate or added to the stature of record.

3.4.7 **Procedures for Estimating Stature:** Stature estimation procedures are presented below according to their primary reference. Because the CIL typically compares results to statures recorded in inches, the conversion from millimeters to inches is added. The following general procedures apply unless otherwise indicated:

- All measurements are to be taken in millimeters.
- The simple linear regression formulas (estimation models), based on one measurement only, are given in Annex B (Stature Formulas) of this SOP and are adjusted to work with bone measurements in millimeters. Point estimates (stature) are obtained by entering the bone measurement into the appropriate formula (see Annex B) and calculating the result.
- The formulas for derivation of the 95% prediction interval are provided in Annex B for each of the estimation models. The 95% prediction interval is obtained by entering the bone measurement into the appropriate formula (estimation model) and calculating the result. (Note: $\sqrt{\ }$ [ ] instructs you to take the square root of the expression in the brackets.).
- Models that are based on small bone segments usually have large prediction intervals.

3.4.8 **Reporting:** Statures are reported in inches in the analytical notes and in the final reports. The reason for using inches rather than centimeters, the preferred unit in anthropological studies is that military and civilian records in the United States typically record stature in inches. Individuals typically self-report their stature in feet and inches. Table 9 can be consulted for easy conversions. The analytical notes and final report include the bone measurement(s), the estimation model used (can simply be cited in report), the point estimate, the prediction interval, and the results of any statistical hypothesis tests when these items are used in the testing. Results of a statistical hypothesis test include the model statistics (reference sample, sample size, correlation coefficient, significance level), statement of the null hypothesis, and the result (rejection or acceptance at the 5% level). Hypothesis tests are typically reported in the FAR addendum. The devices used to do the calculations (calculator, FORDISC) should also be listed. Supporting documentation (e.g., FORDISC printouts) and raw data should be included with the analytical notes, as appropriate.

3.5 **Characteristics of Individuation:** Whereas the previous components of the biological profile are present in every human, and thus derived from population studies, characteristics of individuation as

the term suggests, are unique to the individual. Characteristics of individuation include:

- Ante- and perimortem trauma.
- Pathological conditions.
- Anomalies.
- Indicators of stress and strain.

Such traits found within skeletal and dental remains have a great potential to directly contribute to circumstantial or even positive identification of the deceased. Recognition of these traits, and thus their usefulness in the identification process, is contingent on the overall completeness and preservation of the evidence.

Even when recognized, two criteria must be met to make a trait potentially useful for identification purposes. First is its relative rarity. The more uncommon the trait the more potential it may have in contributing to identification. Unfortunately, the frequency of different traits of individuation is typically not adequately documented in the clinical literature.

Second is the relative likelihood of a trait being recognized *in vivo* and subsequently documented. Uncommon traits in a skeleton without a corroborating record are merely points of academic interest. Overall completeness and preservation of the evidence impacts on the recognition of individual traits and thus their usefulness in the identification process.

Since the subject of individuation is diverse, a comprehensive and specific discussion of methods and literature is beyond the scope of this SOP. Rather, the analyst working within this area is expected to access the relevant literature, much of it clinically based, in accordance with the observations at hand. The following section is designed to provide analysts with broad guidance on the process for recognizing, documenting, and using traits of individuation in the identification process. It is a synthesis of material presented in Aufderheide and Rodriguez Martin (1998), Byers (2002), Di Maio (1999), Galloway (1999), Hauser and De Stefano 1989, Lovell 2000, Mann and Hunt (2005) Ortner and Putschar (1981), and Resnick and Niwayama (1988), which provide generalized and/or in-depth discussions.

3.5.1 **Traits of Individuation**: Many classifications exist for aberrant and pathological conditions in human remains. Since the CIL works largely with individual identifications and rarely at the population level, the formal classification of pathological and similar conditions is of little value from a procedural standpoint. As such, the CIL recognizes the following broad categories of individuating characteristics:

3.5.1.1 **Anomalies:** Anomalies are unusual conditions that exist in the skeleton and dentition that are not routinely observed and are usually congenital or epigenetic in origin. Examples include:

- Accessory bones (e.g., wormian bones, *os japonicum*).
- Bipartite bones (e.g., bipartite patella).
- Sternal, septal, and other apertures.
- Bifid and/or supernumerary ribs.
- Vertebral shifts and other axial anomalies.
- Prominent features (e.g., everted, bilobed chin, large nose).
- Cranial asymmetry or deformation.
- Premature closure of cranial sutures (note: isolated localized closure may be traumatic in origin).
- Premature ossification of cartilage.
- Supernumerary teeth, extra roots, fused teeth, dental agenesis, etc.
- Polydactly.

Anomalies provide good circumstantial evidence toward identification provided clinical literature can demonstrate how "anomalous" they are. Generally, the rarer a trait, the more value it has toward identification.

3.5.1.2 **Stress & Strain:** Stresses and strain on an area of the skeleton over time cause the skeleton to adapt to better withstand these forces. The most common indicators of these types of changes are handedness and occupational markers.

3.5.1.2.1 **Handedness:** Since the majority of humans are right handed, handedness is usually not an important issue in identification. However, if testing indicates the individual was potentially left handed, this finding may become a significant piece of circumstantial evidence. Handedness is usually evaluated by examination of the differential wear on the shoulder girdle. Krogman and İşcan (1986) provide a good generalized discussion on the methods for determining handedness.

3.5.1.2.2 **Occupational Markers:** Repetitive activity over time (from occupational or recreational activity) may leave marks on the skeleton in the form of over developed tubercles, crests processes, and fossae, bowing or other changes in the diaphyses, facets, degenerative changes, or lesions. Often, in paired bones, asymmetries in robusticity, length, and density may be indicative of such activity.

Exaggerated signs of handedness (right or left) may in themselves be an occupational marker. Over exposure to some chemicals may leave marks on bone (e.g., spurring at the entheses [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. Capasso et al. (1999) is a definitive guide for the identification and understanding of the formation processes of occupational markers.

3.5.1.3 **Trauma:** Trauma is injury or disruption of living tissue by an outside force. Accordingly, trauma can be further defined as antemortem (prior to death) or perimortem (around the time of death). The temporal delineation between the two types may not always be clear since the healing process takes time to activate. However, any signs of healing categorically exclude observed trauma from being perimortem.

Postmortem insults to bone are not considered "trauma" but taphonomic events that mimic trauma (i.e., pseudopathology) and, as such, are not addressed in this SOP. Prosthetic devices suggesting or accompanying trauma in an individual are handled as material evidence in accordance with DPAA Laboratory Manual, SOP 3.6 (Material Evidence Analysis).

3.5.1.3.1 **Antemortem Trauma:** Most antemortem traumas observed at the CIL are healed fractures, although other traumatic events such as old dislocations, ossified hematomas, etc. may occasionally be observed.

Trauma in the skeleton, especially if suffered years prior to death, may not be readily discernible. Often it is difficult to determine if a particular trait (e.g., an irregular contour in a clavicle) is traumatic in origin or the result of natural variation.

Degenerative changes in the skeleton, isolated at a single focus and/or inconsistent with the age-at-death, may be traumatic in origin. In such cases radiographs taken of the suspect areas may assist in making determinations (see below).

3.5.1.3.2 **Perimortem Trauma:** Perimortem trauma occurs near the time of death. Consequently, healing should not be discernible. While it may not be unique to an individual, perimortem trauma may help reveal the context and circumstances of loss, and cause and manner of death.

The accurate interpretation of perimortem trauma is especially critical in cases being investigated by medicolegal authorities and may support or refute eyewitness testimony regarding the death of an individual.

Understanding the nature of force and its effects on bone is critical to understanding the dynamics of perimortem trauma. Byers (2002) and Galloway (1999) provide generalized discussions on this topic. Perimortem trauma consists of a number of broad types that are recognizable in the skeleton:

3.5.1.3.2.1 **Blunt Force:** Blunt force trauma results when force is delivered over a wide area of bone. Typical blunt force trauma may result from beatings, ground vehicle and pedestrian accidents, and falls onto a hard surface. Regarding beatings, blunt force trauma is commonly found on the arms (defensive injuries) and head but can occur any place on the body, especially if the person was prone or supine during infliction. The number of blows counted should be considered a minimum since not all may leave marks on the skeleton.

Analysts document blunt force trauma as thoroughly as possible. The following protocol supplements the above differential diagnosis process:

- Identify the location of all defects and injuries.
- Describe the size and shape of all defects and injuries.
- Assess coup versus counter coup injuries, if possible.
- Estimate the minimum number and sequence of blows, if possible.
- Identify the direction of force.
- Identify the type, size, shape, weight, etc. of the instrument, if possible.
- Make other determinations (e.g., person standing or horizontal when injured), if possible.

3.5.1.3.2.2 **Deceleration (Impact) Trauma:** Deceleration injuries, caused by the near instantaneous application of extensive force to the body (e.g., air crash or explosion), are typical in military conflicts and are commonly observed at the CIL. The nature of these injuries bears a direct relationship to the relative velocity of the individual, the type of vehicle they were traveling in and whether or not there was a subsequent explosion or fire.

Trauma from jet aircraft crashes results in extensive fragmentation of the skeleton into minute fragments, usually about 1-2 centimeters or less across. The fragmentation is caused by dissipation of the aircraft and aircrew's potential energy, and the subsequent explosion caused by the highly volatile jet-fuel and any munitions on board. The fragments are usually small enough to make their re-association to a

particular area of the skeleton difficult. Some larger elements (e.g., femoral heads, diaphyseal segments, patellae, tarsals) may remain intact.

Trauma from propeller driven aircraft or helicopter crashes result in less fragmentation. This trauma is characterized by fractures resulting from the application of unusual, mainly torsional and compression, forces to the body caused by rapid deceleration and a chaotic combination of deforming aircraft parts, safety fixation devices and the postures of aircrew conscious of imminent crash. These combine to produce a characteristic pattern of fracturing:

- Fracture edges that are beveled, jagged and irregular.
- Fractures displaying hinging (especially the ribs).
- Spiral fracturing of the femoral and humeral proximal diaphyses.
- Fractures of the metatarsals separating heads from shafts (especially MT2-5) and shearing of the calcaneal tuberosity and talar head.
- Comminuted fractures of the distal humerus and proximal radius and ulna.
- Fractures of the clavicle and acromion.
- Spiral fractures to the shafts of the forearm and lower leg bones.
- Crushing injuries to the skull, thorax and pelvis.
- Compression injuries to the vertebral column and feet.
- Telescopic fractures of the diaphyses.
- Ring fractures around the atlanto-occipital area.

Because of the widely variable causes and origins of deceleration or impact trauma, declarations of such in the FAR should take a conservative approach. Consequently, when needing to describe trauma believed to be attributable to an aircraft crash, the following caveat, or similar appropriate wording, should be used:

"…possible perimortem trauma consistent with, but not exclusive to, a rapid deceleration event."

3.5.1.3.2.3 **Sharp Force:** Sharp force trauma results when force is applied over a more limited area, i.e., a fine narrow linear section or point. Broad categories of instruments are usually determinable from the marks produced. Vertically oriented force, usually from axes, cleavers and ice picks, results in chop marks or puncturing. More horizontally applied force, from knives and saws, produces cut or saw marks depending on the nature of the instrument.

Typical locations of sharp force trauma in the skeleton are the thorax, pelvis (from up-thrusts into the groin), and arms, hands, and fingers (defensive wounds). Slashing wounds to the throat may leave cut marks on the cervical vertebrae, hyoid, and the gonial area and posterior ramus of the mandible. Perimortem mutilation trauma may be present in all areas of the skeleton.

The protocol for documenting sharp force trauma, supplementing the above differential diagnosis process, is as follows:

- Describe the defects or wounds, specifically:
  - **Cleft (chop mark)**: a V shaped depression or notch in the bone caused by chopping, usually accompanied by bone chips and debitage (i.e., "wastage").
  - **Incisions (cut or saw marks):** appear as a cut, caused by drawing a blade or other long cutting surface across a bone surface or edge.
  - **Puncture:** indentations caused by pointed instruments such as knife points and ice picks.
- Determine the direction or orientation of the force.
- Determine the number and sequence of wounds, if possible (i.e., some marks intersect or overlap others that may suggest a sequence). This may be difficult for instruments other than axes and heavy cleavers.
- Estimate the type and size of the instrument (e.g., ax, serrated knife, ice-pick), if possible.

3.5.1.3.2.4 **Projectiles (Gunshot Wounds):** CIL analysts frequently encounter projectile wounds, most often from gunshots. Most are observed or recognized in the skull but such trauma may occur any place in the skeleton. Shrapnel from explosive devices and resulting secondary projectiles may cause trauma indistinguishable from gunshot wounds. A systematic method for analyzing gunshot wounds, supplementing the above differential diagnosis process, appears below:

- Describe the defect or wound (e.g., location, size, shape, beveling, keyholing).
- Note any other relevant observations (e.g., presence and location of bullet wipe, radiating fractures).
- Determine if the defects are entry or exit wounds (this may be difficult since beveling may not be discernable in thin bone such as those around the pteryon or scapular region.
- Determine trajectories by aligning defects using bamboo skewers, wire, or other linear objects, where possible. Understand that projectiles can behave in odd and unexpected ways particularly if

it is unstable before impact or fragments in the body.
- Determine the sequence of trajectories, if possible, by examining intersection of radiating fractures with other fractures, defects, sutures, etc.
- Determine caliber and type of projectiles, if possible (see below).
- Determine type of weapon (pistol, rifle, shotgun, nail gun, etc.), see below.
- Any other determinations (e.g., possible distance of weapon from body based on presence of soot on bone, stippling).

The type and caliber of weapons and projectiles, if not recovered, may be determined by the overall nature of the trauma, hence the necessity for thorough description. The difference between rifle and pistol wounds, for example, is largely a result of the kinetic energy of the projectile. Pistols tend to launch bullets with less kinetic energy than rifles. The result is that pistols may cause simple defects without radiating fractures. Rifle shots, on the other hand, may cause catastrophic destruction upon hitting bone such as shattering a femoral shaft or causing the skull to "explode" from the radical increase in intracranial pressure during passage of the bullet. However, destruction may also be a function of the bullet type with jacketed bullets generally causing less damage than non-jacketed or hollow point projectiles. Byers (2002) provides a generalized discussion on firearms ballistics while Di Maio (1999) goes into further detail.

Projectile wounds are often unpredictable. The analyst should always be prepared for the unexpected and be able to interpret observations accordingly. For example, an entry wound in the skull without an exit wound and a loose bullet missing from the cranial cavity may seem problematic. However, bullets have been known to ricochet back out the entry wound, or exit from a natural opening such as the nares of the skull. Such aberrations may or may not be detectable.

3.5.1.3.2.5 **Strangulation:** Strangulation may be detected by fractures of the hyoid bone or ossified laryngeal cartilages, if present. An unfused hyoid in younger individuals should not be confused with fracturing caused by strangulation.

3.5.1.4 **Pathological Conditions:** Pathological conditions in skeletal and dental remains should be described and differentially diagnosed. Again, since many of these conditions may have multiple interpretations or etiologies (e.g., osteo-, rheumatoid, or septic arthritis) classification is not as important as the diagnosis. Common types of pathological conditions that may be observed include:

- Chronic infectious disease (e.g., tuberculosis).
- Metabolic disorders (e.g., porotic hyperostosis).
- Neoplastic diseases (e.g., tumors).
- Other chronic conditions (e.g., aneurysms).
- Developmental defects (e.g., spina bifida).
- Degenerative joint conditions (e.g., osteoarthritis).
- Ossified arterial plaque.
- Auto-immune diseases (e.g., rheumatoid or psoriatic arthritis).

Given advances in standards of living, medical care, and nutrition over the past 100 years, the majority of conditions untreated for sufficient time to affect the skeleton are now rare. Accordingly, the presence of some conditions (e.g., chronic osteomyelitis) may be of value in differentiating more modern forensic cases from ancient remains or discerning remains from developed regions from those in non-developed areas (e.g., Southeast Asia from North America). Likewise, some conditions (e.g., gout in adolescent Pacific Islanders) may re-enforce previous ancestry determinations.

Taphonomic phenomena are often mistaken for pathological conditions on bones (e.g., rodent gnawing or insect damage versus bone lesions). Pseudopathology should be considered during the differential diagnosis process.

3.5.2 **Differential Diagnosis:** Differential diagnosis may seem straight-forward and uncomplicated (e.g., recognition of a healed parry fracture) or be relatively involved (e.g., determining the type of treponemal disease present). Regardless, description and documentation is the most important step in the differential diagnosis. The observations should be completely described and documented using a combination of text, photographs, diagrams, and sketches. Other analysts should be able to mentally sketch the condition on the bone based on the written description from the notes.

Lovell (in Katzenberg and Saunders 2000) provides basic guidance for differential diagnosis. The following process is a basic guide to conducting differential diagnosis. Additional protocols, described below, may supplement this process.

- Describe the lesion, defect, wound, etc. Varying clinical terminology often hampers description. Lesions are most problematic, however, most can be described as lytic, proliferative, or deformative (destroying, depositing, or deforming bone, respectively). Other items to consider in

descriptions of defects, wounds and lesions include:

- Overall shape and size.
- Extent of the bone involved (describe anatomically, e.g., distal third of shaft).
- Distribution on the bone (discrete, multifocal, diffuse, circumferential, etc.).
- Characteristics of the edges, walls and floor (blunt, sharp, regular, irregular, etc.).
- Type of proliferative bone (compact, pitted, porous, loosely woven), if present.
- Extent and progress of healing, if present.
- Presence of accompanying features (cloaca, sequestra, periostitis).
- If the bone is broken describe the condition of the bone layers in cross section.

- Describe the condition of the remainder of the bone including the articular surface (e.g., eburnation on an adjacent articular surface).
- Describe the adjacent bones (e.g., infection spread from the radial shaft to the interosseous crest of the ulna), to include articular surfaces.
- Compare the afflicted bone to its opposite, if paired (note atrophy, deformation, rarification, thickening, etc.).
- Describe other related pathology in the remainder of the skeleton. Some conditions (e.g., treponemal) are diagnosed based on overall lesion distribution patterns in the skeleton.
- Describe the distribution of similar conditions in the population. This is not directly feasible since the CIL does not work on large population samples. However, clinical literature can be consulted as to frequencies in various populations. If two or more conditions are suspected, one common, the other rare, for an individual from a particular population group, the former is most likely (i.e., the pathologist's adage "if you see hoof prints in Texas, think horses, not zebras").
- Conduct appropriate research. Research may involve accessing clinical literature. Research is important since many alternative diagnoses may not be obvious (i.e., an amputation of the arm at mid-humerus, or a healed fracture with pseudarthrosis where the distal elements were not recovered?).

It should be understood that differential diagnosis is a **process** and not an outcome or result. The process allows the analyst to include and exclude possibilities as the process progresses. Depending on the nature of the remains (e.g., completeness, preservation, etc.) not all steps in the above differential diagnosis process may be feasible and/or they may only progress to a certain point.

As such, a definitive conclusion or diagnosis may not be forthcoming. In fact, a concrete diagnosis of a specific condition is an exception rather than the rule. Instead, equivocal results should be reported as such. All reasonable interpretations should be presented (e.g., "….given the remains present, the advanced nasal destruction could be a manifestation of tertiary yaws, advanced syphilis, or leprosy."). **The most common mistakes in conducting a differential diagnosis are over-reaching, too narrowly restricted, and/or unsupportable results.**

3.5.3 **Comparisons and Identifications:** Compare trauma, pathological conditions or anomalies with any antemortem medical records and include the results included in the notes and the report. The type of antemortem record available dictates the usefulness of the individuation traits for identification. Specifically:

3.5.3.1 **Charts and Treatment Records:** These are usually written or typed summaries of medical problems and treatments. They tend to be generalized and lack any great detail (e.g., fracture to distal right fibula). Consequently, the nature of these records makes corresponding traits of individuation from the remains circumstantial evidence only.

3.5.3.2 **Photographic Images (Superimposition):** Facial photographs of the decedent may be electronically superimposed on photographs of the cranial remains in evidence. Superimposition is discussed in detail in DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).

3.5.3.3 **Radiographic Images:** In principle, radiographic images of the skeleton provide enough traits of individuation in sufficient detail to make a positive identification in the same manner as dental radiography (e.g., Adams and Maves 2002).

Because of pre-existing antemortem protocols, postmortem radiographs can usually be prepared in near identical orientation of the former. DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging) provides guidance on preparing osseous radiographs.

Comparisons can then be made with the radiographs juxta- or superimposed. Typical items of comparison include, but are not limited to:

- Trabecular lattice patterns within individual bones or regions of bones.
- Cranial sinus shapes and patterns.
- Pathological features (exostoses, fused elements, fracture calluses, etc.).

- Size, location, and contours of features (spines, processes, exotoses, tubercles, sutures, foramina, medullary cavity, etc.). The more irregular the feature, the more unique it is assumed to be.

As with dental radiography, no set quantity of points of concordance is required. Rather, the identification depends on the overall number of traits in conjunction with their rarity or uniqueness. Additionally, exclusion of all other potential individuals also demonstrates uniqueness. This is accomplished by radiographic comparison with others in the same loss incident, if possible. If radiographs for others in the loss incident are unavailable, or it is a sole loss incident, comparing randomly selected pertinent radiographs should be sufficient.

Radiographic comparisons associated with chest radiographs, and accompanying test reports, are explained in detail in DPAA Laboratory Manual, SOP 3.9 (Chest Radiograph Comparison).

3.5.4 **Reporting:** Analysts should thoroughly record all observations of traits of individuation in the appropriate section of the skeletal notes using any guidance provided above. Diagrams, sketches and photographs, supplemented with written notes, best describe traits of individuation.

4.0 DOCUMENTATION: Specific reporting requirements for ancestry, sex, age-at-death, stature, and traits of individuation are presented in the respective sections.

Forms in the skeletal notes packet are used to record observations regarding biological profiles and are also designed to serve as a checklist for the procedure at hand. The analyst indicates in the analytical notes and final report the methods, models, exemplars, significant observations used to determine the biological profile, and the results. These are recorded in the analytical notes in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). Ancillary documentation such as FORDISC printouts and radiographs are included with the analytical notes, as appropriate. Results are presented in the final report in accordance with Annex A (Forensic Anthropology Reports) of this SOP. Report templates are found on the DPAA network.

Techniques involving new or unpublished statistical models or procedures should be fully described. Any deviations from procedures in this SOP should also be noted.

Original analytical notes and forms are retained with the original case file in the Laboratory Administration File Room until the case file is retired for permanent storage.

5.0 SURETY: FARs and analytical notes (including radiographs) are peer-reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review).

Radiographs should be of diagnostic quality. Diagnostic quality is defined as imaging which clearly defines the characteristics of the element necessary for the testing. Difficulties in obtaining the desired quality in a radiograph should be reported to a super-user for the respective radiographic system.

Additionally, biological profile determinations are subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

6.0 SAFETY: All remains are handled in accordance with appropriate safety procedures. There are no inherent safety hazards involving testing of dry-bone skeletal and dental remains. Wet-bone and dental remains, i.e., remains with fresh adherent soft tissue are handled with appropriate caution as detailed in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

Safety measures pertaining to osseous radiography are found in DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).

Annex A (Forensic Anthropology Reports)

(A5.10.1, A5.10.2a-k, A5.10.8)

A1.0 PURPOSE & SCOPE: This annex outlines the basic formats and procedures used by analysts when writing a forensic anthropology reports (FARs)

A2.0 GENERAL: FARs are typically written in the CIL. These reports must document the findings of the analyst(s) after completing an examination of the skeletal and/or non-skeletal evidence.

Although the audience for FARs is diverse (e.g., other professionals, family members, casualty officers), its first goal is to provide a competent and professional presentation of the test results. However, with such a diverse audience, analysts should avoid excessive and unnecessary use of jargon or obfuscating technical phrases.

If exceptional circumstances dictate, deviations from the DPAA Laboratory Manual, Appendix 5.2 (Style Guide) are allowed.

A3.0 REPORT TYPE AND CONTENTS: There are two major types of reports:

- Document for Disposition consisting of four report subtypes:
  - CIL Portion, Memorandum.
  - CIL Portion, Management review of non-evidentiary items for CIL Portion.
  - Administrative Fiat, Memorandum.
  - Administrative Fiat, Management review of non-evidentiary items for CIL Portion.
- Forensic Anthropology Report, also consisting of three report subtypes:
  - FAR Short Form.
  - FAR Long Form.
  - Group FAR, Long or Short Form

An example of each report template is found on the DPAA network. The analyst should start with a clean report template for each new report to ensure the currency of the template. The contents, format, and justifications for each report are detailed below:

A3.1 **CIL Portion:** CIL portion definitions, concepts, case strategies, and criteria are discussed in DPAA Laboratory Manual, SOP 1.6 (General Case Work Procedures).

When a CIL Portion is assigned, it is the responsibility of the appropriate Laboratory Manager to determine the format of the disposition document, either the memorandum or the management review of non-evidentiary items for CIL Portion. This decision is guided by the type and quantity of remains present, complexity of the case, and the potential political impacts the case may have. Typically, CIL Portions are assigned as a management review of non-evidentiary items for CIL Portion format.

The Science Director approves CIL Portion(s) Memorandum format, and a Laboratory Manager approves CIL Portion(s) in the management review of non-evidentiary items for CIL Portion format.

If remains are accessioned into the CIL with a valid name association, and these remains can be determined to be a match to human or consistent with human, then CIL Portion disposition documents may be written pending future developments.

A CIL Portion Memorandum typically contains the following sections, as needed (e.g., if there are no dental remains, the dental summary is omitted):

- **Background and Acquisition:** Contains:
  - Organization or individual who recovered the remains.
  - Date and location of recovery.
  - Date of accession.
  - CIL Accession number
- **Anthropology Summary:** Analyzed in accordance with relevant SOPs, and contains:
  - Description of remains including condition and elements present.
  - All relevant biological determinations.
  - Radiographic examination (if warranted).
  - Measurements (if suitable).
  - Other observations.
  - Conclusions based on anthropological testing.
- **Dental Summary:** If any dental evidence has been accessioned, analyzed in accordance with relevant SOPs, and contains:
  - Description of remains including condition and elements present.
  - All relevant biological determinations.
  - Radiographic examination (if warranted).
  - Conclusions based on dental testing.

- **Material Evidence Summary:** If any material evidence has been accessioned, analyzed in accordance with relevant SOPs, and contains:
  - Complete description of material evidence (condition, measurements, types, etc.).
  - Testing of the items, including any name associations.
  - Conclusions.
- **Recommendation:** Recommendation of disposition as a CIL Portion or CIL Portions based on the results of the above tests. (If there is one fragment present, this is termed a CIL "Portion." If there is more than one fragment present, these are termed CIL "Portions.").
- **Photographs & Radiographs:** Prepared in accordance with relevant SOPs, and contains appropriate photographs and radiographs documenting the evidence that should be included in the report.
- **References:** As appropriate.

A CIL Portion, Management review of non-evidentiary items typically contains the following sections:

- **Background:** Contains:
  - Organization or individual who recovered the remains.
  - Date and location of recovery.
  - Date of accession.
  - CIL Accession number.
- **Incident:** Contains:
  - Incident associated with the remains (if any).
  - REFNO (if applicable).
  - Name association(s).
- **Inventory:** This section is broken down into three component parts (Osseous, Dental, and Material Evidence). Each section is analyzed in accordance with relevant SOPs:
- **Osseous:** Contains:
  - Description of remains including condition and elements present.
  - All relevant biological determinations.
  - Radiographic examination (if warranted).
  - Measurements (if suitable).
  - Other observations.
  - Conclusions based on anthropological testing.
- **Dental:** If any dental evidence has been accessioned, analyzed in accordance with relevant SOPs, and contains:
  - Description of remains including condition and elements present.
  - All relevant biological determinations.
  - Radiographic examination (if warranted).
  - Conclusions based on dental testing.
- **Material Evidence:** If any material evidence has been accessioned, analyzed in accordance with relevant SOPs, and contains:
  - Complete description of material evidence (condition, measurements, types, etc.).
  - Testing of the items.
  - Conclusions.
- **Results of Name Association:** This section documents all results associated with determining the validity of a name association. It should note the databases searched, alternate spellings of the name(s), and the results of the search.
- **Histology:** If any osseous material has been examined histologically, the results of the tests are annotated here.
  - A copy of the histological analysis notes should be included with the case.
  - Two check blocks are provided for the histological results.
  - A summary of the test results should be annotated.
- **DNA:** If any osseous material has been tested for mtDNA, the results of the tests are summarized here.
  - A check block is provided to indicate sampling of the materials. Provide a listing of each item of osseous remains sampled
  - A summary of the test results should be annotated in this section. Relevant references should be included.
- **Summary:** Contains the following information:
  - A summary statement(s) that indicate the results of each test and the overall findings of each analytical section, with a recommended disposition for the materials.
  - For example: "The name association with this case is not found in any database for missing US service personnel. The remains are consistent with a human exemplars, but no further biological determinations can be made. The

mtDNA analyses of the osseous remains support an association with an origin from an Asian population. Without further evidence to link the remains to a missing US casualty, it is my opinion that the remains should be declared CIL portions."

- **Management Decision:** Contains the following information:
  - A check block is provided for a concur/non-concur with the analyst
  - A remarks section is provided for any additional comments.
- **Photographs (or Radiographs):** Prepared in accordance with relevant SOPs. An inventory photograph, other relevant photographs, and any radiographs must be annotated at the end of the report.

A3.2 **Administrative Fiat:** This format is used when the evidence present is non-human or non-biological in origin. When an Administrative Fiat is assigned, it is the responsibility of the appropriate Laboratory Manager to determine the format of the report, either the memorandum or the management review of non-evidentiary items for Administrative Fiat. This decision is guided by the type and quantity of remains present, complexity of the case, and the potential political impacts the case may have. Typically, Administrative Fiats are assigned as a management review of non-evidentiary items for Administrative Fiat format.

An Administrative Fiat, Memorandum may contain the following information categories, where appropriate (i.e., if there are no artifacts, the Material Evidence summary is not needed). Many of these categories are completed the same a CIL Portion Memorandum (when noted as "see above.").

- **Background and Acquisition:** See above.
- **Dental Summary:** See above.
- **Material Evidence Summary:** See above.
- **Recommendation:** Recommendation of disposition as an Administrative Fiat based on the results of the above tests.
- **Photographs and Radiographs:** See above.
- **References:** See above.

An Administrative Fiat, Management review of non-evidentiary items typically contains the following sections. Many of these categories are completed the same as an Admin Fiat Memorandum (when noted as "see above.").

- **Background:** See above.
- **Incident:** See above.
- **Inventory:** See above.
- **Osseous:** See above.
- **Dental:** See above
- **Material Evidence:** See above.
- **Results of Name Association:** See above.
- **Histology:** See above.
- **DNA:** See above.
- **Summary:** Contains the following information:
  - A summary statement(s) that indicate the results of each test and the overall findings of each analytical section, with a recommended disposition for the materials.
  - For example: "The osseous materials present are non-human in nature and are therefore recommended to be removed from the accession through Administrative Fiat."
- **Management Decision:** See above.
- **Photographs (or Radiographs):** See above.

A3.3 **Forensic Anthropology Report-Short Form:** This format is used when the elements present cannot be used to determine the majority of the biological profile. Since FARs are written "blind," no background and acquisition section is required.

- **Results of Testing:** Analyzed in accordance with relevant SOPs, and contains:
  - Description of remains including condition and elements present.
  - All relevant biological determinations.
  - Radiographic examination (if warranted).
  - Measurements (if suitable).
  - Other observations.
  - Conclusions based on anthropological testing.
  - CIL Accession number.
- **Photographs & Radiographs:** Appropriate photographs and radiographs, prepared in accordance with relevant SOPs, documenting the remains must be included in the report and referenced in the text. For example, "the fractured left tibia shows new bone formation (see Figure 1)." Because it is ultimately scanned, authors should avoid putting images on the signature page of the report since a significant decrease in image quality occurs.
- **References:** As appropriate

A3.4 **Forensic Anthropology Report Long Form:** This format is used when the majority of the characteristics included in the biological profile can be determined from the elements present. The report

may use a mix of single word or phrase statements and complete sentences. Single word or phrase statements are most applicable at the beginning of each test section for Sex, Age, Ancestry, and Stature (e.g., age estimate 25 years). The report may contain the following information categories and graphics:

- **Title Block:** The title block on the first page is in Times New Roman Font and contains:
  - Report title at the top centered, bold, 16 pt, all caps. The title should reflect the type of testing reported and accession number (final consolidated number).
  - Organization centered, bold, first letter in caps, 14 pt.
  - Date (month and year) centered, bold, with the first letter in caps, 14 pt. For example:

FORENSIC ANTHROPOLOGY REPORT:
CIL 1993-236-I-01

DPAA Central Identification Laboratory

22 January 2007

- **Description of Remains:** Analyzed in accordance with relevant SOPs, and contains:
  - General appraisal of the condition of the remains (i.e., state of preservation).
  - Elements present/lacking (especially elements important in forensic testing). Taking the path of least resistance with the skeletal inventory and diagram is recommended. For a near-complete skeleton, list what is missing and prepare the diagram (see below) to show what is missing. For relatively incomplete cases, list what is present and annotate the diagram accordingly. When using a table, reference it but do not duplicate its contents in the narrative of the report.
  - Any reconstruction performed during the testing.
  - Figure detailing elements present (or missing).
  - CIL Accession number.
  - Any cleaning and/or stabilization.
  - Descriptions and documentation of any sampling cuts for DNA.
- **Minimum Number of Individuals:** Analyzed in accordance with relevant SOPs, and contains:
  - Determination of MNI.
  - Criteria used for the determination with pertinent observations.
  - References when appropriate.
- **Sex:** Analyzed in accordance with relevant SOPs, and contains:
  - Determination of sex.
  - Criteria used for the determination with pertinent observations.
- **Age:** Analyzed in accordance with relevant SOPs, and contains:
  - Estimation of age-at-death.
  - Criteria used for the determination with pertinent observations.
- **Ancestry:** Analyzed in accordance with relevant SOPs, and contains:
  - Assessment of ancestral affinity.
  - Criteria used for the determination detailing pertinent observations.
- **Stature:** Analyzed in accordance with relevant SOPs, and contains:
  - Estimation of stature.
  - Criteria used for the determination with pertinent observations.
- **Trauma:** Analyzed in accordance with relevant SOPs, and contains:
  - Descriptions of the trauma (perimortem only) detailing the location, appearance, appropriate measurements, bone discoloration, etc.
  - Interpretation of the trauma (e.g., possible gunshot wound, blunt force trauma).
- **Observations:** Derived in accordance with relevant SOPs and contains:
  - Descriptions and documentation of any antemortem trauma.
  - Description of postmortem damage to remains, including fractures.
  - Descriptions and documentation of any pathological conditions detailing the location, appearance, appropriate measurements, bone discoloration, etc.
  - Instances of non-skeletal biological material (e.g., hair, adipocere, skin/muscle), and testing of that material.
  - Any other conditions that are not normally found in human skeletal material such as unusual staining/bleaching, adhering metal, etc.
  - Any skeletal anomalies with appropriate descriptions.
  - Cultural modifications.

- **Conclusions:** A short summary statement detailing the test findings of the report.
- **References:** As appropriate.
- **Signature Block:** The name(s), function(s) and signature(s) of the person(s) authorizing the test report are indicated.

A3.5 **Addenda:** An addendum to the FAR Long Form may be generated at the direction of Laboratory Management. The addendum is a comparison of the biological profile as developed from the blind skeletal analysis with the physical characteristics and medical history found in the individual's personnel file, or other pertinent historical evidence (e.g., photographs or material evidence). Diagrams, photographs, radiographs, or figures may be included in the addendum report as appropriate. An example of the addendum can be found on the DPAA network. The addendum should be written as text with a table that may contain the following comparisons:

- Age.
- Ancestry.
- Stature.
- Trauma.
- Other Observations.

Note: The addendum is not a test in that the author is not providing an opinion regarding identification.

A3.6 **Group Forensic Anthropology Report:** This section details a decision making process and the reporting format when analyzing group remains. A group FAR can either be in a long or short format as determined on a case-by-case basis by the appropriate Laboratory Manager at the time of assignment to the analyst. Regarding the decision making process, group remains typically fall into two categories:

A3.6.1 **Large Assemblages:** The first category is large assemblages of remains that cannot be segregated into individuals **and** the majority of the incident individuals are represented by substantial portions of the body (e.g. the non-segregated remains from a crash site resulting in extensive amounts of hand, foot, ribs, and vertebrae that cannot be associated to any individual; however, each casualty is represented by numerous long bones, cranial portions).

In this instance, the appropriate Laboratory Manager can select to have the analyst write the group report as a short format, in a post-analysis "non-blind" fashion. This entails the understanding by the analyst that all testing first is documented in accordance to SOP standards (conducted "blind"), but the report only discusses large, generalized findings that are commensurate with the incident. Therefore, the analyst has access to the biological information about the incident individuals after the notes are completed – effectively, the report is written with an informed prior. Reporting procedures are as follows:

- A detailed inventory and inventory photograph must be presented.
- Major biological findings such as MNI, sex, age, ancestry, stature, and trauma are completed with overall summary statements.
- Additional description and documentation of remains condition, reconstruction, and observations is commensurate with standard FARs and is at the discretion of the analyst.

An example of the summary reporting format is: "The remains represent six individuals based on duplicated right first ribs; where possible to determine, all are likely Caucasoid males between 18 and 30 years of age. Stature estimates from multiple elements are consistent with the heights reported in antemortem records for the individuals in this incident. Multiple instances of perimortem trauma are present on the remains, all of which are consistent with, but not exclusive to, that seen in deceleration incidents."

Any major discrepancies between the incident information and the substantial findings in the biological profile must be discussed in the report, though this does not require a lengthy discourse on methods that produced questionable results on limited data (e.g. a partial cranial metric analysis that has low probability and typicality probabilities indicating a White female for a portion of the remains).

A3.6.2 **Small Assemblages:** The second category is smaller assemblages that represent the majority of the remains present for a given case (e.g. a few non-diagnostic fragments of long bone and cancellous tissues that represent two individuals involved in a high-speed impact that cannot be segregated into individuals. The individual FAR reports consists one or two teeth and a few mtDNA segregated bone fragments).

In these cases, the analyst is directed to report test results in the standard group FAR format, remaining "blind" throughout the entire process. A selection of short or long formats is made by the Laboratory Manager based on the amount of biological determinations that can be generated by the assemblage. Reporting procedures for either short or long group FAR formats follow those outlined above for individual report short or long formats.

A3.7 **Miscellaneous Considerations:** The following are considerations relating to the FAR text organization, structure, and inclusions:

- Correct and consistent nomenclature and terminology should be used throughout the FAR including section headings, figure captions, and in the descriptive text.
- Section headings should be in 14 pt font while descriptive text should be in 12 pt, all in Times New Roman.
- Describe any accession consolidations, as necessary.
- Appropriate photographs and radiographs, prepared in accordance with relevant SOPs, documenting the remains must be included in the report and referenced in the text. For example, "the draining sinus on the left lower tibia shows new bone formation (see Figure 1)." Because it is ultimately scanned, authors should avoid putting images on the signature page of the FAR since a significant decrease in image quality occurs.
- The following guidance applies to figure and photograph captions:
    - When displaying an item(s) being tested, the figure caption should start with the CIL accession number followed by a comma, and then the item description. The first letter after the comma is lower case unless the word is a proper noun or starts a proper noun phrase.
    - Graphic or photographic exemplars should be clearly identified.
    - Scale increments should be indicated in the caption.
    - An example of the above guidance includes:

      Fig 1. CIL 1999-236-I-014, skeletal layout of remains. Scale is in decimeters.

- Line drawings are prepared as follows:
    - Figure showing the skeletal elements present or missing.
    - Major elements and portions thereof present should be shaded.
    - Caption must state if the colored section represents elements that are present or that these are absent and any other pertinent information.
    - Smaller fragments and unidentified and/or unsided fragments may or may not be represented on the skeletal diagram.
    - A figure does not typically contain both a photograph and a line drawing. In these instances, the illustrations should be separated into two figures, but can (and usually) are co-located on the same page.

- Include any table(s) that may be appropriate for the documentation of the biological materials

Annex B (Stature Formulas)

This annex provides stature formulas, derived from various models, and other relevant information.

B1.0 FORDISC:

B1.1 **Reference Populations:** Estimation models in FORDISC are applicable to American white males, white females, black males, and black females. Models are based on long bone lengths and include those of Trotter and Gleser (1952; 1958) for white and black males as well as those derived from the Forensic Data Bank. The Forensic Data Bank models should be used when working with recent deaths, as in criminal cases. The Trotter and Gleser models are generally more appropriate for cases involving the identification of military personnel lost in past conflicts.

B1.2 **Bone Measurements:** FORDISC can estimate stature and provide a prediction interval when any one or more of the requisite measurements have been taken. The anterior height of the sacrum and the height of the innominate are utilized in tandem with other measurements although their addition appears to improve the long bone models little if any. The bone measurements used in FORDISC, whether for use in the Trotter and Gleser models or in the Forensic Data Bank models, are to be taken as described in Moore-Jansen et al. (1994:63-71).

B1.3 **Obtaining the Stature Estimates:** The general operating procedures for FORDISC are covered in the user's manual. The program requires one to select

- The ancestry and sex of the individual being examined (WM, WF, BM, BF).
- The prediction interval size (90% or 95%).
- The bone measurement(s) to be used.
- The source of the estimation model used (Trotter and Gleser or Forensic Data Bank).

Note: The estimation model formulae displayed by FORDISC next to the point estimate are incorrect when "Trotter" is selected as the model source. However, the calculations and the results are correct. The problem is with the display only.

B2.0 Trotter and Gleser (1952, 1958):

B2.1 **Reference Populations:** Trotter and Gleser (1952, 1958; Trotter 1970) have provided estimation models that are applicable to American white males, white females, black males, black females, Mexican males, "mongoloid" males, and Puerto Rican males. The mongoloid sample included a rather eclectic group (Japanese, Hawaiians, Filipinos, and American Indians) and it was determined that Puerto Rican statures were accurately predicted by the black male formulae.

B2.2 **Bone Measurements:** These models are based on the lengths of the humerus, radius, ulna, femur, tibia, and fibula. Caution should be exercised when using the tibia. Trotter measured the tibia length without the malleolus, apparently by allowing it to curve around the end of the osteometric board bringing the distal articular surface to rest flat against the end. Before the maximum length of the tibia is entered into Trotter's formula, 10.0 mm should be subtracted. This correction factor is already included in the formulas below.

B2.3 **Obtaining the Stature Estimates:** Where sample sizes are large, the prediction interval bounds are sufficiently flat to permit a simple approximation, which is provided in lieu of the complete formula. These calculations should be done in FORDISC. If the software is unavailable, an electronic calculator should be used.

B2.3.1 **White Males:**

- Humerus: [3.08 (hum) + 704.5] / 25.4 = point estimate in inches;
Point Estimate +/- 3.1 inches

- Radius: [3.78 (rad) + 790.1] / 25.4 = point estimate in inches
Point Estimate +/- 3.4 inches

- Ulna: [3.70 (ulna) + 740.5] / 25.4 = point estimate in inches
Point Estimate +/- 3.4 inches

- Femur: [2.38 (fem) + 614.1] / 25.4 = point estimate in inches
Point Estimate +/- 2.5 inches

- Tibia: [2.52 (tib-10.0) + 786.2] / 25.4 = point estimate in inches
  Point Estimate +/- 2.6 inches

- Fibula [2.68 (fib) + 717.8] / 25.4 = point estimate in inches
  Point Estimate +/- 2.6 inches

B2.3.2 **White Females:**

- Humerus: [3.36 (hum) + 579.7] / 25.4 = point estimate in inches
  Point Estimate +/- (3.5) $\sqrt{}$ [(hum – 304.3)^2 / (18513) + 1.02]

- Radius: [4.74 (rad) + 549.3] / 25.4 = point estimate in inches
  Point Estimate +/- (3.3) $\sqrt{}$ [(rad – 222.1)^2 / (9533) + 1.02]

- Ulna: [4.27 (ulna) + 577.6] / 25.4 = point estimate in inches
  Point Estimate +/- (3.4) $\sqrt{}$ [(ulna – 240)^2 / (11636) + 1.02]

- Femur: [2.47 (fem) + 541.0] / 25.4 = point estimate in inches
  Point Estimate +/- (2.9) $\sqrt{}$ [(fem – 426.5)^2 / (38750) + 1.02]

- Tibia: [2.90 (tib - 10) + 615.3] / 25.4 = point estimate in inches
  Point Estimate +/- (2.9) $\sqrt{}$ [(tib – 340.0)^2 / (28660) + 1.02]

- Fibula: [2.93 (fib) + 596.1] / 25.4 = point estimate in inches
  Point Estimate +/- (2.8) $\sqrt{}$ [(fib – 343.3)^2 / (28393) + 1.02]

B2.3.3 **Black & Puterto Rican Males:**

- Humerus: [3.26 (hum) + 621.0] / 25.4 = point estimate in inches
  Point Estimate +/- (3.5) $\sqrt{}$ [(hum – 337.9)^2 / (9516.7) + 1.02]

- Radius: [3.42 (rad) + 815.6] / 25.4 = point estimate in inches
  Point estimate +/- (3.4) $\sqrt{}$ [(rad – 265.7)^2 / (8149.3) + 1.02]

- Ulna: [3.26 (ulna) + 792.9] / 25.4 = point estimate in inches
  Point Estimate +/- (3.5) $\sqrt{}$ [(ulna – 285.1)^2 / (9234.7) + 1.02]

- Femur: [2.11 (fem) + 703.5] / 25.4 = point estimate in inches
  Point Estimate) +/- (3.1) $\sqrt{}$ [(fem – 483.4)^2 / (26974.5) + 1.02]

- Tibia: [2.19 (tib - 10) + 860.2] / 25.4 = point estimate in inches
  Point Eestimate +/- (3.0) $\sqrt{}$ [(tib – 395.5)^2 / (27988.3) + 1.02]

- Fibula: [2.19 (fib) + 856.5] / 25.4 = point estimate in inches
  Point Estimate +/- (3.2) $\sqrt{}$ [(fib – 856.5)^2 / (27915) + 1.02]

B2.3.4 **Black Females:**

- Humerus: [3.08 (hum) + 646.7] / 25.4 = point estimate in inches
  Point Estimate +/- (3.3) $\sqrt{}$ [(hum – 307.6)^2 / (43825.5) + 1.01]

- Radius: [2.75 (rad) + 945.1] / 25.4 = point estimate in inches
  Point Estimate +/- (3.9) $\sqrt{}$ [(rad – 236)^2 / (38395) + 1.01]

- Ulna: [3.31 (ulna) + 753.8] / 25.4 = point estimate in inches
  Point Estimate +/- (3.7) $\sqrt{}$ [(ulna – 253.9)^2 / (29973) + 1.01]

- Femur: [2.28 (fem) + 597.6] / 25.4 = point estimate in inches
  Point Estimate +/- (2.6) $\sqrt{}$ [(fem – 437.1)^2 / (100617) + 1.01]

- Tibia: [2.45 (tib - 10) + 726.5] / 25.4 = point estimate in inches
  Point Estimate +/- (2.9) $\sqrt{}$ [(tib – 354.2)^2 / (80225) + 1.01]

- Fibula: [2.49 (fib) + 709] / 25.4 = point estimate in inches
  Point Estimate +/- (2.9) $\sqrt{}$ [(fib – 355.5)^2 / (77542) + 1.01]

B2.3.5**Mongoloid Males:**

- Humerus: [2.68 (hum) + 831.9] / 25.4 = point estimate in inches
  Point Estimate +/- (3.3) $\sqrt{}$ [(hum – 317.4)^2 / (21574) + 1.02]

- Radius: [3.54 (rad) + 820] / 25.4 = point estimate in inches
  Point Estimate +/- (3.6) $\sqrt{}$ [(rad – 243)^2 / (14069) + 1.02]

- Ulna: [3.48 (ulna) + 774.5] / 25.4 = point estimate in inches
  Point Estimate +/- (3.7) $\sqrt{}$ [(ulna – 261.3)^2 / (15575) + 1.02]

- Femur: [2.15 (fem) + 725.7] / 25.4 = point estimate in inches
  Point Estimate +/- (3.0) $\sqrt{}$ [(fem – 446.4)^2 / (36170) + 1.02]

- Tibia: [2.39 (tib - 10) + 814.5] / 25.4 = point estimate in inches
  Point Estimate +/- (2.6) $\sqrt{}$ [(tib – 365)^2 / (36417) + 1.02]

- Fibula: [2.40 (fib) + 805.6] / 25.4 = point estimate in inches
  Point Estimate +/- (2.6) $\sqrt{}$ [(fib – 363.4)^2 / (31516) + 1.02]

B2.3.6 **Mexican Males:**

- Humerus: [2.92 (hum) + 739.4] / 25.4 = point estimate in inches
  Point Estimate) +/- (3.3) $\sqrt{}$ [(hum – 322.6)^2 / (16655) + 1.02]

- Radius: [3.55 (rad) + 807.1] / 25.4 = point estimate in inches
  Point Estimate +/- (3.2) $\sqrt{}$ [(rad – 246.3)^2 / (9932) + 1.02]

- Ulna: [3.56 (ulna) + 745.6] / 25.4 = point estimate in inches
  Point estimate) +/- (3.6) $\sqrt{}$ [(ulna – 263.4)^2 / (9654) + 1.02]

- Femur: [2.44 (fem) + 586.7] / 25.4 = point estimate in inches
  Point Estimate +/- (2.4) $\sqrt{}$ [(fem – 456)^2 / (34276) + 1.02]

- Tibia: [2.36 (tib - 10) + 806.2] / 25.4 = point estimate in inches
  Point Estimate +/- (2.9) $\sqrt{}$ [(tib – 374.9)^2 / (29400) + 1.02]

- Fibula: [2.50 (fib) + 754.4] / 25.4 = point estimate in inches
  Point Estimate +/- (2.8) $\sqrt{}$ [(fib – 373.4)^2 / (20339) + 1.02]

B3.0 Stevenson (1929):

B3.1 **Reference Populations:** Stevenson (1929) used data collected from a northern Chinese male cadaver collection. These models should only be applied to remains believed to be from northern China until their broader applicability can be demonstrated.

B3.2 **Bone Measurements:** Stevenson's models are based on the maximum lengths of the humerus, radius, femur, and tibia.

B3.3 **Obtaining the Stature Estimate:**

- Humerus: [2.81 (hum) + 815.1] / 25.4 = point estimate in inches
  Point Estimate +/- (2.3) $\sqrt{}$ [(hum – 310.7)^2 / (6544) + 1.02]

- Radius: [3.74 (rad) + 800.3] / 25.4 = point estimate in inches
  Point Estimate +/- (2.1) $\sqrt{}$ [(rad – 237.8)^2 / (4606) + 1.02]

- Femur: [2.44 (fem) + 617.2] / 25.4 = point estimate in inches
  Point Estimate +/- (1.7) $\sqrt{}$ [(fem – 439.8)^2 / (15059) + 1.02]

- Tibia: [3.03 (tib) + 592.3] / 25.4 = point estimate in inches
  Point Estimate +/- (1.5) $\sqrt{}$ [(tib – 362.5)^2 / (11074) + 1.02]

B4.0 Choi et al. (1997):

B4.1 **Reference Populations:** Choi et al. (1997) used data collected from a South Korean male cadaver collection. These models should only be applied to remains believed to be from Korea until their broader applicability can be demonstrated.

B4.2 **Bone Measurements:** The models of Choi et al. (1997) are based on the maximum lengths of the humerus, radius, ulna, femur, tibia, and fibula.

B4.3 **Obtaining the Stature Estimate:**

- Humerus: [4.30 (hum) + 333.2] / 25.4 = point estimate in inches
  Point Estimate +/- (3.9) $\sqrt{}$ [(hum – 301)^2 / (6192) + 1.02]

- Radius: [3.89 (rad) + 741.2] / 25.4 = point estimate in inches
  Point Estimate +/- (3.7) $\sqrt{}$ [(rad – 230)^2 / (7098) + 1.02]

- Ulna: [3.74 (ulna) + 707.8] / 25.4 = point estimate in inches
  Point Estimate +/- (4.0) $\sqrt{}$ [(ulna – 247)^2 / (7098) + 1.02]

- Femur: [2.93 (fem) + 368.8] / 25.4 = point estimate in inches
  Point Estimate +/- (3.1) $\sqrt{}$ [(fem – 431)^2 / (17328) + 1.02]

- Tibia: [2.54 (tib) + 733.8] / 25.4 = point estimate in inches
  Point Estimate +/- (3.4) $\sqrt{}$ [(tib – 352)^2 / (17200) + 1.02]

- Fibula: [2.55 (fib) + 744.9] / 25.4 = point estimate in inches
  Point Estimate +/- (3.4) $\sqrt{}$ [(fib – 343)^2 / (14801) + 1.02]

B5.0 Genoves (1967):

B5.1 **Reference Populations:** Genoves (1967) used data collected from a Mexican cadaver collection. Models are provided for males and females. These models should only be applied to remains believed to be of Amerindians from Mexico until their broader applicability can be demonstrated.

B5.2 **Bone Measurements:** The models from Genoves (1967) included here are based on the maximum lengths of the femur and tibia.

B5.3 **Obtaining the Stature Estimate:**

B5.3.1 **Males:**

- Femur: [2.26 (fem) + 663.8] / 25.4 = point estimate in inches
  Point Estimate +/- (2.8) $\sqrt{}$ [(fem – 432.1)^2 / (9349) + 1.05]

- Tibia: [1.96 (tib) + 937.5] / 25.4 = point estimate in inches
  Point Estimate +/- (2.3) √ [(tib – 358.9)^2 / (12400) + 1.05]

B5.3.2 **Females:**

- Femur: [2.59 (fem) + 497.4] / 25.4 = point estimate in inches
  Point Estimate +/- (3.2) √ [(fem – 396.3)^2 / (6532) + 1.07]

- Tibia: [2.72 (tib) + 637.8] / 25.4 = point estimate in inches
  Point Estimate +/- (2.9) √ [(tib – 325.4)^2 / (6352) + 1.07]

B6.0 Meadows and Jantz (1992):

B6.1 **Reference Populations:** Meadows and Jantz's (1992) stature models are based on the lengths of metacarpals (with right and left hands treated separately) using data collected from American black and white males and females (Terry Collection). Since the right and left hand models are nearly equivalent, only the models for the left hand are reproduced here. Separate models are provided for the respective groups.

B6.2 **Bone Measurements:** The midline length, or length from the midline of the proximal articular surface to the midline of the distal articular surface, is taken on each metacarpal. All measurements are to be taken to the tenths of a millimeter with digital calipers.

B6.3 **Obtaining the Stature Estimate:**

B6.3.1 **White Males:**

- MC1: [1.674 (M1) + 91.89] / 2.54 = point estimate in inches
  Point Estimate +/- (4.4) √ [(M1 – 46.12)^2 / (488) + 1.02]

- MC2: [1.311 (M2) + 81.96] / 2.54 = point estimate in inches
  Point Estimate +/- (4.0) √ [(M2 – 66.47)^2 / (916) + 1.02]

- MC3: [1.298 (M3) + 84.90] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) √ [(M3 – 64.89)^2 / (773) + 1.02]

- MC4: [1.355 (M4) + 90.41] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) √ [(M4 – 58.09)^2 / (765) + 1.02]

- MC5: [1.468 (M5) + 90.64] / 2.54 = point estimate in inches
  Point Estimate +/- (4.3) √ [(M5 – 53.01)^2 / (625) + 1.02]

B6.3.2 **White Females:**

- MC1: [1.674 (M1) + 89.52] / 2.54 = point estimate in inches
  Point Estimate +/- (4.4) √ [(M1 – 43.01)^2 / (409) + 1.02]

- MC2: [1.311 (M2) + 79.86] / 2.54 = point estimate in inches
  Point Estimate +/- (4.0) √ [(M2 – 62.28)^2 / (794) + 1.02]

- MC3: [1.298 (M3) + 82.81] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) √ [(M3 – 60.65)^2 / (829) + 1.02]

- MC4: [1.355 (M4) + 88.11] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) √ [(M4 – 54.18)^2 / (672) + 1.02]

- MC5: [1.468 (M5) + 88.52] / 2.54 = point estimate in inches
  Point Estimate +/- (4.3) √ [(M5 – 49.73)^2 / (531) + 1.02]

B6.3.3 **Black Males:**

- MC1: [1.674 (M1) + 88.81] / 2.54 = point estimate in inches
  Point Estimate +/- (4.4) $\sqrt{}$ [(M1 – 49.3)^2 / (422) + 1.02]

- MC2: [1.311 (M2) + 78.05] / 2.54 = point estimate in inches
  Point Estimate +/- (4.0) $\sqrt{}$ [(M2 – 71.15)^2 / (866) + 1.02]

- MC3: [1.298 (M3) + 80.28] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) $\sqrt{}$ [(M3 – 70.16)^2 / (922) + 1.02]

- MC4: [1.355 (M4) + 86.93] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) $\sqrt{}$ [(M4 – 62.30)^2 / (836) + 1.02]

- MC5: [1.468 (M5) + 87.17] / 2.54 = point estimate in inches
  Point Estimate +/- (4.3) $\sqrt{}$ [(M5 – 57.34)^2 / (663) + 1.02]

B6.3.4 **Black Females:**

- MC1: [1.674 (M1) + 85.33] / 2.54 = point estimate in inches
  Point Estimate +/- (4.4) $\sqrt{}$ [(M1 – 44.22)^2 / (382) + 1.02]

- MC2: [1.311 (M2) + 73.36] / 2.54 = point estimate in inches
  Point Estimate +/- (4.0) $\sqrt{}$ [(M2 – 65.58)^2 / (731) + 1.02]

- MC3: [1.298 (M3) + 75.79] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) $\sqrt{}$ [(M3 – 64.38)^2 / (868) + 1.02]

- MC4: [1.355 (M4) + 82.01] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) $\sqrt{}$ [(M4 – 57.08)^2 / (739) + 1.02]

- MC5: [1.468 (M5) + 82.97] / 2.54 = point estimate in inches
  Point Estimate +/- (4.3) $\sqrt{}$ [(M5 – 52.03)^2 / (543) + 1.02]

B7.0 Simmons et al (1990):

B7.1 **Reference Populations:** Simmons et al. provide models based on two measurements of the femur that are intended to be applicable to fragmented femora using data collected from American black and white males and females (Terry Collection). Only two of their models have a sufficiently high correlation coefficient to warrant their use.

B7.2 **Bone Measurements:** Measurements should be taken to the tenths of a millimeter with digital calipers. The measurement descriptions are as follows (see original paper for illustrations):

- **Upper Breadth of Femur (VHA)**: The distance from the apex of the head of the femur to the lateral side of the femur diaphysis, measured in line with the neck of the femur such that the line of measurement bisects the neck. Using sliding calipers, place the fixed jaw on the most prominent point on the femur head. Place the movable jaw on the lateral margin of the femur diaphysis so that the line formed between the two points splits the neck into two equal portions.
- **Lateral Condyle Height (LCH):** On the lateral condyle of the distal femur, it is the distance from the most superior point on the condyle to the most inferior point. Holding the femur in anatomical position with the distal condyles facing the observer, place the fixed jaw of the sliding caliper on the top of the condyle and place the movable jaw on the most inferior point on the condyle. The femur should be held so that it is possible to accurately judge the location of the most inferior point.

B7.3 **Obtaining the Stature Estimate:**

B7.3.1 **White Males:**

- VHA: [0.78 (VHA) + 89.64] / 2.54 = point estimate in inches
  Point Estimate +/- (4.7) $\sqrt{}$ [(VHA – 99.1)^2 / (6857) + 1.01]

- LCH: [1.47 (LCH) + 107.09] / 2.54 = point estimate in inches
  Point Estimate +/- (4.8) $\sqrt{}$ [(LCH – 41.35)^2 / (1685) + 1.01]

B7.3.2 **White Females:**

- VHA: [0.73 (VHA) + 91.54] / 2.54 = point estimate in inches
  Point Estimate +/- (5.2) $\sqrt{}$ [(VHA – 88.24)^2 / (5366) + 1.01]

- LCH: [1.94 (LCH) + 86.10] / 2.54 = point estimate in inches
  Point Estimate +/- (4.5) $\sqrt{}$ [(LCH – 36.30)^2 / (1280) + 1.01]

B7.3.3 **Black Males:**

- VHA: [0.79 (VHA) + 91.70] / 2.54 = point estimate in inches
  Point Estimate +/- (5.1) $\sqrt{}$ [(VHA – 98.99)^2 / (6725) + 1.01]

- LCH: [1.34 (LCH) + 113.23] / 2.54 = point estimate in inches
  Point Estimate +/- (5.4) $\sqrt{}$ [(LCH – 42.33)^2 / (1818) + 1.01]

B7.3.4 **Black Females:**

- VHA: [0.59 (VHA) + 107.10] / 2.54 = point estimate in inches
  Point Estimate +/- (4.7) $\sqrt{}$ [(VHA – 88.98)^2 / (5437) + 1.01]

- LCH: [1.59 (LCH) + 100.07] / 2.54 = point estimate in inches
  Point Estimate +/- (4.2) $\sqrt{}$ [(LCH – 37.05)^2 / (1084) + 1.01]

B8.0 Holland (1992, 1995):

B8.1 **Reference Populations:** Holland (1992) provides models based on measurements of the proximal tibia that are intended to be applicable to fragmented tibiae. Holland (1995) provides models based on measurements of the calcaneus and talus. Multiple regression models are available in the original papers, but offer only slight improvements in precision and require more complicated computations in the derivation of the prediction intervals. In both references, data was collected from American black and white males and females (Hamann-Todd Collection) to develop estimation models that apply to the respective sexes and ancestral groups as well as some combined group models. Only selected linear models are provided for use here.

B8.2 **Bone Measurements:** Measurements should be taken to the tenths of a millimeter with digital calipers. The measurement descriptions are as follows:

- **(Tibia) Biarticular Breadth (BB):** Maximum breadth of the proximal articular surface of the tibia as measured from the lateral edge of the lateral condyle to the medial edge of the medial condyle. This is not the maximum breadth of the proximal tibia, but rather the maximum breadth of the articular surface. Holding the tibia so that the proximal articular surface is in plain view, place the fixed jaw of the digital caliper on the most lateral edge of the lateral condyle. Extend the movable jaw to what appears to be the most medial edge of the medial condyle. Pivot the movable jaw slightly to ensure that the maximum measure is found.
- **(Tibia) Medial Condyle Articular Width (MCW):** Maximum transverse width of the medial condyle as measured from lateral to medial edges. The surface of the condyle generally is circumscribed by a slight rim, and points of the caliper should be placed on this rim. Hold the tibia so that you can look directly down on the proximal articular surface. Place the fixed jaw of the digital caliper on the medial edge of the condyle. Extend the movable jaw to the lateral edge of the medial condyle. Move the caliper anteriorly and then

posteriorly, adjusting the jaws so that they always contact the opposing edges of the condyle. Find the maximum in this manner.

- **(Tibia) Medial Condyle Articular Length (MCL):** Similar but perpendicular to width. Measurement should record maximum length from the anterior edge of the medial condyle to the posterior margin. Hold the tibia so that you can look directly down on the proximal articular surface. Place the fixed jaw of the digital caliper on the anterior edge of the medial condyle. Extend the movable jaw to the posterior edge of the condyle. Move the caliper medially and then laterally, adjusting the jaws so that they always contact the opposing edges of the condyle. Find the maximum in this manner.
- **(Tibia) Lateral Condyle Articular Length (LCL):** Maximum length of the lateral condyle as measured in a manner similar to that for MCL.
- **Maximum Length of the Calcaneus (MCAL):** Maximum length of the calcaneus as taken parallel to the long axis. Hold the calcaneus in anatomical position so that you are looking down on the articular surface. Place the fixed jaw of the digital calipers on the anterior-most point of the articular surface. Extend the movable jaw to the posterior surface of bone in a line parallel to the long axis. Move the calipers medially and laterally (while maintaining an orientation parallel to the long axis of the bone) and pivot them slightly up and down until the maximum is found.
- **Posterior Length of the Calcaneus (PCAL):** Maximum length between the most anterior point of the posterior talar articular surface and the most posterior point of the calcaneus (on the tuberosity ignoring any extensive exostoses). Hold the calcaneus in anatomical position so that you are looking down on the articular surface. Place the fixed jaw of the calipers on the posterior margin of the talar articular surface and extend the movable jaw to the posterior surface of the bone. Move the calipers slightly up and down and medially and laterally to find the maximum. Avoid any exostoses.
- **Maximum Length of the Talus:** Maximum length between the most anterior point of the head and the posterior tubercle. Place the fixed jaw of the digital calipers on the anterior-most point on the head. Extend the movable jaw to the tip of the tubercle. Pivot the bone slightly in the jaws of the calipers to find the maximum.

B8.3 **Obtaining the Stature Estimate:**

B8.3.1 **White Males:**

- Calcaneus: [0.674 (MCAL) + 116.24] / 2.54 = point estimate in inches
  Point Estimate +/- (4.5) $\sqrt{}$ [(MCAL – 81.66)^2 / (569.2) + 1.04]

B8.3.2 **White Females**:

- Tibia: [1.66 (BB) + 50.27] / 2.54 = point estimate in inches
  Point Estimate +/- (3.8) $\sqrt{}$ [(BB – 67.85)^2 / (254) + 1.04]

B8.3.3 **Black Males:**

- Tibia: [1.313 (BB) + 75.36] / 2.54 = point estimate in inches
  Point Estimate +/- (3.9) $\sqrt{}$ [(BB – 77.62)^2 / (182) + 1.04]

- [1.115 (MCL) + 122.8] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) $\sqrt{}$ [(MCL – 48.81)^2 / (210) + 1.04]

- [1.14 (LCL) + 128.26] / 2.54 = point estimate in inches
  Point Estimate +/- (4.1) $\sqrt{}$ [(LCL – 42.98)^2 / (200) + 1.04]

B8.3.4 **Black Females:**

- Tibia: [1.142 (MCW) + 128.78] / 2.54 = point estimate in inches
  Point Estimate +/- (3.7) $\sqrt{}$ [(MCW – 29.03)^2 / (79) + 1.04]

- Talus: [1.046 (MTAL) + 97.55] / 2.54 = point estimate in inches
  Point Estimate +/- (4.5) $\sqrt{}$ [(MTAL – 53.67)^2 / (229) + 1.04]

B8.3.5 **White or Black Males:**

- Tibia: [1.145 (MCL) + 119.14] / 2.54 = point estimate in inches
  Point Estimate +/- (4.4) $\sqrt{}$ [(MCL – 48.37)^2 / (593) + 1.02]

- [1.054 (LCL) + 129.55] / 2.54 = point estimate in inches
  Point Estimate +/- (4.7) $\sqrt{}$ [(LCL – 42.67)^2 / (524) + 1.02]

B8.3.6 **White or Black Females:**

- Tibia: [1.556 (MCL) + 95.53] / 2.54 = point estimate in inches
  Point Estimate +/- (3.4) $\sqrt{}$ [(MCL – 42.93)^2 / (401) + 1.02]

- [1.393 (LCL) + 111.18] / 2.54 = point estimate in inches
  Point Estimate +/- (3.7) $\sqrt{}$ [(LCL – 36.58)^2 / (390) + 1.02]

B9.0 Byers et al. (1989):

B9.1 **Reference Populations:** Byers et al. provide models based on measurements of the metatarsals. Multiple regression models are available in the original paper, but offer only slight improvements in precision and require more complicated computations in the derivation of the prediction intervals. Byers et al. use data collected from American black and white males and females (Terry Collection and Maxwell Museum Collection) to develop estimation models that apply to the respective sexes and ancestral groups as well as combined sex models.

B9.2 **Bone Measurements:** Measurements should be taken to the tenths of a millimeter with digital calipers. The measurement descriptions are as follows:

- **Metatarsals 1-4 Length:** Taken from the apex of the capitulum to the midpoint of the articular surface of the base parallel to the longitudinal axis of the bone. Hold the metatarsal with the proximal end up. Place the fixed jaw of the caliper on the midpoint of the proximal articular surface and extend the movable jaw to the surface of the capitulum. Move the capitulum slightly back and forth to find its apex.
- **Metatarsal 5 Length (Morphological)**: Taken from the apex of the capitulum to the tip of the tuberosity at the proximal end. Place the fixed jaw of the caliper on the tip of the tuberosity and extend the movable jaw to the capitulum. Move the capitulum slightly back and forth to find the apex.

B9.3 **Obtaining the Stature Estimate:**

B9.3.1 **Black and White Males:**

- MT1: [14.3 (MET1) + 815] / 25.4 = point estimate in inches
  Point Estimate +/- 5.1 inches

- MT 2: [11.1 (MET2) + 873] / 25.4 = point estimate in inches
  Point Estimate +/- 5.5 inches

- MT 3: [11.2 (MET3) + 909] / 25.4 = point estimate in inches
  Point Estimate +/- 5.4 inches

- MT 4: [11.6 (MET4) + 910] / 25.4 = point estimate in inches
  Point Estimate +/- 5.4 inches

- MT 5: [10.6 (MET5) + 952] / 25.4 = point estimate in inches
  Point Estimate +/- 5.6 inches

B9.3.2 **Black and White Females**

- MT1: [13.9 (MET1) + 783] / 25.4 = point estimate in inches
  Point Estimate +/- 4.5 inches

- MT2: [11.5 (MET2) + 791] / 25.4 = point estimate in inches
  Point Estimate +/- 4.4 inches

- MT3: [11.6 (MET3) + 836] / 25.4 = point estimate in inches
  Point Estimate +/- 4.7 inches

- MT4: [11.9 (MET4) + 835] / 25.4 = point estimate in inches
  Point Estimate +/- 4.8 inches

- MT5: [10.2 (MET5) + 922] / 25.4 = point estimate in inches
  Point Estimate +/- 5.1 inches

SOP 3.5: FORENSIC ODONTOLOGY

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 27 April 2016
Citation: DPAA Laboratory Manual, SOP 3.5

0.0 PRINCIPLE, SPIRIT & INTENT: *Odontology evidence is analyzed and documented in an organized manner conducive to replication and verification.*

1.0 PURPOSE & SCOPE: This SOP outlines the procedures for forensic odontology at the CIL and applies to all odontologists and dental assistants/technicians. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 GENERAL PRINCIPLES & GUIDELINES: The Science Director establishes identifications after reviewing and analyzing multiple lines of evidence, including the results of forensic odontological comparisons.

The forensic odontologists are assigned cases involving dental remains by Laboratory Management, and typically produce as a result of their testing the Forensic Odontology Report (FOR). The FOR reports general descriptions of the dental remains (inventory, condition, trauma, etc.) along with characterization of any dental restorative work apparent in the remains. Comparisons of dental remains to records of missing persons are made at the request of Laboratory Management, who defines the list of reasonable candidates for identification using all available lines of evidence **(A4.1.5a)**.

2.1 **Location:** Dental tests are performed in designated locations in the CIL. The process may also occur at other locations where appropriate equipment and technology are available (e.g., medical examiner's office) **(A5.3.2)**. If the process occurs in other locations, deviation from this SOP is explained in the analytical notes **(A5.3.1)**. See DPAA Laboratory Manual, SOP 1.8 (Consult Case Management) for more details regarding off-site testing.

2.2 **Evidence Handling & Preservation:** Generally, evidence subjected to dental testing is usually robust in nature and not easily affected by handling, or by the ambient environment in the CIL. Usually, no special precautions or specimen preparation are required, however, in some cases adherent material may require removal for accurate testing to be performed. In these cases, the remains should be cleaned with tap water, a soft bristle brush (e.g. toothbrush), and allowed to air-dry. Any special treatments of remains during the testing process, such as reconstruction, should be discussed with the assigned forensic anthropologist prior to the treatment and reflected in the analytical notes once complete **(A5.3.2)**. Further guidance on evidence handling and preservation are found in DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).

2.3 **Definitions:** For the purpose of this SOP and subordinate documentation, the following definitions apply:

- **Dental Remains:** Teeth and/or supporting skeletal elements (i.e., maxilla and mandible) and prostheses.
- **Apices:** Plural of apex, the end of the tooth root.
- **Impulse:** Unit of measurement of exposure time. Exposure time is the interval of time during which x-rays are produced in a series of bursts or pulses.
- **Kilovoltage Peak (kVp):** Controls the speed of the electrons. Increasing the kVp increases the energy or quantity of x-rays produced.
- **Milliampere (mA):** Controls the number of electrons produced per second. Increasing the mA increases the quantity of x-rays produced.

3.0 TESTING PROCEDURES: The following testing procedures are used by CIL odontologists. Additionally, odontologists adhere to the applicable provisions of DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation) for documenting and reporting MNI, taphonomomic observations, reconstruction of evidence, etc.

3.1 **Assessment of Condition of Dental Remains:** The overall condition of the dental remains, to include DNA potential, should be generally described in the preliminary assessment (see DPAA Laboratory Manual, Evidence Management & Security), analytical notes, and the FOR. Descriptors and their definitions are:

- **Excellent**: The dental remains are in essentially perfect condition being devoid of fractures or loss of tooth structure. The elements are hard and dense and can withstand protracted storage and repeated handling during analysis. The likelihood of obtaining a mtDNA sequence from the teeth is very high due to quality and/or quantity of the remains.
- **Good**: The dental remains are devoid of significant material loss due to fracture, attrition, abrasion, or

erosion. Mild loss of crown morphology or root cementum is evident. However, general anatomical features of the teeth are still present and confident categorization is possible. The remains largely retain their density and hardness, although they may be rarified in spots, but they can withstand protracted storage and repeated handling during analysis. The teeth are most likely to yield a mtDNA sequence.

- **Fair**: There is moderate material loss of the dental remains, especially of tooth structure, due to fracture, attrition, abrasion, erosion and/or other taphonomic processes. Loss of crown and/or root anatomy is evident which may hinder categorization. The remains may display loss of density and some brittleness requiring careful storage and delicate handling during analysis. The teeth may or may not yield a mtDNA sequence.
- **Poor**: There is significant loss of tooth structure, due to fracture, attrition, abrasion, erosion and/or other taphonomic processes. It may be difficult or impossible to categorize the tooth. The remains may display significant loss of density, be extremely friable, and may require special storage and extra careful handling during analysis to preclude damage or degradation. It is unlikely that a mtDNA sequence may be obtained from the dental remains.
- **None**: Only applies to mtDNA. The dental remains are of such quality or quantity that extracting a mtDNA sequence is not possible.

The condition of the dental remains may be expressed as a combination of excellent, good, fair, and poor if the appropriate caveats and descriptions are included (e.g., the remains range from fair to excellent with the posterior dentition generally being in better condition).

3.2 **MNI:** The minimum number of individuals (MNI) represented by the dental remains should be described in the preliminary assessment and the analytical notes. The reasoning for the determination should be noted (e.g., duplicated teeth or gnathic portions). MNI need not be mentioned in individual reports as these by definition only describe a single set of dental remains. MNI of the group remains should be described in the group report.

3.3 **Dental Comparisons:** Dental remains are examined physically and radiographically in order to compare the ante- and postmortem dental information. Dental remains are radiographed and the images stored on the DPAA network in accordance with (CIL-HQ Dental Radiography) of this SOP. Comparison tables should be used whenever practical.

3.3.1 **Records Based Analysis:** A dental records comparison is utilized when relevant radiographs are unavailable. The examination may include the following:

- Descriptions of the dental remains are entered on appropriate forms.
- Dental charts are completed noting all dental conditions.
- When indicated, information obtained from the physical examination is transferred onto a comparison sheet/table containing information on all thirty-two teeth.
- Antemortem dental charts are created by screening the dental records of the name association(s). The antemortem dental charting is then transferred to a comparison sheet/table, if applicable.
- In cases where a name association(s) is not available, a CARIS (Centralized Accounting Repository and Information System) search may be performed to produce a list of possible associations. A circle search can also be performed (using the software program "Bright Light") on the location where the remains were recovered to produce a list of possible individuals.
- The antemortem and postmortem information is compared for similarities and discrepancies. Discrepancies may be explainable or non-explainable depending on the overall context of the case. In cases where a discrepancy can be explained, identification may be possible. If the discrepancy is totally unexplainable or dentally impossible, and error has been ruled out, the result is exclusion (see below). Possible explainable and unexplainable discrepancies may include, but are not limited to:

    - Dental procedures completed after the last documented record entry, or preexisting restorative/extraction treatment not listed within military dental records.
    - Clerical charting errors.
    - Different interpretations of teeth present or missing in a patient's dentition. Differences potentially due to "mesial drift."
    - Teeth restored in the antemortem evidence yet unrestored in the remains, to also include different restored surfaces.
    - Teeth listed as missing in the antemortem evidence yet present in the remains.
    - Third molars marked as "missing" without the use of dental radiographs.
    - Written records and/or radiographs within a patient's antemortem evidence which belong to another individual.

- If an antemortem/postmortem dental match is considered, an attempt to quantify the match with the OdontoSearch Program (Adams 2003a, 2003b) may be attempted. OdontoSearch assists in determining the relative frequency of a postmortem dental restorative pattern in comparison to appropriate databases, thereby estimating the frequency of this pattern in various populations. The statistical analysis, with appropriate confidence interval estimation, may add further support that the recovered remains are indeed the person in question and not, through chance, the remains of another individual. OdontoSearch is particularly useful when sufficient postmortem and antemortem dental evidence is available. However, if the postmortem or antemortem evidence is scant, comparisons may not provide useful results and are therefore not indicated. When indicated, use the following procedures:

  - Access the OdontoSearch program through the website: www.odontosearch.com.
  - Follow the instructions as written within the website for performance of a comparison.
  - Print the results of the comparison and add to the notes.

Special Instructions Regarding Caries: Dental caries are generally not a strong or useful tool when comparing antemortem to postmortem dental records and should only be used in limited cases. The detection and diagnosis of a carious lesion reflect the opinion of the odontologist which is based on his/her training, experience, equipment available (e.g., instrumentation, lighting, dental chair, X-ray machine), as well as the environment (e.g., clinical or field setting). Further, the diagnosis of caries on remains is complicated by taphonomic effects including, but not limited to, the dehydration and loss of pulp tissue. This results in a change in the appearance of a tooth and may possibly alter the tactile feel of coronal grooves, pits, fissures, and the appearance of the carious lesion itself.

Altogether, these factors may often result in significant inter-observer variability among dental professionals as to the actual presence/absence, degree, and severity of a carious lesion. Consequently, it typically is not possible to objectively determine the presence or absence of charted antemortem caries that are not verified radiographically. The odontologist may choose to chart carious lesions on dental remains but should limit them to those that are visually or radiographically large in size.

3.3.2 **Radiographic Based Analysis:** A dental radiographic comparison is utilized when relevant archived radiographs are available.

The radiographic examination at CIL-HQ includes the following:

- Radiographs are prepared in CIL-HQ in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).
- The antemortem radiographs used for the comparison are scanned by appropriate computerized software designed for scanning images or digitally photographed on a x-ray viewer.
- The scanned antemortem radiograph and the postmortem digital radiograph are imported into a word processing document or Powerpoint where they can be pasted adjacent to each other and visually compared. A comparison can also be made by visually comparing the postmortem digital images with the antemortem radiograph.
- Initial comparison may reveal the need for adjustment of the angle and rotation of the dental remains so that subsequent postmortem radiograph(s) more closely approximate the antemortem radiograph(s). A subsequent comparison is then made.
- Ante- and postmortem radiographs are analyzed for patterns that have similar features. Comparisons are made on the basis of these features which include, but are not limited to:

  - Overall morphology of the teeth including shape, pulp chambers, root canal systems, and other anatomical features.
  - Shape/size/radiopacity of the restorative treatment/material.
  - Osseous anatomical landmarks and trabecular patterns.
  - Anomalies (e.g., pulp stones, changes in density of the osseous tissue).
  - Pathology, such as osseous and periapical lesions.
  - Presence and absence of teeth.
  - Socket morphology.

Radiographic based analysis at CIL-OF is conducted using the same process as at CIL-HQ. See DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability) for a description of the instrumentation.

3.3.3 **Professional Opinions:** While the odontologist does not identify individuals, the odontologist may express a professional opinion based on interpretation of the observed characteristics. Significant characteristics for basing an opinion are noted in the Forensic Odontology

Report (FOR). The odontologist should arrive at one of five below opinions based on the antemortem to postmortem comparison, although in rare instances cases may require the use of other descriptors:

- **Positive Identification:** The comparison of the postmortem dental remains to the antemortem dental records exhibits multiple similar unique restorative and/or anatomic features, or radiographic comparative matches which support the positive identification of the individual. In the opinion of the odontologist, the antemortem and postmortem dental information are from the same individual, i.e., the dental remains are those of the individual in question. There are no irreconcilable discrepancies present, which would exclude the individual in question.
- **Probable Identification:** The comparison of the postmortem data to the antemortem dental records exhibits similar unique restorative and/or anatomic features which support the identification of the individual. There are enough concordant features to determine that the remains are probably (i.e., more likely than not) those of the individual depicted in the antemortem records, although not enough to be completely certain. No unexplainable discrepancies are present which would exclude the individual in question.
- **Possible Identification:** The comparison of the postmortem dental data to the antemortem records exhibits similar restorative and/or anatomic features, but due to the quality of either the postmortem remains or the antemortem evidence, or lack of unique characteristics, it is not possible to definitively establish dental identification. There are enough similar features to determine that the remains could be those of the individual depicted in the antemortem records. No unexplainable discrepancies are present which would exclude the identification of the individual in question.
- **Exclusion:** The comparison of the postmortem data to the antemortem records yields restorative and/or anatomic features that are different and inexplicable. No reasonable explanation is possible for the differences. The remains are not those of the individual in question.
- **Insufficient Evidence:** The odontologist is unable to arrive at an opinion due to the lack of dental information.

3.4 **Bite Mark Analysis**. CIL odontologists may occasionally be called upon to offer opinions to law enforcement personnel on pattern injury analysis and comparison/association to potential suspects. Specific procedures for such testing are beyond the scope of the SOP, but Dorion (2004), Johansen and Bowers (2000), Bowers and Bell (1997), and the American Board of Forensic Odontology (ABFO) web site are recommended for further information and more detailed procedures. Professional opinions resulting from analysis are also found on the ABFO website. Bite mark cases are usually consult cases and the below guidance, as appropriate, applies. DPAA Laboratory Manual SOP 1.8 (Consult Case Management) should be consulted prior to engaging in bite mark analysis.

3.5 **Dental Prosthetics & Appliances:** Analysis of dental appliances and prosthetics is conducted as part of dental testing and results in a FOR written in a format modified from that found in Annex A (Forensic Odontology Reports) of this SOP. Required descriptive information for dental prosthetics and appliances includes, but is not limited to:

- Type of appliance.
- Location of teeth replaced and restored.
- Material(s) from which the appliance is made.

In such cases, a material evidence section is included in addition to the dental remains and other sections. When dental prosthetic materials are recovered in the absence of biological remains, only the material evidence and other pertinent sections of the FOR are completed.

3.6 **Special Instructions for Consult Cases:** Instructions for consult case management are found in DPAA Laboratory Manual, SOP 1.8 (Consult Case Management) (**A4.4**). The following special procedures apply to odontological consult cases:

- Once the case is reviewed, accepted, and assigned to an odontologist by Laboratory Management, the lead odontologist arranges with the customer to perform the dental testing. An on-site visit to the customer's facility is preferred over having to perform the case work at the CIL. If testing is performed at the CIL, it should be completed in a single day with a customer representative present in order to avoid accessioning evidence into the CIL (see SOP 1.8).
- The consult case team is comprised of two odontologists. One odontologist serves as the analyst, the other the peer reviewer.
- Prior to meeting with the customer, a case file should be prepared to include the Management Review Checklist and a completed Understanding of Consultation Responsibility for signature by the customer. The latter is signed prior to starting any analytical work.
- Both odontologists **separately** examine the remains and dental records. The analyst assesses all the

antemortem and postmortem evidence, complete the forms, and perform comparisons and other tests, as appropriate.
- As part of the documentation of the testing. The postmortem dental radiographs are either printed or burned onto a CD. All relevant images are included in the case file.
- The analyst renders a professional opinion (see above) and prepares the Dental Identification Summary Report in accordance with Annex A (Forensic Odontology Reports) to this SOP.
- The peer reviewer performs the peer review as with any other FOR. Once the peer review is completed and concurrence achieved, the analyst finalizes and signs the report. Only the analyst's signature appears on the report.
- The **original** Dental Identification Summary Report and the analytical notes are left with the customer. **Copies** of the completed Understanding of Consultation Responsibility form, signed by the customer, are also given to the customer.
- Prior to departing the customer location the analyst ensures the following documentation (either originals and/or copies, see above) is present in the case file:

  - Antemortem Dental Record form.
  - Antemortem radiographs.
  - Postmortem Dental Record form.
  - Postmortem radiographs and photographs.
  - Dental Identification Summary Report.
  - Peer Review documents.
  - Management Review Checklist.
  - Understanding of Consultation Responsibility form (signed by the customer).
  - Any other pertinent notes or documents.

- Upon return to the CIL, the analyst writes the close-out memorandum for signature by the Science Director. This closes out the case. A close-out memo template is available on the DPAA network.

3.7 **Special Instructions Regarding Dental Restorations & Restorative Materials:** The design of dental restorations and their elemental composition may vary from country to country. The characteristics most frequently observed in non-U.S. style dentistry from the Korean War era and prior include:

- Prefabricated crowns.
- Swage crowns.
- Non precious metal crowns.
- Crowns with low gold content.
- Full coverage or open faced crowns on unprepared teeth.
- Irregular shaped pontics and cantilevers designed to close inter-proximal spaces.

The above general characteristics may assist the odontologist in identifying non-U.S. remains. The odontologist must use care; however, not to inadvertently exclude an individual as there is an overlap in restorative care between countries (e.g., swage crowns and prefabricated crowns were commonly used in the U.S., but the teeth were prepared prior to crown insertion; Japanese dentistry during the WWII era included gold foils and amalgam restorations, both common restorative materials in the U.S.).

4.0 DOCUMENTATION: Analyses and results are recorded in the analytic notes in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). The interpretation of the dental records is explained in the FOR. Preparation of the FOR is discussed in Annex A (Forensic Odontology Reports) to this SOP. Templates for the FOR and other forms of documentation are found on the DPAA network.

For case consolidations that have been previously radiographed, change the Patient Information in the Schick CDR program to reflect the current CIL number.

Radiographs of the dental remains are initially captured and saved on the DPAA network T-drive. The T-drive access is limited to those individuals who are trained in dental radiography (dentists and dental assistants/technicians). Dental radiographs are documented on the T-drive as follows:

- Radiographic images are saved on the Schick CDR generated fields labeled as, "Last Name, First Name, ID#" as follows:

  - For South East Asia (SEA):

    - Last Name: CIL number
    - First Name: SEA
    - ID#: REFNO

  - For other losses:

    - Last Name: CIL number
    - First Name: Conflict (WWII, Korea, etc.)
    - ID#: Location (e.g., PNG, Irian Jaya,), MACR#, etc.

- Scanned antemortem films are saved into the "FOR" folder of the CIL Case Files. These scanned images are saved with adequate documentation,

including the individual's last name, type of image, and if known, the date of the original exposure.

Radiographic images may be used by anthropologists to age dental remains. Since anthropologists do not have access to the T-drive, select dental radiographs may be placed on the N-drive. These radiographs are saved into the "FOR" folder of the CIL Case Files. These images are saved with a general description of the dental remains (e.g., third molar radiographs, radiograph of tooth #32, etc.).

5.0 SURETY: The final FOR, to include consult cases, is peer-reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). All analytical notes, including stored digital radiographs, are made available to the peer reviewer at the time the report is reviewed. Dental tests and documentation are also subject to internal and external audits in accordance with DPAA Laboratory Manual, 4.3 (Audits).

Analysts should prepare radiographs to the following standards:

- Minimize distortion.
- Capture all relevant dental information as an image.
- Maximize resolution.

The mA, kVp, and impulse (time) settings of the Nomad system affect the quality of the image. The Schick CDR and Adobe Photoshop programs may also be used to enhance image quality. In such instances, the Digital Image Enhancement (DIE) Form is completed in accordance with DPAA Laboratory Manual SOP 3.0 (Analytical Notes & Documentation) and SOP 3.1 (Forensic Imaging).

6.0 SAFETY: All dental remains are handled in accordance with appropriate safety procedures. There are no inherent safety hazards involving testing of dry-bone skeletal and dental remains. Wet-bone and dental remains, i.e., remains with fresh adherent soft tissue are handled with appropriate caution as detailed in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

Appropriate radiation hygiene measures are taken to minimize exposure to ionizing radiation. Specifically:

- The Nomad system should be operated only by trained personnel who have been instructed in radiation safety and in the operating instructions set forth in the user's manual. Any assigned dental officer or dental assistant/technician can provide instruction in proper dental radiographic techniques.
- Dental radiographs are taken at the lowest possible setting necessary to produce a quality digital image (approximately 2.3 mA and 60 kVp for 0.6-0.12 seconds). To further limit backscattered radiation exposure, the operator is required to utilize/attach the acrylic shield to the end of the x-ray cone during the exposure process.
- The Nomad system is subjected to radiation protection surveys annually. Surveys are performed in conjunction with annual system maintenance. Quality Assurance keeps the results of the surveys.
- Periodic training is offered concerning radiation safety.

Annex A (Forensic Odontology Reports) (A5.10.1, A5.10.2a-k, A5.10.8)

A1.0 PURPOSE & SCOPE: This annex outlines the basic formats and procedures used by analysts when writing forensic odontology reports (FORs).

A2.0 GENERAL: FORs are typically written in the laboratory or office setting. These reports document the findings of the analyst(s) after examining dental evidence.

Although the audience for FORs is diverse (e.g., other professionals, family members, casualty officers), its first goal is to provide a competent and professional presentation of the test results. However, with such a diverse audience, analysts should avoid excessive and unnecessary use of jargon or obfuscating technical phrases.

If exceptional circumstances dictate, deviations from the DPAA Laboratory Manual, Appendix 5.2 (Style Guide) are allowed.

A3.0 REPORT TYPE & CONTENTS: A template example of the FOR format is found on the DPAA network. The analyst should start with a clean report template for each new report to ensure the currency of the template.

A3.1 **FOR (Long Version):** The long version of the FOR typically contains the following sections:

- **Title Block:** The title block on the first page is in Times New Roman Font and contains:
  - Report title at the top centered, bold, 16 pt, all caps and in Times New Roman. An example includes:
  - Organization centered, bold, first letter in caps, 14 pt, in Times New Roman.
  - Date (month and year) centered, bold, 14 pt, with the first letter in caps, in Times New Roman.
  - An example of the above guidance includes:

FORENSIC ODONTOLOGY REPORT:
CIL 1991-097

DPAA Central Identification Laboratory

22 January 2007

- **Dental Remains:** This section includes:
  - Description of dental remains (e.g., condition, restored/unrestored, type of restoration, etc.).
  - Radiographs taken and radiographic specifications.
  - Dental photographs taken.
- **Dental Material Evidence:** If applicable, include:
  - Type of appliance.
  - Location of teeth replaced and restored.
  - Material(s) from which the appliance is made.
- **Antemortem Dental Information**: This section includes:
  - Listing of all relevant antemortem dental records, specifically:
    - ❑ Form type and number.
    - ❑ Name that is present on the form.
    - ❑ Note if the initial exam is signed or initialed by a dental officer or left unsigned.
    - ❑ Date the form was initiated.
    - ❑ First and last entry dates or dates of pertinent treatment on the form.
  - Antemortem dental radiographs: Note condition of the radiographs and how they were found (where located/labeled).
  - Dental casts/models/photographs.
  - Laboratory prescriptions.
  - Any additional evidence that aids in determining an individual's dental status.
- **Comparison:**
  - Detail the comparisons made regarding:
    - ❑ Dental radiographs.
    - ❑ Charting/record comparison.
    - ❑ Photographs.
    - ❑ Study models.
  - Describe and explain any inconsistencies.
- **Opinion:** The opinion of the odontologist is expressed.
- **Signature Block:** The name(s), function(s) and signature(s) of the person(s) authorizing the test report are indicated.

A3.2 **FOR (Dental Prosthetics & Appliances Only—No Remains):** The format for FORs dealing only with material evidence (i.e., no remains present) is as follows:

- Title: Forensic Odontology Report: CIL ####-###-A-01 (or A-01 to A-0X) (in accordance with SOP 3.6, dental

appliances and other unique forms of identification are assigned the first artifact numbers).
- Section titled **Dental Material Evidence** (vice **Dental Remains**): Describe dental appliances/prosthetics and provide photograph(s).
- Section titled **Antemortem Dental Information**: Provide a list of all antemortem dental records of every individual involved in the related incident (similar to a group remains report).
- Section titled **Comparison**: as above.
- Section titled **Opinion**: as above.

A3.3 **FOR (Short Form):** Also called the Dental Identification Summary Report, this an abbreviated version of the FOR used primarily for consult cases. The report is a fill-in-the-blank form that can be hand-written, signed and presented to the customer. Required fields for completion include:

- Case number (include both the CIL number and the customer agency case number).
- Name of deceased.
- Odontologist/analyst name.
- Customer agency and place of examination.
- Comparison/Compatibility Table.
- Remarks (include information on how the opinion was reached).
- Opinion.
- Signature of analyst.
- Date of examination.

A3.4 **Miscellaneous Considerations:** The following are considerations relating to the FOR text organization, structure, and inclusions:

- Correct and consistent nomenclature and terminology should be used throughout the FOR including section headings, figure captions, and in the descriptive text.
- Section headings should be in 14 pt font while descriptive text should be in 12 pt, all in Times New Roman.
- Describe any accession consolidations, as necessary.
- Appropriate photographs and radiographs, prepared in accordance with relevant SOPs, documenting the remains must be included in the report and referenced in the text. For example, "the draining sinus on the left lower tibia shows new bone formation (see Figure 1)." Because it is ultimately scanned, authors should avoid putting images on the signature page of the FOR since a significant decrease in image quality occurs.
- The following guidance applies to figure and photograph captions:
  - When displaying an item(s) being tested, the figure caption should include the CIL accession number and the item description.
  - Graphic or photographic exemplars should be clearly identified.
  - Scale increments should be indicated in the caption.
  - An example of the above guidance includes:

    Figure 1. CIL 1993-236-I-01, dental remains, occlusal view of mandible. Scale is in centimeters.

- Include any table(s) that may be appropriate for the documentation of the biological materials

SOP 3.6: MATERIAL EVIDENCE ANALYSIS

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 23 September 2016
Citation: DPAA Laboratory Manual, SOP 3.6

0.0 PRINCIPLE, SPIRIT & INTENT: *Material evidence is tested and documented in an organized manner conducive to replication and verification.*

1.0 PURPOSE & SCOPE: This SOP outlines procedures for the testing of material evidence accessioned into the CIL. This SOP applies to typical CIL cases and is used by all analysts working for CIL or under its auspices.

In situations where unusual circumstances preclude the adherence to this SOP, documentation must indicate why the procedures could not be followed, the alternative procedures performed, and an opinion on how the accuracy and reliability of the resulting tests were affected. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met **(A4.1.5a)**.

2.0 GENERAL PRINCIPLES & GUIDELINES: Material evidence testing provides support for identifications in the area of time, space, and context, as well as associating specific items of evidentiary value (e.g., identification media, personal effects, military equipment) to specific individuals or groups of individuals. Material evidence may also provide evidence that can help to interpret the circumstances of a loss.

Material evidence testing of personal effects and military items aims to achieve individuation of items whenever possible. The ultimate goal is to aid in and support casualty resolution by providing documented circumstantial evidence. This type of testing is reported in a Material Evidence Report (MER).

Material evidence testing of life-sciences equipment aims to achieve crash interpretations of items whenever possible. The ultimate goal is to support casualty resolution by providing documented circumstantial evidence. This type of testing is reported in a specialized type of MER called a Life-Sciences Equipment-Material Evidence Report (LSE-MER).

2.1 **Location:** In Hawaii, material (non-biological) evidence testing is typically conducted in a laboratory setting, typically in the Material Evidence Laboratory at CIL-HQ (primarily Room 337). Material Evidence is tested in Room 111 at CIL-OF and in Room 125 at CIL-WP. Less typically, external factors may require that testing be conducted in the field or in a laboratory setting other than these examination areas. In these cases, reported results indicate the conditions under which the tests were made. Tests are stopped when conditions in these areas jeopardize the results of the tests **(A5.3.1, A5.3.2)**.

2.2 **Apparatus & Materials**: The following materials are readily available in the CIL for use in material evidence testing.

2.2.1 **Instruments:** In most cases, the analyst can conduct testing through macroscopic examination. When necessary, a hand-lens magnifier and/or a light microscope can be used.

Calipers and balances are required for metric analysis and require maintenance and performance checking in accordance with DPAA Laboratory Manual, SOP 3.2 (Measurement Observation & Traceability).

More specialized equipment (e.g., ring sizers, alternate light sources, SEM) is sometimes used. The instruments used and the degree of precision needed for any particular test procedure are those specified in the primary reference for the operation being performed.

Dental scalers and explorers, scalpels and other blades, as well as soft-bristle brushes, such as paintbrushes or toothbrushes, are sometimes necessary for cleaning (when applicable). Foam pads are used to protect delicate or fragile artifacts undergoing testing.

2.2.2 **Exemplars:** In most cases, material evidence can be compared to exemplars and master reference types of material evidence, including published literary, photographic, and video references. These are found on the internet, stored in the CIL Libraries or DPAA network, and/or in the Material Evidence synoptic cabinets at CIL-HQ and CIL-OF. None of these materials require performance checks or scheduled maintenance. Specific guidance on the use of exemplars during the test process is discussed below.

2.3 **Evidence Considerations**: Special precautions and measures pertaining to material evidence may sometimes be required prior to and during testing, including:

2.3.1 **Maintaining Provenience:** Provenience must be maintained at all times during the testing process. If probative and relevant to the reporting, provenience is presented in Table 1 or in the text of the Material Evidence Report (MER) (see Annex A [Material Evidence Reports] and Annex C [Life Sciences Equipment Material Evidence Reports] of this SOP).

The following information must be placed on the interior labels of the bag(s) containing the material evidence:

- Artifact number (e.g., CIL 2006-081-A-01).
- Designation of the identified object (if obtained).
- Number of items (see below for counts).

The following information does not have to be included on the interior labels of the bag(s) containing the material evidence:

- Initials of the recovery leader.
- Date the evidence was bagged in the field.
- Bag number.
- Mission identifier (e.g., 10-4LA, 109th JFA, or 11-2KS JRO).
- Provenience (e.g., N500/E504).
- Depth (e.g., 3-35 cmbs).

The Artifact number (e.g., CIL 2006-081-A-01) must be written with a large-tipped permanent black marker on the exterior of the bag(s) containing the material evidence.

If the items of the same artifact number (e.g. A-01) are bagged in separate bags (such as the left and right sides of a pair of boots), bag designations must be written on the outside of the bag as well (i.e. Bag 1 of 2).

Items from lot analyses (see below), or multiple individual item identifications, are not lumped together but are separated by provenience and/or association with an individual. This allows material evidence to be analyzed and described as a lot but having different proveniences and accession numbers to be returned to families when the situation warrants.

2.3.2 **Cleaning & Stabilization:** Cleaning and stabilization of material evidence is largely left to the analyst's discretion. Evidence having adherent soil, or other material, that precludes making a requisite observation should be cleaned using appropriate methods and, if wetted, allowed to air dry before examination. Items to be photographed should be cleaned as thoroughly as possible in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).

The analyst documents cleaning and stabilization methods, including equipment and/or chemicals used, in the analytical notes and the final material evidence report (MER). Cleaning procedures that deviate from general methods (e.g., Dremel motor tool) should also be annotated.

Note: Stabilization is regarded as temporary.

2.3.3 **Reconstruction:** Fragmented or damaged items should be reconstructed prior to testing in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).

2.3.4 **Handling Precautions:** Material evidence is generally robust in nature and not easily affected by handling, or by the ambient environment in the Laboratory. Use care in handling more fragile evidence. Evidence in a poor state of preservation can be damaged while being tested. For example, the jaws of metal calipers can scratch or puncture the surface of poorly preserved fabric or metal **(A5.3.1, A5.3.2)**.

3.0 TEST PROCEDURES: Test procedures are as follows:

3.1 **Preliminary Assessment:** Preliminary assessment is conducted in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). During preliminary assessment all material evidence believed to coincide with a single case should be examined at the same time and separated from different case materials so as to prevent contamination and/or commingling of specimens.

3.2 **Assessment of Evidentiary Value:** Material evidence must be assessed for evidentiary value (i.e., the ability to support identification, the circumstances and context of loss, and case resolution) by a member of Laboratory Management. During the assessment all material evidence is triaged into two groups:

- Items having no probative and thus no evidentiary value.
- Items having probative/evidentiary value, thereby requiring full and complete testing in accordance with applicable SOPs.

These groups are placed into separate evidence containers and subject to the procedures outlined below, as appropriate.

3.3 **Treatment of Non-Evidentiary Items:** A Laboratory Manager can authorize administrative removal of the non-evidentiary items from cases after physically checking the relevant evidence in the accession.

The analyst prepares the appropriate Management Review of Non-Evidentiary Items form found on the DPAA network, listing those materials having no probative and/or evidentiary value that are to be removed from evidence.

A Laboratory Manager signs the form after he/she reviews the items. The analyst then prepares (an) evidence containers(s) for those items and seal(s) them using yellow tape and in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

The non-evidentiary items are retained until the completion of the material evidence testing for the evidentiary items, if any, related to the case (see below) and then disposed of in accordance with SOP 1.3.

No testing or further assessments of the non-evidentiary items is required, however, they may be reassessed at any time and deemed probative, as appropriate. In such instances the items are deemed material evidence and undergo testing in accordance with the below procedures.

The completed Management Review of Non-Evidentiary Items form is stored in the case file folder for the accession from which the items were removed. The form acts as the disposition document for the non-evidentiary items. The review is noted in the MER including who performed it and the date.

3.4 **Testing of Evidentiary Items:** Ultimately, material evidence is identified, often by function, by comparison with items from a known source or exemplar. Items that are recognizable through common knowledge (e.g., pencils, toothbrushes, U.S. penny) may be immediately compared, matched, and identified (see below). For items needing more detailed analysis, the following general procedures are used:

3.4.1 **Identify Material Class:** General material class (i.e., cloth, metal, composite/resins) should be identified. This step is primarily an organizational sorting technique.

3.4.2 **Assign the Item to a Group or Class:** More precise and/or additional classification is based on attributes or characteristics shared by all members of a group of items (e.g., harness links). This determination is made on the basis of morphologic, metric and/or functional attributes. The analyst measures the length, width, thickness, weight and any other additional analyst-defined measurement of the item, as appropriate (see below).

3.4.3 **Identify Specific Attributes:** During analysis, relevant individual or specific attributes should be identified. Individual attributes are unique to only one member of a class of material evidence and aid in the determination of the function and identification of an unidentified item.

3.4.4 **Compare & Attempt a Match:** The unknown item should be compared to applicable exemplars in order to determine a match. Matches can be made to exemplars using one or more of the following comparisons:

- Physical.
- Literary/descriptive.
- Photographic/video.
- Metric.

The match can also include spatial and contextual relationships, such as geographic and temporal distribution of materials (e.g., by using exemplars, a questioned item could be identified as a D-ring from the Master Reference PCU-3/Torso Harness used during the Vietnam Conflict). When the analyst determines that the unidentified item matches the exemplar, the analyst is suggesting the class and individual attributes of the unidentified item are consistent with the exemplar.

Document the results of the match accordingly, as follows:

- If you can identify the item, make a positive statement. For example, "This object is a M-1910 Canteen Cup."
- If you think you know what the object is, state, for example: "It is consistent with a U.S. Army Canteen Cup."
- If the object is a component part of a complex item, provide the name and location on the complex item. For example, "This specimen is the terminal snap buckle of the shoulder strap of the 1910 Series, 1935 Combat Field Pack."

There are several Federal Stock Catalogs available. The analyst should include the federal stock catalog name and number and the federal stock number of the item undergoing testing in the analytical notes and MER, when possible.

If you do not know what an object is, describe its morphology and material. Descriptions should be limited to those that are probative. Analysts should avoid extensive descriptions if they are not necessary. Due to the non-specific nature of some classes or groups of material evidence, some items cannot be identified beyond the material type or functional group. These items cannot be identified specifically as to function as many items may have a general function (e.g., fragments of webbing).

3.4.5 **Individual Versus Lot Analysis:** Items undergoing testing may be analyzed individually, or identical and/or similar items may be conducive to lot analysis.

3.4.5.1 **Individual Analysis:** Individual analysis and numbers are used when items are unique or similar but have different individual attributes (e.g., boot soles, boot uppers, rings, watches, knit fabric versus herringbone twill, pocket knives).

For some situations, differing items that are contextually related may be analyzed and reported as one item. For example, a wallet and its contents may all be considered one item (e.g. A-01). However, the analysis and reporting of the individual items within the wallet can be numbered as A-01a, A-01b, A-01c, etc.

3.4.5.2 **Lot Analysis:** The intent of lot analysis is to avoid repetitive artifact descriptions while maintaining the provenience of each item. Lot analysis is used when numerous **identical** Category C, D, and E items (see below) are present (e.g. Type 2, Class II, Style 21 buttons), or such items as bulk fabric with the same weave pattern, miscellaneous ferrous metal, flat glass, curved glass, etc. Lot analysis can also be used when numerous like items of similar use are present (e.g. US Coins, load bearing equipment). The following guidance is provided:

- When sets of identical/similar items are present, each set should be assigned a separate number by provenience– **but can be written up together**.

  For example:

  CIL 2001-178-A-01 Snap, Lift-the-Dot n = 2
  CIL 2001-178-A-02 Snap, Lift-the-Dot n = 3
  CIL 2001-178-A-03 Snap, Lift-the-Dot n = 6

  A single descriptive analysis would be written for all of the snaps but the lot would have three accession numbers since they are each from a different provenience. A statement of association would then be made in a table or in the text.

  A-01 is associated with Feature 4, Burial 2
  A-02 is associated with Feature 5, Burial 7
  A-03 is associated with Feature 7, Burial 9

- Like/similar items that can be associated with different individuals always have separate artifact numbers (i.e., if there are two identification tags for two different individuals).
- During lot analysis, separate items by provenience and maintain separate labeling and bags.
- Lot analysis of component parts of larger items, such as shoe parts, LBE, etc., is allowed under limited circumstances (e.g., their association within a recovery scene) in consultation with Laboratory Management.
- During lot analysis separate items by provenience and/or association with an individual (see above).

3.4.6 **Additional Guidance to Analysts:** The following guidance is provided for consistent testing of material evidence and should be reflected in the analytical notes and MER, as appropriate.

3.4.6.1 **Terminology & Nomenclature:** Correct and consistent terminology and nomenclature should be used throughout the test process including descriptions of component parts of larger objects.

Terminology and nomenclature should match that used in the exemplars referenced, including non-military exemplars (e.g., watch, shoe, jewelry catalogs).

Standard anatomical and geometric terminology (e.g., proximal, distal, anterior, posterior, circular, rectangular, conical, truncated cone) should be used to describe material evidence.

When possible, the appropriate terminology for specific classes of items should also be used (e.g., obverse and reverse for coins, blade and bow for keys, uppers for shoes).

Examples of the correct use of terminology and nomenclature include:

- Not "Jungle Boot" but "Direct Molded Sole Tropical Combat Boot"
- Not "ID Tag Chain" but "Necklace, Identification Tag, Bead Type"
- Not "Big Button" but "Type II, Class D, Style 20 large 4-Hole Sewing Button"

The only exception to this guidance is when describing an identification tag. The descriptor should read, "Identification tag (NAME)". Use the body of the analytical description to provide specific details (e.g., "Item A-01 is an M-1940 Identification Tag").

3.4.6.2 **Use of Exemplars:** Exemplars are included, where appropriate, and cited correctly in the analytical notes and MER (see Appendix 5.2, Style Guide, to this Laboratory Manual). The use of exemplars is left to the discretion of the analyst and should be supported by the peer reviewer.

If the nature and function of an item is general knowledge (e.g., a generic pocket knife, button, snap) then inclusion of a graphic exemplar in the report is not necessary. If the item undergoing testing is a component part of a more complex item, a graphic exemplar may be required to illustrate and confirm the identification (e.g., line drawing, photographs, text descriptions, tabular dimensions in a specification).

Analysts should attempt to obtain two sources when using exemplars from the internet. Internet exemplars can be notoriously unreliable. If a specific identification is made from an internet exemplar, the analyst should try to find a second confirmatory source. Avoid exemplars from auction or retail sites as the illustrated object may be removed from the web page in the future.
It is recommended that when analysts find internet exemplars for rare or obscure items that they contribute a print-out of the website to the appropriate binder in the material evidence library.

3.4.6.3 **Listing of Material Evidence:** Typically, items analyzed and reported through an MER are numbered with an A-01, A-02, A-03 system (i.e. CIL 2001-188-A-01, DPAA Laboratory Manual, SOP 1.7 [CIL Case File Management]), independent of individuals associated with a case. However, Laboratory Management may occasionally assign material evidence items to discreet assemblages consolidated into one accession. In such cases, respective MERs are written for each assemblage with each MER having its own chain of artifact numbers. For example, one particular assemblage of items may be listed as CIL 2015-125-I-01-A-01 to A-05, while another assemblage of items from the same consolidated accession may be listed as CIL 2015-125-I-02-A-01 to A-08.

Personal effects and military items analyzed for the purposes of individualization can be placed in categories according to its probative value to assist in how items are listed and reported. As such, material evidence is categorized accordingly:

- Category A includes personal effects and military items that can be positively correlated to a specific individual; namely identification media (e.g., identification tag, driver's license, military ID card, bracelet with name inscribed on it, clothing with an individual's laundry label sewn into it).
- Category B includes personal effects and military items that might potentially be probative to a specific individual in the loss incident (but no name or serial number is present on the item). For example, boots with size information, rings, rank insignia, pilots wings, jewelry, and other personal effects and personal items.
- Category C includes personal effects and military items of a more generic nature that may only have enough data to be probative to the specific loss incident (such as items that can provide a date and/or terminus post quem).
- Category D includes military items of a more generic nature that may only have enough data to be probative to the theater and/or conflict.
- Category E includes military items of a more generic nature that may only have enough data to be probative to the U.S. Military.

Any item can be placed in a higher category based on context. For example, an item that might otherwise be in Category E can be a Category A-item if it has an individual's name, social security number, military ID number, or any other unique identifying information specific to an individual appears.

Material evidence is listed according to its importance in supporting a potential human identification. Items in Category A are listed first, followed by items in Category B, and so forth.

Dental appliances are the exception to this guidance. Regardless of individualizing potential, dental appliances are usually listed first in the numbering sequence (e.g., A-01, A-02) during testing. Analysts determine if dental appliances are associated with the case prior to assigning numbers to the artifacts.

Dental appliances are processed separately by the odontologist in accordance with DPAA Laboratory Manual, SOP 3.5 (Forensic Odontology) and are typically not included in the MER.

Life-sciences equipment that is analyzed and reported for aircraft crashes in LSE-MERs do not

follow these categories, but are still listed by probative value.

3.4.6.4 **Counts:** Whenever possible, an accurate count of the items is recorded. Items, such as decomposed fabric or shredded raincoats/ponchos, are referenced as multiple fragments, many, or TNTC (too numerous to count). If the analyst feels it is appropriate, an interpretation can be made on the overall count, i.e. "the multiple fragments are consistent with one poncho".

3.4.6.5 **Condition:** The protocol for artifact condition is:

- Excellent: The item is in like-new condition (i.e., you could put a button back on a uniform shirt and no-one would notice).
- Good: The item is generally whole and identifiable, but with some damage, scratching, bending, etc. Text is legible.
- Fair: The item is identifiable, but has serious damage, only partially present, etc. Text is incomplete and/or only partially legible.
- Poor: The item is barely identifiable, broken. Text illegible.

When a range is reported, the description should say the worse condition first (i.e. "poor to excellent", not "excellent to poor"). If relevant, describe the overall artifact condition (e.g., fifty percent of the item is covered with rust-colored corrosion, but overall it is in fair condition). Multiple items in a lot analysis (see above) can be described by the range of conditions.

3.4.6.6 **Measurements:** Items should have their metric attributes (e.g., linear dimensions, mass) recorded when those attributes :

- Support the identification of the item (e.g., identification tag chain, WWII canteens)
- Provide the ability to associate items within an assemblage (e.g., watch components)
- Potentially allow an item to be associated with an individual (e.g., size of a boot sole).

It is not generally required to record the metric attributes of items when those attributes are already known (e.g., coins, identification cards, government-issued equipment). Scaled photographs should provide the general metric attributes of all items in the assemblage. Some items, (e.g., large amounts of fabric fragments of identical weave) should be weighed *in toto* with only a representative sample needing to be photographed.

3.4.6.7 **Logos, Motifs & Writing:** Fully describe and illustrate (if pertinent) any decorative motifs, manufacturers' logos, writing or similar characteristics that are present on items undergoing testing (e.g., jewelry, religious medals, certificates, identification cards or similar items). Specifically:

- If the analyst provides a reproduction of text from an identification tag, watch back or other item, it should be offset in the center of the page of the analytical notes or MER and the text and organization as it appears on the object interpreted and copied as closely as possible.
- Non-English language renditions of the above should be interpreted, if possible.
- Font typeface should be identified (serif, sans-serif, cursive, decorative, handwritten, etc.). If the typeface is not readily identifiable, use a typeface that closely matches those found on the object and include that typeface in the analytical notes and MER text.
- Analysts may describe items using terms that specify a manufacturing technique including, but not limited to:
    - Embossed: raised in relief from a surface.
    - Engraved: to form by incision into a surface; typically refers to figures, letters, or devices.
    - Incised: when a surface has been cut into; typically used when not referring to text.
    - Stamped: figures, letters, or devices that have been pressed into a surface.

If the manufacturing technique is not readily discernible, use more generic terms.

3.4.6.8 **Materials of Manufacture:** Identification of manufacturing materials may only be conclusively stated if elemental testing is conducted using the SEM (component testing) or other definitive tests. Short of elemental testing, items should only be referred to as a "–like" material (e.g., aluminum-like, gold-like) or as a color (e.g., aluminum-colored, gold-colored, brass-colored).

Fabrics typically are referred to by their weave pattern without reference to their parent material (e.g., silk, cotton, linen). Synthetic fabrics are referred to as "synthetics." Other synthetic non-fabric items are referred to as plastic-like or composite/resin-like material.

3.4.6.9 **Optical Lenses:** Optical lenses, or fragments thereof, from binoculars, gun sights, prescription eyewear, etc. are frequently encountered material evidence.

3.4.6.9.1 **Lens Testing:** Prior to any lens testing, the analyst should determine if antemortem records exist for comparison. If none are present, lens testing is moot and need not occur.

The lens fragment or complete lens must be tested for refractive error prior to using the Optosearch program. Lenses should be tested at an optometry clinic, or similar facility, approved by Laboratory Management and the data recorded on the appropriate analytical forms. Any printouts produced at the optical facility should be signed and dated by the appropriate technician. The technician must be trained, and certified, if possible, in the use of any equipment used in the testing.

A laser lensometer is the preferred equipment used to determine refractive errors for optical materials, although any manual lensometer can be used. The Humphrey® lensometer is the preferred device in that it can reliably read the refractive error from a fragment of optical glass smaller than 1 cm^2.

The refraction error is determined by placing the lens or lens portion into the lensometer and recording its digitally-measured strength. Multiple trials are performed to assure an accurate determination of refractive error. Side determination of the lens should be made, if possible.

Refractive errors are measured using three variables:

- Sphere power (sphere). Though prescriptions can occur with very high numbers, the sphere correction rarely exceeds -15 diopters (myopic) to +15 diopters (hyperopic) in each eye.
- Cylinder power (cylinder). Cylinder corrections (for astigmatism) are measured from 0 to -10 in each eye.
- Axis of the cylinder power (axis). The axis is measured in single degree increments from 0 to 180.

While the axis variable cannot be obtained from loose fragments that do not have a mountable edge portion, sphere and cylinder variables are unaffected by this constraint. Heavily scarred or pitted glass fragments may not produce results, although the laser lensometer often can mitigate these problems.

Sphere and cylinder powers are measured in quarter diopter increments. While the typical correction ranges are given for these variables, corrections can occasionally fall outside of these parameters.
At this point, if it is determined that the optics are not prescription eyewear, no additional specialized testing is required.

For eyeglass prescriptions/corrections, two possible recording methods are used. In older cases, (e.g., WWII, Korea, some Vietnam), the individual's correction on the Report of Medical Examination, Standard Form 88, is likely in a **positive cylinder** format. This was the typical reporting format for those conflicts, and is still somewhat used today. All recording done at the 15th Airwing Optometry Clinic, as well as the majority of current U.S. eye clinics, is conducted in a **negative cylinder** format.

These two formats are **not** directly comparable. Therefore, the positive cylinder format has to be converted into a negative cylinder format prior to comparing the record to the prescription eyewear being examined and prior to using any of the below databases.

Determining the reporting format is not difficult. Where the individual's correction is listed the listing follows this format:

- Sphere.
- Cylinder.
- Axis of the Cylinder (simply called the Axis).

If the second column (Cylinder) contains a positive number then the prescription is in a positive cylinder format and must be converted. If the number is negative, a negative cylinder format is indicated and conversion is unecessary.

Converting a positive cylinder to a negative cylinder format is as follows:

- The Sphere and Cylinder corrections are **added** together. The sum is the new **Sphere** value.
- The sign of the Cylinder correction is reversed (e.g., made to be a negative number) and the integer is kept the same. The resulting number is a negative **Cylinder** value.
- If the Axis correction value is <90, then 90 is **added** to it. If the Axis of the Cylinder correction value is >90, then 90 is **subtracted** from it. The resulting number is the new AXIS value.
- Ensure this procedure is conducted for **both** eye corrections.

Examples for a positive to a negative cylinder format conversion follow:

Sphere (+2.00) Cylinder (+2.50) Axis (170)
Converts to:

Sphere (+4.50) Cylinder (-2.50) Axis (80)

The conversion is: Sphere +2.00+2.50 = +4.50, Cylinder -2.50 (sign reversed), and Axis 170-90 = 80.

Sphere (-5.00) Cylinder (+2.00) Axis (45)

Converts to:

Sphere (-3.00) Cylinder (-2.00) Axis (135)

The conversion is: Sphere -5.00+2.00 = -3.00, Cylinder -2.00 (sign reversed), and Axis 45+90 = 135.

3.4.6.9.2 **Database Use:** After the lens testing is completed, the frequency of occurrence for the prescription of the eyewear may be determined using the Optosearch program and databases (Berg and Collins 2006) located on the DPAA network.

Three databases containing large sample sizes from diverse populations are used for comparison purposes. Two databases have associated non-identifying biological information about the patients. Specifically, in descending order of size:

- NOSTRA (Naval Opthalmic Support Training Activity) database contains ~370,000 prescriptions, no biological information.
- NHANES (National Health and Nutrition Examination Survey) database contains 8000 prescriptions, biological information present.
- CILEPI (Central Identification Laboratory Eyeglass Prescription) database contains ~4000 prescriptions, with biological information.

Several levels of specificity are employed using Optosearch. The analyst can:

- Input a complete prescription into the search function and calculate the frequency of match within the selected database or population.
- Input partial or incomplete prescription information and search solely on selected variables.
- Structure queries that accommodate biological information such as age, sex, or ethnicity. The program calculates the frequency of match using the parameters of the investigator's guidelines.

The frequency of match is incorporated into the identification process, as appropriate, or is used to associate the specific optical items to specific individuals, or groups of individuals, based on the strength of match to the appropriate antemortem medical records.

3.5 **Role of the Life Support Investigator (LSI):** Life Support Investigators (LSIs) and Life Support Augmentees are technical personnel representing a specialized component of material evidence testing generally restricted to the examination of aircrew life support equipment, aircraft related survival equipment, and aircraft wreckage. See Annex B (Life Support Investigation) and Annex C (Life Sciences Equipment-Material Evidence Reports) of this SOP for details on life support evidence testing and reporting.

4.0 DOCUMENTATION: The results of material evidence testing are recorded in the analytical notes in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). The analytical notes include all observations that were relevant to the testing, special treatments with regard to the evidence, the exemplars used, and the formation of professional opinions.

Specialized tests require analytical notes and descriptions of the procedures in the MER. If the analyst used the SEM, Optosearch, alternate light source, or other special equipment/methods, appropriate analytical notes need to be produced. The procedure used is annotated in the analytical notes of the item being tested.

Any translations of non-English writing associated with material evidence should include the name of the interpreter who provided the translation.

Photographs of material evidence are prepared in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).

The final MER is prepared in accordance with Annex A (Material Evidence Reports) or Annex C (Life-Support Equipment-Material Evidence Report) of this SOP. Templates for the MERs are available on the DPAA network.

5.0 SURETY: Final MERs are peer-reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). All analytical notes are made available to the peer reviewer at the time the MER is reviewed. Material evidence testing is also subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

6.0 SAFETY: All material evidence is handled with the appropriate specimen handling procedures in accordance with DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

Annex A (Material Evidence Reports) (A5.10.1, A5.10.2a-k, A5.10.8)

A1.0 PURPOSE & SCOPE: This annex outlines the basic formats and procedures used by analysts when writing Material Evidence Reports (MERs). This annex does not pertain to:

- Life-Science Equipment-Material Evidence Reports (LSE-MERs).
- Materials that are routinely handled under administrative fiat(s) or CIL portions.

A2.0 GENERAL: MERs are written as stand-alone reports that provide written and visual testimony pertaining to the evidence recovered. MERs are typically written in the laboratory or office setting and document the findings of the analyst(s) after examining material evidence.

Although the audience for MERs is diverse (e.g., other professionals, family members, casualty officers), its first goal is to provide a competent and professional presentation of the test results. However, with such a diverse audience, analysts should avoid excessive and unnecessary use of jargon or obfuscating technical phrases.

If exceptional circumstances dictate, deviations from the Style Guide (Appendix 5.2) of this Laboratory Manual are allowed.

A3.0 REPORT FORMAT & CONTENTS: A template example of the MER format is found on the DPAA network. The analyst should start with a clean report template for each new report to ensure the currency of the template.

A3.1 **Title Block:** The title block on the first page is in Times New Roman Font and contains:

- Report title at the top centered, bold, 16 pt, all caps. The title should reflect the type of testing reported and accession number (final consolidated number).
- Organization centered, bold, all caps, 14 pt.
- Date (month and year) centered, bold, with the first letter in caps, 14 pt. For example:

An example of the above guidance **(5.10.2a-c, g)**:

MATERIAL EVIDENCE REPORT:
CIL 1993-236-A-01 Through 09

DPAA LABORATORY

22 January 2007

Note: The above example uses two digit artifact numbers (e.g., 1993-236-A-01). For large cases where the number of artifacts exceeds 99, it is permissible to use three digit artifact numbers (e.g., 100, 101……)

A3.2 **Body of the Report:** The body of the material evidence report is typically written using the below format. Besides text, the body of the report includes photographs and appropriate tables.

The below format and section headings follow the preferred order of presentation and should be followed closely; however, it is anticipated that situations can arise that may require certain adjustments for greater clarity.

A3.2.1 **Background:** A brief (1-2 sentences) description of the loss incident should be presented. This is followed by a more detailed description of the acquisition, excavation, or recovery circumstances of the material evidence, as appropriate. Analysts should avoid protracted details if not immediately relevant and/or presented in other reports.

A3.2.2 **Material Evidence:** Guidance for completing this section is as follows. Refer to the body of this SOP for more details **(A5.10.2e, A5.10.2f)**:

- Tables: Tables are structured as specified in the templates and the Style Guide (Appendix 5.2) of this Laboratory Manual. Tables listing the Material Evidence should only be presented in the MER if necessary. Additional tables may be required (e.g., lot analysis) and are prepared at the discretion of the analyst. Tables may also be utilized in the Findings Section (see below).
- Specific provenience information for each item is only presented in the MER if the analyst deems it probative to the report.
    - If presented, the analyst can show the information in a table or in the text. If necessary to the reporting, a plan map with provenience information can be provided at the discretion of the analyst.
    - If specific provenience information for each item is not presented in the MER, a very brief comment should address this issue in the Background section. For example, "All items were recovered from Site VN-01234", "All items in this report were recovered within the same general archaeological area with no probative pattern of distribution" or "all items described in this report were received as a unilateral turnover

and thus have no provenience information associated with them".

- The following are considerations relating to the Material Evidence Section text organization, structure, and inclusions, specific (but not limited) to Category A and Category B items:

  - Correct and consistent nomenclature and terminology should be used throughout the MER including section headings, figure captions, and in the descriptive text.
  - Material evidence is listed in accordance with its utility in supporting a potential identification (e.g., dental appliances are usually listed first in the numbering sequence, but written separately [see above]).
  - The Material Evidence Section does not include interpretative conclusions. For example, if an M-1940 identification tag has specific information, the analyst should not state that it is consistent with information in an individual's personnel file. That type of statement is reserved for the Findings Section.
  - Include information of any assessments of evidentiary value that may have occurred.
  - Describe any accession consolidations, as necessary.

- The following are considerations relating to material evidence descriptions:

  - Parallel the descriptions in the report to the guidance presented in the body of this SOP (i.e., organize by material class, artifact type).
  - Include counts of material evidence items whenever possible, and however relevant.
  - Describe the condition of the artifacts.
  - Describe general cleaning procedures, as necessary.
  - Include only those measurements that support the identification of the object (as described in the body of this SOP) and only if they do not detract from the clarity and/or readability of the MER.
  - Descriptions and illustrations (if pertinent) of any decorative motifs, manufacturers' logos, writing or similar characteristics that are present.
  - Identification of manufacturing materials (note: this may only be conclusively stated if elemental testing is conducted using precise testing methods (e.g., the SEM).

- The following are considerations relating to an identification of the item **(A5.10.2i)**:

  - Use correct, accurate nomenclature when making an identification and document accordingly.
  - Include the federal stock number (and citation thereof) in the description when available.
  - Use a proper section heading for material evidence descriptions. An example of a sample section heading for a material evidence description is as follows:

    CIL 1999-056-A-06 Prescription lens n = 1
    CIL 1999-056-A-06 M-1910 Canteen cup n = 1
    CIL 1999-056-A-06 Poncho fragments n = multiple

  - Cite exemplars correctly

- Photographs: See DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging). Because it is ultimately scanned, authors should avoid putting images on the signature page of the MER since a significant decrease in image quality occurs.
- Figure & photograph captions: The following guidance applies:

  - When displaying an item(s) being tested, the figure caption should start with the CIL accession number followed by a comma, and then the item description. The first letter after the comma is lower case unless the word is a proper noun or starts a proper noun phrase.
  - When referring to photographs of samples in a lot analysis, the phrase after the comma should begin "a representative sample . . ."
  - Graphic or photographic exemplars should be clearly identified.

  Examples of the above guidance include:

  Figure 21. CIL 2006-081-A-07, man's gold-colored signet ring.

  Figure 22. CIL 2006-081-A-22, M-1940 Identification Tag.

  Figure 23. CIL 2006-081-A-23, representative sample of Class D, Type II, Style 21 4-Hole Sewing Button.

  Figure 23. Graphic exemplar of M-1940 Identification Tag (citation).

- Items that are grouped into Categories C, D and E are usually of minimal probative value; therefore they can be reported in Table format with minimal description. Photographs of these items can be presented as a group, where appropriate, and in

simplified form (e.g. obverse, reverse, and exemplars of a coin are not necessary).

A3.2.3 **Findings:** Present interpretative conclusions and associate individual items and sets of items with identified individuals, where possible, in this section. Use tables where appropriate **(5.10.2i).**

A3.3 **Signature Block:** the name(s), function(s) and signature(s) of person(s) authorizing the test report **(A5.10.2j)**.

A3.4 **References:** If an item is precisely identified, an exemplar reference must be cited. Citations must include the page number when books, catalogs, manuals, etc. that are paginated are referenced.

A3.5 **Appendices**: As necessary.

Annex B (Life Support Investigation)

B0.0 PRINCIPLE, SPIRIT & INTENT: *Life support evidence is tested and documented in an organized manner conducive to replication and verification.*

B1.0 PURPOSE & SCOPE: This annex outlines procedures for the testing of life support evidence accessioned into the CIL. This annex applies to typical CIL cases and is used by all LSIs and LSI Augmentees working for CIL or under its auspices. Further, this annex outlines the basic formats and procedures used by LSIs when writing Life Support Reports (LSRs).

All of the provisions specified or implied in the body of this SOP remain in effect, as appropriate, unless specifically or implicitly contradicted by this annex.

B2.0 GENERAL PRINCIPLES & GUIDELINES: The duties and responsibilities of the Life Support Investigator (LSI) and LSI Augmentee are found in the DPAA Laboratory Manual, SOP 1.1 (CIL Work Environment) and DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing).

Life support evidence is a form of material evidence. Life support evidence testing provides support for identifications in the area of time, space, and context, as well as associating specific items of evidentiary value to specific loss sites and events, individuals or groups of individuals. Life support evidence may also provide evidence that can help to interpret the circumstances of a loss.

Life support evidence testing aims to achieve individuation of items whenever possible with the ultimate goal of aiding in and supporting casualty resolution by providing documented circumstantial evidence. There are two types of testing:

- Routine testing is where there are no immediate requirements for analytical conclusions to support an identification of an item of life support evidence. Routine testing of life support evidence, as it is accessioned, supports case progression.
- Priority testing is requested when questions of immediate concern (e.g., site correlation issues, number of individuals on board aircraft) need to be answered.

B3.0 TEST PROCEDURES: LSI's follow an abbreviated test process wherein they identify component parts of known aircrew and aircraft life support equipment.

Once life support evidence arrives in the CIL it is documented by organic LSIs, regardless if it was recovered in the field by an organic or augmentee LSI. Organic LSIs subsequently open all evidence containers and review the evidence to verify the field identification of items as life support evidence.

Life support evidence is usually recovered as intact, discreet or discernable items (e.g., a parachute D ring, survival vest fabric, ejection seat handle). As such only light cleaning or conservation is usually necessary to assess probative value and/or identify the item.

Because of the intact nature of life support evidence, measurements and other tests for these items, detailed in the body of this SOP, are usually not required due to the availability of US government specifications (usually in the form of graphic exemplars) in reaching final conclusions. The LSI may need to compare the item to applicable synoptic exemplars in order to determine a match.

B4.0 DOCUMENTATION: Documentation of life support investigation is as follows:

B4.1 **Analytical Notes:** The results of life support evidence testing are recorded in the analytical notes in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). The analytical notes include all observations relevant to the testing and identification, special treatments regarding the evidence, the exemplars used, and the formation of professional opinions.

Specialized tests require additional analytical notes. If the LSI used the SEM, alternate light source, or other special equipment/methods, appropriate analytical notes are produced. The procedure used is annotated in the analytical notes of the item being tested.

B4.2 **Photographs:** Photographs of life support evidence are prepared by the material evidence analyst in accordance with DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).

B4.3 **Life Support Reports (LSR):** After concluding their tests, the LSIs write Life Support Reports (LSR) in the DPAA message format **(A5.10.1, A5.10.2a-k, A5.10.8)**. LSRs are written as stand-alone reports that provide written testimony pertaining to the evidence recovered, or attesting to negative results if evidence is not recovered.

An Interim LSR is written after each excavation of a field location. Each Interim LSR is a compilation of all previous LSRs written for that site. A Final LSR which also compiles all previous LSRs for a site is written only after the site is closed, or when directed by Laboratory Management.

Templates for the LSR are available on the DPAA network. The templates vary in format depending on the circumstances of the type of mission that originated the evidence, e.g., template for:

- Excavation Missions (RTs) (Figure B-1).
- Investigation Missions (ITs) (Figure B-2).
- Multiple JFAs (Figure B-3).

Instructions for completing the LSR are depicted in Figure B-4.

The reports are usually drafted in the field and finalized after the LSI returns to the CIL. It is permissible for the LSI Augmentee who recovered the life support evidence in the field to write the LSR as long as it is reviewed by an organic LSI. The author should start with a clean report template for each new report to ensure the currency of the template.

Since the LSR is in DPAA message format, it is devoid of photographs and any other extensive information and supporting documentation that may be pertinent to the case at hand. As such, it is permissible to coordinate the content of the LSR with the regional MDTs prior to finalizing and authenticating the report. During coordination MDT customers are allowed to examine supporting documentation provided the CIL retains control of the material.

All coordination with MDT must be accomplished prior to the LSR being finalized and authenticated. LSRs delivered to the customer and subsequently returned for correction or additional work, are amended in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).

Once the LSR is finalized the LSI Section updates its database. The LSI database provides data and situational awareness regarding field mission and case status with regard to life support evidence.

Additionally, once the LSR becomes final, the LSI Section notifies the MDT, who then updates Brite Light.

B4.4 **Life Science Equipment-Material Evidence Reports (LSE-MER):** See Annex C (Life Sciences Equipment-Material Evidence Reports) to this SOP.

B4.5 **Other Documentation:** LSIs may prepare other documentation related to testing. Specifically:

- A Memorandum for Record is usually generated for unilateral turnovers. Like the LSR, MFRs are usually drafted in the field and finalized at the DPAA.
- Email traffic (usually generated as a result of priority analysis).
- Abbreviated reports (usually generated as a result of priority analysis).

B4.6 **Disposition of Documentation:** The original LSRs and related documentation (e.g., analytical notes, field notes and logs) are forwarded to Quality Assurance for review.

Once the LSR and related documentation clear the quality assurance review, they are filed by Laboratory Administration. Documentation having a CIL number is filed in the Material Evidence Folder in the case file. Documentation for LSI cases that did not result in evidence are not assigned a CIL number rather they are filed in a separate binder in Laboratory Administration under the appropriate JFA and site numbers. In either instance, copies may be retained by the LSI Section for future reference.

B5.0 SURETY: Final LSRs and LSE-MERs are peer-reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). All analytical notes and related documentation are made available to the peer reviewer at the time the final LSR or LSE-MER is reviewed.

Since they are not competency certified, any tests in which LSI Augmentees participate are done so under the full auspices and supervision of fully competency certified CIL LSIs.

Life support evidence testing is also subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

B6.0 SAFETY: There are no safety concerns with life support evidence testing above and beyond those listed in the body of this SOP.

SUBJ/ANALYSIS OF MATERIAL EVIDENCE ASSOCIATED WITH CASE 0000 (SITE XX-XXXXX).
REF/A/RMG/CDR DPAA HICKAM AFB HI/(DTG).
AMPN/REFERENCE A IS THE EXCAVATION SUMMARY REPORT OF CASE 0000 (SITE XX-XXXXX) CONDUCTED DURING JOINT FIELD ACTIVITY 12-3XX (XXTH JFA).
RMKS/1. (FROM)(ON) _____, A JOINT TEAM EXCAVATED A SUSPECTED _____ CRASH SITE (48X XX XXXXX XXXXX; WGS-84) IN VILLAGE, DISTRICT,PROVINCE. DPAA ANALYSIS {***Specific aircraft identified or identification media found}*** EXCLUSIVELY CORRELATED THE (RECOVERED) (AND PHOTOGRAPHED) ITEMS TO THE CASE 0000 AIRCRAFT. ***{Aircraft type identified with no life support and no similar aircraft within 50 kilometers}—***(CORRELATED TO CASE 0000 AIRCRAFT) **{WHEN ONLY AIRCRAFT WRECKAGE FOUND}** (CORRELATES TO CASE 0000 INCIDENT) **{IF YOU HAVE LIFE SUPPORT AND EITHER AIRCRAFT WRECKAGE OR NO AIRCRAFT WRECKAGE}**--***{Aircraft type identified but similar aircraft within 50 kilometers or no known losses of this type aircraft within 50 kilometers}--***(CORRELATED THE RECOVERED (AND PHOTOGRAPHED) ITEMS TO AN ____ AIRCRAFT INCIDENT, BUT NOT TO A SPECIFIC AIRCRAFT TYPE OR CASE.
{Unidentifiable wreckage}--(DPAA ANALYSIS COULD NOT CORRELATE THE RECOVERED (AND PHOTOGRAPHED) ITEMS TO A SPECIFIC AIRCRAFT TYPE OR CASE).
2. THE TEAM RECOVERED THE FOLLOWING ITEMS:***{Only items recovered from a site and turned over to LSA. No need to separate different paragraphs of aircrew/aircraft related items. Just list them all under RECOVERED}***
    A. NO TABS
    B. NO TABS
    C. NO TABS
3. THE TEAM PHOTOGRAPHED BUT DID NOT RETAIN THE FOLLOWING ITEMS: ***{Only items photographed at a site and left or taken back to your hotel for further identification and left}***
    A. NO TABS
    B. NO TABS
4. THE TEAM EXAMINED AND PHOTOGRAPHED THE FOLLOWING ITEMS AT THE VILLAGE/WITNESS HOME: IF ONLY ONE ITEM NO SUBPARAGRAPH
5. THE TEAM EXAMINED THE FOLLOWING ITEMS PROVIDED BY THE VNOSMP/WITNESS:
6. DPAA ANALYSIS INDICATES: ***{Clearly explain only what the material evidence tells you--i.e. part number ____ found only on ____ type of aircraft}*****{End your statement with}** THE LIFE SUPPORT SECTION COULD NOT FURTHER IDENTIFY THE REMAINING ITEMS.
7. DPAA COMMENTS: **{If you found no life support items, you first line should include this statement}** THE TEAM DID NOT RECOVER NOR OBSERVE ANY LIFE SUPPORT OR AIRCREW RELATED MATERIALS DURING THIS EXCAVATION. ANALYSIS OF THE MATERIAL EVIDENCE INDICATES ***{What items (if any) proves how many individuals may have been in the aircraft}*** (____ WERE IN THE AIRCRAFT AT IMPACT). ***{Other possible comments need to convey if the items do not support an individual in the aircraft or if the items were not life support/aircrew related}*** DPAA FILES INDICATE THERE WERE ___ CRASH INCIDENTS WITHIN 50 KILOMETERS OF GC _____. ***{YOU MAY NEED TO TAKE YOUR G.S. OUT FARTHER THEN 50KM TO GET YOUR POINT ACROSS. Try to narrow down possibilities and uncover relationships between aircraft in the grid search and the examined items}*** **(YOUR LAST LINE HERE SHOULD BE THE SAME AS YOUR LAST LINE IN PARAGRAPH 1).**
8. EVAL/RDA/BSMF/ETC.

Figure B-1. LSR template for excavation (RT) missions.

SUBJ/ANALYSIS OF MATERIAL EVIDENCE ASSOCIATED WITH CASE 0000 (SITE XX-XXXXX).
REF/A/RMG/CDR DPAA HICKAM AFB HI/(DTG).
AMPN/REFERENCE A IS THE DETAILED REPORT OF INVESTIGATION OF CASE 0000 (SITE XX-XXXXX) CONDUCTED DURING JOINT FIELD ACTIVITY 12-3XX (XXTH JFA).
RMKS/1. (FROM)(ON) _____, A JOINT TEAM INVESTIGATED A SUSPECTED _____ CRASH SITE (48Q XX XXXXX XXXXX; WGS-84) IN VILLAGE, DISTRICT, PROVINCE. DPAA ANALYSIS {***Specific aircraft identified or identification media found}*** EXCLUSIVELY CORRELATED THE (RECOVERED) (AND PHOTOGRAPHED) ITEMS TO THE CASE 0000 AIRCRAFT. ***{Aircraft type identified with no life support and no similar aircraft within 15 kilometers}--***(CORRELATED TO CASE 0000 AIRCRAFT) **{WHEN ONLY AIRCRAFT WRECKAGE FOUND}** (CORRELATES TO CASE 0000 INCIDENT) **{IF YOU HAVE LIFE SUPPORT AND EITHER AIRCRAFT WRECKAGE OR NO AIRCRAFT WRECKAGE}**--***{Aircraft type identified but similar aircraft within 50 kilometers or no known losses of this type aircraft within 50 kilometers}--***(CORRELATED THE RECOVERED (AND PHOTOGRAPHED) ITEMS TO AN _____ AIRCRAFT INCIDENT, BUT NOT TO A SPECIFIC AIRCRAFT TYPE OR CASE.
{Unidentifiable wreckage}--(DPAA ANALYSIS COULD NOT CORRELATE THE RECOVERED (AND PHOTOGRAPHED) ITEMS TO A SPECIFIC AIRCRAFT TYPE OR CASE).
2. THE TEAM RECOVERED THE FOLLOWING ITEMS:***{Only items recovered from a site and turned over to LSA. No need to separate different paragraphs of aircrew/aircraft related items. Just list them all under RECOVERED}***
    A. NO TABS
    B. NO TABS
    C. NO TABS
3. THE TEAM PHOTOGRAPHED BUT DID NOT RETAIN THE FOLLOWING ITEMS: ***{Only items photographed at a site and left or taken back to your hotel for further identification and left}***
    A. NO TABS
    B. NO TABS
4. THE TEAM EXAMINED AND PHOTOGRAPHED THE FOLLOWING ITEMS AT THE VILLAGE/WITNESS HOME: IF ONLY ONE ITEM NO SUBPARAGRAPH.
5. THE TEAM EXAMINED THE FOLLOWING ITEMS PROVIDED BY THE VNOSMP/WITNESS:
6. DPAA ANALYSIS INDICATES: ***{Clearly explain only what the material evidence tells you--i.e. part number ____ found only on ____ type of aircraft}*****{End your statement with}** THE LIFE SUPPORT SECTION COULD NOT FURTHER IDENTIFY THE REMAINING ITEMS.
7. DPAA COMMENTS: **{If you found no life support items, you first line should include this statement}** THE TEAM DID NOT RECOVER NOR OBSERVE ANY LIFE SUPPORT OR AIRCREW RELATED MATERIALS DURING THIS INVESTIGATION. ANALYSIS OF THE MATERIAL EVIDENCE INDICATES ***{<u>What</u> items (if any) proves <u>how many</u> individuals may have been in the aircraft}*** (____ WERE IN THE AIRCRAFT AT IMPACT). ***{Other possible comments need to convey if the items do not support an individual in the aircraft or if the items were not life support/aircrew related}*** DPAA FILES INDICATE THERE WERE ___ CRASH INCIDENTS WITHIN 15 KILOMETERS OF GC _____. ***{YOU MAY NEED TO TAKE YOUR G.S. OUT TO 50KM TO GET YOUR POINT ACROSS. Try to narrow down possibilities and uncover relationships between aircraft in the grid search and the examined items}*** **(YOUR LAST LINE HERE SHOULD BE THE SAME AS YOUR LAST LINE IN PARAGRAPH 1).**
8. EVAL/RDA/BSMF/ETC.

Figure B-2. LSR template for investigation (IT) missions.

SUBJ/ANALYSIS OF MATERIAL EVIDENCE ASSOCIATED WITH CASE 0000 (SITE XX-XXXX).
REF/A/RMG/CDR DPAA HICKAM AFB HI (UC)/(DTG).
REF/B/RMG/DPAA ANNEX CAMP SMITH HI **(CDR JTF/FA OR WHAT EVER)** (UC)/(DTG).
NARR/REFERENCES:
A. REFERENCE A IS THE EXCAVATION SUMMARY REPORT OF CASE 0000 (SITE XX-XXXX) CONDUCTED DURING JOINT FIELD ACTIVITY 12-3XX (XXTH JFA)
B. REFERENCE B IS THE EXCAVATION SUMMARY REPORT OF CASE 0000 CONDUCTED DURING JFA 0X-3XX IN THE SOCIALIST REPUBLIC OF VIETNAM (S.R.V.) (LAO PEOPLE'S DEMOCRATIC REPUBLIC (L.P.D.R)) (KINGDOM OF CAMBODIA (K.O.C)). (ADD APPLICABLE COUNTRY)
RMKS/1. FROM _____, A JOINT TEAM EXCAVATED A SUSPECTED _____ CRASH SITE (48X XX XXXXX XXXXXX; WGS-84) IN _XXX VILLAGE, XXX DISTRICT, PROVINCE. DPAA ANALYSIS {***Specific aircraft identified or identification media found}*** EXCLUSIVELY CORRELATED THE (RECOVERED) (AND PHOTOGRAPHED) ITEMS TO THE CASE 0000 AIRCRAFT. ***{Aircraft type identified with no life support and no similar aircraft within 15 kilometers}--***(CORRELATED TO CASE 0000 AIRCRAFT) **{WHEN ONLY AIRCRAFT WRECKAGE FOUND}** (CORRELATES TO CASE 0000 INCIDENT) **{IF YOU HAVE LIFE SUPPORT AND EITHER AIRCRAFT WRECKAGE OR NO AIRCRAFT WRECKAGE}**--***{Aircraft type identified but similar aircraft within 50 kilometers or no known losses of this type aircraft within 50 kilometers}--***(CORRELATED THE RECOVERED (AND PHOTOGRAPHED) ITEMS TO AN ____ AIRCRAFT INCIDENT, BUT NOT TO A SPECIFIC AIRCRAFT TYPE OR CASE.
{Unidentifiable wreckage}--(DPAA ANALYSIS COULD NOT CORRELATE THE RECOVERED (AND PHOTOGRAPHED) ITEMS TO A SPECIFIC AIRCRAFT TYPE OR CASE).
2. THE TEAM RECOVERED THE FOLLOWING ITEMS DURING THIS JFA:***{Only items recovered from a site and turned over to LSI. No need to separate different paragraphs of aircrew/aircraft related items. Just list them all under RECOVERED}***
A. NO TABS
B. NO TABS
3. THE TEAM PHOTOGRAPHED/BUT DID NOT RETAIN THE FOLLOWING ITEMS:
A. NO TABS
B. NO TABS
4. THE TEAM EXAMINED AND PHOTOGRAPHED THE FOLLOWING ITEMS AT THE VILLAGE/WITNESS HOME: IF ONLY ONE ITEM NO SUBPARAGRAPH
5. THE TEAM EXAMINED THE FOLLOWING ITEMS PROVIDED BY THE VNOSMP/WITNESS:
6. DPAA ANALYSIS INDICATES: ***{Clearly explain only what the material evidence tells you--i.e. part number ____ found only on ____ type of aircraft}*****{End your statement with}** THE LIFE SUPPORT SECTION COULD NOT FURTHER IDENTIFY THE REMAINING ITEMS.
7. DPAA COMMENTS: **{If you found no life support items, you first line should include this statement}** THE TEAM DID NOT RECOVER NOR OBSERVE ANY LIFE SUPPORT OR AIRCREW RELATED MATERIALS DURING THIS EXCAVATION. ANALYSIS OF THE MATERIAL EVIDENCE INDICATES ***{What items (if any) proves how many individuals may have been in the aircraft}*** (____ WERE IN THE AIRCRAFT AT IMPACT). ***{Other possible comments need to convey if the items do not support an individual in the aircraft or if the items were not life support/aircrew related}*** DPAA FILES INDICATE THERE WERE ___ CRASH INCIDENTS WITHIN 15 KILOMETERS OF GC _____. ***{YOU MAY NEED TO TAKE YOUR G.S. OUT FARTHER THEN 50KM TO GET YOUR POINT ACROSS. Try to narrow down possibilities and uncover relationships between aircraft in the grid search and the examined items}*** **(YOUR LAST LINE HERE SHOULD BE THE SAME AS YOUR LAST LINE IN PARAGRAPH 1).**
8. EVAL/RDA/KMA/ETC...

Figure B-3. LSR template for multiple JFAs.

Figure B-4. Generic Instructions (in Bold) for Completing LSRs.

SUBJ/ANALYSIS OF MATERIAL EVIDENCE ASSOCIATED WITH LKA CASE ???? (SITE).
REF/A/RMG/DPAA ANNEX CAMP SMITH HI(UC)/15XXXZ MAR 10.
REF/B/RMG/DPAA ANNEX CAMP SMITH HI(UC)/202330Z NOV 09.
REF/C/RMG/CDR JTF-FA HONOLULU HI/280722Z FEB 02.
NARR/REFERENCES:

A. REF A is always the most current ESR/DRI report for the current JFA.

B. REF B is always the previous JFA ESR or this could be a prior DRI, DRE, or even a prior life support report. If you are using a prior life support report as a reference, ensure you include in either your findings or conclusions paragraph this reference.

C. REF C (if needed) is a continuation from above.

NOTE: References can be anything you may need to get your point across. LSEL reports, photographs of actual material evidence, or even photographs unilaterally turned over.

RMKS/1. FROM **(inclusive dates here)** 16 OCTOBER THROUGH 14 NOVEMBER 2009 AND 15 JANUARY THROUGH 12 FEBRUARY 2010, A JOINT TEAM EXCAVATED AN RF 4C CRASH SITE (48Q XD 37637 77764; WGS-84) IN KY TAY VILLAGE, KY TAY DISTRICT, SAVANNAKHET PROVINCE. DPAA ANALYSIS EXCLUSIVELY CORRELATED RECOVERED ITEMS TO THE LKA CASE 1063 AIRCRAFT DURING A PREVIOUS INVESTIGATION (REF C). THE LIFE SUPPORT SECTION COULD NOT EXCLUSIVELY CORRELATE THE ITEMS RECOVERED DURING THESE EXCAVATIONS TO THE LKA CASE XXX AIRCRAFT. **This last sentence is also the same as the last sentence of the final paragraph.**

2. THE TEAM RECOVERED THE FOLLOWING ITEMS DURING JFA 10-1LA: **This paragraph is a listing of your findings. This is taken from one of the references above. Normally this is REF A, and is either taken from the current ESR or DRI.**

A. POSSIBLE TORSO HARNESS
B. POSSIBLE G-SUIT PIECES
C. POSSIBLE LIFE PRESERVER COMPONENTS
D. POSSIBLE PARACHUTE COMPONENTS
E. POSSIBLE LEG RESTRAINT STRAP
F. POSSIBLE O2 HOSE PIECES
G. POSSIBLE SURVIVAL KIT ITEMS
H. POSSIBLE LIFERAFT COMPONENTS
I. POSSIBLE SURVIVAL VEST PIECES

3. THE TEAM PHOTOGRAPHED BUT DID NOT RETAIN MISCELLANEOUS AIRCRAFT WRECKAGE DURING JFA 10-1LA. **This paragraph is a listing of your findings. This is taken from one of the references above. Normally this is REF A, and is either taken from the current ESR or DRI.**

4. THE TEAM RECOVERED THE FOLLOWING ITEMS DURING JFA 10-2LA: **This paragraph is a listing of your findings. This is taken from one of the references above. Normally this is REF B, and is normally taken from a previous ESR.**

A. POSSIBLE LIFE SUPPORT
B. POSSIBLE PARACHUTE COMPONENTS
C. UNIDENTIFIED CLOTH MATERIALS
D. UNIDENTIFIED BUCKLES
E. POSSIBLE LIFE RAFT REPAIR PLUG
F. POSSIBLE HARNESS COMPONENTS AND MATERIALS
G. PARACHUTE PACK FASTENER, P/N MS70029

5. THE TEAM PHOTOGRAPHED BUT DID NOT RETAIN THE FOLLOWING ITEMS DURING JFA 10-2LA: **This paragraph is a listing of your findings. This is taken from one of the references above. Normally this is REF B, and is normally taken from a previous ESR.**

A. MISCELLANEOUS AIRCRAFT WRECKAGE
B. FIVE .38-CALIBER CASINGS AND TWO .38-CALIBER PROJECTILES.

6. DPAA ANALYSIS INDICATES: **This paragraph is also part of your findings. This is where you take all the information above and you analyze it to form the basis of your conclusions below.** THE ITEMS IN PARA 2A AND 4F ARE COMPONENTS OF THE TORSO-HARNESS WHICH INCLUDE ADJUSTMENT WEBBING ENDS, A V-RING CONNECTOR AND A D-RING CONNECTOR. THE ITEMS IN PARA 2B ARE PARTS OF THE ANTI-G SUIT. THE ITEMS IN PARA 2C ARE LEFT SIDE LPU-3/P CONTAINER AND FLOTATION CELL. THE ITEMS IN PARA 2D AND 4B ARE PARACHUTE LOCKING CONES, CONTAINER FLAP MATERIAL, AND ATTACHMENT BUCKLES. THE ITEMS IN PARA 2G ARE FISH HOOK PIECES. THE ITEMS IN PARA 2H ARE TWO SLEEVE AND SPRING ASSEMBLY PARTS TO ONE MAN LIFERAFT BOTTLES. THE ITEMS IN PARA 2I ARE SURVIVAL VEST PIECES. THE ITEM IN PARA 4E IS ONE HALF OF A LIFE RAFT REPAIR PLUG. THE ITEM IN PARA 4G IS A PARACHUTE PACK FASTENER, P/N MS70029 MFD 66. THE ITEMS IN 4A CONSISTS OF SIZE 3 SAFETY PINS, CHROME SPOON FISHING LURE, SWIVEL HOOK FISHING LURE CONSISTENT WITH ITEMS FOUND IN STANDARD FISHING KITS PACKED WITHIN SURVIVAL KITS. THE LIFE SUPPORT SECTION COULD NOT FURTHER IDENTIFY THE REMAINING ITEMS.

7. DPAA COMMENTS: **This final paragraph is basic summary and conclusions section. Here you take all the information above, interpret your findings and make a formal conclusion. Here is also where you need to add additional information from references not mentioned in your findings section. Here is where you place individuals (one or more) in the aircraft at the time of impact. You also use your conclusions to support this fact. You also mention if your conclusions support correlation to aircraft type, model, or tail number. If you do not have an exclusive correlation, you include a bright light data base search, eliminating as many aircraft as possible.** RECOVERY OF TWO ONE MAN LIFE RAFT BOTTLE SPRING AND SLEEVE ASSEMBLIES CONFIRMS BOTH INDIVIDUALS WERE IN THE AIRCRAFT AT THE TIME OF IMPACT. DPAA ANALYSIS EXCLUSIVELY CORRELATED RECOVERED ITEMS TO THE LKA CASE XXXX AIRCRAFT DURING A PREVIOUS INVESTIGATION (REF C). THE LIFE SUPPORT SECTION COULD NOT EXCLUSIVELY CORRELATE THE ITEMS RECOVERED DURING THESE EXCAVATIONS TO THE LKA CASE XXXX AIRCRAFT. **This last sentence here is the same as the last sentence of paragraph 1.**

8. EVAL/TER/DVM/LES/RDA/RCM.

Annex C (Life Sciences Equipment-Material Evidence Reports) (A5.10.1, A5.10.2a-k, A5.10.8)

C1.0 PURPOSE & SCOPE: This annex outlines the formats and procedures used for writing Life Science Equipment-Material Evidence Reports (LSE-MERs). This annex does not pertain to:

- Standard Material Evidence Reports (MERs).
- Materials that are routinely handled under administrative fiat(s) or CIL portions.

C2.0 GENERAL: LSE-MERs are written as stand-alone reports that provide written and visual testimony pertaining to the evidence recovered. LSE-MERs are typically written in the laboratory or office setting and document the findings of the analyst(s) after examining material evidence, specifically life-sciences equipment.

Although the audience for LSE-MERs is diverse (e.g., other professionals, family members, casualty officers), its first goal is to provide a competent and professional presentation of the test results. However, with such a diverse audience, analysts should avoid excessive and unnecessary use of jargon or obfuscating technical phrases.

Deviations from DPAA Laboratory Manual, Appendix 5.2 (Style Guide) are allowed in exceptional circumstances.

C3.0 REPORT FORMAT & CONTENTS: A template example of the LSE-MER format is found on the DPAA network. The analyst should start with a clean report template for each new report to ensure the currency of the template.

C3.1 **Title Block:** The title block on the first page is in Times New Roman Font and contains:

- Report title at the top centered, bold, 16 pt, all caps. The title should reflect the type of testing reported and accession number (final consolidated number).
- Organization centered, bold, all caps, 14 pt.
- Date (month and year) centered, bold, with the first letter in caps, 14 pt. For example:

An example of the above guidance **(5.10.2a-c, g)**:

LIFE-SCIENCES EQUIPMENT - MATERIAL EVIDENCE REPORT: CIL 1993-236-L-01 Through 09

DPAA - LABORATORY

22 January 2007

Note: The above example uses two digit artifact numbers (e.g., 1993-236-L-01). For large cases where the number of artifacts exceeds 99, it is permissible to use three digit artifact numbers (e.g., 100, 101……)

C3.2 **Body of the Report:** The body of the material evidence report is typically written using the below format. Besides text, the body of the report includes photographs and appropriate tables.

The below format and section headings follow the preferred order of presentation and should be followed closely; however, it is anticipated that situations can arise that may require certain adjustments for greater clarity.

C3.2.1 **Background:** A brief (1-2 sentences) description of the loss incident should be presented. This is followed by a more detailed description of the acquisition, excavation, or recovery circumstances of the material evidence, as appropriate. Analysts should avoid protracted details if not immediately relevant and/or presented in other reports.

C3.2.2 **Material Evidence:** Guidance for completing this section is as follows. Refer to the body of this SOP for more details **(A5.10.2e, A5.10.2f)**:

- Tables: Tables are structured as specified in the templates and the Style Guide (Appendix 5.2) of this Laboratory Manual. Tables listing the LSE-Material Evidence should only be presented in the LSE-MERs if necessary. Additional tables may be required (e.g., lot analysis) and are prepared at the discretion of the analyst. Tables may also be utilized in the Findings Section (see below).
- Specific provenience information for each item is only presented in the LSE-MER if the analyst deems it probative to the report.
    - If presented, the analyst can present the information in a table or in the text. If necessary to the reporting, a plan map with provenience information can be provided at the discretion of the analyst.
    - If specific provenience information for each item is not presented in the LSE-MER, a very brief comment should address this issue in the Background section. For example, "All items were recovered from Site VN-01234", "All items in this report were recovered within the same general archaeological area with no probative pattern of distribution", or "all items described in this report were received as a unilateral turnover

and thus have no provenience information associated with them".

- The following are considerations relating to the Material Evidence Section text organization, structure, and inclusions:

  - Correct and consistent nomenclature and terminology should be used throughout the MER including section headings, figure captions, and in the descriptive text.
  - Material evidence is listed in accordance with its utility in supporting a potential identification.
  - The Material Evidence Section does not include interpretative conclusions. For example, if an helmet fragment is specific to a Type APH-6, the analyst should not state that it is consistent with those worn by F-4B pilots. That type of statement is reserved for the Findings Section.
  - Include information of any assessments of evidentiary value that may have occurred.
  - Describe any accession consolidations, as necessary.

- The following are considerations relating to material evidence descriptions:

  - Parallel the descriptions in the report to the guidance presented in the body of this SOP (i.e., organize by material class, artifact type).
  - Include counts of material evidence items whenever possible, and however relevant.
  - Describe the condition of the artifacts.
  - Describe general cleaning procedures, as necessary.
  - Include only those measurements that support the identification of the object (as described in the body of this SOP) and only if they do not detract from the clarity and/or readability of the MER.
  - Descriptions and illustrations (if pertinent) of any decorative motifs, manufacturers' logos, writing or similar characteristics that are present.
  - Identification of manufacturing materials (note: this may only be conclusively stated if elemental testing is conducted using precise testing methods (e.g., the SEM).

- The following are considerations relating to an identification of the item **(A5.10.2i)**:

  - Use correct, accurate nomenclature when making an identification and document accordingly.
  - Include the federal stock number (and citation thereof) in the description when available.
  - Use a proper section heading for material evidence descriptions. An example of a sample section heading for a material evidence description is as follows:

    CIL 1999-056-L-01 Coveralls, Anti-G, Cutaway n = 1
    CIL 1999-056-L-02 Helmet, Pilots' Protective, Type APH-6 n = 1

  - Cite exemplars correctly

- Photographs: See DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging). Because it is ultimately scanned, authors should avoid putting images on the signature page of the LSE-MER since a significant decrease in image quality occurs.
- Figure & photograph captions: The following guidance applies:

  - When displaying an item(s) being tested, the figure caption should start with the CIL accession number followed by a comma, and then the item description. The first letter after the comma is lower case unless the word is a proper noun or starts a proper noun phrase.
  - When referring to photographs of samples in a lot analysis, the phrase after the comma should begin "a representative sample . . ."
  - Graphic or photographic exemplars should be clearly identified.

  Examples of the above guidance include:

  Figure 21. CIL 2006-081-L-07, Harness, Integrated Parachute, Type MA-2.

  Figure 23. Graphic exemplar of Harness, Integrated Parachute, Type MA-2 (citation).

C3.2.3 **Findings:** Present interpretative conclusions in this section. Use tables where appropriate **(5.10.2i).**

C3.3 **Signature Block:** the name(s), function(s) and signature(s) of person(s) authorizing the test report **(A5.10.2j)**.

C3.4 **References:** If an item is precisely identified, an exemplar reference must be cited. Citations must include the page number when books, catalogs, manuals, etc. that are paginated are referenced.

C3.5 **Appendices**: As necessary.

SOP 3.7: DNA SAMPLING

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 12 January 2017
Citation: DPAA Laboratory Manual, SOP 3.7

0.0 PRINCIPLE, SPIRIT & INTENT: *Biological trace evidence is sampled for DNA analysis in an organized manner conducive to testing and verification. At all times, the integrity and test value of the evidence is maintained.*

1.0 PURPOSE & SCOPE: This SOP outlines procedures for the selection, collection, and documentation of skeletal and dental samples for DNA analysis. This SOP applies to typical CIL cases and is used by all personnel working for the CIL or under its auspices. In situations where unusual circumstances preclude the adherence to this SOP, the results must indicate why the procedures could not be followed, the alternative procedures performed, and an opinion on how the accuracy and reliability of the resulting tests were affected. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met **(A4.1.5a, A5.7.1, SA5.7)**.

Note: The term "sampling" as used in this SOP is not sampling as defined by ISO 17025 (i.e., "Sampling is a defined procedure whereby a part of a substance, material, or product, is taken to provide for testing or calibration of a representative sample of the whole.") or the ASCLD-LAB Sampling Policy. In the CIL, DNA results obtained from a sampled element, and the conclusions reached, are applied to the sampled element only and not to the entire assemblage of evidence present. Associations of other evidence to the sampled element are made through osteological, odontological, and archaeological methods, as well as testing of additional skeletal and dental remains for DNA analysis that are detailed elsewhere in this Laboratory Manual. For example, in the absence of the above methods, DNA results obtained for a sampled femur can only be applied to that femur and cannot be extrapolated to any other skeletal or dental remains found in association with that femur **(A5.7.1)**.

2.0 DEFINITIONS: For the purposes of this SOP, the following terms and definitions apply:

- **Mitochondrial DNA (mtDNA):** Mitochondrial DNA is the genetic material found in the mitochondria of cells. It is inherited through maternal lines and is found in all cells of the body. DNA testing for CIL casework typically involves mtDNA.
- **Nuclear DNA (nucDNA):** Nuclear DNA is the genetic material found in the nucleus of a cell. It is inherited from both parents and is found only in the cell nucleus. Nuclear DNA testing is secondary to mtDNA testing for CIL casework.
- **Y-chromosome DNA (YDNA):** Y-chromosome DNA is that subset of the nuclear genome that is present on the Y-chromosome, and as a result is inherited through the paternal line with no recombination. Like other nuclear DNA testing, Y-chromosome DNA testing is secondary to mtDNA testing for CIL casework.
- **Ancient DNA (aDNA):** Ancient DNA is a term used for residual DNA after substantive post-mortem processes have diminished the probability of straightforward DNA recovery. All typical CIL casework involving DNA is considered aDNA.
- **Armed Forces DNA Identification Laboratory (AFDIL):** AFDIL is the primary agency responsible for processing DNA samples, generating data, and reporting results for the CIL.
- **DNA Personnel:** CIL Staff competency certified to assist with the sampling of remains for DNA and to address administrative issues including, but not limited to, family reference samples, and administrative correspondence, etc. Some DNA personnel who have additional training in osteology, experience in DNA sampling techniques, case assessment for sampling strategy, are authorized to approve osseous elements for sampling as directed by Laboratory Management, and create chains of custody of DNA evidence and transmittal **(A4.1.5a)**.

Refer to Figure 1 regarding the following definitions.

- **Pulp:** Pulp of the tooth contains neurovascular elements and connective tissue (or remnants thereof in ancient remains) and represents the innermost cavity of the tooth.
- **Dentin:** Dentin is a yellow appearing hard tissue surrounding the pulp cavity where the majority of DNA is found in an ancient tooth.
- **Cementum:** Cementum is a hard tissue found surrounding the dentin in the root portion of the tooth only.
- **Enamel:** Enamel is a white appearing hard tissue found surrounding the dentin in the crown portion of the tooth only.

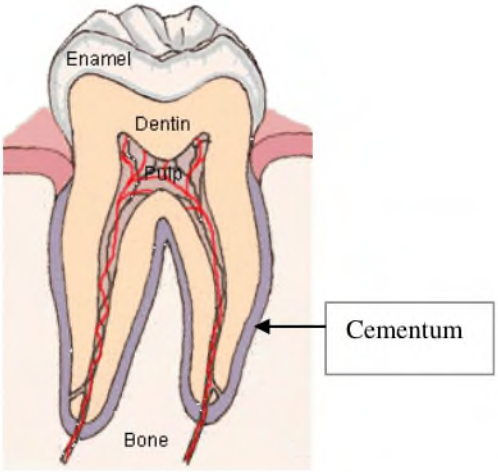


Figure 1. Basic Dental Anatomy

3.0 GENERAL PRINCIPLES & GUIDELINES:

3.1 **Location:** Sampling of trace evidence for DNA is typically conducted in the DNA Sampling Rooms at CIL-HQ and CIL-OF (Rooms 338 and 118, respectively). Tests are stopped when conditions in these areas jeopardize the subsequent analysis **(A5.3.2, A5.3.3)**.

3.2 **Apparatus & Materials**: Equipment necessary to select, collect, and document DNA sampling is maintained in the CIL in accordance with DPAA Laboratory Manual, SOP 3.2 (Measurement Observations & Traceability). Apparatus and materials involved typically include the following:

- Rotary cutting tools (including attachments, blades, drill bits and chucks).
- Ultrasonic cleaner.
- UV crosslinker.
- UV lamp.
- Digital scales.
- Digital camera.
- Diluted chlorine-based bleach solution.
- Personal protective equipment (PPE) (e.g., eyewear, hand protection and surgical gloves, face masks, surgical scrubs, caps and gowns).
- Steel grips and surgical prying implements.
- 15ml sterile polypropylene conical tubes.
- Weigh boats.
- Paper towels/ surgical napkins.
- Evidence containers and supplies (indelible markers, envelopes, tags etc.).

3.3 **Evidence Handling & Preservation**: The biological evidence subjected to testing is usually robust in nature and not easily affected by handling, or by the ambient environment in the CIL. Evidence is handled in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security) **(A5.3.1, A5.3.2)**.

The CIL recognizes that there is considerable debate about the steps required to minimize contamination and maximize recovery of ancient DNA (aDNA) from highly degraded and otherwise challenging samples. CIL procedures are based on an evaluation of the current literature on aDNA sampling, the CIL's unique experience with skeletal and dental sampling for DNA analysis, and ongoing consultation with leaders in the field (Leney 2006).

Where remains are to be sampled for DNA or are potential candidates for future DNA sampling, precautions need to be taken prior to and during sample selection to avoid contamination of the samples with contemporary DNA. As such, the majority of the procedures listed in this SOP are special precautions or measures taken to preclude contamination. While the risk of sample contamination cannot be totally eliminated, particularly prior to remains passing into the CIL's custody, the overall strategy is one of risk minimization **(A5.3.3, A5.8.4)**. Specifically:

- Washing bone should be kept to a minimum. If washing is necessary, scrubbing should be avoided and gloves worn. Where possible, remains should not be washed prior to DNA sampling. If cleaning is required, dry brushing is preferred.
- Until DNA testing is completed, the number of persons handling remains and the duration of handling should be minimized and moderated by wearing clean latex gloves.
- For disinterments and casket openings:
    - Masks and gloves should be available in the event the casket falls apart or the remains are similarly exposed.
    - Once at the CIL, wear gloves and masks during the casket opening
    - Sample for DNA as soon as possible after accessioning into the CIL
- Individuals experiencing frequent sneezing, runny nose, etc. should refrain from handling remains or wear a surgical mask while conducting trace evidence analysis.
- Use procedures to mitigate the risk of fresh contamination. These are detailed in Annex A (Osseous Sampling Procedures) and Annex B (Dental Sampling Procedures) to this SOP.

4.0 PROCEDURES: Sampling of trace evidence for DNA consists of various procedures depending if the

specimen to be sampled is osseous (see Annex A), dental (see Annex B), or other biological material. Regardless, the following general procedures apply to typical cases **(A5.8.4)**:

4.1 **Sample Nomination:** CIL cases to be sampled for DNA testing are typically nominated by the analyst assigned to the case. AFDIL may also request resubmissions should an initial sample be of insufficient quality for complete testing or give an insufficient sequence **(A4.1.5a)**. Resubmission is contingent on the adequacy of the remaining biological material.

If both osseous and dental materials are present, the respective analysts should coordinate with each other to ensure both that all necessary elements are sampled and that duplicative samples are not taken.

Nominating analysts are encouraged to include as much information as they deem relevant when discussing nominations with a DNA personnel. Sample selection guidelines are circulated periodically based on developments in DNA technology and/or changes in the sample processing agreements between the AFDIL and the CIL. Current guidelines are found in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). Further guidance can be obtained by consulting DNA personnel.

Regarding the elements nominated for sampling, analysts should complete the below procedures **prior to entering the case in the sample log:**

- Tag/label the elements, particularly where there is a large quantity of biological evidence and/or a large number of samples, so they can be easily identified by those conducting the sampling.
- If there is any reason to sample an element in a particular manner, clearly indicate on the selected elements where the cuts are to be made (in narrative form or by marking with a rubber band, tag, etc.)
- Segregate the material and take all practical measures to protect it from fresh contamination.
- Ensure that provenience data are preserved on segregated material.
- Record metric data as required from osseous evidence **prior to sampling**. While every effort is made during sampling to preserve the integrity of metric landmarks, this may not always be feasible when obtaining an adequate DNA sample.
- Notify the appropriate odontologist of any osseous sample requests involving a maxilla or mandible. These must be fully documented by an odontologist prior to sampling.

Recommendations are submitted electronically via the DPAA DNA Log located on the DPAA network. More detailed guidance is found in Annexes A and B to this SOP. Consult the DNA personnel regarding its detailed use.

4.2 **Sample Approval:** DNA personnel approve DNA sampling by checking the approved box in the DPAA DNA Log. Only an individual logged onto the DPAA network as an approving authority can operate this check box.

4.3 **Sample Collection:** Protective measures for analysts, and the procedures, equipment, and facilities used in the DNA sampling process are detailed in Annex A (Osseous Sampling Procedures) and Annex B (Dental Sampling Procedures) to this SOP **(A5.3.3)**. The primary goal is to minimize the risk of adding fresh (and therefore potentially DNA-rich) contamination to the samples while maximizing the potential of obtaining a DNA sequence.

Where possible, DNA sampling should be done as soon as possible after the remains are accessioned. Contamination of remains in the days immediately prior to sampling is probably a more serious cause of DNA test failures than contamination that takes place at a distant time from the sampling event. However, handling remains months or even years before sampling may contribute to false positive and mixture sequence results.

CIL personnel competency certified in this SOP collect DNA samples. Sample collection guidelines are periodically circulated based on developments in DNA technology, changes in the sample processing agreements between the AFDIL and the CIL, and the need to collect non-standard or novel sample types. Current guidelines can be obtained from DNA personnel. Additionally, DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security) provides DNA sample selection criteria for osseous and dental evidence.

Selection and collection of DNA samples from skeletal remains comprises choosing appropriate skeletal elements for sampling and preparing a sample of adequate size to potentially yield DNA sequence information while minimizing the damage to those elements. Selection and collection of DNA samples from dental remains consists primarily of sending gross or partial dental remains, and in some instances granular dental tissue composed primarily of dentin (but possibly containing portions of enamel, cementum and necrotic pulp) to AFDIL.

Sampling of tissues other than bones and teeth may require deviation from the procedures in this SOP

and should be conducted in consultation with the DNA personnel.

4.4 **Sample Documentation:** Samples are documented by:

- Photography.
- Radiography (normally dental and thoracic elements only).
- Entry of information in the DPAA DNA Log.
- Completion of tags (to attach to parent bone after a sample is taken).
- Completion of cards kept with the sampled tooth.
- Preparation of envelopes containing samples sent to the AFDIL.
- Detailing environmental conditions, if any, during sampling that may affect the test results or their interpretation.

Note that sample tags/cards (retained at the CIL) and envelopes (sent to AFDIL) are the primary documentation for each sample. The chain of custody form and DPAA DNA log should accurately record the information from tags, cards, and envelopes, but are secondary documents.

Additionally, all personnel involved in sampling for DNA ensure they record deviations, additions, and/or exclusions, if any, regarding the sampling methods employed in this SOP.

4.5 **Sample Chain of Custody:** Chain of custody is maintained in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). Tracking information is recorded in the DPAA DNA Log. Checking the Submission Completed box then locks the record. Only personnel logged on to the DPAA network as DNA Log administrators can operate this check box. Laboratory Administration personnel send samples via FedEx.

4.6 **Special Instructions for Critical Cases:** A case is designated as "critical" when its element(s) represent the only biological material which may produce genetic information capable of resolving a case and for which re-sampling of the element(s) may not be possible. AFDIL (or other appropriate DNA laboratories) process each sample separately regardless of the number of samples in the same accession. This protects against:

- Contamination of the negative control.
- Cross contamination between individual elements with a similar accession number.
- Possible exhaustion of the reagent blank.

Cases designated as "critical" are annotated as such in the cover letter. "Critical" samples may include but are not limited to:

- Cases for which a single duplicated element is present (MNI ≥ 2) which cannot be excluded from an individual still unaccounted-for from a particular incident at the time of sampling.
- Teeth/tooth from which a contiguous jaw fragment with other potential teeth for sampling does not exist which cannot be excluded from representing an individual(s) still unaccounted-for from a particular incident at the time of sampling.
- Cases for which single elements (osseous or dental) represent the only biological material with potential for DNA testing and for which all unaccounted-for from a particular incident have not been identified at the time of sampling.
- Elements that are being re-sampled, but probably cannot yield an additional sample of adequate size for testing, and that cannot be excluded from representing an individual(s) still unaccounted-for from a particular incident at the time of sampling.
- Other cases determined as "critical" by Laboratory Management.

4.7 **Atypical Samples:** Occasionally, atypical samples may be submitted for testing, including, but not limited to, hair, finger/toe nails, soft tissue (e.g., skin, muscle, connective tissue), and non-biological evidence thought to contain trace DNA. The process for submission of atypical samples is determined by DNA personnel on a case by case basis in accordance with the principle, spirit & intent of this SOP.

Presumptive Serological Testing for DNA:
Atypical samples may include the suspected presence of serological residue (e.g., blood or body fluids) on evidence. In the CIL, such situations are usually associated with material evidence (e.g. a dark brown stain on a portion of flight suit thought to be blood). By extension, confirmation of the material to be serological residue suggests its probative value with respect to obtaining DNA samples.

DNA personnel are authorized to conduct presumptive testing of suspected biological materials. The sole intent of the test is to exclude, or fail to exclude, the suspected material as having substantive value as biological evidence. In other words, the test is not analytical in nature and no other results, other than the presence/absence of possible biological residue, are to be inferred.

As such, a positive test (i.e., suggesting but not proving the presence of biological residue) is subsequently used by analysts to determine if the

tested material should be considered for further DNA testing. A negative test (suggesting that there is little or no biological residue) would typically result in a decision to forgo DNA testing. The following guidelines are used to conduct presumptive testing of such evidence:

- Only commercially procured test kits, containing pre-mixed reagents, are used. Kits with sealed one-time use packets are preferred **(SA5.1.4)**.
- The analyst follows the directions included with the test kit.
- Positive and negative controls are conducted prior to testing the suspected material.
- The results of the tests on the control samples and the subject material (positive or negative) are recorded in the analytical notes as free text.
- Sufficient amounts of the suspected material are preserved for subsequent testing, if possible, mindful that the purpose of such presumptive testing is to guide choices about future DNA testing.
- Measures to prevent contamination of potential DNA evidence should be used when processing such evidence. Specifically:
    - The evidence should be exposed to the external environment for the minimum time required to remove a sub-sample for presumptive testing
    - Samplers should work on a bleached surface using DNA free implements.
    - Samplers should (minimally) use gloves and a face mask when processing such evidence.
    - Samplers should NOT work under UV light with samples that may contain biological residue as this would destroy or damage any evidentiary DNA that might be present.
    - Janitor or housekeeping personnel.

4.8 **Return of Sample Residues to the CIL:** In the event any samples need to be returned to the CIL, they are returned to the location of origination. This includes samples sent to the AFDIL that were not processed and any residual materials from samples that were processed. Sample residues are discussed in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

5.0 DOCUMENTATION: The above documentation of DNA sampling occurs simultaneously with the two sampling processes and is discussed in detail Annex A (Osseous Sampling Procedures) and Annex B (Dental Sampling Procedures) to this SOP.

Osseous and dental DNA samples are not tested on site at the CIL rather they are processed by outside laboratories, primarily the AFDIL. Results of DNA testing are presented in report format as dictated by the SOP of the particular laboratory and handled at the CIL in accordance with current procedures.

A tracking binder of annual sample submissions is maintained by DNA personnel at CIL-HQ and CIL-OF for verification purposes.

All hard copy digital photographs prepared during the sampling process and used in casework are considered analytical notes and are annotated in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).

6.0 SURETY: Several surety measures are in place regarding the DNA sampling:

6.1 **Proficiency Tests:** Blind proficiency tests (utilizing material with a previously determined DNA sequence) are sent to the AFDIL at least twice each calendar year from CIL-HQ and CIL-OF **(A5.9.1b)**. The test is designed to provide:

- The AFDIL with a regular check on reproducibility of sequence results.
- A check on the CIL's contamination prevention procedures.

Non-human material is sampled and sent to the AFDIL periodically as a negative control.

6.2 **Sense Criteria:** In line with conventional practice in the DNA field, the profiles obtained are evaluated against the hypothesis tested. Where the results fall outside the range of the hypothetical outcomes, DNA personnel conduct a further review ranging from informal inquiries with the DNA analyst concerned up to and including independent retesting of the sample in question.

6.3 **External Compliance:** Before DNA casework is submitted to laboratories other than the AFDIL, the CIL ensures that these institutions are in compliance with DNA Advisory Board (DAB) Standard 17 as detailed in the current DNA Quality Assurance Audit Documentation or other substantive accreditation of equivalent or higher standing in the forensic DNA community and that this is fully documented.

6.4 **Reference Samples & Evidence Area Access:** Access to evidence areas is detailed in DPAA Laboratory Manual SOP 1.2 (CIL Physical Security). Individuals entering the evidence areas may be required to provide a DNA sample. The subsequent DNA profile is used as a reference in order to detect false positives resulting from contamination of evidence.

Individuals who regularly access evidence areas, and/or have close contact with biological evidence are considered "high risk" in terms of contributing to DNA contamination. Risk is assessed based on time in the evidence area as well as proximity to the evidence.

High risk individuals must contribute a buccal swab (preferred) or a blood sample for DNA profiling. High risk individuals include, but are not limited to:

- CIL Staff members (including interns).
- Visiting scientists.
- Photographers from the DPAA FIC.
- Augmentees to include subcontracted field personnel.
- Exhumation/disinterment assistants and volunteers from other DPAA sections.
- Personnel supporting or assisting the medical examiners and/or medical examiner operations (e.g., autopsies in the morgue).
- Janitor or housekeeping personnel.

Visitors may be high risk or low risk. Infrequent or one-time visitors to evidence areas are usually considered "low risk" for contamination (Gilbert et al. 2006 and CIL experience). As such, they may or may not be requested to volunteer a DNA sample.

Regardless of whether the visitor is high or low risk, risk is further reduced by:

- Granting access to only those with a legitimate need (e.g., visiting scientists, maintenance workers, janitors) as determined by the Laboratory Director or, in his absence, an appropriate member of Laboratory Management.
- Minimizing the time visitors are allowed in the evidence areas.
- Minimizing the number of visitors allowed in the evidence areas (e.g., for work crews, only the minimum number needed to perform the work should be allowed access).
- Preventing visitors from hovering over and/or touching remains.

Since the Laboratory Director is the only person who can grant access to evidence areas, he is also the final arbiter when assessing risk and subsequently deciding to sample visitors for DNA.

DNA profiles obtained from evidence that are consistent with personnel who have their profiles on file with the AFDIL are reported to the CIL. DNA personnel assess the likelihood of any actual contamination and either instruct the AFDIL to accept the results or submit a resample for verification of results. Contamination Inquiry PDFs (received from the AFDIL) and the Contamination Record (Form 3701) are returned to the AFDIL with the findings filed in the n:case file. Hard copies are provided to Laboratory Administration and filed in the DNA subfolder for each case.

6.5 **Oversight:** DNA personnel maintain oversight on all case selection, sampling, proficiency tests, test results and interpretation, along with relevant documentation.

6.6 **Error-Checking of DNA Sample Log:** Evidence personnel having DNA LOG ADMIN privileges review entries in the DNA sample log prior to shipment to ensure all fields are properly completed.

6.7 **Audits:** All aspects of DNA selection, sampling and documentation are subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

7.0 SAFETY: All skeletal and dental remains are handled in accordance with appropriate specimen-handling procedures. Handling of wet bone and dental remains (i.e., remains with adherent soft tissue) and the use of hazardous materials and equipment (such as bleach, cutting tools, and ultraviolet light) are in accordance with DPAA Laboratory Manual, SOP 1.4 (Laboratory Safety Program).

Annex A (Osseous Sampling Procedures) (A5.3.3)

A1.0 PURPOSE & SCOPE: This annex details technical procedures for the selection, collection and documentation of DNA samples from osseous remains at CIL-HQ and CIL-OF. This annex serves as a training guide and as a checklist for DNA sampling by qualified staff, and the same for annual proficiency examinations.

A2.0 PROCEDURES: There is considerable difference of opinion among scientists regarding the optimal sampling method for obtaining DNA from biological material. The procedures listed below represent an evaluation of the literature and reflect the subsequent professional judgment of CIL subject matter experts. Osseous DNA sample selection and collection consists of the following steps. Appropriate documentation occurs concurrently with each step.

A2.1 **Tasking of Personnel:** Laboratory Management, either verbally or by email, tasks DNA personnel to nominate cases for DNA sampling. Sampling is then conducted DNA personnel.

A2.2 **Sample Nomination:** The nomination is submitted electronically through the DPAA DNA Log located on the DPAA network as depicted in Figures 2 & 3. Analysts must ensure that they:

- Create a new page for each new sampling of a case (**not for each sample** in the same case during the current sampling session).
- Check for all prior sampling in the CARIS DNA tab. If sampled previously, enter the next number/letter in the appropriate box (upper right corner) using the below numbering convention.
- Include the AFDIL number on the samples and paperwork if the case has been previously sampled.
- Indicate in the relevant portion of the DPAA DNA Log which skeletal elements are recommended for sampling. Factors considered include:
  - MNI (minimum number of individuals).
  - State of preservation of the remains.

The database record must be completed for the nomination to be approved (Figures 4 & 5).

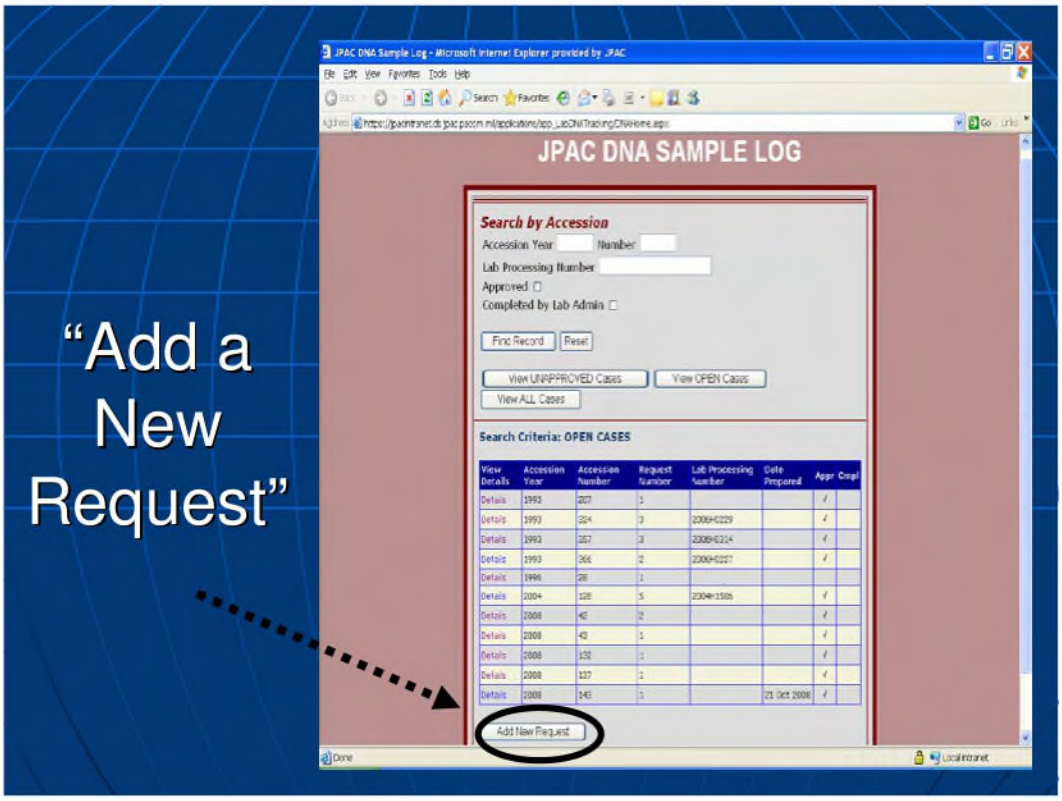


Figure 2. Adding a new request to the DNA Log

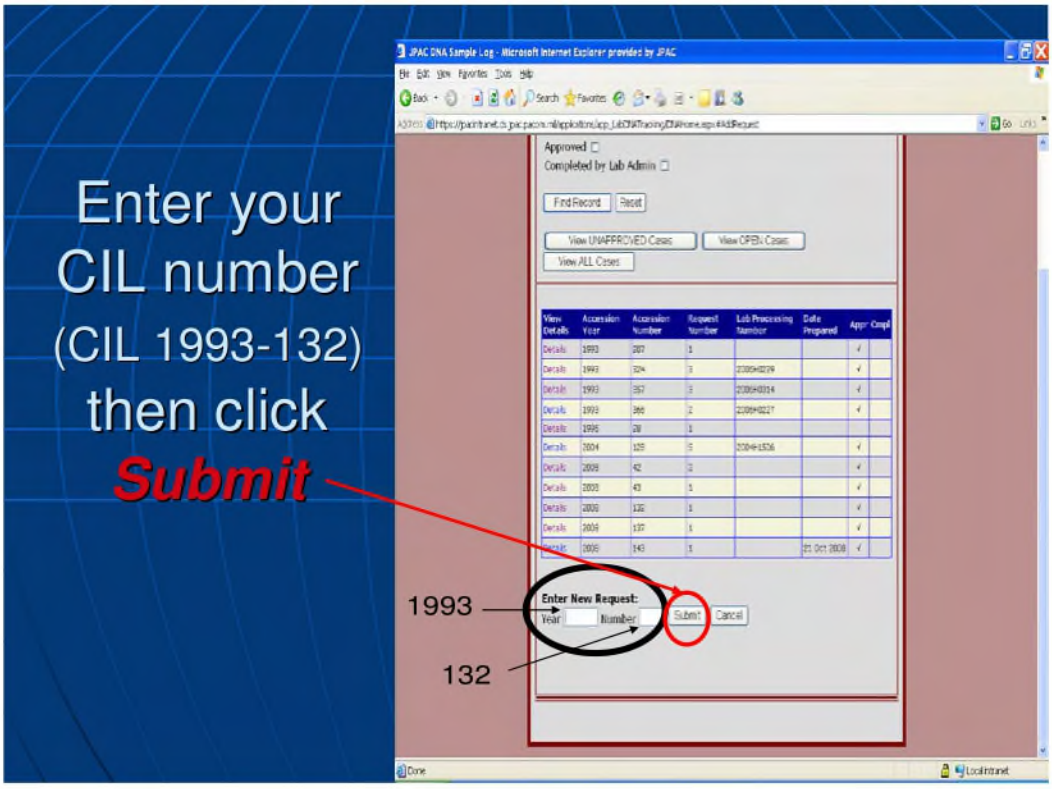


Figure 3. Submitting the request

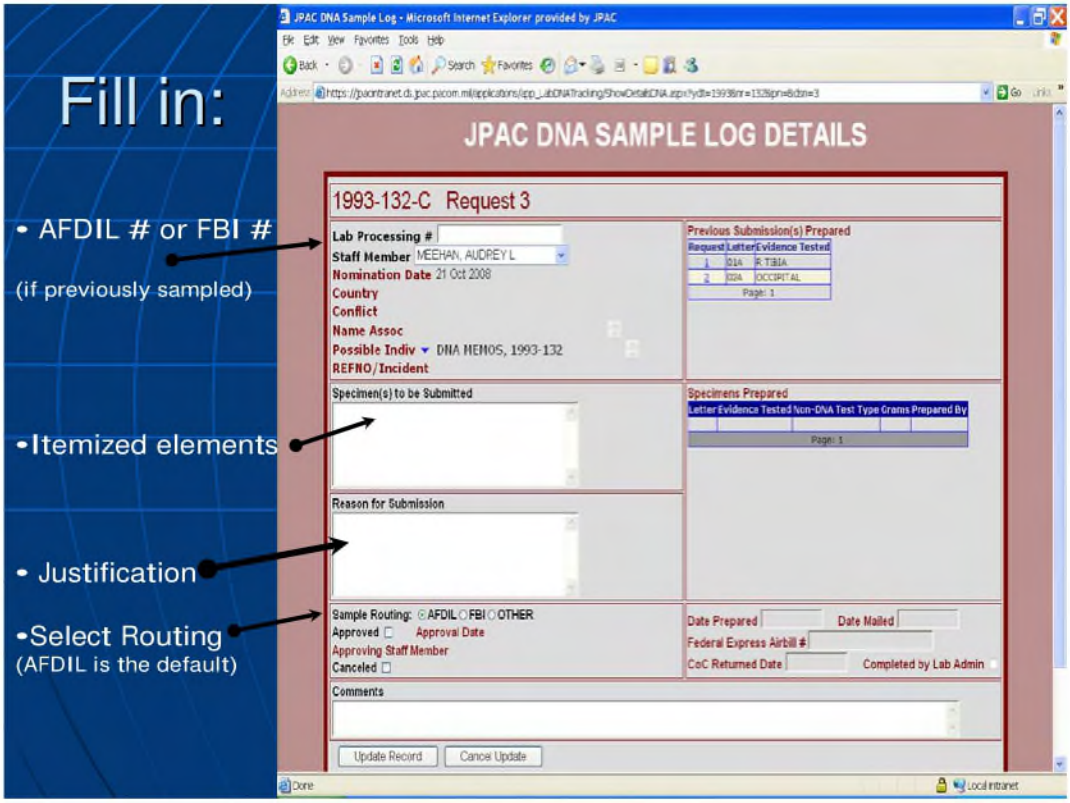


Figure 4. Completing the details in the Sample Log

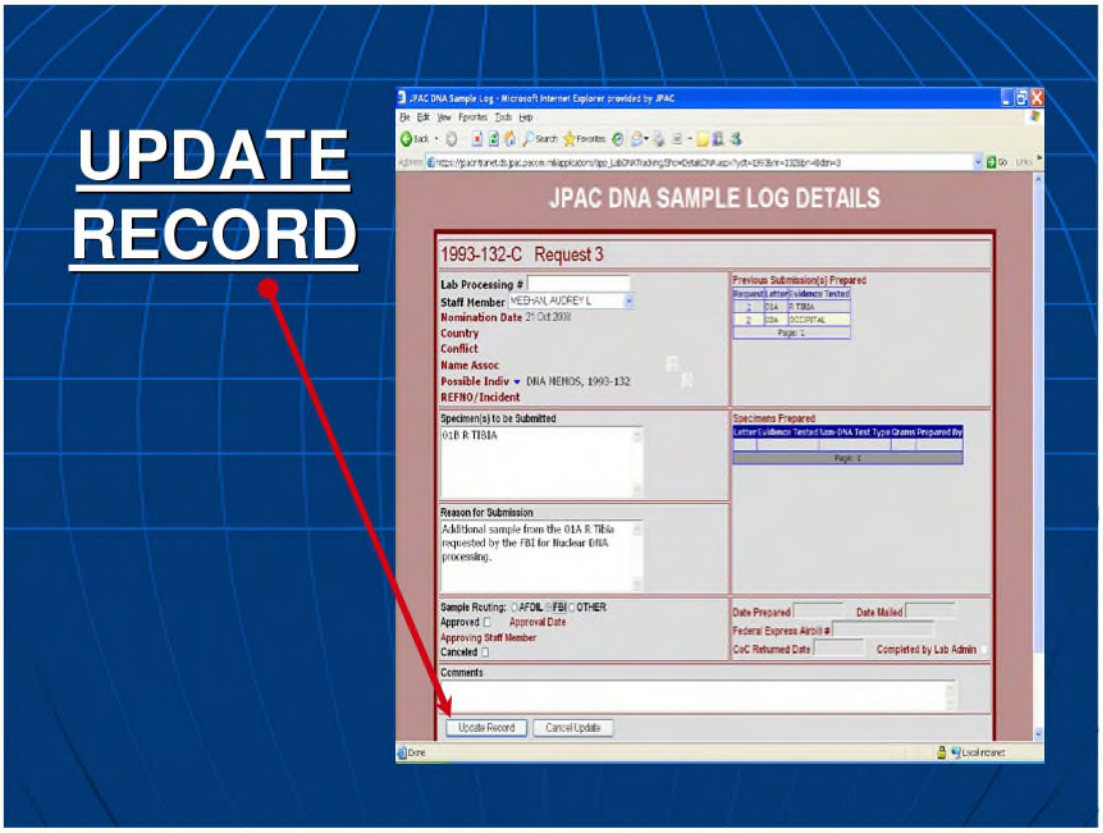


Figure 5: Updating the Record

The information forms the basis for the AFDIL cover letter and streamlines the request for family reference samples (FRS). The analyst discusses the nomination with DNA personnel who approve sampling by checking the approval box; the record is automatically date stamped.

The nominations are reviewed by the DNA personnel designated to obtain the samples prior to sample collection so that appropriate skeletal elements can be triaged.

Analysts should assist this process by tagging the remains they are nominating.

Note that the DNA Sample Log is an integrated module of the CARIS database, and as such it is managed by the DPAA IT for the use of the CIL. While CIL DNA personnel are responsible for maintaining the integrity of the data within the Sample Log to the best of their ability, factors outside their control may affect the database.

While analysts should designate skeletal elements to the best of their ability, designations may change over the course of the analytical process. Thus an element may be sampled as one bone (e.g., a left humerus) and later be determined to be a different bone (e.g., a right femur). The Sample Log reflects the analyst's interpretation at the time of nomination, and the (potentially different) interpretation of the DNA personnel at the time of sampling.

A2.3 **Sample Collection:** The following procedures should be followed, in the order indicated below, to reduce the risk of mislabeling or contaminating samples:

A2.3.1 **Wear Personal Protective Equipment (PPE):** The intent of PPE is to protect the sampler and to prevent fresh contamination of the sample. The following guidelines apply:

- Change into surgical scrubs (this protects your regular clothes from bleach).
- Wear a surgical facemask (this protects both you and the sample).
- Wear disposable sterile surgical gown.
- Wear gloves. The following are guidelines for using gloves:
  - Only uncontaminated gloves come in contact with evidence.
  - Gloves are recommended at all times when handling bleach or bleached objects.

- Samplers should double glove during actual cutting. The inner pair can be worn continuously to protect the hands from contact with bleach. The optional outer pair can be changed or sprayed with bleach and wiped to prevent contamination of the samples. In cases with high organic content, sample to sample contamination is possible.
- If there is any question concerning contamination of the gloves they should be sprayed and wiped with bleach or discarded.

- Use eye protection (prescription glasses, safety goggles, and/or the exhaust hood glass pane) while using the cutting tools, when spraying the bleach solution, and while working under the hood.
- Wearing a full gown (covering all the skin on the arm not covered by scrubs or gloves) should be used by the individual conducting the sampling.
- Wear hair covering (e.g., bouffant cap) while preparing for sampling and while obtaining the samples.

A2.3.2 **Prepare the Sampling Area & Equipment:** The following procedures apply:

- Assemble all the equipment needed to preclude bringing things into the work area during the procedure (except the remains to be sampled)
- Remove all extraneous material from the area. Materials that are unable to be cleaned (e.g., glove boxes) should be placed in the "non-clean" section of the work area during the entire sampling process.
- Prepare bleach solution by filling a spray bottle with 10-20% bleach concentrate and 80-90% tap water. Unused bleach should be immediately returned to storage after a sampling session is concluded. Bleach is an extremely corrosive agent and should be used sparingly when cleaning high value items such as the balance and crosslinker.
- Spray the interior and exterior of the fume hood with diluted bleach and dry with paper towels, facilitated by turning on the hood fan. At the completion of this step, the fume hood can be closed and the fan turned off until actual cutting takes place.
- Thoroughly clean everything with bleach solution that may contact the sample or that you may have to handle concurrently with sampling, e.g.:

  - Work area outside of the fume hood including the counter area, photography area, and the non-clean area.
  - Anything else the sample rests on.
  - The balance, dental hand piece, and bits, ultrasonic cleaner, and screwdriver.
  - Things that are touched during/in between sampling (e.g., the top of the hand piece and crosslinker door handle/key pad).

- After cleaning, remove soiled cleaning materials from the work area.
- Perform an intensity check on the crosslinker prior to each day or part day of sampling activity in accordance with DPAA Laboratory Manual, (Trace Evidence Equipment & Supporting Materials).
- Cross-link the hand piece, bits, screwdrivers, blades, and the cable for the hand piece prior to use. Sufficient UV dosage can be programmed by pressing the "Energy" button and then punching in "9999"; this is equal to one joule of energy per cm^2.
- Place a blue surgical napkin next to the scale with the blue plastic side facing up and wipe with bleached cloth. This serves as your background for photographing the sample and parent bone for chain of custody purposes.

A2.3.3 **Pre-Sampling Specimen Preparation:** Pre-sampling specimen preparation is required as part of the documentation and the chain of custody procedures. The following procedures apply:

- Sign out the case(s) for sampling from the Evidence Coordinator. If the accession is on a table, notify the analyst assigned to the case.
- Put on a pair of surgical gloves and wipe them thoroughly with bleach.
- Beyond this stage it is possible to facilitate the entire process by using two samplers. One maintains uncontaminated status and handles the samples. The other handles all the potentially contaminated material and minimizes contact with the items being sampled. This saves time and systematizes the contamination avoidance procedures. Careful coordination between the team is required and members are encouraged to discuss procedures in advance and during the sampling process.
- In the non-clean area and using an indelible marker, prepare a manila card and an envelope with the below information:

  - CIL number.
  - AFDIL number (added to the envelope only, for AFDIL's convenience, if the accession has been previously issued a number by AFDIL).
  - Sample designator (assigned by DNA personnel). The following rules apply:

    - For cases not previously sampled the sample designator is two digit (minimum) numerical, with samples from the same element

designated by a terminal letter. Thus the first sample is 01A, followed by 02A, 03A etc. Subsequent re-samplings of the third element would thus be 03B, 03C etc.
- ❑ If the case has been previously sampled, check CARIS for previous designators. Where the old CILHI sample designation system (alphabetical designation of elements - A,B,C etc. and numeric suffixes for re-sampling A.1, A.2 etc.) is already started, this is to be continued unless otherwise stated by DNA personnel.
- ❑ If sampling different elements in the same case, begin where the case designators left off (e.g., if two original submissions were designated A and B, samples should begin with C and continue alphabetically). If original designators were 01A, 02A, 03A then begin with 04A.
- ❑ If confused/concerned about the proper designator, see DNA personnel.

- Element sampled. Detailed description is not needed. A list of approved element designations is available to ensure reliable and uniform recording of data.
- Date.

- Write the CIL number and, if applicable, the AFDIL number, on a re-sealable convenience bag and set to the side of the non-clean area within the work area.
- Photograph the uncut bone with the card label including the area to be sampled. Use the blue side of the napkin for background.

A2.3.4 **Procuring the Sample:** These procedures are applied to only ONE case at a time:

- Bleach your gloves before cutting.
- Sample the bone within the fume hood. Specifically:

  - The fluorescent light and exhaust fan should be on.
  - Pull the window down to within a few inches of your arms.
  - A bleached napkin should be used within the hood to assure a new clean cutting surface is available when multiple elements from the same accession are being sampled.
  - Use the hand piece with a disposable blade crosslinked immediately prior to cutting remembering to adjust the RPM to compensate for the diameter of blade selected.
  - Use a napkin to open, close, and operate the crosslinker in order to keep gloves clean so as not to contaminate equipment when it is removed from the crosslinker.
  - If possible, the sample should be cut as a window from the parent bone. Avoid sampling any diagnostic areas of the skeletal element. Consult the nominating analyst if in doubt.
  - A block of bone is better than a thin plate of bone since less of the surface has to be removed in AFDIL's pre-extraction processing.
  - Largely cancellous samples are rejected by AFDIL so do not cut them.
  - Attempt to remove 3-5 grams of bone. If not possible, try to remove at least 1 gram including a substantial portion of cortical bone. Samples less than 1 gram have yielded useable DNA, but are less likely to do so.

- Once the sample is cut, remove the sample and parent bone to the blue napkin/photography area
- Weigh the sample using the balance. Specifically:

  - Ensure the unit of measure is in grams.
  - Document the sample weight on both the label and envelope

- Place the sample near the respective area of the parent bone.
- Photograph the sample and the parent bone together with the label and then photograph the sample alone with the labeled envelope. The following guidance is provided:

  - If cutting samples alone, remember the camera and marker are not clean so do not handle the sample after picking up these items without bleaching your gloves.
  - If two people are working together, the first can retain the top pair of gloves and handle the sample while the second photographs and completes labeling.

- If working alone, tip the sample into the envelope without handling it. If handling the sample is needed to get it into the envelope, re-bleaching the outer gloves are required. If two people are cutting, the non-photographer (whose gloves are still clean) can place the sample in the envelope for the photographer.
- Seal the envelope with evidence tape. Initial and date the front and back of the envelope so that the writing crosses both the tape and the envelope.
- Tag the parent bone with the label and replace it in the appropriate accession.
- Photograph the labeled side of the sealed envelope.
- Place the sealed envelope inside the AFDIL convenience bag labeled with the accession number.

A2.4 **Between Samples:** If another sample is to be cut:

- Change gloves or thoroughly clean them with bleach.
- Clean hood and all instruments with a bleach solution. If working alone, clean the marker, balance, and blue poly towel with bleach solution.
- Replace the blue pad in the hood.
- Discard blade(s).
- After wiping their surfaces clean of bone dust with a paper towel dampened with bleach solution, the drill bit, screwdriver, drill, cable, and other items to be reused are either placed directly in the crosslinker or secured adjacent to the crosslinker if the crosslinker contains already crosslinked equipment.
- After the hood area is cleaned, take crosslinked tools out of the cross-linker, place them under the hood and use them during the next sampling.
- Take the used items and place them in the cross-linker. Consider:
  - To ensure that the hand piece and other tools are properly crosslinked, they should be placed on a transparent raised surface (i.e., row of petri dishes) in order to ensure that all sides are exposed to the radiation.
  - More than one tool set can be irradiated at a time by bagging them in a sealed bag, which can subsequently be opened in the fume hood after cleaning. Bagging is not required but may improve efficiency.
  - Bags should be discarded after crosslinking as the UV weakens the plastic.
- Program the cross-linker for the dose specified (i.e., "9999" = 1 joule) after pressing "energy" button. Then wait for it to count down. Consider:
  - Times get longer as the bulbs age and emit less radiation.
  - The cross-linker may overheat if used constantly. Pausing for cool-down allows the sampler(s) to rest and subsequently stay focused and thus avoid violations of procedure.
  - Placing equipment over the sensor should be avoided. This prevents dose measurement, lead to longer run times, overheating, and causes over exposure to UV rather then under exposure. Blockage, however, does not affect the decontamination process.
- Before beginning work on a new accession, replace all evidence from the previous accession in its accession box or to the table from which it was removed for sampling.

A2.5 **Clean-up:** At the end of the work session:

- As bleach is corrosive, all work surfaces, including the handpiece and equipment, should be wiped down with generous quantities of water after all sampling is complete. This water dissolves the majority of the bleach residue and should then be blotted off the surfaces. Leaving the wet surface to dry does not adequately remove the bleach residue.
- Periodically remove the chuck from the handpiece, place the chuck in bleach solution and place in the ultrasonic bath for five minutes to remove osseous residue. Swab the inside of the handpiece with a sterile swab moistened with bleach to remove any osseous residue.
- Swab the inside of the handpiece and chuck with tap water to remove bleach residue. Dry with compressed air (include the threaded portion). This prevents corrosion of the bit and handpiece surfaces.
- After cleaning, place all non-disposable used equipment in the cross-linker for the recommended time period using the above guidance.
- After sampling, the case is returned to the Evidence Coordinator.

A2.6 **Update the DNA Log:** For each accession of the sampling session, enter the following data into the DNA Log:

- Sample number.
- Sample description.
- Sample weight (when applicable).
- Initials of sampler(s).

When the current nomination is complete, enter the following information into the DNA Log:

- Sampling complete (check box).
- Date prepared.

A2.7 **Chain of Custody Considerations:** The chain of custody (CoC) form is completed for each accession sampled in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). For the purposes of DNA sampling the electronic version of the form is used for clarity and due to the large numbers of copies required. The following guidelines apply:

- Personnel completing the CoC form should note:
  - Samples are sent by CIL to AFDIL.
  - Samples are included as individually numbered items.
  - For cases that run over a single form, use sequential numbers. No terminus is needed for

the first page but documents need to be numbered appropriately in the lower right corner (e.g.,"1 of 2", "2 of 2").
  - Received From are DNA personnel or other persons tasked with completing the CoC form.
  - Received By typically is FedEx and their 12 digit tracking number will be entered.
  - The fields "Village/District/Province or Equivalent" and "Grid Coordinate" are not generally used for DNA samples.
  - The fields "Associated Incident/Site," "Conflict," and "Country" are not required, although the latter two are generally used.

- A separate cover letter to AFDIL for each shipment of samples is prepared by a DNA personnel.
- Disposition of the CoC form includes:
  - One copy is kept within the bag containing the sample envelopes.
  - A copy the CoC form and the submission cover letter are provided to Laboratory Administration to be filed in the DNA subfolder for each case.
  - A copy of the cover letter and all CoC forms are kept in the submission binder maintained by DNA personnel.
  - A (non mandatory) copy may be retained by the sampler if desired.

- If sampling continues beyond one workday, bag(s) containing samples are kept in a locked chain of custody cabinet. The sealed envelopes and CoC form are placed in the bags.
- Save the digital images in the DNA network folder under Chain of Custody. Each case has a new folder using the CIL number and date of cutting to name the folder, in the format YYYY Month DD (e.g., 2004-089 2004 Jul 28). A copy of the CoC form and the cover letter should be saved in the same folder.
- When the DNA personnel sign the CoC form, he/she certifies that the images are complete, are an accurate representation of the evidence, and have been properly stored on the DPAA network.
- Place the samples in a FedEx box in the locked chain of custody cabinet, along with the cover letter drafted by DNA personnel.
- The following are the responsibility of Evidence Coordinators who have DNA LOG ADMIN privileges:
  - Check the CoC s for any typographical errors by comparing the submission envelopes (digital images may be used) to the CoC.
  - Check the cover letter for any typographical errors.
  - Log the FedEx bill number and date of pickup in the DPAA DNA Log.
  - Close the record in the database by checking the completed box. This box is later temporarily unchecked so the date that AFDIL returns the receipt paperwork can be entered, along with new AFDIL case numbers, but is rechecked as soon as the entry is completed.

Annex B (Dental Sampling Procedures) (A5.3.3)

B1.0 PURPOSE & SCOPE: This annex details technical procedures for the selection, collection, and documentation of DNA samples from dental remains in CIL-HQ and CIL-OF. This annex serves as a training guide and as a checklist for DNA sampling by qualified staff, and the same for annual proficiency examinations.

B2.0 PROCEDURES:

B2.1 **Tasking of Personnel:** Laboratory Management either verbally or by email, task odontologists to conduct sampling subject to coordination of workloads with Laboratory Management.

B2.2 **Sample Nomination:** To nominate a case for DNA sampling, completely fill out the DPAA DNA Log in accordance with the nomination guidance supplied in Annex A of this SOP. The following additional guidelines apply:

- DNA personnel review nominations regularly, and approve sampling in the DPAA DNA Log. If DNA personnel have any questions, the case is discussed among those involved.
- If necessary, DNA personnel indicate on the DPAA DNA Log which elements to nominate for sampling.
- The decision regarding which dental elements from a particular accession are sampled is based on various factors and considerations, including but not limited to:

    - Cases where name associations exist require comparison to any available antemortem dental records prior to nomination. Teeth for which an identification can be made based on antemortem dental record comparison usually are NOT sampled.
    - Using MNI procedures, if two anatomically identical teeth are found within a given accession, the sampling of such teeth are preferred as they permit the possible identification of more than one individual.
    - Intact, well preserved teeth with completely formed root apices are preferred, but not an absolute requirement.
    - If possible, teeth with dental restorations should be avoided. The presence of dental restorations minimizes the yield of tissue and increases the risk of crown fracture. This may also complicate any attempt at radiographic comparison should antemortem radiographs become available at a later date.
    - When possible, teeth with extensive carious destruction or peri/postmortem fracture should be avoided.
    - If several teeth articulate within a contiguous jaw fragment, only one tooth needs to be sampled. This allows another tooth from the same individual to be sampled should the initial tooth fail to produce a sequence, produce an inconclusive sequence or become contaminated. Sampling another tooth from a contiguous jaw fragment is highly recommended before considering the re-sampling of any individual tooth.
    - When several well preserved teeth articulate in a contiguous jaw fragment, select a tooth whose disarticulation causes the least amount of fragmentation and damage to the alveolar process.
    - An osseous sample from a well preserved mandible is preferable to a dental sample. This can be coordinated between the DNA personnel. Maxillary bone, which is generally more porous and lacking cortical bone relative to the mandible, typically is excluded from osseous sampling. An upper dentition associated with a cranium should be considered for osseous sampling especially if temporal or occipital elements can be sampled.
    - Where opposing jaw fragments demonstrate sound occlusion and interdigitation, only one tooth/bone from either jaw fragment is necessary for sampling.

B2.3 **Sampling:** The following procedures should be followed, in the order indicated below, to reduce the risk of mislabeling or contaminating samples:

B2.3.1 **Pre-Sampling Documentation:** Prior to sampling, documentation of the elements must be undertaken. This allows images of any element(s) that may be irreparably damaged during sampling to be included in reports and potentially allow for correlation should antemortem dental records become available subsequent to sampling. Documentation also allows subsequent analysts to discern which elements were sampled and their relationship to adjacent teeth and/or a contiguous jaw fragment, if present.

If a tooth is removed from its in-situ association with a jaw or portion of jaw, pre-sampling documentation enables other analysts to reconstruct the case as needed.

B2.3.1.1 **Teeth & Sample Numbering:** Teeth are identified on all forms, labels, and correspondence

using the Universal System of dental nomenclature when morphologically possible. Specifically:

- In rare cases in which a supernumerary tooth must be sampled, the Universal System of dental nomenclature is used followed by the letter "**s**".
- In cases where anatomic ambiguity, prior restorative treatment, caries, tooth fracture or degradation precludes an unequivocal designation, the following method for sample identification is be used:
  - If the jaw can be identified, use "**Max**" for maxilla and "**Man**" for mandible.
  - If the anatomic side can be identified, use "**Rt**" for right side and "**Lt**" for left side.
  - If the tooth type can be identified, use "**Molar**", "**Premolar**", "**Canine**", and "**Incisor**" as appropriate. For example: A tooth determined to be a molar from the right maxilla, but not otherwise-specified, is designated: **Max Rt Molar.**
  - Other sensible variants are permitted at the odontologist's discretion.

B2.3.1.2 **Radiographs:** All elements approved for sampling are digitally radiographed in accordance with DPAA Laboratory Manual, SOP 3.5 (Forensic Odontology). Radiographic images should preserve information that could be potentially correlated to written and radiographic antemortem dental records that might ordinarily be lost during the harvesting of tissue to include, but not limited to:

- Restorations, to include bases and liners.
- Evidence of endodontic therapy.
- Resorption or calcification of the root canal/pulp chamber space.

Multiple radiographic images using various angulations are to be taken of restored teeth prior to sampling.

B2.3.1.3 **Photographs:** All elements approved for sampling are digitally photo documented to include surfaces with restorations. Facial and occlusal view photographs are required, to include the tooth in-situ within its respective socket, and/or loose and removed from the jaw. Images are stored on the DPAA network in the appropriate case file and in the DNA CoC. Annotated in the image are:

- Case number and sample number.
- Tooth# or other designation.
- Metric scale.
- Other pertinent information.

B2.4 **Sample Collection:** Dental samples for DNA testing may be sent via two procedures, either as gross dental remains (i.e., whole teeth, partial teeth, or tooth fragments) or as dentin powder, the result of drilling the interior of the tooth. The procedure chosen depends upon the nature of the sample, and the needs and limitations of the laboratory testing the samples. Because they are more resistant to contamination, whole teeth are preferred for submission over partial teeth or tooth fragments.

B2.4.1 **Submission of Gross Dental Remains**: This is the primary method for submission of teeth for DNA sampling. In the rare case where a tooth is the only evidence associated with an accession, written approval by the Laboratory Director should be obtained prior to submission of the tooth for sampling. The submission process is as follows:

- After photographs and dental radiographs have been taken of the nominated tooth, a plastic ziploc bag, a DNA sample tag, and a manila envelope are labeled with the following:
  - CIL number.
  - AFDIL number (if case was previously sampled. The AFDIL# is not required on the index card).
  - Sample designator (see Annex A for protocols regarding sample designators).
  - Tooth #.
  - Date.
- The first chain of custody photo is taken. Depicted in the photograph are:
  - The dental remains being submitted.
  - The DNA sample tag.
  - The labeled plastic ziploc bag.
  - The labeled manila envelope.
  - Metric scale.
- The dental remains are placed within the plastic ziploc bag and closed. The second chain of custody photograph is taken, and depicts:
  - The dental remains within the labeled bag.
  - The labeled manila envelope.
  - Metric scale.
- The ziploc plastic bag containing the tooth is placed inside the manila envelope which is then sealed with evidence tape, initialed, and dated. The third and final chain of custody photograph is taken and includes:
  - The labeled and sealed manila envelope.
  - Metric scale.

- Place the labeled DNA tag into the original bag from which the dental remains were taken. This serves as a place holder to track where the dental evidence has been sent.

B2.4.2 **Submission of Dentin Powder**: In the event that the gross dental evidence cannot be released from the CIL, the sub-contracted laboratory cannot process gross dental remains, or for any other reason deemed necessary by Laboratory Management, the dental remains may be sampled at the CIL. The following procedures should be followed in order to minimize the risk of contaminating the evidence:

B2.4.2.1 **Wear Personal Protective Equipment (PPE):** The intent of PPE is to protect the sampler and to prevent fresh contamination of the sample. The following guidelines apply:

- Change into surgical scrubs (this protects your regular clothes from bleach).
- Wear a surgical facemask (this protects both you and the sample).
- Wear disposable sterile surgical gown.
- Wear gloves. The following are guidelines for using gloves:
    - Only uncontaminated gloves come in contact with evidence.
    - Gloves are recommended at all times when handling bleach or bleached objects.
    - Samplers should double glove during actual cutting. The inner pair can be worn continuously to protect the hands from contact with bleach. The outer pair is changed to prevent contamination of the samples. In cases with high organic content, sample to sample contamination is possible.
    - If there is any question concerning contamination of the gloves they should be sprayed and wiped with bleach or discarded.
- Wear eye protection while using the cutting tools and when spraying the bleach solution.
- Wearing disposable sleeves is optional. If sleeves are not used, a full gown (covering all the skin on the arm not covered by scrubs or gloves) should be used by the individual conducting the sampling.
- Wear hair covering (e.g., bouffant cap) while preparing for sampling and while obtaining the samples.

B2.4.2.2 **Prepare the Sampling Area & Equipment:** The following procedures apply:

- Assemble all the equipment needed to preclude bringing things into the work area during the procedure (except the dentition to be sampled).
- Remove all extraneous material from the area. Materials that are unable to be cleaned (e.g., glove boxes) should be placed in the "non-clean" section of the work area during the entire sampling process.
- Prepare bleach solution by filling a spray bottle with 10-20% bleach concentrate and 80-90% tap water. Unused bleach should be immediately returned to storage after a sampling session is concluded. Bleach is an extremely corrosive agent and should be used sparingly when cleaning high value items, such as the balance and crosslinker.
- Remove the bit from the handpiece, place the chuck in bleach solution and place in the ultrasonic bath for five minutes to remove oil residue. Swab the inside of the handpiece with a sterile swab moistened with bleach to remove any oil residue.
- Spray the interior and exterior of the fume hood with diluted bleach and dry with paper towels, facilitated by turning on the hood fan. Repeat this step three times. At the completion of this step, the fume hood can be closed and the fan turned off, remaining in the off position during sampling.
- Run the UV hood lamps in the hood area for at least 5 to 10 minutes prior to sampling. Do not work in close proximity to the working lamp without adequate skin covering and protective eyewear, even if it is faced away from you, as the metal surfaces are highly UV reflective.
- Thoroughly clean everything that may contact the sample with bleach solution, spraying and wiping everything three times, e.g.:
    - Work area outside of the fume hood including the counter area, photography area, and the non-clean area.
    - Anything else the sample will rest on.
    - The balance, dental hand piece engine, and ultrasonic cleaner.
    - Things that can be touched during/in between sampling (e.g., the top of the drill power unit and crosslinker door handle/key pad).
- After cleaning, remove soiled cleaning materials from the work area.
- Calibrate the crosslinker prior to each day or part day of sampling activity in accordance with DPAA Laboratory Manual, SOP 3.2 (Measurement Observations & Traceability).
- Prior to each sampling, cross-link at an intensity level ≥ 6 Joules/cm^2 the following:
    - 15ml centrifuge tube(s).
    - One to three dental hand piece(s).

- One to three weigh boat(s).
- Round surgical burs in each weigh boat.

- Turn off the UV flood lamps before commencing sampling in the hood area.

B2.4.2.3 **Pre-Sampling Specimen Preparation:** Pre-sampling specimen preparation is required as part of the documentation and the chain of custody procedures. Photographs are taken at key points during the sampling process, not only to document the chain of custody but also to aid in reconciling any inadvertent mislabeling of materials. Procedures include:

- Sign out the case(s) to be sampled from the Evidence Coordinator or, if the case is on a table, notify the analyst assigned to case.
- Write the CIL number and, if applicable, AFDIL number, on a bag and set to the side of the non-clean area within the work area.
- Label a DNA tag using an indelible marker (this card should be able to fit in the bag discussed below). On one side this card should be labeled with:

  - CIL number.
  - AFDIL number (if applicable).
  - Sample designator (see Annex A for protocols regarding sample designators).
  - Date.

- The reverse side of the card reflects the weights (annotated later) of the intact specimen ("Whole"), specimen post sampling ("Cut"), the powdered sample ("Powder"), and the empty 15ml centrifuge tube ("Empty tube"), respectively.
- The bag is labeled with the same information as the front of the DNA tag except for the date.
- Label a manila envelope. Include the AFDIL number, if known. The appropriate information is later annotated to the right of each heading. Annotating the specimen's designator in large, bold print allows for easy recognition of individual samples on the chain of custody contact sheets. Note: the information on this envelope is recorded on the CoC form (see below).
- 15ml, sterile, polypropylene, conical, screw cap tubes are used for sample collection. The tube used to collect the sample is labeled with the accession number. The AFDIL number is listed if the sample represents a subsequent sample from a previously sampled element. The 15 ml tube is weighed prior to cross linking with this weight annotated on the card. This weight is used to calculate the net weight of the powder sample.
- The element is weighed and the finding noted on the card to the right of "Whole:"
- The first chain of custody photo is taken depicting:

  - The pre-sampled element.
  - Labeled bag.
  - Labeled envelope without the sample mass annotated.
  - Labeled card annotated with "WHOLE" mass of intact specimen.
  - Metric scale.

B2.4.2.4 **Procuring the Sample:** The procurement steps apply to one case at a time and require that all procedures and steps described above have been completed. Any violation of the integrity of the outer surgical gloves during sampling requires immediate cessation of the procedure and re-gloving prior to continuation. Where whole teeth or intact roots are submitted for DNA testing, the procedures outlined in this section do not apply. Sampling progresses as follows:

- The element to be sampled is put into an ultrasonic bath of sodium hypochlorite (bleach) for six minutes. Bleach solution is made up using 10% commercially available 5.25% sodium hypochlorite and 90% tap water. Relatively small structural or carious defects and open root apices can be sealed with dental wax prior to ultrasonic cleaning. Where a tooth is too fragile for ultrasonic cleaning, a triple bleach wipe may be substituted and a note to this effect placed in the record.
- The sterile surgical towel inside a surgical gown pack is placed over the bench surface inside the fume hood and is bathed in UV light. Sterile gauze pads are transferred onto the surgical towel as well as the previously crosslinked:

  - Dental hand piece and burs.
  - Weigh boat.
  - 15ml tube.

- The element to be sampled is transferred from the ultrasonic bath with a gloved hand and placed on the sterile surgical towel. The fume hood door is always in a closed position when not in use.
- At this point, the sampler wipes the outer pair of sterile surgical gloves with bleach solution. The UV lamp is removed and the sampler's arms are placed inside the hood and the door closed to the greatest extent possible without injury or discomfort to the operator.
- The assistant can facilitate the hook-up of the dental hand piece to the control unit, open and close of the fume hood door, and facilitate other functions as needed. To minimize fresh

contamination, the sampler should only handle equipment inside the fume hood that is vital to sampling the tissue.

- The tooth is sampled in the following manner:
  - The external surface of the tooth is notched at or below the cemento-enamel junction (a #2 round bur is recommended).
  - The groove is extended into the pulp chamber.
  - The tooth is cut cross section in a circumferential manner leaving the last 1-2 mm intact.
  - The final separation of the crown from the root is completed using gentle pressure. This allows for better orientation of the tooth crown to the tooth root after sampling. Complete separation of the crown from the root using the bur is discouraged. This may complicate re-orientation of the crown to the root for presentation following sampling.
  - Both coronal and radicular portions of dentin are sampled using sequentially sized round burs. Obtain as much dentin as possible, without undue compromise to the integrity of the external structure of the crown and root. Also consider the possibility that the remaining tooth structure may need to be re-sampled in the future.
  - The extraction of tissue is performed in the weigh boat that captures the fine powdered sample. Periodically transfer the powder into the 15ml tube using the weigh boat in a funnel-like fashion and secure the screw cap between transfers to ensure some sample is collected. Do not wait until all possible tissue is collected in the weigh boat prior to transferring the sample to the 15ml tube. This precludes the entire sample be lost due to operator error or unforeseen circumstances.

- Once the powdered sample is collected, the screw cap is securely tightened and the outside of the tube wiped clean of any residual sample or glove starch using sterile gauze.
- Weigh the remainder of the tooth or tooth fragments post sampling and record the mass to the right of "Cut:" labeled on the card.
- Weigh the mass of the collected sample minus the weight of the 15ml tube and record the mass to the right side of "Powder:" labeled on the card.
- The second chain of custody photo is taken depicting the element post sampling with the:
  - Labeled ziploc bag.
  - Labeled envelope (with the sample "MASS:" annotated).
  - Labeled card annotated with "Whole:" mass of intact specimen, "Cut:" mass of the specimen, and "Powder:" mass (total weight of tube and sample minus the mass of the 15ml empty tube).
  - Labeled 15ml tube containing the dental tissue.
  - Metric scale.

- Place the 15ml tube containing the sample in the envelope and seal the open flap end with evidence tape. Also, initial and date the envelope at the interface of the tape and envelope on both sides.
- Place the sampled tooth with the completed card inside the labeled bag.
- The third chain of custody photo is taken depicting:
  - The sampled tooth inside the labeled bag with the labeled card.
  - The labeled envelope(s) sealed with evidence tape and initialed.
  - Metric scale.

- The operator and assistant can now remove PPE. Sampling is completed and the final documentation completed.

B2.4.2.5 **Between Samples**: If further dental samples need to be prepared:

- Discard the sterile towel, weigh boat, and gauze in the fume hood. Remove the bur from the handpiece. Place the used and unused burs in the Sharps container.
- Place the used handpiece and chuck in the sink to be cleaned after the sampling session is completed.
- Repeat the cleaning procedures documented above, to include the fume hood and any surface the next sample may rest upon, with bleach solution three times. Also clean any area the operator may touch during the sampling procedure.
- Run the UV hood lamps in the hood area for at least 5 to 10 minutes prior to taking the next sample.
- The sampler should discard previously used sterile gowns and gloves. The surgical head cover and face mask need not be replaced unless damaged. Other than a new set of non-sterile gloves, the assistant may continue to wear the same PPE.
- The sampler dons a new sterile surgical gown and two sets of sterile gloves.
- Ensuring the first chain-of-custody photograph of the next sample has been taken, complete the next sampling session by repeating the previously discussed procedures

B2.4.2.6 **Clean-up:** At the end of the work session:

- As bleach is corrosive, all work surfaces, including the handpiece and equipment should be wiped down with generous quantities of water after all sampling is complete. This water dissolves the majority of the bleach residue and should then be

blotted off the surfaces. Leaving the wet surface to dry does not adequately remove the bleach residue.
- Swab the inside of the handpiece and the bits with tap water to remove bleach residues. Dry with compressed air and then lightly oil, to include the threaded portion of the bit.
- Discard burs into the sharps container.
- After washing and blotting the work surfaces, turn on the hood fans and UV flood lamps in the hood area until the surfaces are dry.
- After sampling, the case is returned to the Evidence Coordinator.

B2.5 **Chain of Custody Considerations:** Evidence is sealed and authenticated and the chain of custody (CoC) form is completed for each accession sampled in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security). More photos are taken and the DNA Submission Packet is initiated, completed, and transmitted to AFDIL (or other DNA laboratory) for processing and testing. Detailed procedures are as follows:

- The bag and its contents are checked in to the Evidence Coordinator.
- Once all relevant elements in an accession number have been sampled, a DNA Sample Submission Packet is initiated by the sampling odontologist. The packet should be reviewed by DNA personnel. The packet contains:

  - Evidence sealed envelopes containing sample(s) and appropriate negative control(s).
  - A completed CoC form.
  - A DNA cover letter.

- Complete a separate CoC form for each accession number using the information on each envelope. Laboratory Administration ensures that all sample information is entered into CARIS and that appropriate paperwork is initiated and filed in accordance with current procedures.
- If osseous samples are being sent to AFDIL (or other DNA laboratory that is performing the testing) at the same time, the dental samples should be included on the same cover letter, to be completed by DNA personnel. If only dental samples are being sent at this time, the sampling odontologist should complete a cover letter detailing:

  - Accession number(s).
  - Whether the sample is osseous or dental.
  - Number of samples for each accession number.
  - Details as to case association with conflict or era.
  - Prioritize the cases as needed.
  - Indicate which cases have been sampled previously to include previous AFDIL numbers.
  - If the samples are identified as "critical samples" and require separate processing to minimize contamination.
  - Indicate the FedEx tracking number.

- Two copies are forwarded to Laboratory Administration. One copy is placed in the DNA Logbook with the corresponding CoC form, the other is filed in the DNA sectional folder of the case file for each accession.
- Place the sealed envelope(s) containing sample(s) and the completed CoC form in the bag labeled with the accession number.
- The now completed DNA Submission Packet can be forwarded to Laboratory Administration for transmittal to AFDIL or other appropriate DNA laboratory for processing and testing. If Laboratory Administration is unavailable to receive the DNA Submission Packet, it is to be locked in the compact shelving on the laboratory floor. Alert Laboratory Administration the next business day that the DNA Submission Packet needs to be transmitted.
- Follow up with Laboratory Administration within two business days to ensure the DNA Submission Packet was forwarded.
- Save the digital images in the DNA network folder under Chain of Custody. Each case has a new folder using the CIL number and date of cutting to name the folder, in the format YYYY Month DD (e.g., 2004-089 2004 Jul 28). A copy of the CoC form and the cover letter should be saved in the same folder.
- When the analyst signs the CoC form, he/she certifies that the images are complete, are an accurate representation of the evidence, and have been properly stored on the network.
- As information becomes available, Laboratory Administration fills out the appropriate sections in the DPAA DNA Log and CARIS. Information includes:

  - Date of transmittal of DNA Submission Packet.
  - FedEx tracking number for the transmittal.
  - Return date for CoC form from the DNA Laboratory.
  - Assignment of the DNA Laboratory processing number for newly sampled cases.

SOP 3.8: HISTOMORPHOLOGY

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 2 November 2016
Citation: DPAA Laboratory Manual, SOP 3.8

0.0 PRINCIPLE, SPIRIT & INTENT:
Histomorphological analysis is performed using validated methods to a high degree of repeatability and accuracy.

1.0 PURPOSE & SCOPE: Histomorphological analysis has the potential to identify non-human osseous and non-osseous materials in cases where only very small and otherwise unidentifiable fragments of material remain. This SOP covers selecting, nominating, embedding, sectioning, grinding and mounting specimens for histomorphological analysis. It also details procedures for the determination of non-human bone and non-osseous material.

This SOP also covers the following histomorphological procedures which are subject to on-going research at the CIL and thus **not currently validated** for casework:

- Absolute determination of human bone based on osteon size and spatial relationships.
- Estimation of age at death from fragments that have no anatomical orientation.

As such, these procedures have very restricted use at the CIL. Use of non-validated procedures is covered in DPAA Laboratory Manual, SOP 4.0 (CIL Surety).

Note: Histomorphology in the CIL does not constitute sampling as defined by ISO 17025 (i.e., "Sampling is a defined procedure whereby a part of a substance, material, or product, is taken to provide for testing or calibration of a representative sample of the whole.") or the ASCLD-LAB Sampling Policy. In the CIL, results obtained from a sampled element, and the conclusions reached, are applied to the sampled element only and not to the entire assemblage of evidence present. Associations of other evidence to the sampled element are made through osteological, odontological, and archaeological methods that are detailed elsewhere in this Laboratory Manual, as well as testing of additional skeletal remains for histomorphology. For example, in the absence of the above methods, histomorphological results obtained for a sampled fragment can only be applied to that fragment and cannot be extrapolated to any other skeletal or dental remains found in association with that fragment **(A5.7.1)**.

2.0 GENERAL PRINCIPLES & GUIDELINES:

2.1 **Theoretical Framework:** Histomorphology is similar between genera within *Mammalia.* Related quadrupedal taxa (e.g., sheep and goats) tend to have similar plexiform, or parallel-layered, bone microstructure (Figure 1).

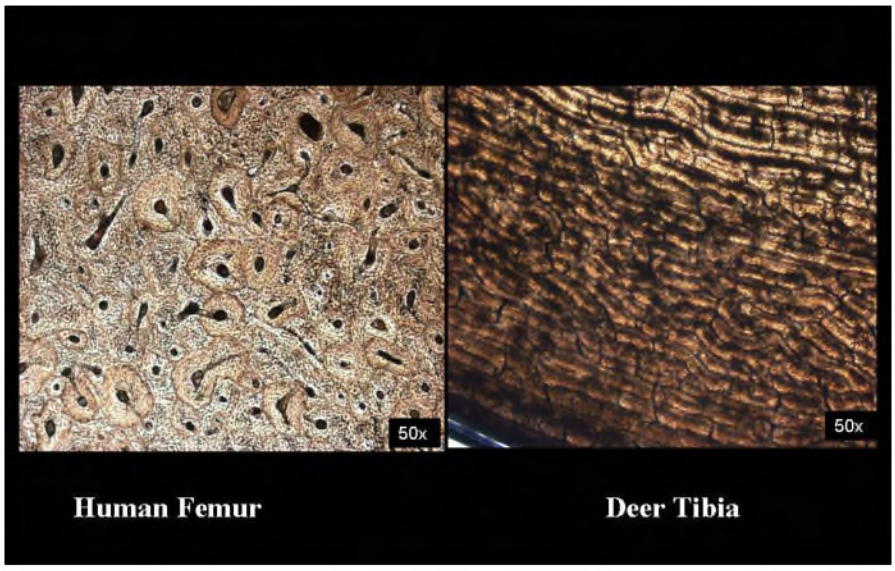


Figure 1. Human Haversian bone compared to deer plexiform bone.

Adult humans have Haversian bone throughout the full thickness of their cortical bone. Certain other mammalian groups have a mixture of plexiform and Haversian bone. This causes difficulty in ascertaining with absolute certainty if bone is human when only Haversian bone is present. However, bone can be identified as non-human if plexiform bone is present.

2.2 **Location:** Histomorphological analysis occurs in the Histology Laboratory (Room 315) in CIL-HQ and in Room 117 at CIL-OF. External factors may occasionally require that histomorphological analysis be conducted in areas other than these examination areas. In these cases, reported results must indicate the conditions under which the analysis was made. Tests are stopped when conditions in these areas jeopardize the results of the tests **(A5.3.1, A5.3.2)**.

2.3 **Apparatus & Materials**: The following are available in the CIL for use in histomorphological analysis.

2.3.1 **Equipment & Supplies:** There are a number of specialized equipment items used in histomorphological analysis including, but not limited to:

- Cutting instruments (e.g., Dremel® multi-tools).
- Sonic cleaner.
- Balances.
- Fume hood.
- Hand held digital camera.
- Vacuum desiccator.
- Polyscience, Inc. peel away plastic molds or equivalent.
- Thin sectioning equipment (e.g., Buehler Isomet 1000 Saw).
- Grinding Equipment (e.g., Buehler Petro-Thin grinder).
- Leica DM 2500 light microscope.
- Microscope mounted digital camera.
- Microscopic Digital Image Capture software.

Some of this equipment may require maintenance, performance checking, and calibration in accordance with DPAA Laboratory Manual, SOP 3.2 (Measurement Observations & Traceability). Detailed calibration instructions for the Leica DM 2500 are provided in that SOP.

The procurement, reception, initial inspection, initial set-up or storage, and other aspects of quality control of the above equipment and the various chemicals and preparations listed below may be subject to the provisions of DPAA Laboratory Manual, SOP 1.5 (CIL Support).

There are various chemicals and preparations used in histomorphological analysis including, but not limited to:

- Buehler Epo-Thin Resin and hardener or equivalent.
- Cyanoacrylate based glue (e.g., "super glue").
- “Cool 2”cutting fluid or equivalent.
- Epoxy adhesive resin and hardener.
- Acetone.
- Diamond polishing paste or equivalent.
- Mounting medium.

Additionally, various standard items of bench equipment are used including, but not limited to:

- Forceps.
- Petri dishes.
- Stirring rods.
- Sandpaper.
- Toothpicks.
- Pencils and indelible markers.
- Various size labels.
- Plastic trays.

2.3.2 **Exemplars:** In most cases, histomorphological material can be compared with image exemplars located in the CIL. Select exemplars appear in the figures and Annex A (Decision Matrix for Microscopic Analysis of Osseous Fragments) of this SOP. None of these materials require calibration or scheduled maintenance.

2.4 **Evidence Handling & Preservation**: There is no special evidence handling or security measures for histomorphological analysis. Parent fragments, and completed slides and embedded blocks are subject to all of the provisions specified in DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security).

Generally, evidence subjected to analysis is usually robust in nature and not easily affected by handling, or by the ambient environment in the CIL. However, special precautions or measures pertaining to specimen preparation may sometimes be required prior to analysis, including **(A5.8.4):**

- Cleaning remains having adherent soil, soft tissue, etc. that precludes analysis. In these cases, the surface of the fragment should be cleaned using appropriate methods and, if wetted, allowed to air dry before examination.

- Use care in handling more fragile evidence. Remains in a poor state of preservation can be damaged while being analyzed.
- Specialized precautions are detailed below in procedures.

3.0 PROCEDURES: The following procedures are used in histomorphological preparation and analysis:

3.1 **Verification of Past Histomorphology:** Prior to undertaking histomorphological preparation or analysis, the lead analyst assigned the case (i.e., skeletal, CIL portion, or admin fiat) checks CARIS to verify if prior histomorphological preparation and/or analysis exist. The analyst considers any existing preparation and/or analysis and incorporates it into the current casework, as appropriate. Any questions should be directed to the Laboratory Manager responsible for histomorphology.

3.2 **Specimen Nomination:** For the determination of human versus non-human bone, the nomination by the lead analyst is dependent on the following criteria:

- Whether the bone is from an appropriate region of the skeleton (e.g., long bone, rib) and contains enough cortical bone to be analytically viable.
- Whether the fragment needs to be embedded using epoxy resin. Embedding is used to stabilize fragments when specimens are of small size and/or taphonomically compromised.

The nomination process by the lead analyst requires the determination of the anatomical orientation of the specimen. In certain circumstances, a longitudinally sectioned fragment of cortical bone with Haversian systems may give the appearance of plexiform bone (see Annex A, Decision Matrix for Microscopic Analysis of Osseous Fragments). In order to take a true transverse section, the transverse versus longitudinal orientation must be recognized (note orientations like cranial/caudal [superior/inferior] versus dorsal/ventral [anterior/posterior] where possible). In specimens where significant deviations from a true transverse section occur, results should be accompanied with the appropriate caveat.

3.3 **Specimen Procurement:** For cases involving a single fragment, a small specimen for histological analysis should be used, leaving a portion of the original fragment, if possible. If the original fragment is too small, the entire item is embedded. Once the fragment(s) to be analyzed are selected, the lead analyst:

- Consults with the appropriate DNA personnel prior to sampling for histological analysis to determine whether the fragment is of a sufficient quality and quantity to warrant sampling for DNA analysis. If determined to be sufficient for DNA sampling, an additional sample is prepared for DNA testing.
- Nominates the samples in the DNA Sample Log.
- Where multiple specimens are taken from a single case, ensures the samples are sequentially labeled 01H, 02H…etc., using indelible ink, and ensures each specimen and parent fragment are placed in their respective dish.
- Coordinates with DNA personnel to ensure the histological sample is procured following DPAA Laboratory Manual, SOP 3.7 (Sampling Trace Evidence for DNA).

3.4 **Verification of DNA Sample Log Nomination:** Prior to performing histomorphological preparation or analysis, the histologist assigned to the case checks the DNA Sample Log to verify the sample is nominated for histological analysis.

3.5 **Specimen Documentation:** Histomorphological samples are documented as follows:

- DNA personnel photograph the intact fragment(s) prior to sectioning or embedding.
- The histologist describes and documents each histology sample destined for analysis, including its mass, length, and width.
- Prior to embedding and thin sectioning the sample, the histologist verifies that the photographs of the sample were taken by looking in the DNA folder on the DPAA Network. If the photographs have not been taken, the histologist prepares the photos in accordance with DPAA Laboratory Manual, SOP 3.7 (Sampling Trace Evidence for DNA).

3.6 **Specimen Preparation:** Specimens are prepared as follows. Embedding is not always required. In such instances, the analyst may proceed directly to thin sectioning.

3.6.1 **Embedding:** Specimens too small or friable to be held in the cutting chuck are embedded in a mixed solution of *Buehler Epo-Thin* resin/hardener epoxy for thin sectioning (Figure 2). Sonic cleaning to remove debris prior to embedding is determined on a case by case basis. If a sonic bath is necessary, the specimen is allowed to dry for 24 hours before embedding. The procedure for embedding is as follows:

- Select the appropriate size Peel-Away (*Polysciences, Inc.*) mold for the specimen.
- Label each mold/specimen using paper labels and pencil. Place the paper into the mold so that it can be embedded within the resin with the specimen.

Pen cannot be used as the epoxy solution erases the ink from the label. The label information includes:

- CIL number and sample number.
- Date.
- Initials of person embedding the sample.
- Anatomical orientation, if known.
- Element side (left or right), if known.
- Element name, if known.

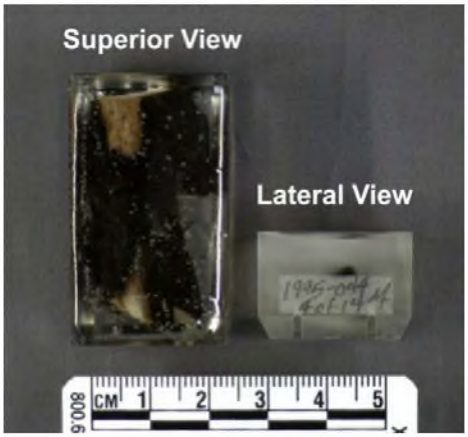


Figure 2. Osseous material embedded using epoxy resin. Note the internal label on the lateral view.

- Place the specimen in the mold. If the specimen has a great deal of trabecular bone or is extremely light, it may be necessary to affix the specimen to the base of the mold using cyanoacrylate based glue to prevent the specimen from rising to the surface when the resin is poured into the mold. This method may be better for larger samples; however, try to minimize the amount of bone surface area affixed to the mold to avoid the bone dislodging from the embedding medium. The larger the surface area the more difficult it is for the embedding material to cover the base of the specimen.
- Place a container on a balance and zero the balance. The resin is added to the container in sufficient quantity to allow for approximately 12 grams of resin per specimen. Note the mass of the epoxy resin.
- Add hardener to the resin in the quantity of 0.39 times the mass of the resin. Stir the mixture using a wooden stirrer until it is clear (i.e., no longer opaque), approximately 2 min. Stir slowly in order to minimize the air in the mixture. Carefully pour the mixture into each mold. Allow a thorough covering of the specimen with epoxy but do not over-fill the mold.
- If there are a large number of air bubbles present within the epoxy, place the full molds into the vacuum desiccator, which is then "pumped-down" to remove the air bubbles. Shut off the desiccator when the solution bubbles (trapped air rises to the top) in several of the molds.
- Allow the specimens to sit in the desiccator for approximately five minutes. After five minutes, slowly release the air valve of the desiccator to equalize the pressure. Do not release this valve too quickly as the rush of air causes the molds to capsize.
- Once pressure equalizes, remove the specimens from the desiccator.
- Allow the molds to harden overnight. When hard, remove and discard the plastic mold.
- Lightly sand the top of the epoxy block to remove any sharp edges.
- If sample improperly hardens (e.g. due to improper ratio of resin and hardener) acetone can be used to dissolve epoxy medium. Cover the block with acetone and allow the epoxy to dissolve overnight. If necessary, repeat this step. Thoroughly clean adhering epoxy before starting specimen documentation and preparation again.

3.6.2 **Thin Sectioning:** Thin sectioning, to include saw/microtome set-up, sectioning, and saw/microtome dismantling and clean up, is found in the current Histomorphology Desk Guide located on the DPAA Network. A minimum of three sections per sample should be cut. Specimens that are very small or friable may not be available for additional thin sectioning in the case of improperly cut sections.

3.6.3 **Slide Preparation:** Procedures include:

3.6.3.1 **Grinding:** Sections that are not thin enough (50-100 µm) are attached to a labeled glass slide using five minute epoxy for grinding using the following procedures:

- Label the slides before mounting using either a diamond edged stylus or in an indelible ink marker. Include the following information:
  - Initials of person making section.
  - CIL number and sample number.
  - Date.
  - Anatomical orientation arrows (anterior, posterior, medial, lateral), if known.
  - Element side (left or right), if known.
  - Element name, if known.
  - When multiple sections are made, label each slide sequentially with A, B, C, etc.
- Place equal amounts of epoxy resin and hardener onto the slide. Mix slowly with a toothpick.

- Place the specimen on the slide with forceps, ensuring that the orientation is correct and the polished surface is in contact with the glass slide.
- Ensure the specimen is flat by applying gentle pressure on the specimen with a toothpick.
- Place all slides on plastic trays with a case number label on the tray.
- Wait 1-2 hours for the epoxy on the slides to dry before proceeding further.
- Grinding is accomplished with the Buehler Petro-Thin grinder. Grind the specimen to a thickness of 80-100 micrometers (approximately the thickness of a piece of paper). Some minor hand sanding, using fine grit sand paper and a polishing cloth with diamond paste may be required to finish the grinding. Follow polishing procedures outlined above.
- Let the section dry overnight.

3.6.3.2 **Mounting**: When the section is thin enough, after sectioning or after grinding, it is mounted using Permount mounting medium:

- If not attached to a glass slide yet, label the slides before mounting using either a diamond edged stylus or in an indelible ink marker. Include the following information:
  - CIL number and sample number.
  - Date.
  - Initials of person making section.
  - Anatomical orientation arrows (anterior, posterior, medial, lateral), if known.
  - Element side (left or right), if known.
  - Element name, if known.
  - When multiple sections are made, label each slide sequentially with A, B, C, etc.
- Place a few drops of mounting medium on the sample, and cover with a glass coverslip. Place a weight on the cover slip and remove any excess bleeding from the sides. Allow to dry until the mounting medium has set and the section can be handled.

3.7 **Data Collection:** Histomorphometric data are collected using a Leica DM 2500 transmitted light microscope equipped with 10x wide field oculars, 1.25 x, 5x, 10x, 20x, 40x UPLanFL objectives, and a microscope-mounted digital camera.

Microscopic Digital Image-Capture software is used to calibrate the digital images for each thin-section. This calibration is discussed in detail in DPAA Laboratory Manual, SOP 3.2 (Measurement Observations & Traceability).

After calibration, microscopic images of the specimen are captured. A scale should appear in each image.

Images are then saved in the case folder as .tiff files with the case number, histological sample number, and total magnification as the identifier (e.g., 2007_011_01H_x100.tiff).

Histological measurements, including area and circularity* are collected using Image J or equivalent programs. Measurements should be saved in an Excel file and stored in the case folder.

*Circularity = 4π x (area) ÷ (circumference)^2

3.8 **Analytical Conclusions:** Analytical conclusions are reported in the analytical notes and case reports, as appropriate, as: Match to Non-human, Inconclusive, or Non-osseous.

3.8.1 **Match to Non-Human:** The determination of non-human bone is performed using qualitative analyses. The process is summarized in Annex A (Decision Matrix for Microscopic Analysis of Osseous Fragments) of this SOP.

Qualitative analysis includes comparisons of plexiform and Haversian bone. Distinguishing non-human from human bone is straight-forward given the following considerations:

3.8.1.1 **Plexiform Bone:** Plexiform bone is a non-human bone structure and is never associated with developing or mature human bone. Therefore its presence definitively excludes human juvenile and adult bone. However, plexiform bone can be confused with human laminar and woven bone from young juveniles or pathological conditions where healing bone is present (e.g., fracture calluses).

Compare the specimen with image exemplars of the various types of plexiform bone organization, human woven bone, and normal human Haversian bone in order to derive a conclusion. Where plexiform bone is present the conclusion should be Match to Non-human and no further analysis is required.

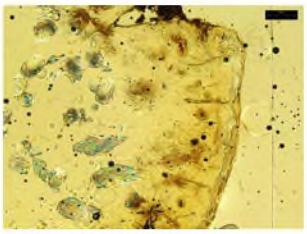
3.8.1.2 **Osteon Banding:** While plexiform bone is diagnostic of non-human bone, the presence of Haversian bone does not necessarily indicate human. Canines, mature bovids, *Pan,* and several other large mammals develop some Haversian bone as they age. However, microscopically, their osteon arrangement can differ from that of human bone. In non-human mammals that possess Haversian bone, osteons can be arranged in a linear fashion in bands of six or more osteons (Mulhern and Ubelaker 2001). This

phenomenon rarely occurs in secondary human bone and when it does, is limited to a random band of 4-6 osteons.

In non-humans, multiple bands occur, often consisting of 6-12 very small osteons (osteon mean area less than 20000μm). Both primary and secondary osteons have been noted to form bands in non-humans. Determining if bone is human or non-human solely based on osteon banding must be performed with caution. Multiple bands of more than six secondary osteons must be evaluated to demonstrate that the overall pattern of the cortical bone is not the random banding of a few osteons that may occur in humans.

3.8.2 **Inconclusive:** A fragment(s) that cannot conclusively be established as either non-human or non-osseous is designated Inconclusive. This designation includes all osseous remains that have full Haversian bone or unremodeled periosteal bone resembling plexiform bone.

3.8.3 **Non-Osseous Identification:** Non-osseous material (e.g., plastic, shell) do not have cellular structures. Plant material has cells with cell walls. Such instances are consistent with non-osseous material (Figure 3). No further analysis is required.



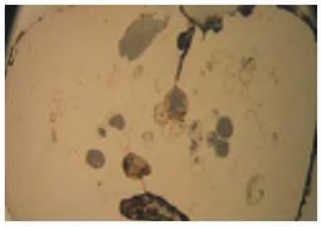


Figure 3. Examples of non-osseous material (plastic). Note the lack of cellular structures.

3.9 **Update CARIS:** The appropriate DNA personnel are informed of the results (usually by email), so they can enter the results into CARIS.

3.10 **DNA Considerations:** If the result is "Match to Non-human" any planned DNA testing is cancelled. If the results are "Inconclusive" samples may be submitted for DNA testing.

Note: If the results are inconclusive, the analyst should request "12S rRNA" testing prior to mitochondrial or other DNA testing.

4.0 DOCUMENTATION: Images necessary for deriving an analytical conclusion are prepared as hard copy, stand-alone documentation, and are also saved to a compact disc. Images illustrate the histomorphological features on which the analytical conclusions are based. Where necessary, use the appropriate software to annotate features of interest (Figure 4). Document with the image whether or not (circular) polarization was used in obtaining it. Measurement data and a detailed description of the bone microstructure, identifying relevant microstructure components, are recorded on the histology data collection forms found on the DPAA network. These are all considered analytical notes and must conform to the provisions of DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation) and placed in the case file.

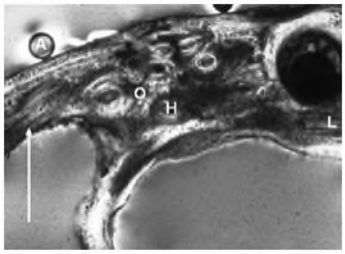


Figure 4. Examples of annotations such as arrows or letters to point out structures.

Analytical notes pertaining to histomorphological analysis are turned over to the Laboratory Manager responsible for histomorphology. The Laboratory Manager ensures that a Histology Folder containing all analytical notes and images is placed in the Anthropology Subfolder in the case file by the histologist.

5.0 SURETY: Histological analytical notes supporting test reports are subject to peer review in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review) and audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

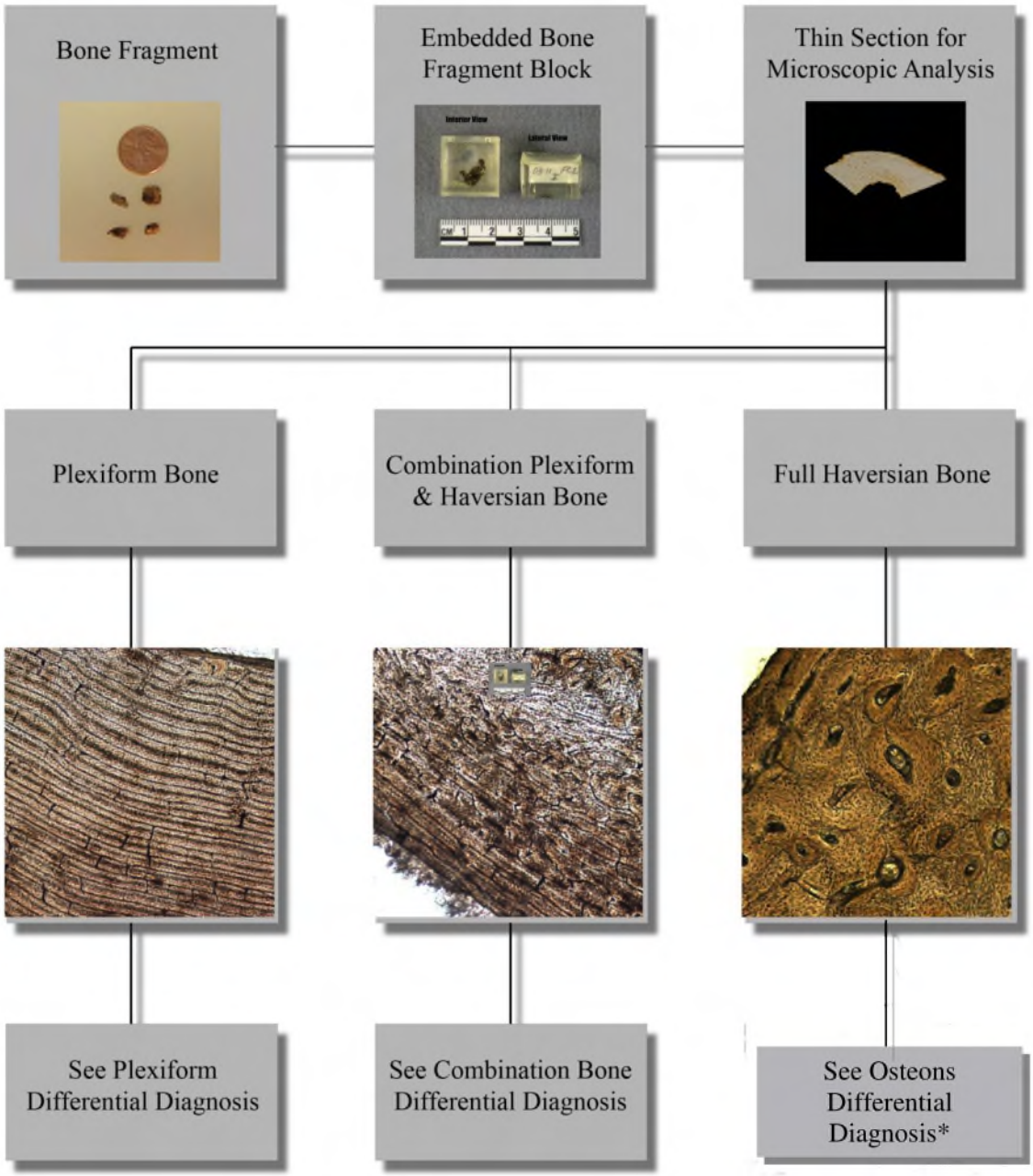
When histomorphological analytical notes support CIL portion or admin fiat cases, the management review by a Laboratory Manager, competency certified in histological analysis, serves as the technical and administrative review.

6.0 SAFETY: The following hazards exist in connection with histomorphological preparation and analysis:

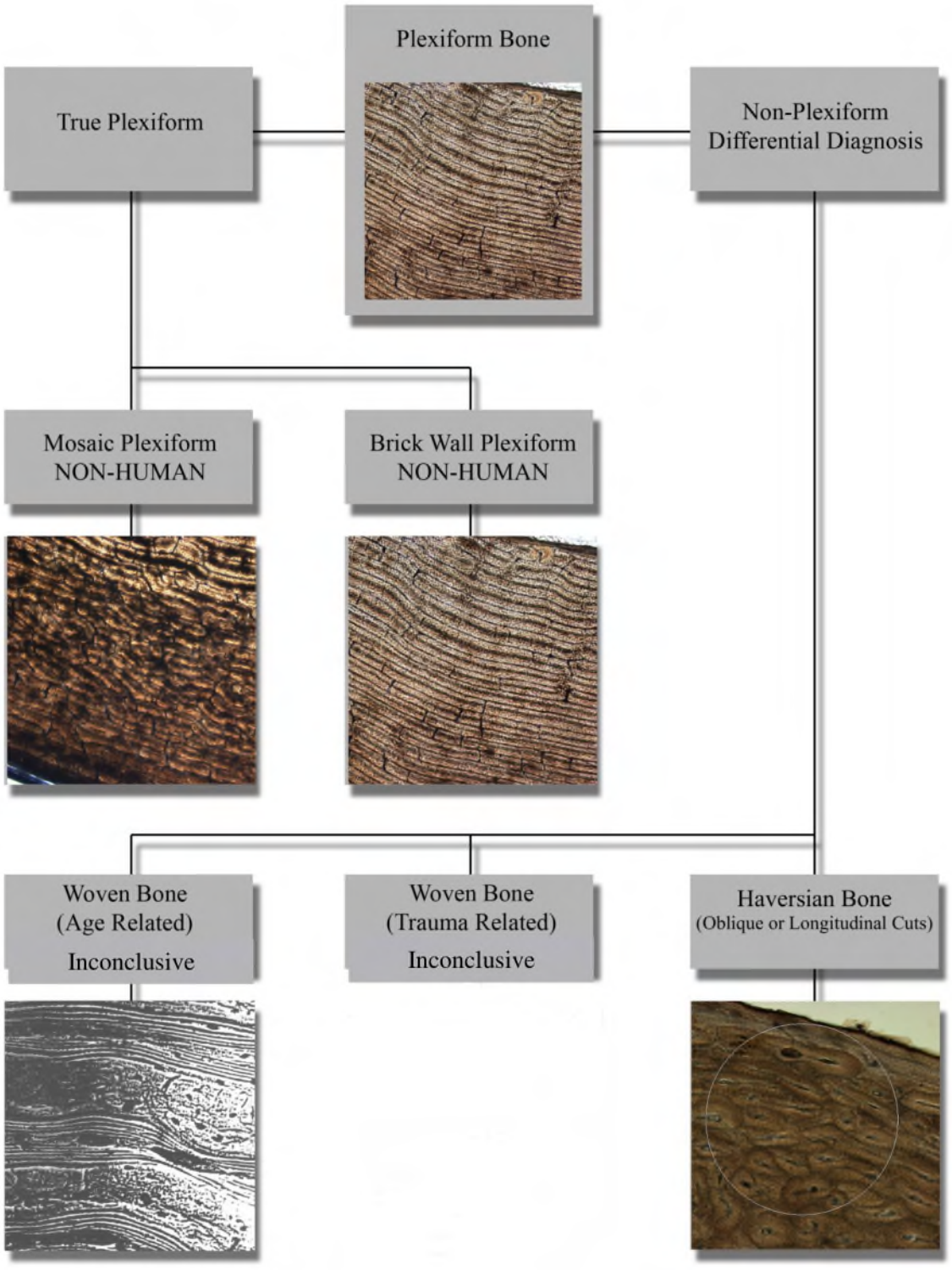
- Sharp blades.
- Moving parts/mechanical equipment
- Glass slides.
- Dust and flying debris.
- Electrical items in proximity to wet or damp areas.
- Chemicals.
- Bio-hazards (if working with "wet" bone).

Analysts follow the provisions in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) pertaining to the mitigation of the above hazards and potential environmental problems. Appropriate personal protective equipment is worn for the tasks being performed.

Annex A: Decision Matrix for Microscopic Analysis of Osseous Fragments

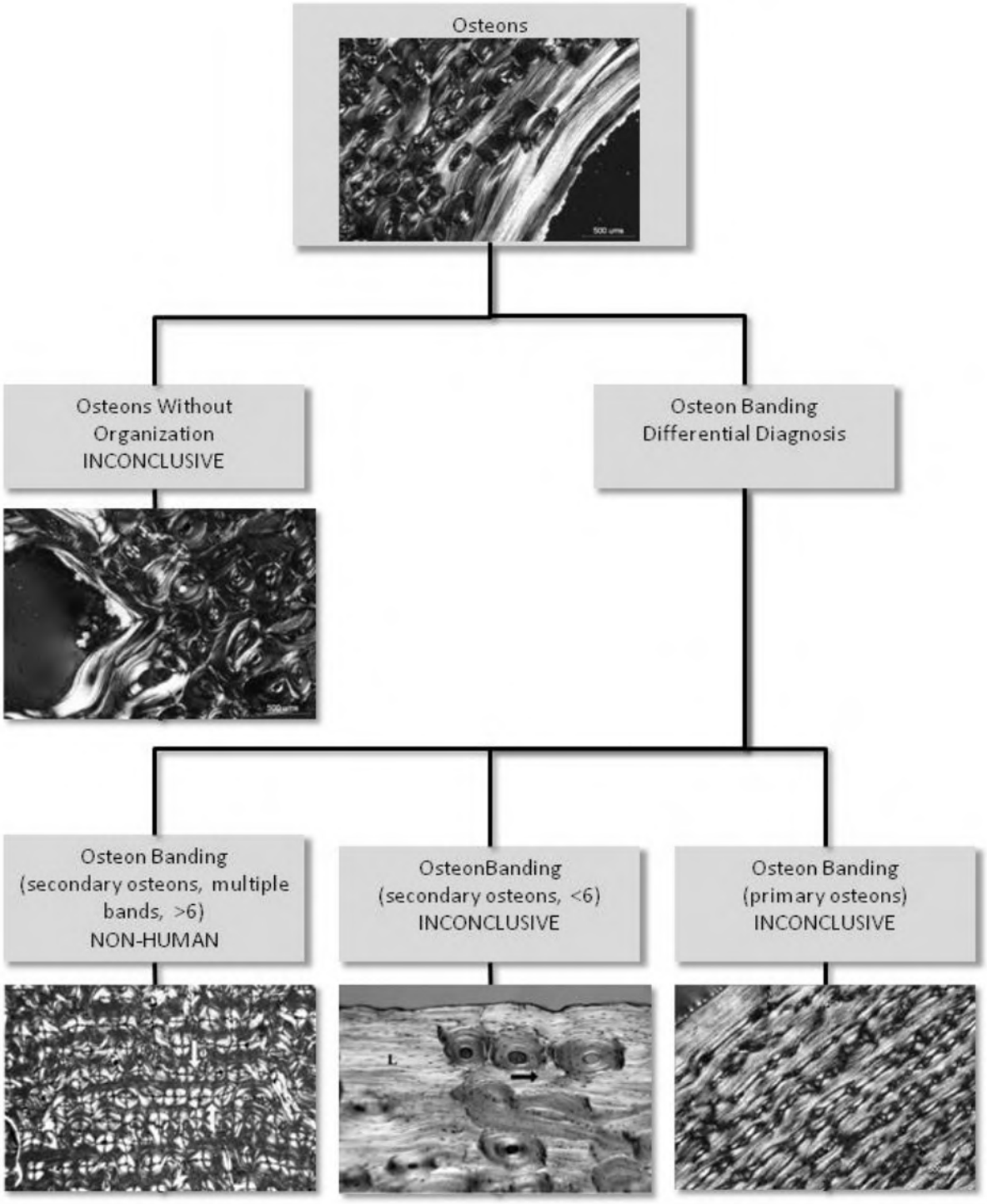


Plexiform Differential Diagnosis



Combination Bone Differential Diagnosis

Osteons Differential Diagnosis



SOP 3.9: CHEST RADIOGRAPH COMPARISON

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 3 May 2017
Citation: DPAA Laboratory Manual, SOP 3.9

CONTENTS

0.0 PRINCIPLE, SPIRIT & INTENT: *Skeletal anatomy of human remains is analyzed in an orderly manner to determine correspondence to antemortem (AM) chest radiographs. Tests are documented in a manner conducive to the replication and verification of the work performed. Validated methods are employed.*

1.0 PURPOSE & SCOPE: The purpose of chest radiograph comparisons is to provide a line of evidence that includes or excludes individuals as candidates for identification. This is achieved by the comparison of antemortem (AM) chest radiographs with postmortem (PM) radiographs of disarticulated human skeletal remains.

This SOP applies to typical CIL cases and is used by all analysts working for the CIL, or under its auspices. In situations where circumstances preclude the adherence to this SOP, the analytical notes and report must indicate why the procedures could not be followed, the alternative procedures performed, and an opinion on how the accuracy and reliability of the resulting tests were affected. In these circumstances, the analyst also employs those methods that best satisfy the principle, spirit and intent of this SOP.

2.0 GENERAL PRINCIPLES & GUIDELINES:

2.1 **Case Assignment**: Laboratory Management (typically the CXR manager), assigns chest radiograph comparisons to analysts including the osseous remains and the AM radiographs to be examined **(A4.1.5a).** For each accession, arrays of AM radiographs are tracked on a Chest Radiograph Comparison Array Tracking form that is saved, by the analyst, to the CXR directory in the corresponding case file. This typically occurs after each array has been completed by the analyst. The tracking form indicates the parameters used to select individuals for inclusion in each array.

2.2 **Blind Analysis:** Unless otherwise directed by Laboratory Management, analysts conducting AM chest radiograph comparisons work in the blind. Blind analysis means that, while actively engaged in the analytical process, the analyst does not know *a priori* which antemortem radiograph represents the correct, incorrect, or suspected match to the skeletal remains and/or other potentially influencing case details.

Analysts apply the highest ethical standards when conducting blind analysis. Violations are treated as serious ethical breaches and dealt with accordingly by Laboratory Management.

2.3 **Analysts**: Only competency certified analysts perform and peer review chest radiograph comparisons. Analysts must also hold competency certification in DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation) and SOP 3.4 (Determining Biological Profiles). Certification in SOPs 3.3 and 3.4 may or may not include writing FARs.

2.4 **Location:** Chest radiograph comparisons are typically performed in CIL-HQ. They may also occur at other locations where appropriate equipment and technology exist and where performance check records for this equipment are available **(A5.3.1, A5.3.2)**. In these circumstances, the alternate location and performance check details are be recorded in the analytical notes.

2.5 **Definitions:**

Pertaining to the clavicle:

- x-axis = the long axis of a clavicle.
- z-axis = an axis perpendicular to the long axis of the clavicle and running infero-superior (i.e., within the coronal plane).
- y-axis = an axis perpendicular to the long axis of the clavicle and running postero-anterior (i.e., within the transverse plane).
- Roll = rotation around the y-axis.
- Yaw = rotation around the z-axis.
- Pitch = rotation around the x-axis.

Note: When finalizing clavicle scans using the bounding box and CAD tags procedure in ScanStudio (see Annex D), the surface mesh becomes rotated such that the x and y axes are switched relative to the anatomical position of the clavicle. While not an optimal feature of ScanStudio, the interchange of the z and y axes are inconsequential for CMP because the CMP automatically corrects for ScanStudio's unorthodox registration of the clavicle on the 3D coordinate axis.

Pertaining to radiographs:

- Acetate Recovery = a chemical and physical process that removes channels by detaching the radiograph's entire emulsion from the acetate backing.
- Channel = a buckle or bubble-like configuration in the radiograph resulting from shrinkage of the acetate support and subsequent, localized, separation of the emulsion from the acetate backing.
- Crazing = numerous channels which intersect to give a radiograph a mosaic appearance.
- Radiopacity (or radiodensity) = the portion of the radiograph that is light or white due to attenuation of the x-ray beam.
- Radiolucency = the portion of the radiograph that is dark due to little attenuation of the x-ray beam.
- Source to Image Receptor Distance (SID) = how far the x-ray tube is from the image receptor (otherwise, known as the focus film distance or FFD).

Pertaining specifically to radiographic comparison:

- Explainable difference = anatomy that is inconsistent between the AM and PM radiograph, but which can be rationally explained, typically by factors extrinsic to the PM radiographic process. Examples include:
  - AM or PM fracture of the clavicle subsequent to the date of AM radiography.
  - Formation of bony spurs at muscle attachment sites subsequent to the date of AM radiography.
  - Loss of image integrity in localized areas due to deterioration on the AM radiograph.

The reduction of soft tissue shielding at the shoulders during PM radiography (i.e., making the conoid tubercle more conspicuous) is one example of a valid explainable difference underpinned by a factor intrinsic to the PM radiographic process.

Mismatch in bone orientation does not qualify as an explainable difference, except for articulated vertebral sequences where items of concordance have been demonstrated across three or more orientation-matched elements of the sequence *and* all elements of the sequence possess congruent articulations, structural morphology, and developmental morphology.

- Inexplicable difference = inconsistent anatomy between the AM and PM radiograph that falls outside the definition of explainable difference (see above). Examples include:
  - Differences that are not associated with AM or PM fracture(s) of the skeletal elements.
  - Differences in bone shape at regions not typically subject to change (i.e., beyond muscle attachment sites).
  - Differences not associated with image integrity/localized deterioration of the AM radiograph.

- Item of concordance = an anatomical feature depicted on the PM radiograph that exhibits near-identical shape and/or similar radiopacity as the AM radiograph. Examples of anatomical features that might serve as items of concordance are presented in Table 1. Items of concordance may also be referred to as: items of consistency, correspondence, and/or similarity. Note:
  - Items of concordance are determined macroscopically and qualitatively by the analyst.
  - Radiodensity is judged relatively since soft tissue shielding is present on the AM images, but often not on the PM images.
  - Items of concordance are not subject to the constraints of anatomical language or their size. That is, an item of concordance is not required to be a well-circumscribed and/or named component of the skeleton (such as a bony spur or a conoid tubercle). An item of concordance may pertain to an unnamed structural feature at a given point, region, or area on the PM

radiograph, such as a decreased density within one particular segment of the cortical margin.

- Weight of evidence = the value and the number of data points/observations that provide support for a conclusion.

Table 1: Examples of anatomical features that may serve as items of concordance.

Clavicles	Vertebrae
General outline shape (e.g., straight, arched or sigmoid).	Form of the lateral outlines of the vertebral column (including lateral projections at zygapophyseal joints).
Surface undulation (presence, size, shape and position of tubercles, bulges, plateaus, or notches along superior and inferior shaft margins).	Position, size, shape and symmetry of the spinous processes (e.g., oval, circular, trianglular, bifid).
Shape of sternal edge (e.g., straight, convex or concave).	Position, size and shape of the inferior and superior articular facets of each vertebrae.
Shape of medial metaphysis (superior and inferior surfaces are fluted, parallel, or a combination of both: e.g., superior surface is arched while the inferior surface is straight).	Size, shape and symmetry of the cortical outline of C7 neural arch.
Presence/absence, position, size and shape of rhomboid fossa(e).	Position, size and shape of transverse processes of cervical vertebrae.
Thickness of cortex along shaft.	Direction, length and shape of transverse processes of thoracic vertebrae, especially T1.
Density of medullary region at the lateral ends of the shaft.	Position, shape and size of pedicle outlines of thoracic vertebrae.
Presence/absence, position, size and shape of tubercles / spurs at the sternocleidomastoid muscle insertion.	Position, size, and shape of radiodensities found within the vertebrae.

- Collage = a composite image created from different PM radiographs (e.g. including the right clavicle from a radiograph, and the left clavicle from another radiograph). Although authorized, collages should be avoided when possible, and all remains should be recorded in the closest matching orientation in a single superimposition PM radiograph.

2.6 **Apparatus & Materials**: The following materials are available in the CIL and may be employed during chest radiograph comparisons:

2.6.1 **Exemplars:** Human anatomy exemplars from the CIL collections.

2.6.2 **General Electric Proteus XR/a System:** A system used to radiograph osseous remains. See DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging) for general description of machinery and procedures. For procedures specific to chest radiograph comparisons, see below.

2.6.3 **Imaging Software:** Adobe® Photoshop® is used for image superimpositions, as described in Annex A (Superimposition Procedure) of this SOP.

2.6.4 **AM Chest Radiographs:** For prior military service members, there are two types of AM chest radiographs in the CIL: 1) original hardcopy radiographs; and 2) electronic copies of original hardcopy radiographs. These radiographs represent posterior-anterior projections of individuals who are unaccounted for from the Korean War; however, some individuals from World War II (WWII), the Cold War, and the Vietnam War are also represented.

The electronic radiograph copies form the basis for routine casework analysis, and they are stored on the network drive "XRays on hq-nas-01". Newly acquired hardcopy radiographs should be converted to electronic format in accordance with Annex B (Electronic AM Chest Radiograph Collection) of this SOP prior to undertaking chest radiograph comparisons. Access to "XRays on hq-nas-01" is restricted. Access is authorized by Laboratory Management and implemented by the DPAA-J6.

Original hardcopy chest radiographs requested from the U.S. National Archives and Records Administration (NARA) for individuals belonging to the U.S. Army, the U.S. Army Air Corps, the U.S. Army Air Forces, and the U.S. Air Force are stored in the CIL (see Annex C, Hardcopy AM Chest Radiograph Collection).

The CIL does not retain the original hardcopy radiographs requested from the NARA for U.S. Navy personnel (including the U.S. Marine Corps); however, it does hold electronic copies of some of

these records (see Annex B). Original hardcopy radiographs for unaccounted-for individuals across the Armed Forces may also be found in the Official Military Personnel Files (OMPFs) and the Individual Deceased Personnel Files (IDPFs) held by R&A and the NARA. Radiographs from these packets held in the R&A have also been electronically copied.

2.7 **Evidence Handling & Preservation:**

2.7.1 **Osseous Remains:** Osseous evidence subject to testing is usually robust in nature and not easily affected by handling or by the ambient environment in the CIL **(A5.3.1, A5.8.4)**. However, poorly preserved remains should be handled with additional care during specimen preparation so that further damage is avoided. Such specimen preparation procedures include:

- Cleaning in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Reconstruction in accordance with DPAA Laboratory Manual, SOP 3.3 (Taphonomic Effects & Evidence Conservation).
- Rearticulation (see below).
- 3D surface-scanning (see below).

If damage beyond the displacement of small osseous flakes occurs during these procedures, document the damage in the analytical notes.

2.7.2 **Body Region & Osseous Elements Evaluated:** Comparison of osseous remains and/or PM radiographs to AM chest radiographs typically concerns the left and right clavicles and the C3 to T3 vertebrae. These elements form the basis for comparison due to their:

- Preservation and likelihood for recovery.
- Clarity on AM chest radiographs.
- Ease for estimating AM positions relative to the image receptor of the x-ray machine.
- Morphological distinctiveness.

2.7.3 **AM Chest Radiographs:** When conducting case analysis, working versions (or copies of the archived) electronic radiographs is used. The original, archived, electronic radiographs stored in the "Archive" directory on the network drive "XRays on hq-nas-01" is not overwritten with modified files.

Original hardcopy radiographs do not typically require manual handling since electronic copies of AM radiographs are used for analysis. Where handling of the original radiographs is necessary, (e.g., to maintain storage and preservation), guidelines provided in Annex C of this SOP should be followed.

2.8 **Analytical Coordination:** Chest radiograph comparisons may precede, follow-on, or be conducted concurrently with other types of analyses. Consequently, new findings, for example MNI, segregation, and/or seriation, may arise during either chest radiograph comparison testing, or the other testing. Where any such differences occur between the analytical domains (e.g., SOP 3.4, Determining Biological Profiles), the analysts consult to ensure congruency between their notes and reports. Congruency can typically be achieved by one analyst citing the findings of the other analytical procedure. In cases where an analyst cannot be consulted, Laboratory Management determines the appropriate course(s) of action.

2.9 **Requesting the CMP:** Laboratory Management (typically the CXR manager) may request a short-listing of potential candidates for chest radiograph comparison based on the clavicular morphology through the CMP (Clavicle Matching Program, see Annex D, Clavicle Matching Program, of this SOP).

In most cases, the CMP is employed only after relevant historical candidates are excluded to exhaustion using routine chest radiograph comparison procedures. Use of the CMP is stated in the Chest Radiograph Comparison Array Tracking form which includes a brief description of the AM sample used for comparison (e.g. related to a conflict, a specific loss incident, etc.).

When assigned to begin CMP arrays, the analyst runs the clavicle scan(s) first against a targeted subsample determined by historical research, and then provides this ranked list to laboratory management. The analyst is typically assigned to compare, sequentially, the top 5, 15, and 25% of the total subsample in three separate arrays. Previously compared individuals are excluded from subsequent CMP arrays. If these subsample arrays do not result in a match, the CMP is run against the entire conflict sample, and the analyst then compares an array of the top 5% of this sample. If this array does not result in a match, CXR analysis is halted, unless and until new information or methods become available.

3.0 TESTING PROCEDURES: The chest radiograph comparison process is delineated by a two stage process, with three steps in each stage (six steps total). Analysis is completed at either Step 3 or Step 6 depending on the observations arising from the analytical process. Wherever possible, chest radiograph comparison is undertaken before DNA sampling. The following is a summary of the six step

process:

Stage 1 (Triage):

- **Step 1:** Preliminary assessment of the remains (inventory, description, rearticulation, surface scanning, and photography, see 3.1 below).
- **Step 2:** Capture of exploratory PM radiographs (see 3.2 below).
- **Step 3:** Initial comparison of exploratory PM radiographs to AM radiographs (see 3.3 below). This step has two outcomes:
  - Potential Match: Progress to Step 4 if a potentially matching candidate is observed.
  - Exclusion: Render an exclusion opinion (email to Laboratory Management and place copy of the email into case file) if no potentially matching candidate is observed.

Stage 2 (Additional Examination):

- **Step 4:** Additional PM radiography (see 3.4 below).
- **Step 5:** Final comparison using the PM radiograph(s) depicting the osseous elements in the closest estimated position to the candidate for match (see 3.5 below).
- **Step 6:** Render a professional opinion based on the analytical results and complete a Chest Radiograph Comparison Report (CXR) (see 3.6 below).

3.1 **Preliminary Assessment Remains (Step 1):** Inventory, describe, and chart the skeletal remains in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). Rearticulate vertebral elements to approximate AM spatial positions. To accomplish this, dental utility wax should be used sparingly to provide the minimal required support to hold the vertebral components in the desired position. A distance of approx. 5 mm should be used to represent the inter-vertebral spaces and 1- 2 mm separation used between the articular processes at the zygapophyseal joints to account for articular cartilage (Figure 1). Pay close attention to precise alignment of the superior and inferior articular facets during rearticulation.

Note: If the vertebrae are highly fragmented, incomplete and/or poorly preserved, rearticulation of the remains should not be attempted (to avoid further fracture of the osseous elements). The wax should be carefully and gently applied to the bones, so that it can easily be removed without damage to the osseous elements after the analysis is complete. Any fractures (not including displacement of tiny osseous flakes/pieces from eroded remains) that arise from the chest radiograph comparison process are documented in the analytical notes.

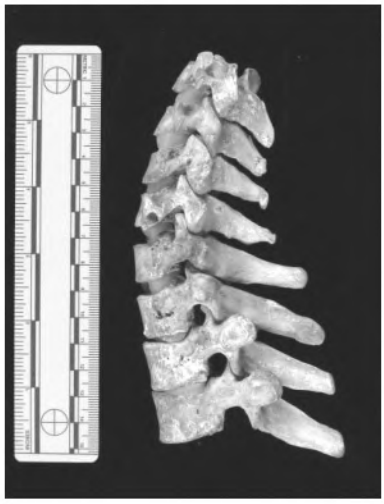


Figure 1: Lateral view of a rearticulated vertebral column using small amounts of dental wax.

Anterior and posterior photographs of the rearticulated remains and the clavicles are taken at this step, in accordance with general procedures outlined in the DPAA Laboratory Manual, SOP 3.1 (Forensic Imaging).

If available and in a good state of preservation, the clavicle(s) should be surface-scanned with the NextEngine™ 3D scanner (see Annex D of this SOP for procedures). If the remains display extensive erosion, DNA sampling cuts, and/or fragmentation, surface- scanning is not necessary. Each right and left clavicle is saved as a .stl file and stored in the CD accompanying the analytical notes.

3.2 **Exploratory PM Radiographs (Step 2):** Three exploratory PM radiographs are taken using AM x-ray conditions and estimated AM bone positions to approximate the AM radiograph in at least one PM image.

For prior military service members, this is accomplished by reference to the standard body position used for induction military chest radiography, as described by:

- War Department 1942.
- Bailey 1942.
- War Department 1944.
- Verstandig and Ainsworth 1944.
- Department of the Army 1967.

Specifically:

- The body faces away from the x-ray source and toward the image receptor (postero-anterior projection).
- The anterior side of the thorax is in contact with the image receptor.
- The neck is in extension.
- The shoulders are rotated forwards.
- The top of the image receptor is approximately three inches above the location of the subject's shoulders.

For PM positioning of the osseous elements this typically also requires:

- The long axis of the clavicle to be placed almost parallel to the image receptor (elevated slightly laterally).
- The vertebrae to be placed farther from the image receptor than the clavicles (i.e., the medial ends of the clavicles are approx. 10 mm from the image receptor while the C3 vertebrae are approx. 60 mm from the image receptor).
- The rearticulated vertebrae to be positioned towards the top edge of the image receptor (C3 just below the superior edge of the image receptor).
- The medial ends of the clavicles to be placed as close as possible to the T3 level, but avoiding overlap with the vertebral bodies (so as not to complicate their interpretation from the PM radiographs).

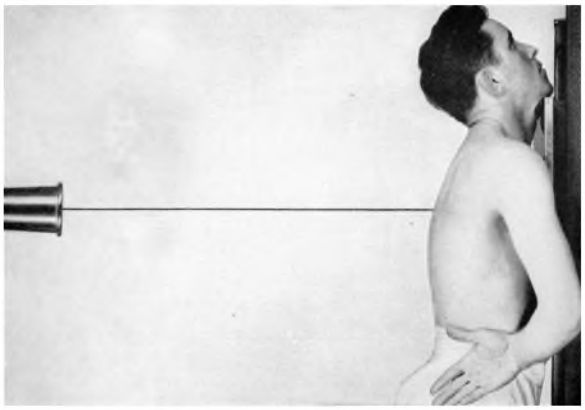


Figure 2: A living subject positioned for posterio-anterior radiography. Image from the War Department's 1944 Technical Manual TM 8-280.

Figure 2 provides an example of a living subject positioned for AM radiography. Figure 3 shows an example of positioning the skeletal remains. Note that for AM radiography the image receptor is vertically orientated, but for PM radiography it is horizontal so the remains do not need to be suspended against gravity

The source to image receptor distance (SID) should be selected prior to PM radiography depending on the size and date of the AM radiographs used for the comparison. Where comparisons are made to more than one AM radiograph, the SID corresponding to the time period that encapsulates the majority of radiographs in the comparative sample should be used.

For 14x17" radiographs, select the SID in accordance with the date on the radiograph and the Army's Technical Manuals (War Department 1942; War Department 1944; Department of the Army 1967; Table 2). If an imaging date is not recorded on the radiograph(s) use an SID of 60".

Figure 3: Osseous remains positioned for the first exploratory radiograph. Note the postero-anterior position.

Table 2: Source to image receptor distances for comparison to 14x17" AM chest radiographs.

SID	Appropriate for Radiographs	Technical Manual	Technical Manual Date
72"	Taken prior to 30 Dec 1944	TM 8-275	26 Jan 1942
60"	Taken between 30 Dec 1944 and 1 Mar 1967	TM 8-280	30 Dec 1944
72"	Taken after 1 Mar 1967	TM 8-280	1 Mar 1967

For 4x10", 4x5", and 35mm film, an SID between 36" and 60" are used to approximate photoflurography settings described by:

- De Lorimier 1942.
- Bailey 1942.
- Mason 1944.
- Verstandig and Ainsworth 1944.
- Zanca and Herpel 1944.

Foam stands (and/or some other radiolucent support) are used to hold the osseous remains in their appropriate positions during PM radiography (Figure 3). The orientation of the osseous remains for the first exploratory PM radiograph (the best estimate of the AM position) is as follows:

- The rhomboid fossae of the clavicles face postero-inferiorly so that the base of the conoid tubercle is hidden behind the shaft from the anterior perspective (Figure 4).
- The spinous processes of inferiorly located vertebrae are oriented vertically (Figure 3 and 5), so that they produce clear circular-like perimeter outlines on the radiographic image (Figure 5a).

For the two other exploratory PM radiographs adjustments of the bone positions, from the first exploratory PM radiograph, are needed. That is, position the clavicles in +5 and -5 degree rotation around their long axis and with +15 and +30 degrees of anterior inclination of the vertebral column (note that degrees of rotation are approximate). See Figure 5 for directions of bone rotation and examples of resulting radiographs.

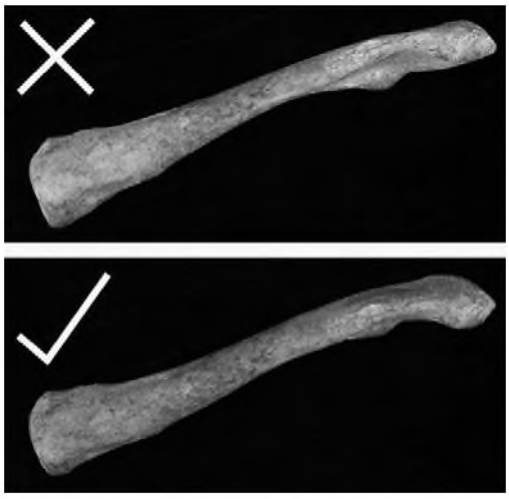


Figure 4: Incorrect (upper panel) and correct (lower panel) position of the clavicle about the x-axis for the first exploratory PM radiograph, as viewed from the anterior perspective.

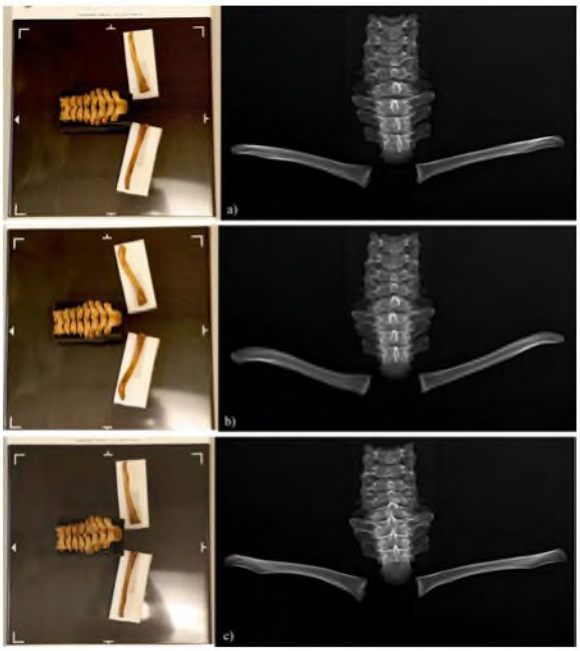


Figure 5: Exploratory PM radiography. (a) First exploratory PM radiograph (best estimate position). (b) Second exploratory PM radiograph. (c) Third exploratory PM radiograph. Arrows indicate direction of element rotation from (a) in subsequent images.

Turn on the collimator reference light and position the specimen in the center of the platform. Use the knobs on either side of the collimator reference light to adjust the aperture to dimensions that are relative to the specimen being captured. The amount of empty gray space around the elements affects the quality of the image, so ensure that empty space around the elements is minimized. The default study procedure on the Computer Monitor is *Proteus Protocols …CXR*, and on the GE tablets is *DRY BONES_CXR* with the *KVP*, *mA*, and *Time* values of 60, 100, 0.040 respectively should be used. Record the x-ray settings used for PM radiography in the analytical notes. This includes the SID used for each PM radiograph, as measured using the manual tape measure.

3.3 **Initial Radiographic Comparison (Step 3):** Antemortem radiographs for each individual (corresponding to the candidate names provided by Laboratory Management) should be sequentially juxtaposed with the PM images, on a ≥1.9 mega-pixel computer screen(s) and in a darkened room, so that the AM and PM images can be simultaneously viewed. A comparison of the skeletal anatomy is then made macroscopically by the analyst between the PM and AM images.

The best quality AM image for each individual is used for the comparison and the file name of this image recorded in the analytical notes. The radiograph's degree of quality and clarity is also noted.

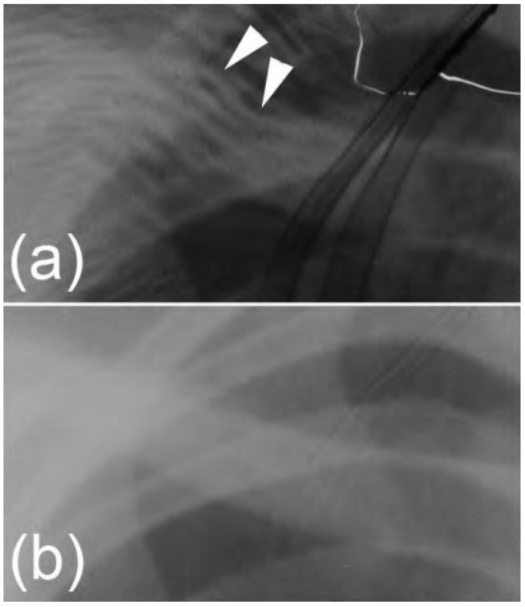


Figure 6: An example of distortion to the clavicle produced by channeling. (a) White arrows highlight distortions to the right clavicle on a channeled radiograph. (b) The same radiograph, after acetate recovery, without channels and accompanying distortions.

Since channeling and crazing can distort the anatomy visible on chest radiographs (Figure 6), radiographs without these deficiencies should be used in preference to those that exhibit them. When only channeled radiographs exist for an individual, or an individual is additionally represented by faint images, channeled radiographs should be subject to acetate recovery prior to comparison. This is especially true when the channeling / crazing is extensive or marked, and/or when the channeling/crazing impinges upon body regions that are used for comparison (i.e., clavicles and C3 to T3 vertebrae).

Where digital enhancement of the AM image is required, the *Exposure Setting* in Adobe® Photoshop® (CS3 or higher) should be utilized as the first option. The magnitude of the *Offset*, *Gamma* and *Exposure* to obtain the final enhanced image should be recorded in the analytical notes. Any additional image enhancement procedures are documented. Completion of a separate Digital Image Enhancement form is not required.

Anatomical features useful for chest radiograph comparisons are listed in Table 1; however, these features are not used as an exhaustive list. Decisions concerning the correspondence between the PM and AM images are based on a comprehensive and thorough assessment of the anatomy depicted on the PM and AM images by the analyst.

Take care when comparing the conoid tubercles of the clavicles since, as previously mentioned, there is significant shielding of these structures (by the shoulders) at AM x-ray. That is, conoid tubercles might be clearly present on the PM radiographs but not on the AM radiographs. Foramina through the cortex of the shaft, such as that for the supraclavicular nerve, also tend to be more readily apparent on the PM radiograph(s) in contrast to the AM radiograph(s).

Where numerous items of concordance are found, at least to one AM radiograph and either across single or multiple bones, analysts proceed to Stage 2 (Steps 4-6) of the comparison process. Where few items of concordance are observed for any AM radiograph at Stage 1, an opinion should be rendered and emailed to Laboratory Management without advancing to Steps 4-6. A copy of this email is retained in the case file along with the analytical notes documenting Steps 1-3. A digital copy of both the email in Outlook message format (*.msg) and the most up-to-date array tracking form are stored in the corresponding case file network drive.

When remains subjected to chest radiograph comparison (CXR) originate from a commingled human remains (CHR) project (see DPAA Laboratory Manual, SOP 3.3, Taphonomic Effects & Evidence Conservation), the preliminary results of the triage procedure are emailed to Laboratory Management and the CHR Project Manager before proceeding to Steps 4-6 in case of a potential match. This email is also included into the appropriate CIL accession number for tracking purposes.

If there is a potential match, the CHR Project Manager assigns to the remains the accession number of the case into which they are being consolidated (if necessary), prior to the generation of a CXR. The CHR Project Manager communicates the appropriate CIL number to the analyst so the CXR process can be completed. In case of accession number change, previous forms must reflect that change, and remains must be checked in before consolidation, and checked out with the new number prior to proceed with Steps 4-6.

CXR cases are tracked in the "CXR_Case_Tracking.xlsx" spreadsheet which is

located on the network drive "XRays on hq-nas-01" under the directory "CXR Case Tracking". One designated analyst updates the spreadsheet upon completion of each array to ensure that the information for each case is current.

The spreadsheet is accompanied by a README.txt file that outlines the content of each field within the document.

3.4 **Additional PM Radiograph Capture (Step 4):** If exploratory PM radiographs closely replicate AM bone positions and corresponding SID settings, additional PM radiographs are not required. Additional radiographs are required if the PM bone positions need adjustment to obtain near-identical positions to the AM radiograph or if a different SID must be used to match the AM radiograph. In the event that additional radiographs are needed, use the following procedure:

- Match the SID to that used for the date of AM radiography (see Exploratory PM Radiographs, above).
- Adjust the positions of the rearticulated remains so that they match, as precisely as possible, the candidate AM radiograph used in Step 3. For example:
  - Pitch of the clavicles can be judged by how high the lateral ends of the clavicle are above the medial ends, as depicted on the AM radiograph.
  - Yaw of the clavicles can be judged by the relative position of the curves along the bone's length, and the morphological appearance of the sternal end. That is, if the base of the clavicle's articulation with the manubrium was flat, and exposed exactly parallel to the x-ray beam, then the sternal articular surface would appear as a single line on the AM radiograph, not as an oval-shaped silhouette.
  - Roll of the clavicles can be judged by the visibility of the conoid tubercle below the shaft (if a conoid tubercle is present) or, for example, by the height of the posterior perimeter outline of the rhomboid fossa against the total height of the medial end of the clavicle.

Try to replicate all AM bone positions in a single PM radiograph.

3.5 **Final Radiographic Comparison (Step 5):** The PM radiograph (or a collage from more than one PM radiograph) that best replicates the AM bone positions should be compared to the AM radiograph to finalize items of concordance or any dissimilarities. These observations are recorded on the appropriate analytical forms.

In the case that numerous items of concordance exist, not more than 25 of the largest and most readily visible characteristics are described and documented in the analytical notes. Superimpositions of the clavicles are also undertaken in these instances (see Annex A of this SOP), except where extenuating circumstances preclude it (e.g., poorly focused or poor quality AM radiographs).

Table 3: Opinion options for image comparison.

Opinion	Definition
Match	PM anatomy matches AM anatomy
No Match	PM anatomy does not match AM anatomy
Indeterminate	Radiographs do not exhibit sufficient information and/or information is equivocal

Table 4: Opinion options for identity.

Opinion	Definition	Prerequisite Image Comparison Status
The osseous remains are those of X	The weight of evidence suggests that the PM and AM records are from the same person	Match
The osseous remains cannot be excluded as those of X	Several complicating factors exist, but no anatomical features exclude the remains as X	Match
The osseous remains are not those of X	The weight of evidence suggests that the PM and AM records are not from the same person	No Match
Indeterminate identity	Insufficient evidence exists to determine if the osseous remains are, or are not, those of X.	Indeterminate

3.6 **Professional Opinion (Step 6):** The professional opinion possesses two components: i) a statement of the overarching result of the image comparison obtained in step 5; and ii) a statement concerning the identity of the skeletal remains, based on the weight of evidence in part (i). The opinion options that exist for parts (i) and (ii) are presented in Tables 3 and 4 respectively.

In forming image comparison opinions, analysts first evaluate the eligibility of the PM radiograph for a "no match" outcome (prior to a "match") thereby minimizing the opportunities for false positive results. Image comparison opinions are also used as

prerequisites for rendering identity opinions as listed in Table 4. For example, a "match" opinion authorizes an identity opinion of either: i) remains are those of X, or ii) the remains cannot be excluded as those of X. Analysts always proceed in their analysis from an image comparison opinion to an identity opinion (never in the reverse order).

4.0 DOCUMENTATION: Analyses and results are recorded in the analytic notes in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).

Any deviations from procedures in this SOP are documented in the analytical notes.

For Steps 1-3, exclusion opinions and findings of insufficient evidence for derivation of an opinion are emailed to Laboratory Management. The analytical notes documenting Steps 1-3 are be placed into the case file. A Chest Radiograph Comparison Report (CXR) normally not generated for these findings, unless requested by Laboratory Management.

For Steps 4-6, a CXR is prepared in accordance with Annex E of this SOP. Templates for the CXR are found on the CIL network. Superimpositions are illustrated in accordance with Annex A [Chest Radiograph Comparison Reports (CXRs)] and in conjunction with juxtaposed comparisons (see CXR Template for examples). Image collages must be marked as such in CXR Figures.

In case of exclusion, after Steps 1-3, copies of photographs, PM radiographs, and AM radiographs will be transferred to a CD and placed with the analytical notes into the case file. After Steps 4-6, a new CD is burned with at least the following files:

- Copies of raw photographs (.jpg).
- PM radiographs (.jpg).
- AM radiographs (.tif).
- Report figures (.tif)
- Low opacity superimposition (.psd).
- Photoshop History log of the superimposition (.txt).
- 3D models of the scanned clavicles if available (.stl).

The analyst additionally prints from the case file network drive, and include in the case file, a hard copy of the completed and corresponding Chest Radiograph Comparison Array Tracking" form. This document is authenticated (signed) by management, upon receipt of the CXR case file prior to its assignment for peer-review. A copy of the Low Opacity superimposition (.psd file) and the scanned .stl files are also added to the network case file.

All original analytical notes, the image CD, and reports are retained with the original case file in Laboratory Administration until the case file is retired for permanent storage.

5.0 SURETY: The chest radiograph comparison methods have been validated and endorsed by the Armed Forces Medical Examiner. An internal validation study that examined the results of 66 applications of CXR (with 723 comparisons) where there was an independent means to establish identity found no false positive results. Therefore, the error rate (false positive) is conservatively estimated to be 1/67 = 0.015, or 1.5%. The study indicated that the false negative rate is lower, and also of less concern since negative findings will lead to further analysis at a later time.

Additionally, the CXR is peer-reviewed in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review) by an analyst competency certified in chest radiograph comparison. All analytical notes, including stored digital radiographs and photographs, are made available to the peer reviewer at the time the report is reviewed.

Chest radiograph comparisons are also subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits). Opinions rendered at the end of Stage 1 (Step 3) are not normally subject to peer review unless a CXR has been prepared under the direction of Laboratory Management.

6.0 SAFETY: Appropriate measures are taken to minimize human exposure to ionizing radiation. Wet-bone (i.e., remains with fresh adherent soft tissue) are handled with appropriate caution as detailed in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

Annex A (Superimposition Procedures)

A1.0 PURPOSE & SCOPE: This annex describes the procedures for superimpositions that are used to supplement juxtaposed image comparisons and the documentation of the image comparison process.

A2.0 GENERAL: There are two types of superimpositions. Use Adobe® Photoshop® version CS3 or later for both methods. Before undertaking a superimposition ensure that the metadata and text file "history log", under Edit→ Preferences→General, is turned on and 'Edit Log Items' is set to 'Detailed.'

A3.0 LOW-OPACITY SUPERIMPOSITION:

- Open the selected PM radiograph(s) for superimposition in Adobe® Photoshop®, along with the selected AM radiograph.
- Crop the AM radiograph down so that the clavicles comprise the majority of the image.
- Use the *Polygonal Lasso Tool* to select either the left or right clavicle on the PM image. The selection should not follow along, or approach, the edges of the clavicle. Instead it should be box-like with straight margins and include free space between the clavicle outline and the borders of the selection box (Figure 7).
- Copy the selected area and paste it into a new layer on the AM image.
- Select the *Free Transform* editing tool (Ctrl-T) and use the toolbar icon "∞" to link the width and height of the image so the aspect ratio is maintained.
- In the *Layers* window, reduce the opacity of the clavicle to approximately 50%.
- Use the cursor to manipulate the rotation and size (aspect ratio maintained), and coordinate the position of the clavicle over the AM image until a gross approximation is obtained.
- Continue using the *Free Transform* tool (size and rotation adjustments only) to refine the alignment of the clavicle until a near-identical replication of the bone coordinate position and size is obtained, or no fit can be made. Varying the opacity of the clavicle layer during this process may be helpful (Figure 6).
- Repeat the above steps for the opposite clavicle.
- If a near exact overlay is obtained, set the opacity of both clavicle layers to the same value so that all three images can be visualized (normally around 12%). Ensure that the AM and PM images do not visually overpower each other. Record the opacity in the analytical notes.
- Save the image as a PSD file (it is needed for the Windowed High-Opacity Superimposition, described below).
- Flatten the image and save separately in TIFF and then JPEG format.
- Turn off the "history log", under Edit→ Preferences→General.
- Print out the history log and place in the case file with the analytical notes.

A4.0 WINDOWED HIGH-OPACITY SUPERIMPOSITION:

- Open the previously saved PSD file for the Low-Opacity Superimposition.
- Set the opacity of the clavicle layers to 100% and merge them together.
- Select the *Paint Bucket* tool with black fill and click it in the "open space" of the clavicle layer, so that the background in this layer is black and hides the AM radiograph beneath it.
- Select the *Eraser* tool and set the size so that when used over the clavicle it simultaneously erases both the superior and inferior cortical margins.
- Cut two or more windows along the length of each clavicle (Figure 8).
- Save the image as a PSD file.
- Flatten the image and save separately in TIFF and JPEG format.

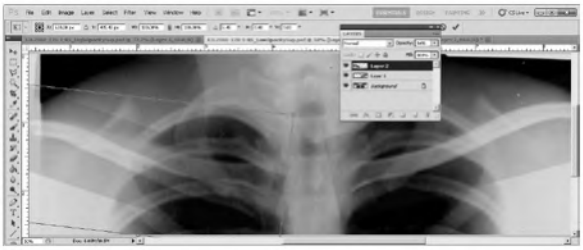


Figure 7: Example of construction of a low-opacity superimposition. The free transform tool is being used to align the PM image of the right clavicle with the AM image. Alignment of the left clavicle (on the reader's right) is complete.

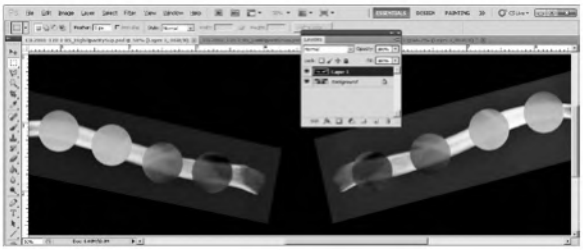


Figure 8: Example of construction of a high-opacity superimposition. Four windows have been cut through each clavicle's PM radiograph to view the underlying AM image.

Annex B (Electronic AM Chest Radiograph Collection)

B1.0 PURPOSE & SCOPE: This annex describes the Electronic AM Chest Radiograph Collection stored on the network drive "XRays on hq-nas-01" and outlines related protocols and procedures.

B2.0 GENERAL: The Electronic AM Chest Radiograph Collection houses AM chest radiographs. The collection is comprised of two parts: one component contains individuals belonging to the U.S. Army, the U.S. Army Air Corps, the U.S. Army Air Forces, and the U.S. Air Force (hereafter referred to as the Army / Air Force Collection); the other component contains U.S. Navy personnel (hereafter referred to as the Navy / Marine Collection).

An archival image set exists for both components, which contain all available radiographs for each person in TIFF format. The Army / Air Force component is organized according to the box numbers under which the original radiographs were delivered to the CIL by the National Archives and Records Administration (NARA).

B3.0 COLLECTION SPREADSHEET: An inventory of the collection is contained in the "CHEST_RADIOGRAPH_LIBRARY_DATE.xlsx" spreadsheet which is located on the network drive "XRays on hq-nas-01" under the directory "DIL_Spreadsheets". Use this spreadsheet when searching for radiographs of individuals.

The spreadsheet is accompanied by a README.txt file that explains the fields and how recordings in them were made. Names and information listed in the spreadsheet have been cross referenced against CARIS and other R&A spreadsheets (e.g., The Listing of the Dead).

B4.0 DIGITIZATION PROCESS: Original radiographs were/are digitized using the following process:

B4.1 **General:**

- Place all negative film radiographs under a 1/16 inch thick sheet of glass and image via digital photography on a Bogen Super Repro Copy Stand trans-illuminated by a four 5100K compact fluorescent spiral lights under 1/8 inch thick opaque white Plexiglas (color #2447).
- Use a bubble level to ensure the copy stand table is horizontal and that the camera body is parallel to it.
- Capture images by remote firing of the camera shutter.
- Digitize positive print radiographs using a Contex Flex50i flatbed scanner.

B4.2 **Army/Air Force Collection:** This collection consists of sheet films of four sizes: 2x3, 4x5, 4x10 and 14x18 inches. For each individual, number the radiographs from oldest to most recent in the lower left corner using a fine-point felt-tip permanent marker. Photography settings used for digitization of radiographs, relative to their film size, are reported below:

- Camera settings for the 2x3, 4x5, and 4x10 inch films:
  - Camera = Nikon D300
  - Lens = 60 mm Macro
  - ISO = 200
  - Aperture = f8
  - Shutter Speed = 1/60 sec
  - White Balancing = 5000 K
  - Metering = 3D Color Matrix
  - Exposure Mode = Manual
  - Focus method = Manual
  - View Finder gridlines = ON
  - Image Quality = Large / TIFF
- Camera settings for the 14x18 inch films. Same as above except:
  - Camera = Nikon D700
- Copy-stand camera height settings:
  - 3x3" radiographs = 352mm
  - 4x5" radiographic images (4x5" and 4x10" films) = 485mm
  - 14x17" radiographs = 1010mm
- Contex Flex50i flatbed scanner settings:
  - Input = Auto
  - Resolution = 300
  - Type = Color (24 bit)
  - Image Compression = None
  - Pixel Order = Interleveled
  - Byte Order = IBM PC

B4.3 **Navy/Marine Collection:** This collection consists of images taken from 35 mm and 70 mm film spools loaned from the NARA. Use the cameras reported above for imaging. The copy stand camera height settings are:

- 35 mm film = 220 mm
- 70 mm film = 352 mm

B4.4 **IDPF and OMPF radiographs:** Same as for A4.2, with the exception that 35mm spoked films are shot with a copy stand camera height of 220 mm.

B4.5 **Radiograph File Names:** Electronic chest radiograph files are named in the following manner:

SMITH_FRED_13445667_002.tif

Where:

- "SMITH" represents the last (family) name.
- "FRED" represents the first name.
- "13445667" represents the service number (if no service number present then NSN, NS# or some other designator is used).
- "002" represents the image number of the radiograph for an individual. (Note that images are ordered sequentially by date of acquisition except where no date is present / readable on the radiograph. Undated radiographs are ordered last.)

B5.0 ACETATE RECOVERY: Channeled Army and Air Force radiographs may be subject to a process called acetate recovery in order to improve the radiographic image.

Radiographs subjected to acetate recovery are represented in the collection by two images: one pre- and one post-acetate recovery image. The pre-acetate image records the radiograph in its original state. If the radiograph was firmly stuck within and to both sides of the storage envelope, the envelope, not the radiograph, was imaged. If the radiograph was stuck to only one side of the envelope, the radiograph and the envelope are both captured on the same image.

The post-acetate recovery images possess an equivalent (or higher) resolution than that described in A4.2 and are marked by "AR" in the image number of the file name.

Annex C (Hardcopy AM Chest Radiograph Collection) (A5.3.2, A5.8.4)

C1.0 PURPOSE & SCOPE: This annex describes the Hardcopy AM Chest Radiograph Collection, its components, requirements for storage, and ongoing requirements for collection maintenance.

C2.0 GENERAL: The Hardcopy AM Chest Radiograph Collection is comprised of hard copy U.S. Army, U.S. Army Air Corps, U.S. Army Air Forces, and U.S. Air Force radiographs. These radiographs are typically photoflurographs recorded on 4x5" film, however, radiograph size is varied (storage media includes 35mm microfilm through to standard-size 14x17" chest radiograph films). The collection is divided into four sub-groups:

- OK collection – radiographs displaying little evidence of vinegar syndrome (i.e., the deterioration process where acetic acid is released).
- VS collection – radiographs displaying evidence of vinegar syndrome.
- PW collection – paperwork associated with radiographs from the OK and VS collections.
- AR collection – dried pellicles from radiographs that have undergone the acetate recovery process.

These groups are not static. Radiographs are moved from the OK collection to the VS collection as vinegar syndrome is detected and from the VS collection to the AR collection as acetate recovery is warranted and/or required. Items in each collection are stored under their corresponding box number (as delivered to the CIL by the NARA) and in alphabetical sequence.

Radiograph location is tracked using the "CHEST_RADIOGRAPH_LIBRARY_DATE.xlsx" spreadsheet located on the "XRays on hq-nas-01" under the directory "DIL_Spreadsheets".

When not being handled, the OK collection is housed separately from the VS and the PW collection to avoid cross contamination of the good quality films by chemicals leaching from the deteriorating films and associated paper items (vinegar syndrome is autocatalytic). During handling, these groups should be separated as much as possible to limit cross contamination.

C3.0 HANDLING REQUIREMENTS: The hardcopy radiographs are retained for archival and traceability purposes and should not be handled on a routine basis. For casework analysis, use the Digital AM Chest Radiograph Collection.

Use extreme care when handling original radiographs and take the following precautions:

- Do not bend the radiographs, their storage envelopes, and/or plastic archival sleeves.
- Wear latex or cotton gloves when removing radiographs from their protective sleeves and/or handling them outside their protective storage media.
- Do not grasp channeled radiographs on the channels/crazing. Handle radiographs from their edges or by the edges of the archival sleeves.
- Do not expose radiographs to extreme temperature or humidity.
- Slowly acclimatize the radiographs when moving them to/from low temperature environments, such as deep freeze. For example, place the radiographs in a picnic cooler to slow the equilibration process.

C4.0 STORAGE: During storage, take the following precautions:

- Keep the radiographs in their archival protective sleeves.
- Lay the archival sleeves horizontally or store them vertically.
- To avoid cross contamination, do not reuse archival sleeves for different radiographs.

The PW and AR collections are stored at room temperature. The OK and VS collections are stored at -30C since these films are subject to ongoing deterioration and release of chemical vapors. For frozen storage the Critical Moisture Indicator Packaging Method is used (McCormick-Goodhart, 2003). This method uses two low-density 4mm zipper-style polyethylene bags in each packing unit. Materials are placed into the smaller bag (subcontainer), which is placed inside the larger bag (container), with a moisture buffer and humidity indicator between the two bags. The radiographs and archival sleeves comprising each packing unit should not exceed 1.5"in total thickness (McCormick-Goodhart, 2003) and at the CIL, typically do not exceed 1.0".

C5.0 COLLECTION MAINTENANCE: Regular maintenance is only scheduled for those collections that are deep frozen (OK and VS collections). This maintenance is recorded in the "CHEST_RADIOGRAPH_LIBRARY_DATE.xlsx" spreadsheet.

At least once per audit year, the humidity indicators of the outer bags are examined, for both the VS and

OK collection, to ensure radiograph microenvironments have not been compromised. When an outer bag has been compromised, further investigation ensues to determine if the inner bag has also been breached. Packaging units with compromised inner bags are dried before having inner and outer bags replaced for continued storage. If outer bags alone are compromised, they alone are replaced.

At least once per audit year, draw radiographs for at least 20 individuals from the OK collection for evaluation of vinegar syndrome. No more than 10 individuals can originate from the same reference box number. Therefore, up to ten individuals can be examined from the same sub-container (inner bag). Individuals selected for evaluation in any consecutive year should not originate from the same container (outer bag) and preferably should come from a section of the collection not subject to recent testing.

Examination for vinegar syndrome is usually made by visual inspection of films for shrinkage and/or channeling, but may also be supplemented by the use of film based deterioration monitors (e.g., A-D STRIPS®).

If films have advanced into vinegar syndrome, examine all other radiographs from the same sub-container and move vinegar syndrome films to the VS collection. Record these radiograph movements in the "CHEST_RADIOGRAPH_LIBRARY_DATE.xlsx" spreadsheet on both the "Hardcopy Radiograph Maintenance" worksheet and the "Army/Air Force" worksheet.

Annex D [Clavicle Matching Program (CMP)]

D1.0 PURPOSE & SCOPE: The CMP may be used to create potential short-lists of candidates for chest radiograph comparisons. This annex outlines the procedures used to obtain a ranked list based on clavicle outline morphology using the CMP.

D2.0 GENERAL: Laboratory Management may request that a short-listing of individuals be created using the CMP in cases that have exhausted the top historical candidates, or in cases where the list of potential matches is too long to allow triage to be performed in a timely manner.

The CMP uses the outlines of the clavicles to rank individuals according to their shape similarity by way of Elliptical Fourier Analysis. The process requires surface-scanning of the remains and production of shadowgrams before comparison with an AM database (composed of manual tracings collected on available AM radiographs). The detailed methodology is described in Stephan *et al.* 2014. The medial ends of the clavicle(s) processed through the CMP must be in a good state of preservation. The CMP does not require the lateral end of the clavicle to perform a comparison. Thus, in cases where the lateral clavicular ends have sustained damage, the CMP can still be utilized.

D3.0 APPARATUS AND MATERIALS: The different steps of a clavicle shape comparison with the CMP are usually performed in Room 151, CIL-HQ, using the "Cinemassive™", a multi-platform computer (Windows 7 and Linux), connected to a NextEngine™ scanner (model 2020i, NextEngine Inc., Santa Monica, CA). The NextEngine™ is interfaced to ScanStudio© HD Pro software (v. 1.3.0, ShapeTools LLC and NextEngine Inc.).

Note: The above system is non-secure. Passwords can be posted on equipment and shared among users.

D4.0 TRAINING: Utilization of the CMP and the related equipment is performed by trained analysts. Training is recorded and filed accordingly.

This SOP is not a substitute for training. Untrained analysts do not operate the equipment.

D5.0 SURFACE SCANNING: Each clavicle is typically surface-scanned with the NextEngine™ scanner by way of the following:

- Open ScanStudio© HD Pro under the Windows 7 platform of the Cinemassive™.
- Position the clavicle on the NextEngine™ stand in a vertical position, fixing the inferior part with utility wax.
- Select "Start" and ensure that the settings allow a sufficient resolution (Positioning = 360; Divisions =5 or 6; Target = Light or Neutral; Points/in.^{2} = at least 1.1k; Range = wide).
- Perform a second acquisition with the clavicle horizontally positioned.
- Select "Trim" to delete the non osseous scanned elements (i.e. the stand and utility wax).
- Select "Align" and use three points on each acquisition so they can be properly aligned.
- Select "Fuse" to create a new model based on the 2 acquisitions. At the Fuse menu, choose "Simplify" at 0.0040.
- Select "Remesh (fill holes) at a ratio of 1 to homogenize the fused surface.
- Select the "CAD" tool to orient the model in anterior view using the bounding box (Figure 9). Use the "Constraint" buttons to limit the degrees of freedom and position the box so that the x-axis runs through the long axis of the clavicle and so the y-axis and z-axis are perpendicular to it. Properly position the tags "Front" and "Top" on the bounding box.

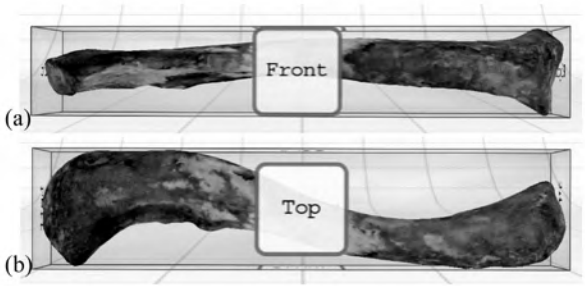


Figure 9: Orientation of a 3D surface-scanned right clavicle in ScanStudio© HD Pro. The element is displayed in (a) anterior view, with the conoid tubercle slightly visible, and in (b) superior view. Tags indicating the top and front faces are properly placed.

It is recommended to save the file after each acquisition. A new folder with the accession number of the case is created in *D:/3D_Clavicle_Scans*. The final model must be saved in the stereolithographic format (.stl) as binary.

- In order to be properly centered, the model is then opened in MeshLab© software (v.1.2.1).
- In the "straighten up a mesh" window, and in the "origin" tab, select "center on Bbox."
- Select "freeze" the positioning.
- Save the centered model as a .stl file (select "STL file format" in the scroll down menu).

- The resulting file is saved in an empty individual folder in the folder *D:/Shadowgrams*, for each right and left clavicle.

D6.0 SHADOWGRAM PRODUCTION: The extraction of shadowgrams from the 3D models must be performed on the Linux platform of the Cinemassive™ computer:

- (Re)boot the Cinemassive™ and select Ubuntu v.2.6.35.22.
- Open a Terminal ("Konsole") window (in the Linux menu Applications, System tools).
- Enter the path of the .stl file (e.g. *cd /media/RAID6JPAC/Shadowgrams/CIL2013-003/Left/*).
- Once located in the proper path, enter the command to build shadowgrams as follows: "*build_shadowgram Rclav.stl*" as "Rclav.stl" is the 3D model saved with MeshLab© software. A series of 195 images corresponding to different orientations will be created in the same folder.
- Only 4 .jpg images will be used for each clavicle. For the right clavicle, extract the images #13, #43, #117 and #147. For the left clavicle, extract the images #27, #75, #131, and #179.

D7.0 SHADOWGRAM PROCESSING: The CMP includes the processing steps necessary for the creation of folders, trimming of the shadowgrams' ends, distortion, calculation of the Fourier descriptors, and comparison of the quantified shapes:

- Under the Windows 7 platform of the Cinemassive™ computer, open the CMP with the shortcut *runGUI.Rdata* on the desktop, or open a R session (v.2.15 64bits), load the package "DPAA", and enter the command "*runGUI()*." It displays an independent window titled "Auto Classification Process for Radiographic Matching."
- Enter the "Working PATH." It defines the physical location of the folder containing the AM and PM images to be compared (e.g. *D:/AM_Database*). Each comparison can be performed against the complete AM database, or against a sub-sample based upon historical information. Laboratory Management specifies the comparison sample.
- If a new comparison sample must be created, the "Initialize AM Images" button will create empty new folders in which the images, process files, and results will be stored. The source folder must be manually created in Windows 7. The "Initialize AM Images" action only creates the sub-folders. Several comparisons against the same sub-sample can be performed in the same folder.
- Once the "Working PATH" is defined, the "Enter" key will auto-populate the other similar fields.
- Processing AM images will only be necessary if a new sub-sample of AM radiographs is created. Once the folders are created with the button "Initialize AM Images", copy the AM tracings in the designated folder (e.g. *D:/AM_Database/Images/AM/Full/Outlines/Jpgs*).
- The default settings should remain the same for the number of Cootes points (301) and the smoothing bandwidth (10). The number of processors used for this action should be set at 15 or 20 for a faster processing.
- "Remove AM Images" should be used to delete the image and data of individuals already identified from a sub-sample that will be re-used for comparison.
- The processing of the PM images requires the creation of folders for each unknown individual. Select both clavicle sides if available.
- Enter a CIL number (with no space), select the "Initialize PM Images" button.
- The 4 shadowgrams for each clavicle (see E6.0) is then copied in the corresponding designated right or left folder (e.g. *D:/AM_Database/Images/PM/Left/Images/Jpgs*).
- Each shadowgrams is then automatically distorted with the button "Distortion of PM Images." The applied correction factor between the 3D model and the radiograph is described in Stephan and Guyomarc'h 2014.
- The next step requires the trimming of the lateral and medial ends on the 4 images of each clavicle. Select all 4 images at once to speed the process.

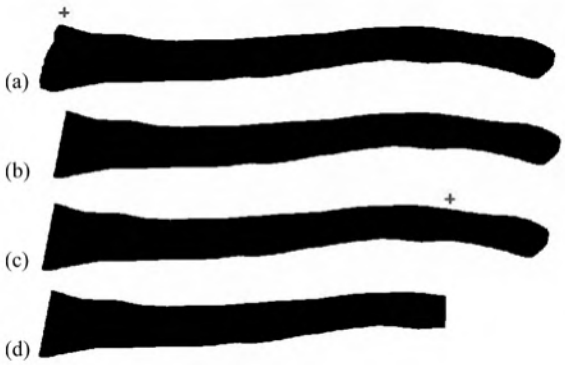


Figure 10: Trimming of a left clavicle. (a) Positioning of the first point of the segment (+) defining the medial trimming. (b) Medial trimming performed after positioning of the second point. (c) Positioning of the first point of the segment (+) defining the lateral trimming. (d) Trimmed clavicle including the conoid tubercle.

- Trim the lateral end by cutting vertically the outline at the apex of the lateral part of the clavicle's S-shaped curve (if present, the conoid tubercle must be preserved).
- Trim the medial end by cutting the peripheral edge vertically to produce a linear border (Figure 10).
- The end at the left side of the screen must be cropped first (whether a right or left clavicle is trimmed) by creating a segment whose first point is superior, and the second inferior.
- Delete all PM images with the exception of the ones that have been trimmed and distorted (4 images for each right and left clavicle) using the button "Remove PM images."
- The action "Process PM Images" will calculate the Fourier descriptors for all images present in the designated folder (only the 4 images trimmed and distorted must remain in each right and left folder). This action is performed for each right and left clavicle.

D8.0 COMPARISON: The similarity in terms of shape of the clavicular outline between AM tracings and PM shadowgrams is assessed through Elliptical Fourier Analysis (EFA). The distance score (d) for the EFA (difference between each AM and PM images) is calculated as the square-root of the sum of the squared differences between each of the forty Fourier descriptors: $d = \sqrt{\sum_{j=1}^{40} (X_j^{AM} - X_j^{PM})^2}$

where: X_j^{AM} = the AM Fourier descriptor; and X_j^{PM} = the PM Fourier descriptor.

The action "Run Comparison" is performed using the following settings:

- EFA comparison exclusively.
- Both clavicles (if available).
- HarmonicMean as the math to rank.

After comparison, the CMP creates a .csv file in the Results folder (e.g. *D:/AM_Database/Results*). If both clavicles are used for comparison, the list must be manually ranked ("Custom sort" in Excel) by the column "Dist_HM_EFA" from the smallest to the largest value. The resulting list is saved as an Excel spreadsheet, copied on a CD, and provided to Laboratory Management.

Annex E (Chest Radiograph Comparison Reports) (A5.10.1,A 5.10.2a-k, A5.10.8, SA5.10.1.1a-e)

E1.0 PURPOSE & SCOPE: This annex outlines the basic formats and procedures used by analysts when writing a Chest Radiograph Comparison Report (CXR).

E2.0 GENERAL: CXRs are typically written in a laboratory or office setting. The CXR is used to present test results. However, because the audience for CXRs is diverse (e.g., other professionals, family members, casualty officers) jargon or obfuscating technical phrases should be avoided.

If circumstances dictate, deviations from the DPAA Laboratory Manual, Appendix 5.2 (Style Guide) are permitted.

E3.0 REPORT TYPE & CONTENTS: A template example of the CXR format is found on the DPAA network. Start with a clean report template for each new report to ensure the most current version is used.

Format: The CXR typically contains the following sections:

- **Title Block:** The title block on the first page is in Times New Roman Font and contains:
  - Report title at the top centered, bold, 16 pt, all caps. The title should reflect the type of testing reported and accession number (final consolidation accession number) **(A5.10.2a, A5.10.2c).**
  - Organization centered, bold, first letter in caps, 14 pt **(5.10.2b).**
  - Date (month and year) centered, bold, with the first letter in caps, 14 pt. For example:

CHEST RADIOGRAPH COMPARISON REPORT: CIL 1993-236-I-01

DPAA Laboratory

22 July 2010

- **Description of Remains:** Analyzed in accordance with relevant SOPs, and contains**(A5.10.2f)**:
  - General appraisal of the condition of the remains (i.e., state of preservation).
  - Elements present or lacking (especially elements important in forensic testing).
  - Include photographs of the remains.
  - Any reconstruction performed during the testing.
  - CIL accession number.
  - Any cleaning and/or stabilization.
- **Antemortem Radiographs for Comparison**: This section lists all of the individuals for whom AM chest radiograph comparisons were undertaken and who selected the images for comparison (i.e. the total number of arrays, the total number of individuals compared, and in which array the match was found). Since the analytical portion of the case is complete at this stage, the CXR analyst can access the completed and corresponding array tracking form from the network drive to obtain this information. If acetate recovery was undertaken, it is described in this section. Include a figure showing multiple examples of AM radiographs encountered during comparison.
- **Postmortem Radiographs**: Briefly describes the protocol used to generate the series of postmortem radiographs and supplies a figure from the analysis conducted for the current case **(A5.10.2e)**.
- **PM to AM Comparison:** Describes the results of the comparisons (both the initial and final) including, as necessary **(A5.10.2i, A5.10.2k)**:
  - Overview of the items of concordance and/or inconsistencies, illustrated with labeled juxtaposed AM and PM figures, and with details of concordances provided in tabular format.
  - Figures of both Low-Opacity Superimposition and Windowed High-Opacity Superimposition.
  - Details of any image enhancement pertinent to the enclosed figures.
- **Opinion:** Records the analyst's opinion of who, if anyone, the remains belong to.
- **Signature Block:** Records the name(s), function(s) and signature(s) of the person(s) authorizing the test report **(A5.10.2j).**

E4.0 Miscellaneous Considerations: The following are considerations relating to the CXR text organization, structure, and inclusions:

- Correct and consistent nomenclature and terminology should be used throughout the CXR including section headings, figure captions, and the descriptive text.
- Section headings should be in 14 pt font while descriptive text should be in 12 pt, all in Times New Roman.
- Describe any accession consolidations, as necessary.
- The following statement should follow the "AM Radiographs for Comparison" title block, as

necessary: "Loss of figure detail is intrinsic to routine printing processes. To maximize image quality, this report should be viewed on-screen using the electronic file."

- Appropriate photographs and radiographs, prepared in accordance with relevant SOPs, documenting the remains must be included in the report and referenced in the text. For example, "the clavicles were well preserved without any erosion (Figure 1)."
- Because it is ultimately scanned, avoid putting images on the signature page of the CXR since a significant decrease in image quality occurs.
- The following guidance applies to figure and photograph captions:

  - Wherever possible, the figure caption should begin with the CIL accession number, followed by a comma, and then the figure description.
  - Graphic or photographic exemplars should be clearly identified.
  - Scale increments should be indicated in the caption.
  - An example of the above guidance includes:

Figure 1. CIL 1993-236-I-01, superior view of the right clavicle. Scale is in centimeters.

DPAA Laboratory Manual

(Current and Updated Version Located on DPAA Intranet)
Last Revised: 5 February 2015
Citation: DPAA Laboratory Manual, Part IV Cover Page

PART IV: SURETY

Surety within the CIL is demonstrated through a variety of measures, discussed throughout this Laboratory Manual. Part IV discusses the CIL Surety Program, followed by SOPs for implementing surety measures that are more extensive and/or have not already been discussed in Parts I-III of the Laboratory Manual. Since surety is an integral part of all CIL operations, all personnel requiring competency training will be required to certify in Part IV.

SOP 4.0: CIL SURETY

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 30 March 2017
Citation: DPAA Laboratory Manual, SOP 4.0

0.0 PRINCIPLE, SPIRIT & INTENT: *The integrity of the CIL's procedures, policies, field science and analytical work must remain above reproach at all times.*

1.0 PURPOSE & SCOPE: This SOP covers surety for the CIL and applies to all CIL Staff, including all Scientific Staff of the CIL who work in the CIL and to any field sciences activities under the auspices of the CIL Scientific Recovery Expert (SRE) **(A4.2.2)**. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 THE SURETY MODEL OF QUALITY ASSURANCE: The CIL adheres to the surety model of quality assurance. Through a multitude of programs and measures, surety results in each and every end product being of equally high standard and reliability.

Traditional quality assurance (QA) programs evoke images of randomly pulling products off of the assembly line (i.e., one out of a hundred, or even one out of 10,000, or more, items) and subjecting them to a battery of (usually arbitrary) tests to gauge the overall quality of the product. Only then are failures recognized and corrective action taken to fix or improve subsequent products. A frequent QA image is a newly assembled vehicle being purposely crashed into a barrier in order to gauge the effects.

This typical QA model, however, is inadequate for many types of manufacturing or service industries whose end-product failure would have catastrophic results for its customers, as well as the reputation and viability of the company. Consequently, a new QA model, surety, was developed. Surety was first practiced in the 1930s by the aircraft industry. Recognizing that in-flight failures of aircraft are usually very unforgiving, each vehicle had to be designed, manufactured, operated, and maintained to previously unheard of standards. The success of products subjected to refined Surety Programs during WWII led to the adoption of the model by other sectors during the post-war economic boom, including the pharmaceutical, electronics, and computer industries, military and civilian nuclear programs, medical care, and, in the past 30 years, forensic services.

Altogether, the surety model differs from the traditional quality assurance in a number of points. Specifically surety is:

- **Multifaceted:** Multiple measures exist for evaluating the surety of the product
- **Redundant:** Multiple cross validating avenues for evaluating different aspects of the operation are in place. Deficiencies not recognized by one measure may be detected by another.
- **Proactive:** Measures are taken prior to, and during every step, of the production process to detect and correct deficiencies.
- **Synchronized:** Surety measures are interconnected and mutually supporting. One measure may be an indicator that another measure needs improvement. For example, deficiencies noted during an audit of a technical operation may indicate that written procedures and/or training programs may be inadequate.
- **Personnel Based:** Quality people of high morale are the basis for the success of the operation. Individuals must be trainable, committed to the company, and product at hand, and have a stake in the success of said product. The program is only as good as the people that make it happen.
- **Research Oriented:** A research arm must exist that is dedicated to improving the product either through its technical design and/or the production process.
- **Documented:** All aspects of the operation are documented. A paper trail must exist that allows traceability of product problems and failures that identify both incidental and a root causes.
- **Subject to Outside Oversight:** Oversight by professional bodies or organizations provides impetus and motivation to improve the product and, conversely, avoid stagnation of the operation. Evidence of adequate oversight may come in the form of some type of accreditation.

3.0 CIL SURETY: The Surety Program ensures that the CIL operates at all times in an objective and scientifically sound manner that utilizes reliable and accurate procedures that consistently generates unbiased data.

Surety encompasses all the activities undertaken by the CIL in its permanent facilities, at sites away from its permanent facilities, or in associated temporary or mobile facilities **(A4.1.3)**. The Surety Program also

applies to outsourced scientific work done on the behalf of DPAA. The Surety Program allows the CIL (and its customers) to be confident that the forensic findings of the CIL are impartial, scientifically and technically sound, thoroughly documented, and legally defensible. In other words, the CIL (and its customers) can be "sure" that the integrity and accuracy of its identifications (the "product") withstand the test of time.

The CIL continually seeks to improve the effectiveness of its Surety Program through the use of the quality policies, goals, and objectives, and surety measures (e.g., audit results, analysis of data, corrective and preventive actions, management review) **(A4.10)**.

3.1 **Goals and Objectives:** Goals and objectives fulfill a need for direction through a careful analysis of what Laboratory Management and the parent organization believe are the appropriate functions of the CIL and the direction in which it should be moving. Goals and objectives make a significant contribution to the management process and serve as a basis for a sound management philosophy **(SA4.2)**.

CIL surety is achieved by a series of surety goals and objectives communicated to all employees **(A4.2.2)**. These include:

- Ensuring the accuracy of the data generated by the test process.
- Ensuring uniformity and accountability in all records and testing procedures.
- Providing guidelines to employees so they know what is expected of them.
- Ensuring a safe workplace.
- Ensuring the use of documented and valid materials and procedures.
- Monitoring personnel and equipment performance.
- Eliminating non-conforming materials or work.
- Documenting corrective actions taken.
- Facilitating feedback to Laboratory Management on performance standards.
- Ensuring that CIL personnel performing tests have the appropriate level of qualification and training.
- Ensuring that CIL personnel are competent in the selection and performance of the tests required for the completion of their work.
- Facilitating the preparation and/or verification of all control materials, standards and reference collection items used.
- Enabling the measurement of performance quality with known standards and to be able to act on any inconsistencies encountered.

3.2 **Surety Policy:** The CIL's Surety Policy Statement, issued under the authority of the Science Director, is found in Annex A (Surety Policy Statement) of this SOP **(A4.2.2a-e)**.

3.3 **Surety Measures:** The CIL has a number of measures in place to meet the above objectives and thus enhance the surety of its search, recovery, and identification processes. These measures include, but are not limited to:

3.3.1 **CIL Accreditation**: In 2003 the American Society of Crime Laboratory Directors Laboratory Accreditation Board (ASCLD-LAB) accredited the CIL under the Legacy Program. The CIL sought accreditation for four primary reasons:

- To improve the quality of CIL services provided to the POW/MIA mission.
- To develop and maintain criteria that can be used by the CIL to assess its level of performance and to strengthen its operation.
- To provide an independent, impartial, and objective system by which the CIL can benefit from a total operational review.
- To offer to the POW/MIA mission and to other users of CIL services a means of determining that the CIL has met established standards.

The accreditation inspection was, in effect, an external audit that determined CIL compliance with over 100 criteria. The CIL was initially accredited in ASCLD-LAB's Crime Scene and Trace Evidence Disciplines. At the time, Anthropological, Odontological, and Material Evidence testing fell under the Trace Evidence discipline.

Assessments routinely occur every five years. In the interim, accreditation is maintained through annual submission of select items of compliance documentation largely derived from the audit program and/or an on-site surveillance visit.

In 2008 the CIL was accredited under the ASCLD-LAB International Program. As such, the CIL carries out its testing activities in such a way as to meet the requirements of ISO/IEC 17025 (*General Requirements for the Competence of Testing and Calibration Laboratories*), and appropriate supplements in order to satisfy the needs of the customer, the regulatory authorities or organizations providing recognition **(A4.1.2)**. The CIL was reaccredited under this program in 2013. During this accreditation the CIL added Forensic Biology to its list of accredited disciplines.

In 2016, ASCLD-LAB merged with the American National Standards Institute-American Society of Quality National Accreditation Board (ANSI-ANAB) but retained its nomen of ASCLD-LAB. As a result of this merger, in 2017 ASCLD-LAB modernized its accredited disciplines. Consequently, the CIL became accredited in:

- Anthropology
- Odontology
- Biology
- Materials (Trace)

Crime Scene accreditation was dropped as the CIL's field sciences were placed in Anthropology, which includes the subdiscipline of Archaeology as well as Osseous, Histology, and CXR testing. All DNA activity in the CIL falls under Biology. Material Evidence, Life Support, and SEM testing are subdisciplines of Materials (Trace).

3.3.2 **Management Practices:** Surety is as much a management philosophy as it is an organized series of procedures designed to assure the reliability and validity of CIL identifications.

Laboratory Management and the Lead Quality Manager are committed to the development and implementation of the Surety Program, to continually improving its effectiveness, and to communicate to the CIL Staff the importance of meeting customer requirements as well as statutory and regulatory requirements **(A4.2.3, A4.2.4, A4.10)**.

Only by consistently adhering to surety can the CIL ensure high standards. Without the correct implementation of surety, all work done by the CIL and the field is, for legal purposes at least, meaningless. Laboratory Management and the Lead Quality Manager must not allow themselves or the remainder of the CIL Staff to succumb to a "that'll do" approach, and should strive to maintain the standards set out in this Laboratory Manual at all times.

As such, informal management reviews occur periodically with at least one formal annual review resulting in a formal report (see below), conducted by Laboratory Management and the Lead Quality Manager **(A4.15.1)**.

The roles and responsibilities of Laboratory Management and the Lead Quality Manager, including their responsibility for ensuring compliance with ISO/IEC 17025 and other accreditation standards, and other management practices, are discussed in detail in DPAA Laboratory Manual, SOP 1.1 (CIL Work Environment) **(A4.2.6)**.

3.3.3 **Work Environment:** A positive work environment facilitates surety. Policies and procedures that establish common standards between supervisors and subordinates, solicit constructive suggestions from the CIL Staff, and allow for the redress of employee grievances **(A4.8)**, are implemented to foster a work environment that is conducive to the fulfillment of the CIL mission **(A4.2.3, A4.10)**.

Employees enjoying a positive work environment are generally content (of high morale), free from undue stress and thus are more loyal, productive, trustworthy and less apt to make mistakes. DPAA Laboratory Manual, SOP 1.1 (CIL Work Environment) discusses the work environment of the CIL.

3.3.4 **Safety:** Safety is part of the work environment; however, it is a topic of such importance and extension that it warrants its own SOP. The CIL Safety Program is documented in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) **(SA5.3.6, SF5.3F-21)**. Additionally, any safety considerations for procedures and practices undertaken by the CIL are detailed at the end of every SOP in this Laboratory Manual.

In general, CIL personnel operate in a manner so as to ensure the protection of themselves as well as other assigned personnel, property and the public at large. The CIL minimizes, to the greatest possible extent, the risk of accident or injury.

3.3.5 **Evidence Management & Security:** The integrity of evidence begins at recovery and proceeds until its disposition and is critical to the legal defensibility of CIL casework. Evidence is managed and secured in accordance with DPAA Laboratory Manual, SOP 1.3 (Evidence Management & Security) **(A4.2.4)**.

3.3.6 **Test (Analytical) Methods & Procedures:**

3.3.6.1 **Definition:** A test (also called an analytical or technical) method or procedure is an orderly, predetermined, validated, step-by-step procedure designed to ensure uniformity and objectivity in casework.

An analytical activity is defined as a test when it meets one or more of the following criteria:

- There is a set of test protocols or methods in place that must be followed by the analyst.

- There is a qualitative or quantitative result that lends itself to interpretation by the analyst.
- There is specific guidance on how to interpret the result.

As such, provided none of the above conditions are involved in processes, the following do not constitute tests:

- Direct physical comparisons to exemplars (e.g., artifact comparison during material evidence analysis).
- Determinations solely made using professional knowledge or judgment (e.g., recognizing a fragment as part of a femur).
- Differential diagnosis of a pathological or similar condition.
- Trauma analysis.

3.3.6.2 **Selection & Use:** At the general laboratory level, the CIL uses appropriate test methods and procedures for all tests within its scope. These include sampling, handling, transport, storage and preparation of items to be tested, and, where appropriate, an estimation of the measurement uncertainty as well as statistical techniques for analysis of test data **(A4.2.5, A5.4.1)**.

All test methods and procedures used by the CIL are considered standard if they:

- Have been subjected to external peer review and publication.
- Are recognized by the profession as established.
- Are approved following an internal validation study.
- Are vetted and published through a NIST recognized standards development organization (SDO).

The most commonly used standard test methods and procedures are present in the appropriate sections of the DPAA Laboratory Manual **(A5.4.4)**.

The CIL uses test methods and procedures, including those for sampling, which meet the needs of the customer and are appropriate for the tests it undertakes **(A5.4.2)**. Standard methods/procedures are adopted from the following sources:

- International, regional or national standards.
- Reputable technical organizations.
- Relevant scientific texts or journals.
- Manufacturer of the equipment.

The CIL ensures that it uses the latest valid edition of sources, standards, and references unless it is not appropriate or possible to do so. Sources, standards, and references for methods and procedures that contain sufficient and concise information on how to perform tests do not need to be supplemented or rewritten in the SOPs as internal methods/procedures if these are written in a way that they can be used as published by the CIL Staff **(A5.4.2)**.

However, when necessary and appropriate, the sources, standards, and references may be supplemented in the SOPs with additional details to ensure consistent application **(A5.4.2)** and to prevent misapplication. As such, additional appropriate controls and standards may be specified in the methods and procedures and their use documented in the case record, as appropriate **(SA5.9.1.1)**.

The CIL confirms that it can properly perform standard test methods and procedures before introducing them into CIL, usually by conducting a performance check. In the event a standard method/procedure changes, the confirmation is repeated by the CIL **(A5.4.2)**.

When the CIL must use test methods or procedures which are non-standard, such methods and procedures must be appropriate and fully documented.

Although many acceptable methods and procedures may exist to perform a particular test, wide variables in casework (see below) require that the CIL Staff have the flexibility to exercise discretion in selecting the test methods and procedures most appropriate to the overall situation.

As such, at the analyst level it is incumbent on the analyst to develop a test strategy prior to undertaking casework for a particular case. A solid test strategy contributes to the clarity of test reports, the efficacy of results, CIL productivity, and analyst professional development.

Test strategies are developed by the analyst using the following considerations:

- Investigative problem at hand (e.g., building a biological profile, segregation of commingling, excluding evidence from further case considerations).
- Completeness and condition of the evidence.
- Methods and models available.
- SOP limitations and considerations.
- Customer considerations (e.g., destructive testing allowed or not allowed).

The goal of the test strategy is to limit the tests to those that are the most probative and which yield the most robust results. For example, given an aging problem and the above considerations, the analyst should run the most statistically appropriate tests to establish the upper and lower age limit.

The analyst should not run tests that do not add probative results or rigor to the analyses. In other words tests are not run "as an experiment to see where they go."

The process for formulating test strategies may range from simple to complex. A simple test strategy may involve only a mental assessment of the situation on the part of the analyst and then proceeding accordingly. Complex test strategies are best exemplified by large scale projects such as the commingled human remains projects which may involve repeated planning and consultations over the life of the casework.

Regardless of the complexity of the test strategy, Laboratory Management ensures that the test methods and procedures used are appropriate and meet acceptable scientific standards.

3.3.6.3 **Availability:** The CIL has archived and stored all standard test methods and procedures to include instructions on the use and operation of all relevant equipment, and on the handling and preparation of items being tested, where the absence of such instructions could jeopardize the results of the tests. The following, when relevant to the work of the CIL, are kept current and made readily available to CIL Staff **(A5.4.1).**

- Methods/procedures.
- Instructions.
- Standards.
- Manuals.
- Warranty information.
- Reference data.

3.3.6.4 **Customer Considerations:** Customer considerations factor into methods/procedure selection (for the definition and examples of customers, see DPAA Laboratory Manual, SOP 1.1, CIL Work Environment).

In general, methods/procedures do not have to be reviewed with the customer on a case-by-case-basis. By submitting evidence, or requesting services, the customer agrees to the CIL's methods and procedures **(A4.4.1a, A4.4.1c)**. The customer is informed of the methods/procedures chosen.

In the event the customer requests certain methods/procedures, the CIL accommodates the customer, if practical. The CIL informs the customer when the methods/procedures proposed by the customer are considered to be inappropriate or out of date **(A5.4.2)**.

The process for dealing with customer feedback and complaints is detailed below.

3.3.6.5 **Deviations:** Deviation from test methods or procedures occur only if the deviation has been documented, technically justified, authorized, and accepted by the customer **(A5.4.1),** as appropriate.

Where the customer requires deviations, additions or exclusions from documented methods or procedures, these are recorded in detail with the appropriate data, included in all documents containing test results, and communicated to the appropriate personnel.

3.3.7 **Facilities:** The CIL provides facilities that:

- Foster a safe, comfortable work environment
- Ensure the stability and security of evidence
- Enable the technically sound and/or legally defensible testing and identification of human remains.

Facilities are discussed in DPAA Laboratory Manual, SOP 1.1 (CIL Work Environment) and DPAA Laboratory Manual, SOP 1.5 (CIL Support) **(A5.3.1, A5.3.2)**. Physical security and access for these facilities are detailed in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security) **(A5.3.4, A5.4.7.2b)** while safety is discussed in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) **(SA5.3.6, SF5.3F-21)**.

3.3.8 **Peer Review:** Peer review is an evaluation of a test and/or field report and applicable supporting documentation for adherence and consistency with CIL policies and for editorial correctness **(SA5.9.4, SA5.9.5)**. The CIL requires 100% peer review of test and field reports **(SF4.13.2.1F-2h)**. Peer reviews are documented in writing with the records maintained in the case file. Details of internal and external peer reviews are covered in DPAA Laboratory Manual, SOP 4.1 (Peer Review) **(A4.2.3, A4.10, SF4.13.2.1F-2h)**. The following reports are subject to external and/or internal peer reviews:

- Forensic Anthropology Reports (FAR).
- Forensic Odontology Reports (FOR).
- Material Evidence Reports (MER).
- Search and Recovery Reports (SAR) **(SF4.13.2.1F-5**.

- Chest Radiograph Comparison Report (CXR).
- Commingled Human Remains Report (CHR).
- Life Support Report (LSR).

Specialized reports (e.g., super-imposition) supporting the above reports are also peer reviewed.

3.3.9 **Audits:** An audit is an inspection used to evaluate or verify any activity related to surety. CIL audit procedures are outlined in DPAA Laboratory Manual, SOP 4.3 (Audits). Audits are conducted with the aim of providing Laboratory Management with an evaluation of performance against existing standards. Audit procedures and checklists are available as subordinate documents to DPAA Laboratory Manual, SOP 4.3 (Audits) **(A4.2.3, A4.10, A4.14.1)**.

3.3.10 **Performance Checks & Maintenance:** The CIL is furnished with sampling, measurement, and test equipment required for the correct performance of its tests (including sampling, preparation of test items, processing, and analysis of test data). In cases where the CIL needs to use equipment outside its permanent control, the requirements in this Laboratory Manual and ISO/IEC 17025 are met **(A5.5.1)**.

Some of the equipment and reference materials used in the CIL and at recovery scenes require regular performance checks and maintenance. The CIL uses appropriate methods and procedures for all maintenance and performance checks within its scope. These include sampling, handling, transport, storage and preparation of items to be maintained and calibrated, and, where appropriate, an estimation of the measurement uncertainty as well as statistical techniques for analysis of maintenance and performance check data.

The CIL has instructions on the use and operation of all relevant equipment, and on the handling and preparation of items for performance checks where the absence of such instructions could jeopardize the results of subsequent tests. These, and performance checks and maintenance procedures, are dealt with in DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability) and DPAA Laboratory Manual, SOP 2.0 (Recovery Scene Processing), respectively **(A5.4.1)**. Additionally:

- Equipment and its software used for testing, performance checking, and sampling are capable of achieving the accuracy required and comply with specifications relevant to the tests concerned. Performance checks may be necessary for key quantities or values of the instruments where these properties have a significant effect on the results **(A5.5.2)**.
- Before being placed into service, equipment (including that used for sampling) is performance checked to establish that it meets the CIL's specification requirements and complies with the relevant standard specifications. Equipment is checked before use, as appropriate. Quality Assurance keeps the maintenance, performance check, and calibration records, and related documentation, for most trace evidence and some recovery scene equipment **(A5.5.2)**.
- All Scientific Staff ensure that equipment and supporting materials are in good condition when they have finished using them and report any malfunctions or breakage to Laboratory Management, Quality Assurance, the Support Coordinator, and/or the Safety Officer, as appropriate.
- All instructions, standards, operating manuals, warranty information, and reference data relevant to the work of the CIL are kept current and made readily available to CIL Staff **(A5.4.1)**.
- Deviation from test and performance check methods related to equipment occur only if the deviation has been documented, technically justified, authorized, and accepted by Laboratory Management and/or the customer **(A5.4.1)**.
- Computers and automated equipment are maintained to ensure proper functioning and are provided with the environmental and operating conditions necessary to maintain the integrity of test data **(A5.4.7.2c, SF5.5.2F-37e)**.
- Training on test equipment used by the CIL occurs during the in-house training program and covers:
    - Manufacturer's instructions.
    - Procedures to be used.
    - Maintenance and performance check requirements, if any.

3.3.11 **Uncertainty of Measurement:** The CIL applies procedures for estimating uncertainty of measurement related to tests. Annex B (Uncertainty of Measurement Policy) of this SOP details the procedures and process for the estimation of uncertainty of measurement in the CIL **(A5.4.6.2)**.

3.3.12 **Document Control**: The CIL controls all documents that form part of its Surety Program (usually internally generated documents but also select items from external sources) **(A4.3.1)**.

The CIL document control program:

- Establishes what documents are relevant.

- Ensures the most current versions of approved documents are used.
- Allows for traceability of documentation. For example the CIL can determine what policies and procedures were in effect at any given time.

Generally, any document that tells how to do something, who does it, where it is done, what is collected, etc. should be controlled.

Details on the CIL Document Control Program are found in Annex C (Document Control) of this SOP.

3.3.13 **Records Control:** All records must be legible and are stored and retained in such a way that they are readily retrievable. Facilities provide a suitable environment to prevent damage, deterioration, and loss **(A4.13.1.1, A4.13.1.2)**.

All records, including case files in particular, are held secure and in confidence in accordance with government regulations **(A4.13.1.3)**.

Records stored electronically are backed up and protected against unauthorized access or amendments by a myriad of DoD information management safeguards implemented by the DPAA IT Section **(A4.13.1.4)**. Additional electronic security details are found in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security).

Various types of records exist in the CIL. Key categories of records include:

3.3.13.1 **Analytical Notes & Reports (Technical Records):** The CIL has established formal analytical note taking and reporting procedures. Guidelines for the proper recording of all test data from casework are found in DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation). Reports are produced for cases in accordance with the templates and guidelines found in the respective SOPs. Style questions for writing reports are addressed in DPAA Laboratory Manual, Appendix 5.2 (Style Guide).

3.3.13.2 **Case Files:** Casework examination and administrative documentation and records are known collectively as case files. Analytical notes & reports (above) comprise a portion of case files. Procedures for controlling, managing, identifying, collecting, indexing, accessing, filing, storage, maintenance, security, and disposal of case files, to include technical records, are found in DPAA Laboratory Manual, SOP 1.7 (Case File Management).

All case files are held secure and in confidence in accordance with government regulations **(A4.13.1.2, A4.13.1.3, SF4.13.1.2F-1).**

3.3.13.3 **Surety Records:** Surety records are any records pertaining to the Surety Program not included in the above categories. Surety records include, but are not limited to:

- Audit Reports and subsequent corrective actions.
- Individual and collective training records.
- Performance check, calibration, and maintenance records.
- Annual reports and management reviews.
- Other records of corrective and preventive actions.
- Physical security logs and records.

Surety and other non-test records are retained for at least one ASCLD-LAB accreditation cycle and ultimately disposed of in accordance with government regulations **(A4.13.1.1, A4.13.1.2, SF4.13.1.2F-1)**.

3.3.13.4 **Various Files & Records:** Various files, working papers, and records, not otherwise discussed in the Laboratory Manual, exist in the CIL both as hard copy and electronically. These files are uncontrolled and generally exist outside of the CIL Quality Management System.

Many of these items exist electronically as common or shared folders on the network. With respect to such items, the following provisions exist in order to maintain and control the network and provide network space:

- All electronic files and folders should reflect ownership. This is usually accomplished by having the last name of the file owner or proponent in the electronic file name. For common names (e.g., Smith, Jones) or individuals who share last names, initials should also appear.
- Multiple items owned by the same individual (e.g., three common folders) should be consolidated into one folder whenever possible and practical.
- CIL Staff who supervise intern projects should subsume the intern's folder into their folder.
- Individuals who depart the CIL and leave items on the network by default give permission for the CIL to delete those items.

Hard copy files and working papers are managed by the CIL Staff in such a manner that they do not adversely infringe on space in the CIL, pose safety or health hazards, or present other problems.

3.3.13.5 **Protection of Records, Confidentiality & Release of Information:** CIL Staff must protect and preserve all relevant records from loss, damage and unauthorized release at all times.

Measures for the physical handling and protection of case files and related records are found in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security) and SOP 1.7 (CIL Case File Management).

The CIL is responsible, through legally enforceable commitments (e.g., contractual commitments), for the management of all information obtained or created during the performance of analytical and inspection activities. The CIL informs the customer, in advance, of the information it intends to place in the public domain. Except for information the customer makes publicly available, or when agreed between the CIL and the customer, all other information is considered proprietary information and is regarded as confidential.

When the CIL is required by law or authorized by contractual commitments to release confidential information, the customer or individual(s) concerned, unless prohibited by law, be notified of the information provided.

Information about the customer obtained from sources other than the customer is treated as confidential.

Use of "Official Use Only" or "FOUO": Confidentiality of customer information is maintained primarily through designation of records containing restricted information as "For Official Use Only" (often abbreviated FOUO, which is subsequently used in this SOP), and handing them accordingly.

FOUO is not a document classification akin to Confidential, Secret, or Top Secret since their contents, if released do not have an adverse impact on national security. Rather, FOUO is a designator indicating that records so marked, if released, may complicate the DPAA mission and/or cause problems for the organization and/or its members. As such, FOUO records are subject to certain measures designed to prevent their unauthorized release.

Given the above considerations, FOUO records in the CIL include, but are not limited to:

- Test reports and other case file contents.
- Customer information.
- Family information pertaining to the missing.
- Audit results and/or other surety findings.
- Deliberate process planning documents (e.g., Cases for ID lists and schedules).
- Operations and plans related records (e.g., deployment schedules) whose compromise may have adverse force protection consequences.
- Personnel rosters, evaluations, files, or other items containing personal information.

FOUO records are usually labeled as such, in bold and upper case letters, center justified in the top and bottom margins of each page (see DPAA Laboratory Manual, SOP 3.0 [Analytical Notes & Documentation] for the definition and discussion of a "page."). Handwriting FOUO on the top and bottom margins, either spelled out or abbreviated, is permissible so long as the writing is legible and large enough to be noticed.

Note: Even though they may be marked as such, documents such as **blank** forms, checklists, and templates are not considered FOUO until they are filled in or completed. CIL SOPs are not considered to be FOUO and may be released without special permission or authorization by Laboratory Management.

Questions regarding FOUO labeling, and what may be releasable and non-releasable should be directed to Quality Assurance or to a Laboratory Manager.

CIL Staff do not release information contained in FOUO records, to include test results and other case file records, or customer information, to external parties except as directed in the relevant parts of the Laboratory Manual or by Laboratory Management.

Release of FOUO information to external parties outside of the provisions of the Laboratory Manual (i.e., non-routine requests) is coordinated with Laboratory Management, relevant DPAA Directorates (e.g., Agency Director, Public Affairs Office), and other DoD agencies (e.g., DPMO, JAG, etc.), as appropriate. Freedom of Information Act (FOIA) and Privacy Act provisions may apply.

CIL Staff receiving non-routine requests refer the requestor to Laboratory Management **(SA5.10.3.3)**. Laboratory Management oversees preparation of the necessary forms and documentation required for release of information.

REMEMBER!

Err on the side of caution. Just because a record is not labeled FOUO does not mean it is releasable to external agencies!

All test reports must complete the quality assurance process prior to release!

3.3.14 **Training & Continuing Education:** CIL operations are improved by extensive training, continuing education, and professional development

(A5.2). These are discussed in DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education) **(A4.2.3, A4.10)**. Specific aspects of this surety measure include:

- **Education, Training & Qualifications of Personnel:** All members of the Scientific Staff have a post-graduate academic background and qualifications, experience, and training in a field relevant to their hired position and appropriate to their duties. Generally, those hired after 1 January 2001 must successfully complete competency testing, the results of which are kept by Quality Assurance.
- **Continuing Education:** Members of the Scientific Staff must stay abreast of developments in their relevant fields of research by reading scientific literature and by attending at least one professional meeting or workshop per year, when possible. Attending seminars or college courses and guest speaker lectures also counts towards continuing education. Laboratory Management provides analysts with an opportunity to comply with this requirement, as resources permit **(A4.2.4)**. Quality Assurance maintains records of attendance at such events.
- **Personnel Records:** The Laboratory Director maintains personnel files on each analyst. These include personal history, job description, annual performance evaluations, records of promotion, commendations and disciplinary actions.
- **Training Records:** All training is documented. Quality Assurance maintains documentation of all training and continuing education, via training and development files for each individual in accordance with DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education).

3.3.15 **Competency & Proficiency Testing:** Competency and proficiency testing is detailed in DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education).

Unless excused by the Laboratory Director, all CIL Personnel hired after 1 January 2001 undergo initial competency tests and practical exercises for their key general and specialized job skills prior to independent and unsupervised work.

All analytical and technical personnel also undergo annual proficiency tests in select areas of previously demonstrated competence. Proficiency for a general or specific task must be documented in an individual's Training and Development file (see above) before that individual is allowed to work unsupervised. Proficiency is current if it has been demonstrated within the last 12 months. Each SRE and trace evidence analyst and technician is proficiency tested in each area of demonstrated competence at least once during each accreditation cycle**.**

3.3.16 **Preventive Action:** The CIL takes a proactive approach to identifying and mitigating potential problems before they occur.

Apart from the review of operational procedures, the preventive action may involve analysis of data, including trend and risk analyses, proficiency test results, audit findings and observations, and other quality control data, as appropriate, and where they are found to be outside pre-defined criteria, planned preventive action is taken to prevent problems **(A5.9.2)**.

In this respect, preventive action is most closely tied to, and most often implemented through, the CIL audit program in the form of observations and the "corrective action" taken regarding observations (see DPAA Laboratory Manual, SOP 4.3).

However, needed improvements and potential sources of non-conformances, either technical or concerning other operations of the CIL, may be identified by any of the surety measures outlined in this SOP. The need for action to prevent nonconformities is then evaluated.

Regardless of the surety measure identifying the preventive action, when improvement opportunities are identified or if preventive action is required, action plans are developed, implemented, and monitored to reduce the likelihood of the occurrence of such non-conformances and to take advantage of the opportunities for improvement **(A4.2.3, A4.10, A4.12.1)**.

Procedures and plans for preventive actions include the initiation of such actions and application of controls to ensure that they are effective **(A4.12.2)**. The preventive actions taken are appropriate to the probably impact of the potential problem.

At this point, the preventive action process is very similar to the corrective action process of the audit program. As such, the use of the Corrective Action Report form used during the auditing process (see above) is highly recommended; however, documentation may take any format, provided the preventive action is adequately documented as outlined above.

3.3.17 **Corrective Action:** The CIL takes corrective action when nonconforming work (see below) or departures from the policies and procedures in the

Surety Program or problems with technical operations have been identified **(A4.9.2, A4.11.1)**. All of these are identified through the surety measures discussed in this SOP.

The procedure for corrective action starts with "cause analysis," or an investigation to determine the root cause(s) of the problem **(A4.11.2)**. Cause analysis is often the most difficult part in the corrective action process. Often the root cause is not obvious and thus a careful analysis of all potential causes of the problem is required. Potential root causes include, but are not limited to:

- Poor methods or procedures (i.e., inadequate SOP).
- Untrained or unskilled staff.
- Poor equipment maintenance or mis-calibration.
- Lack of management involvement or supervision.
- Inadequate supplies.
- High operations tempo.
- Inadequate facilities.
- Unrealistic customer requirements.
- External requirements or impositions.

Surety data are analyzed, as appropriate, and where they are found to be outside pre-defined criteria, planned corrective action is taken to correct the problem and to prevent incorrect results from being reported **(A5.9.2)**.

Where and when corrective action is needed, the CIL selects appropriate personnel to perform the corrective actions in a timely manner. Actions are implemented that are most likely to eliminate the problem and to prevent recurrence. Corrective actions are to a degree appropriate to the magnitude and the risk of the problem **(A4.11.3)**.

The CIL documents and implements any required changes resulting from corrective action investigations **(A4.11.3)** and monitors the results to ensure that the corrective actions taken are effective (see below) **(A4.11.4)**.

Where the identification of non-conformances or departures casts doubts on the CIL's compliance with its policies and procedures, or on its compliance with ISO/IEC 17025, it ensures that the appropriate areas of activity are audited as soon as possible in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits) **(A4.11.5)**. Additional audits may also follow the corrective actions in order to confirm their effectiveness.

Corrective action may be taken with regard to personnel or technical and non-technical procedures. Specifically:

3.3.17.1 **Personnel Problems:** CIL employees may receive corrective actions for problems involving:

- Violations of provisions of this Laboratory Manual.
- Violations of the CIL Code of Ethical Conduct.
- Non-concurrence on technical reports.
- Failing competency and/or proficiency tests.
- Security violations.
- Safety violations.
- Poor or non-conforming laboratory or field work **(A4.9.1)**.
- Disruption of the positive work environment.
- Other improprieties that merit consideration.

Whenever Laboratory Management initiates a formal inquiry regarding a CIL analyst or technician as the result of a peer review, internal audit, or other review process, certain administrative precautions are automatically taken. The analyst under review:

- Has his/her access to evidence and records areas suspended.
- Is required to surrender any unescorted access and is awarded a lower level of access.
- Is excused from CIL case and/or field work.
- Is excused from performing peer reviews.
- Is prohibited from going on TDY or similar assignment when that assignment involves representation of the CIL.

The above actions are deemed as precautionary and are intended to safeguard the welfare of the CIL and the analyst under review until such time as the issue in question is resolved. No one should infer wrongdoing or malfeasance on the part of the person under review when the above actions are taken. Additionally, the above actions can be waived or modified by Laboratory Management as the situation permits.

Corrective actions taken resulting from a non-verification or non-concurrence on a peer reviewed report are described in DPAA Laboratory Manual, SOP 4.1 (Peer Review).

Corrective actions taken for CIL security violations are detailed in DPAA Laboratory Manual, SOP 1.2 (CIL Physical Security).

Other violations of CIL policy are handled by Laboratory Management and, depending upon severity and frequency of the violation, usually consist of a verbal reprimand for the first offense, followed by the issuance of a corrective action memorandum for second offenses. Remedial training in the form of a Personal Improvement Plan (PIP) in accordance with DPAA Laboratory Manual, SOP 4.2

(Training, Tests & Continuing Education) may be necessary.

The Laboratory Director maintains documentation of all corrective actions taken in the employee's personnel record. Copies of corrective action documentation are given to the employee and other key personnel, as appropriate.

3.3.17.2 **Technical Problems:** Laboratory Management is immediately notified should any test procedure be suspected, or demonstrated, to be inadequate (not functioning as intended or consistently failing to produce the expected results). An example is a problem similar to that encountered with Trotter's measurement of the tibia with regard to stature estimation.

Identification of technical problems can occur at various places and times within the Surety Program and technical operations. Problems may be recognized through:

- Findings reported in the professional literature.
- Routine tests.
- Staff observations or management supervision.
- Peer review.
- Management reviews.
- Proficiency testing.
- Audits.
- Customer complaints.
- Equipment checks.
- Non-conforming work on the part of the analyst.
- Other surety measures.

Prompt remedial action is taken when technical problems are identified. Laboratory Management:

- Immediately halts work
- Suspends all use of the problematic procedure
- Withholds results and reports, as appropriate, until a committee can be appointed to investigate the problem. The findings are presented to the Science Director who then **(A4.9.1a)**:
    - Upholds the procedure in question and order work resumed **(A4.9.1e)**.
    - Allows use of the procedure with caveats or modifications.
    - Totally suspends use of the procedure.

Should the last two options be exercised, a report is prepared that evaluates the significance of the technical problems stating exactly how the procedure impacted on and/or compromised past casework **(A4.9.1b)**. Audits may be conducted to make these determinations.

The Science Director takes immediate and appropriate corrective action based on the findings of the report including rescinding identifications, if necessary, and informing the customer that work has been recalled. Should the procedure be upheld, but the problem be attributed to other circumstances (e.g., inadequate training, mis-calibrated equipment) Quality Assurance takes immediate corrective action, as appropriate **(A4.9.1c, A4.9.1d)**.

3.3.17.3 **Procedural Problems & Non-Conforming Work:** Laboratory Management is immediately notified should any work be found that was not performed in accordance with CIL procedures or the agreed requirements of the customer. When violations, either intended or unintended, involve test procedures, this is deemed non-conforming work **(A4.9.1)**.

The Procedural Compliance Committee (PCC) investigates significant unilateral (i.e., not first consulting Laboratory Management) deviations from laboratory and field procedures by members of the CIL Staff.

The PCC is chaired by the CIL Laboratory Director and includes three other members of the CIL Staff appointed by the Chair plus the Lead Quality Manager. In cases involving the Laboratory Director, the Science Director serves as the Chair. The Chair is afforded 1.5 votes with the remaining committee members each casting one vote each. The Lead Quality Manager does not vote and instead acts as an advisor to the PCC. Abstentions are not allowed **(A4.9.1a)**.

The PCC evaluates alleged procedural deviations and votes to render one of three findings:

- No significant procedural deviation occurred.
- A significant deviation from one or more SOPs did occur but are deemed justifiable under the circumstances presented.
- Significant and unjustifiable deviations from one or more SOPs occurred.

Should the PCC find that a justifiable deviation from an SOP occurred, the PCC evaluates whether changes should be made to the Laboratory Manual and recommends to the Laboratory Director possible amendments, if appropriate. If a faulty technical procedure is the cause of non-conforming work, its use may be suspended by the Science Director and the above procedures for evaluating technical problems and implementing corrective action followed **(A4.9.1a-e)**.

Should the PCC find that a significant and unjustifiable deviation from one or more SOPs has occurred the Committee Chair takes corrective disciplinary action in accordance with the above personnel guidance.

3.3.18 **Monitoring:** Various surety measures provide for monitoring of CIL operations and tests. These are found in DPAA Laboratory Manual, SOP 4.1 (Peer Review), SOP 4.2 (Training, Tests & Continuing Education), and SOP 4.3 (Audits).

Scientific and technical staff are continually monitored and observed through various programs detailed in this SOP. These programs verify that the individual is performing competently.

The CIL utilizes more technical procedures for monitoring the validity of tests. Test performance is monitored by operating quality control techniques appropriate to the volume of work and the type and frequency of testing undertaken by the CIL. In accordance with the above SOPs the range of monitoring techniques used by the CIL may include the use of **(SF5.9.1F-47)**:

- Reference collections or internally generated reference materials, certified reference materials, and/or secondary reference materials.
- Statistical tables.
- Positive and negative controls.
- Replicate or comparative tests using the same or alternate methods.
- Retesting of retained items.
- Independent checks (verification) by other authorized personnel.
- Systematic assessment of the factors influencing the result.
- Assessment of the uncertainty of the results based on scientific understanding of the theoretical principles of the method and practical experience.

Depending on the particular test being performed, the CIL may use of one or more of the above examples to demonstrate that the test, analysis, or examination is "under control."

The monitoring procedures necessary should be determined by the best professional practice. All monitoring is planned, reviewed, and documented in accordance with the above SOPs.

The procedures should be documented and the resulting data is recorded in such a way that trends are detectable and, where practicable, statistical techniques can be applied when reviewing of the results. Records are retained and show all appropriate monitoring measures that were taken, that all results are acceptable or, if not, that remedial action was taken **(A5.9.1, A5.9.1a-e, SA5.9, SF5.9.1F-47)**.

3.3.19 **Audit of the CIL Surety Program:** After the annual CIL audits are conducted, the Lead Quality Manager reports on the state of the Surety Program to the DPAA Deputy Director, Science Director and Laboratory Management, presenting any data deemed necessary by the Science Director. Details of this surety measure are found in DPAA Laboratory Manual, SOP 4.3 (Audits).

3.3.20 **Review of Expert Witness Court Testimony:** Each member of the CIL Staff who testifies in deposition or in open court has his/her testimony monitored and/or reviewed by an appropriate member of the Scientific Staff or by a key member of the court **(SF5.9.1F-53)**.

The CIL Staff undergo periodic training to this effect **(SA5.2.1.2, SF5.2.2F-13)**. DPAA Laboratory Manual, SOP 1.8 (Consult Case Management) provides guidance on this subject **(A4.2.3, A4.2.4, A5.9.6)**. Records related to trial testimony are retained for one ASCLD-LAB accreditation cycle **(A5.9.7)**.

3.3.21 **Individual Characteristic Databases (SA5.8.4.6):** Individual characteristic databases are collections, in computerized, searchable form, of features associated with an object or person uniquely or with a high degree of probability. Individual characteristic database samples are specimens of known origin from which individual characteristic information originates (e.g., reference blood or biological specimens, bone histology sections from known individuals, reference DNA sequences). Currently, the only individual characteristic databases recognized by ASCLD-LAB are CODIS, NIBIN, and AFIS.

The CIL is not the proponent for, nor does it possess, any individual characteristic databases or individual characteristic database samples. However, there may be circumstances where CIL Staff may collaborate with other agencies and thus encounter and use individual characteristic databases and database samples (e.g., mass casualty resolution).

In such instances individual characteristic databases and database samples are treated as evidence, reference materials, or as examination documentation depending on the policy of the proponent agency **(SA5.8.4.6.1)**.

When individual characteristic database samples are treated as evidence they meet evidence chain of custody, sealing, protection, storage, and marking requirements **(SA5.8.4.6.1a)** required by the CIL and/or the proponent agency, as appropriate.

Because of the need for traceability when used in tests, each individual characteristic database sample used by the CIL is uniquely identified **(SA5.8.4.6.2)** and protected from loss, cross transfer, contamination and/or deleterious change **(SA5.8.4.6.3)** using the protocols of the proponent agency **(SA5.8.4.6.1b)**.

Accordingly, CIL access to individual characteristic database samples is restricted to those persons authorized by the proponent agency and the CIL Laboratory Director. Such authorized persons may include contractors and technicians who are not employees of the DPAA, but who are responsible for CIL equipment repair, database maintenance and improvement, etc. of the database being used by the CIL **(SA5.8.4.6.1b, SA5.8.4.6.4)**.

3.3.22 **Oversight of Subcontracted Work:** The CIL may subcontract work to external agencies. In such instances, the CIL ensures the work performed complies with the provisions of ISO/IEC 17025 or ISO/IEC 17020, as appropriate to the fullest extent needed and as appropriate **(A4.5.1, A4.5.4)**. Details on managing subcontracted work are found in DPAA Laboratory Manual, SOP 4.4 (Outsourcing Scientific Work).

3.3.23 **Validation of Analytical Methods & Procedures:** The Scientific Staff is encouraged to develop new and innovative test procedures, methods, and techniques to apply to casework. Additionally, the CIL constantly reviews new and current scientific methods for potential adoption by its analysts.

Validation of a test procedure is the confirmation by examination and the provision of objective evidence that the particular requirements for a specific intended use are fulfilled **(A5.4.5.1)**.

New procedures, to include computer software **(A5.4.7.2a)**, must be validated to confirm that they are fit for their intended use by one of the following methods **(A5.4.5.2)**:

- Validated by an in-house validation study (see below).
- Validated by publication in a peer-reviewed journal, books and other media deemed appropriate by the profession.

The validation of new procedures entails:

3.3.23.1 **Determining Categories of Procedures:** New procedures fall into two broad categories:

- **Category 1 (C1):** Innovative or expanded use of existing procedures that are based on already established procedures or principles. These include non-routine methods, routine methods used outside their intended scope, and amplifications and modifications of routine methods.
- **Category 2 (C2):** Experimental research leading to new procedures that depart significantly from established norms. These include CIL designed/developed methods.

Laboratory Management evaluates new procedures to determine their classification as either C1 or C2. C1 procedures may be used in CIL casework prior to validation, provided:

- The new procedure is used in tandem with already established procedures. The new procedure cannot form the primary or definitive source of data upon which the final test conclusion was based. In other words, an identification cannot hinge on the results of an un-validated method.
- All casework involving C1 procedures that lead to the identification of an individual must undergo review by at least two external reviewers.

C2 procedures may not be used in casework prior to validation **(SF5.4.2F-23a, SF5.4.5.1F-32)**.

3.3.23.2 **Validation Studies:** The introduction of new test methods and procedures developed by the CIL for its own use is a planned activity in writing which is assigned to qualified personnel equipped with adequate resources. Specifically, the Laboratory Director convenes a Research Validation Committee to design and oversee in-house validation studies. The nature of the study and the composition of the committee vary with the procedure being validated. Written plans are updated as development proceeds and effective communication exist among all personnel involved **(A5.4.3)**. Committee members developing new procedures should consider the following information in their studies **(A5.4.4)**, as appropriate:

- Appropriate identification of the method/study.
- Scope.
- Description of the type of item(s) being tested.
- Parameters, quantities, and ranges to be determined.
- Apparatus and equipment including technical performance requirements
- Reference standards and reference materials required

- Environmental conditions required and any stabilization of the test items needed
- Description of the procedure, including:
  - Identification, sampling, handling, transporting, storing and preparation of the test items.
  - Checks to be made prior to starting work.
  - Checks that the equipment is properly working and, where appropriate, and adjustment of the equipment prior to each use.
  - The method of recording observations and results.
  - Safety measures to be observed.
- Criteria and/or requirements for approval/rejection.
- Data to be recorded and the method of analysis and presentation.
- The uncertainty or the procedure for estimating uncertainty.

The validation study is as extensive as necessary to meet the needs of the given application or field of application. Additionally, the range and accuracy of the values obtainable from validated methods (e.g., the uncertainty of the results, selectivity of the method, linearity, limit of repeatability and/or reproducibility, robustness against external influences), as assessed for the intended use, will be relevant to the customer's needs. As method development proceeds, regular reviews should be carried out to verify that the needs of the customer are still being fulfilled. Any changes in requirements that necessitate modifications to the development plan should be authorized and approved **(A5.4.5.2, A5.4.5.3)**.

Note: Validation is always a balance between costs, risks, and technical possibilities. In some cases the range of uncertainty of values (e.g., accuracy, selectivity, linearity, repeatability, robustness) can only be given in a simplified way due to lack of information and other constraints **(A5.4.5.3)**.

The Validation Committee records the results obtained, the procedure used for the validation, and a statement as to whether the method is fit for the intended use **(A5.4.5.2, A5.4.5.3)**.

3.3.23.3 **Performance Check:** Once the validation study is completed and prior to implementation of a validated method new to the CIL, the reliability of the new procedure is demonstrated in-house against any documented performance characteristics of that procedure. Performance checks should utilize the monitoring techniques outlined above. Records of performance verification are maintained for future reference **(SA5.4.5.4, SF5.4.2F-23b & c)**.

When changes are made in the newly validated method, the influence of such changes should be documented and, if appropriate, a new validation study may be in order **(A5.4.5.2)**.

3.3.23.4 **Validation Report:** The validation report should address the information in the above bullets as well as:

- Specification of the requirements.
- Determination of the characteristics of the methods.
- A performance check that demonstrates that the requirements can be fulfilled by using the method (see above).
- A final statement of validity.

3.3.23.5 **Publication:** Validation of procedures should ultimately include their publication in a respected peer reviewed professional journal, book, or other media deemed appropriate by the profession.

3.3.23.6 **Other Considerations:** In extraordinary cases, where methods are employed without prior performance verification, the circumstances of the case and the analytical processes used are fully documented. The CIL cannot claim accredited status for test results obtained through the use of the non-validated methods or procedures. Any analytical notes and test reports generated for cases employing such methods should reflect the appropriate caveats **(SF5.4.5.1F-34).**

3.3.24 **Customer Feedback, Complaints & Appeals:**

3.3.24.1 **Feedback:** The CIL seeks feedback, both positive and negative, from its customers. The feedback is used and analyzed to improve the Surety Program, testing activities, and customer service **(A4.7.2, A4.8)**.

Any feedback (positive and negative) generated by the customer is forwarded to the Lead Quality Manager. A copy is placed in the respective case file. The feedback is used and analyzed to improve the quality system, testing activities, and customer service **(A4.7.2)**.

3.3.24.2 **Complaints:** Ultimately, all complaints made by the customer are investigated and addressed by the Science Director, or his representative, who strives to resolve the issue(s) to the satisfaction of the CIL and the customer **(A4.8)**. The process for handling complaints against consult cases versus jurisdictional (military) cases differs.

The handling process for complaints regarding consult cases is as follows:

- Upon receipt, forward the complaint to Top Management.
- Top Management records the complaint.
- Whenever possible, Top Management acknowledges the complaint with the customer.
- Top Management then confirms whether the complaint relates to investigative and/or analytical activities performed by the CIL. If validated, Top Management investigates the complaint or may delegate a Laboratory Manager and/or the Lead Quality Manager to investigate. Regardless, the investigator is impartial and not involved in the original activity that generated the complaint.
- Top Management tracks the complaint informally through email or verbal conversation with the investigator. The investigator keeps a record of investigative actions.
- Top management keeps the complainant apprised of the progress of the investigation.
- The investigator turns over the results of the investigation to the Science Director who then decides on corrective actions for resolution of the complaint and how to respond to the customer.
- Top Management provides the complainant with formal notice of the end of the complaint process, and provides the results of the investigation and the corrective actions taken.
- Documentation of the handling process for complaints is filed in the case file and with the Lead Quality Manager.

Complaints and negative feedback for military cases are more systemic and institutional in nature, seldom requiring solicitation from the CIL. The Science Director, Laboratory Management, and the Laboratory Administrator deal with complaints for these cases through formal and informal processes. These processes may involve one or more of the steps for the handling process pertaining to consult cases, above, and may exclude others.

Informally, routine customer complaints and feedback are provided to the CIL by the Casualty and Mortuary Offices, and subsequently resolved, via as needed telephone and email correspondence.

Formally, complaints and feedback for military cases are addressed through official military correspondence, when required. Additionally, the Science Director's cover letter in the identification packets contains his contact information should issues arise **(A4.7.2)**.

At least once yearly, Laboratory Management participates in a formal Casualty Conference involving the Military Casualty and Mortuary Offices and the Armed Forces DNA Identification Laboratory (AFDIL). The purpose of the Casualty Conference is to discuss matters of common concern, including issues of customer service and satisfaction **(A4.7.2)**. Other meetings and conferences may also be utilized by the Science Director to solicit customer feedback.

Because complaints and feedback related to military jurisdictional cases may be sensitive in nature, documentation of corrective action is usually maintained by the Science Director, or his representative, and is released only on an as needed basis **(A4.7.2)**.

Regardless of the type of case related to the complaint, considerations pertinent to customer complaints are as follows:

- Top Management is responsible for all decisions at all levels of the handling process for complaints.
- The CIL is responsible for gathering and verifying all necessary information to validate the complaint. Customers who fail to adequately cooperate in providing information may have their complaint dismissed.
- Investigation and decisions on complaints do not result in any discriminatory or retributive actions.
- This process for handling complaints is available to any interested party, upon request.

3.3.25 **Management Reviews:** In accordance with a predetermined schedule, Laboratory Management periodically reviews of the CIL's operational and testing activities to ensure their continuing suitability and effectiveness, and to introduce necessary changes or improvements. The reviews take into account **(A4.15.1)**:

- The suitability of policies and procedures.
- Adequacy and fulfillment of CIL surety goals and objectives **(A4.2.2)**.
- Reports from managerial and supervisory personnel, including the Annual Audit of the CIL Surety Program (see DPAA Laboratory Manual, SOP 4.3, Audits).
- Related subjects at staff and management meetings.
- The outcome of recent internal and external audits.
- The status of corrective and preventive actions.
- Assessments by external bodies.
- Any Peer Review Oversight Committee (PROC) results.
- The results of inter-laboratory comparisons or proficiency tests.

- Changes in the volume and type of the work.
- Changes that could affect the surety program.
- Feedback from customers and other interested parties related to the surety program.
- Complaints from all sources.
- Follow up actions from previous management reviews.
- Other relevant factors, such as quality control activities, resources and staff training.

Management reviews are conducted at least annually (one per calendar year) **(SF4.15.1F-9)** with the findings/results, and the arising actions documented and retained by the CIL for at least one ASCLD-LAB cycle of accreditation **(A4.15.2, SA4.15.1.1, SA4.15.1.2)**.

Outputs from the management review include decisions and actions related to:

- Improvement of the effectiveness of the surety program and its processes.
- Improvement of the CIL related to the fulfillment of the surety program.
- Resource needs.

Laboratory Management ensures that the resulting actions are carried out within an appropriate and agreed timescale **(A4.15.2)** and that they are compatible with the CIL's goals, objectives, and plans for the coming year **(A4.2.2)**. If there is no suspense date given for a resulting action at the time of the management review, it is assumed that the action will be completed by the next annual management review.

Annex A (Surety Policy Statement) (A4.2.2a-e)

The CIL is committed to providing the highest quality forensic services to its customers. To meet this requirement, a Surety Program has been established by the Science Director of the CIL to provide accurate, impartial, relevant and legally defensible field and test results to the families of the missing, law enforcement and criminal justice organizations, and the medico-legal profession. It is imperative that all work conducted by the CIL be based on sound scientific methods and reflect the highest quality and scientific integrity possible to meet the needs of its customers. This applies not only to the actual field and technical analytical work performed, but also to the written reports that are generated and the expert witness testimony provided by CIL Scientific Recovery Experts (SRE), analysts, and technicians.

Predicated by proper professional ethics, technical competency can be achieved only by the combination of a number of components such as:

- Demonstrated competency.
- Training.
- Experience.
- Casework supervision by Laboratory Management and feedback to the SREs, analysts and technicians.
- Continuing education and professional development.
- Proficiency testing.
- Peer Review.
- An appreciation of established scientific protocol and methodology.

Each of these components is important and do not exist on the periphery of CIL planning and operations. All must be integrated into the CIL vision, and the daily and long term activities of the CIL to form a total Surety Program.

Surety is a dynamic endeavor requiring maintenance and oversight of all systems and functional areas. As the Science Director of the CIL, I am committed to supporting a Surety Program through a peer-based independent accreditation system based on the continuing compliance of all personnel to all international standards required by the American Society of Crime Laboratory Directors, Laboratory Accreditation Board (ASCLD-LAB). All CIL Staff must abide by the policies and procedures of the CIL Surety Program. These policies and procedures are defined and approved for use in the DPAA Laboratory Manual.

Laboratory Management is committed to compliance with *ISO/IEC 17025* and the *ASCLD-LAB International Supplemental Requirements for Accreditation* and to continually improving the effectiveness of the Surety Program. Accordingly, the Lead Quality Manager, with the support of Laboratory Management, on an annual basis, conducts and supervises internal audits, as appropriate, to verify that CIL operations continue to comply with the requirement of the Surety Program. The internal audits address all elements of *ISO/IEC 17025* and all appropriate supplements.

Original Signed

Science Director

Annex B (Uncertainty of Measurement Policy)

B1.0 GENERAL: Uncertainty of measurement (or simply "uncertainty" for the purposes of this SOP) applies only to numerical values in quantitative analysis **which appear in a test report**. Further, such a measurement **must be one that matters**.

A "measurement that matters" is defined by ASCLD-LAB as one that "is used, or may reasonably be expected to be used, by an immediate or extended customer (i.e., anyone in the judicial process) to determine, prosecute, or defend, the type or level or criminal charge(s)." In the CIL, measurements that matter are those that affect or have the potential to affect the overall conclusions of an identification. In the event of the above conditions, this uncertainty of measurement policy fully applies.

Uncertainty is defined by the *International Vocabulary of Basic and General Terms in Metrology* (reprinted in ASCLD-LAB International's *Estimating Uncertainty of Measurement Policy*) as:

"A parameter associated with the result of a measurement that characterizes the dispersion of values that could reasonably be attributed to the measurand."

In this definition, the uncertainty is the "parameter" and is expressed as a dispersion of values. As such, **the objective of determining uncertainty is to define the upper and lower limits of the dispersion, or the range of values.** Examples of the dispersion of values include, but are not limited to:

- Standard deviation (or a given multiple of it).
- Half width of an interval having a stated level of confidence.
- Confidence interval defined by statistical probability.

Although uncertainty of measure pertains to a single numerical value, measurement of uncertainty involves more than a single measurement. It embraces all components of a test. While some uncertainties may be obtained by interpreting the statistical spread of results of a series of measurements, others may involve using more subjective techniques such as sampling plans, experience, etc.

While the CIL Staff, in general, does not normally need to concern itself with rigorous, metrologically, and statistically valid calculations of uncertainty (and in some instances the test method may preclude them), the CIL needs to be cognizant of this concept in all of its test procedures and at least attempt to identify all the components of uncertainty and make a reasonable estimation. All uncertainty components which are of importance in the given situation are taken into account using appropriate methods of analysis **(A5.4.6.2, A5.4.6.3)**. Important aspects of uncertainty in the CIL include:

- Basing uncertainty on a (point) estimate. In other words, the estimate of uncertainty must have an empirical basis.
- Identifying all components of uncertainty for its test procedures. When estimating uncertainty, all uncertainty components must be considered using appropriate methods of analysis. Components of uncertainty in the CIL are discussed below.
- Ensuring reported test results do not give the wrong impression of uncertainty (or, conversely, certainty).
- Basing estimates of uncertainty on those parameters that significantly impact reported values.
- Understanding that the estimate of uncertainty is not the sum of individual uncertainties associated with each step of the test protocol.
- The level of uncertainty that is acceptable is decided on the basis of fitness for purpose to meet the needs of the customer. Sometimes a large uncertainty may be acceptable, other times a small uncertainty is required. Regardless, uncertainty is directly proportional to the impact on the final conclusion.
- Recognizing that the most significant factor in the reality of uncertainty is human factors, (i.e., the technique of the analyst) and not the test method.

B2.0 ESTIMATING UNCERTAINTY: Although there is no single method or approach in quality assurance for estimating uncertainty, and the "how to" is currently subject to some debate, a good faith effort of estimation is still required in specific categories of tests. As a minimum, the estimate must be reasonable and based on data. The following considerations are used to determine uncertainty in the CIL.

B2.1 **Components of Uncertainty:** Components (also called "sources" or "factors") of uncertainty must be identified. Many components determine the correctness and reliability of the tests performed by the CIL. The extent to which the components contribute to the total uncertainty of measurement differs considerably between types of tests. The CIL accounts for these components in adopting and developing test methods and procedures, in the training and qualification of personnel, and in the

selection and performance checks of the equipment it uses **(A5.1.1, A5.1.2, (A5.4.6.2))**. The components of uncertainty and how they impact applicable methods used at the CIL, and how they are mitigated include, but are not limited to:

B2.1.1 **Reference Standards & Reference Materials Used:** Reference standards and materials (e.g., synoptic exemplars, anatomical specimens, calibration standards) that are undamaged, serviceable, and calibrated (if necessary) are assumed to have a negligible influence on uncertainty.

B2.1.2 **Test Methods & Method Validation:** All uncertainty estimates are based on empirical data used in determining a quantitative value and comparing that value to the true value. In other words, only numerical values appearing in a test report, derived from direct measurements specified in a continuous (metric) method need to have an estimate of uncertainty. Such methods at the CIL include:

- Stature estimates.
- FORDISC tests.
- Any determinations (e.g., sex) made from univariate osteometric measurements.
- Osteometric sorting of commingled individuals.
- Select aspects of material evidence analysis to include optometric analysis.

Quasi-continuous and discontinuous (non-metric) methods are exempt from estimates. Examples of the former are pubic symphysis age-at-death determination techniques where subjective observations of features (e.g., ridge and furrow systems, ventral ramparts) are subsequently quantified by assigning a phase or score. These, in turn, are subsequently correlated to a point estimate associated with a statistically derived age range.

In those cases where a well recognized test method specifies limits to the values of the major sources of uncertainty and specifies the form of presentation of calculated results, the CIL is considered to have adequately addressed uncertainty provided the test method and reporting instructions have been followed. As such, validated metric methods are further exempt from uncertainty estimates in the CIL, and no further action is necessary, if the following conditions are met:

- The uncertainty evaluation procedure and guidance as specified in the method is followed.
- The uncertainty specified can be utilized if full compliance with the test method is demonstrated.
- The method implicitly includes the uncertainty in the test results.

In other words, the CIL assumes that whatever uncertainty applied when the method was being developed and validated is transferable to the results obtained by the user of the method provided the method is performed as validated. For example, an osteometric measurement necessary for a stature estimate taken with analog calipers having an inherent error of +/- 0.5 mm during the development of the method is assumed to be present in the practical application of the method provided the user is performing the measurement using calipers having the same inherent error. By extension, if the overall stature result has an uncertainty of +/- 2.5 cm, the component of the uncertainty attributable to instrumentation is assumed to be the same as during the development of the method provided that the instrumentation is congruent in terms of inherent error.

Uncertainty is not an issue regarding validated metric methods unless the below conditions exist:

- Variations in procedures occur.
- Changes occur in what is measured.
- Techniques and methods associated with the measurement change or are modified.
- Correction of the measurement results occur for systematic effects.

B2.1.3 **Software:** Under the same guidelines as test methods (above), uncertainty is not an issue with validated software.

B2.1.4 **Sampling:** Uncertainty is applied to sampling. Sampling is defined as where the results from a portion are extrapolated to apply to the whole. This is opposed to sample selection where the results from the portion are not applied to the whole. As such, a relevant procedure must first be defined as sampling versus sample selection.

For sampling based on metric techniques, uncertainty is determined from two sources:

- Preparation of samples.
- Transportation, storage, handling of samples.

The components of uncertainty and conducting the estimates of uncertainty for the above sources are treated as any other uncertainty problem and are done in accordance with the provisions of this SOP.

B2.1.5 **Equipment & Measurement Traceability:** Uncertainty of measurement inherent in tests,

especially regarding supporting equipment, is closely tied to equipment and measurement traceability (e.g., appropriateness of use, calibration, serviceability), the foundation of the CIL's maintenance program detailed in DPAA Laboratory Manual, SOP 3.2 (Measurement & Observation Traceability).

In general, it has been determined that the test equipment with the measuring functions used in the CIL contributes little to the uncertainty to the test result provided **(A5.6.2.2.1)**:

- The proper instrument specified in the method for measuring is used.
- The instrument is well maintained.
- The device is working within the parameters specified in the user's manuals.
- Requisite performance checks have been performed.

B2.1.6 **Environmental Conditions During Measurement & Tests:** The effect of ranges of temperature, humidity, and other ambient conditions in the CIL, relevant to measurements and tests involving bone, dentition and material evidence, have a negligible contribution to uncertainty.

B2.1.7 **Properties, Condition, and/or Handling of the Test Items Being Tested:** The predicted long term behavior of the item being tested is not normally considered when estimating uncertainty. In general, the nature of the evidence tested at the CIL normally adheres to this principle and typically does not result in variances that would affect uncertainty of tests.

Only when some types of evidence are improperly conserved, could uncertainty become an issue (e.g., a leather item measured wet, and then shrinks during the drying process, faulty bone reconstruction, shrinkage of "green bone," etc). Even in such instances, the dichotomy of measurement would only affect the test if the physical dimensions being measured are crucial to the identification of the item undergoing tests. This situation rarely occurs in the CIL with material evidence but can occur during the analysis of biological items.

Bone reconstruction may affect the uncertainty to the degree that it can be detected by the measuring equipment (e.g., greater than 0.5 mm). In such instances, when the measurement must be used, such as in stature estimations or FORDISC calculations for ancestry, measurements taken from partial, reconstructed, or damaged bones are deemed "approximate." Normally, even approximate measurements do not have the tendency to affect the final outcome of the test unless the results plot out near a sectioning point.

B2.1.8 **Performance of the Analyst & Other Human Factors:** The most significant, ever present, and widely varied uncertainties are the result of human error and other variances in performance. The ways in which human performance affects uncertainty of tests may vary widely. However, the usual quality control measures (e.g., peer review, audits, training and continuing education, proficiency tests, supervisor involvement), when properly and consistently applied, can effectively reduce (but not altogether eliminate) uncertainty in tests.

B2.2 **Conducting Estimates of Uncertainty:** The CIL must complete uncertainty studies as part of the validation process in the event that non-validated methods and techniques are introduced into the CIL, or validated methods and techniques are modified for special use. The purpose of specific studies and their results should be considered when estimating uncertainty to include the impact on CIL productivity and resources. However, scientific integrity and the needs of the CIL and its customers are the determining factors in the extent of resources the CIL uses in estimating uncertainty. Using the above guidance, the CIL adheres to the following approach to conduct estimations of uncertainty of measurements.

- Specify what is being measured. Examples include osteometric measurements, number of osteons in a defined and circumscribed microscopic field, etc.
- Specify the measurement system (e.g., sliding calipers) and those parameters (i.e., dispersion of values) that significantly affect the result.
- Identify and list all potential components/sources of uncertainty. Sources contributing less than 1/5 to 1/3 of the total measurement uncertainty do not have much impact on the combined uncertainty and can be disregarded unless there are several sources that fall into this category. Only those components under the control of the CIL need to be considered when estimating uncertainty. Additionally, potential sources of uncertainty may be assumed to be minimal by the CIL if previous experience demonstrates that uncertainty is not impacted to any significant degree.
- Evaluations of uncertainty associated sources which were verified during the course of a test and found to be in compliance with CIL protocols need not be reported.
- Identify and compile recent test data on replicate sampling or testing that is available in the CIL. This can include, but is not limited to: method validation studies, proficiency test results, replicate

testing data, scientific literature, etc. Where data cannot be obtained, documented professional judgment based on previous experience can be used.
- The degree of rigor needed in uncertainty of measurement depends on factors such as:

  - The requirements of the test method.
  - The requirements of the customer.
  - The existence of narrow limits on which decisions on conformity to a specification are based.

B3.0 DOCUMENTATION: The CIL maintains documentation regarding uncertainty for each protocol for which it developed to include records that describe the process used to develop the estimate of uncertainty for a particular method. These records include data, calculations and the components and sources of uncertainty considered. Additionally, the record must include the details of method performance. This can include, but is not limited to:

- A description of the statistical method (e.g., standard deviation, confidence interval) used to report the estimate.
- Sectioning points, if applicable.
- Selectivity of method (usually available in the method validation protocol).
- Demonstration of repeatability and/or reproducibility.
- Extent of external influences or interference from external sources.

B4.0 REPORTING: The CIL ensures that the form of reporting of the result does not give a wrong impression of the uncertainty. Reasonable estimation is based on knowledge of the performance of the method and on the measurement scope and makes use of, for example, previous experience and validation data **(A5.4.6.2)**.

Where applicable, information and a statement on the estimated uncertainty of measurement is provided in test reports when it is relevant to the validity or application of the test results, when a customer's instruction so requires, or when the uncertainty affects compliance to a specification limit **(A5.10.3.1c)**. Statements of uncertainty are reported in test reports as specified elsewhere in this Laboratory Manual. Where relevant, uncertainty should be appropriately discussed and caveated when uncertainty is:

- Relevant to the validity or interpretation of the test results.
- Required by the customer.
- Affecting compliance with regard to a specific limit or sectioning point.

B5.0 SURETY: Uncertainty estimates should be re-checked periodically especially if uncertainty factors change (e.g., significant personnel turnovers, procurement of new equipment, adoption of new methods).

Annex C (Document Control)

C1.0 GENERAL: Documents are relatively unchanging and exist to provide a framework for the Surety Program in the CIL. Documents are not to be confused with a record which is a product of the Surety Program. For example, a blank analytical form is a document until it is filled in. At that point the form becomes a record. Document examples, in general, include, but are not limited to:

- Military regulations, policy statements, standards, or other normative documents.
- Test methods.
- Drawings (e.g., CIL floor plans for all locations).
- Data tables.
- Forms
- Software, specifications, instructions, manuals, etc.

Documents may exist in various media to include hard copy, electronic, digital, analog, photographic or written. Regardless of the medium, documents must remain legible and readily identifiable at all times.

Authorized editions of appropriate documents are available at all locations where operations essential to the effective functioning of the CIL are performed. Documents are located in the CIL Libraries, the DPAA network, and adjacent to select essential items of equipment, and field sites **(A4.3.2.2a)**.

All documents in the CIL that are part of the Surety Program are reviewed and approved for use by authorized personnel (usually by Laboratory Management and/or Quality Assurance) prior to issue. Master lists or equivalent document control procedures (e.g., an appendix at the end of a document) identifying the current revision status and distribution of documents in the Surety Program is used to preclude the use of invalid and/or obsolete documents **(A4.3.2.1)**.

Changes to documents are reviewed and approved by the same functional area coordinator or designated representative who performed the original review, when possible, unless specifically designated otherwise. The designated personnel have access to pertinent background information upon which to base their review and approval **(A4.3.3.1)**.

Electronic documents (e.g., forms) may be locked from unauthorized editing. Normally, only Laboratory Management and Quality Assurance have final editing privileges for electronic documents **(A4.3.3.4)**.

Where practical, the altered or new text is identified in the document or recorded in the appropriate attachments (e.g., Appendix 5.5 (Revisions) in the Laboratory Manual) **(A4.3.3.2)**. Minor changes, such as typos and grammar, need not be identified or recorded provided they do not substantively change the document.

Adequacy of documents is ascertained annually through various surety measures. These include, but are not limited to, deliberate inventory, the peer review process (DPAA Laboratory Manual, SOP 4.1, Peer Review) and/or the CIL Audit Program, (DPAA Laboratory Manual, SOP 4.3, Audits) **(A4.3.2.2b)**.

C1.1 **Categories of Documents:** Key categories of documents in the CIL include:

C1.1.1 **Laboratory Manual:** In the CIL, the structural hierarchy of surety documentation begins with ISO/IEC 17025 and appropriate supplements. From these documents, the DPAA Laboratory Manual is based. In effect, the Laboratory Manual is the "Quality Manual" in that elements pertaining to surety are found throughout **(A4.2.5)**.

From the Laboratory Manual, all subsequent documentation is generated to include forms, checklists, training guides, and other CIL documentation.

Design, use, and control of the Laboratory Manual are outlined in DPAA Laboratory Manual, SOP 1.0 (Overview of the Laboratory Manual).

C1.1.2 **Forms:** The full body of current and official forms is located on the DPAA network **(A4.3.2.2a)**. A version of a form is considered in effect until superseded by a subsequent version. Proper forms, in particular, must be used for analytical notes. To ensure the use of the most current form, CIL Staff should avoid using uncontrolled downloaded or desktop copies whenever possible.

C1.1.2.1 **Definition:** In the CIL a form is an *a priori* designed data collection tool, approved by Laboratory Management, used to document data and/or information in a systematic manner. Forms allow information and data to be consistently organized and readily retrievable and may be completed by hand writing, and/or by computer.

In short, anything that can be "filled in" should be considered a form, to include report and memo templates.

Given the above parameters, the following are not considered to be forms in the CIL:

- Computer printouts of results (e.g., osteometric sorting, FORDISC).
- Completed reports (e.g., audit reports, FORs, FARs).
- Completed memos.
- Completed analytical notes.

C1.1.2.2 **Approval:** New or expedient forms not already in use by the CIL are subject to approval by the Laboratory Management and must be brought under control using the document control procedures in this SOP prior to being used. Do not use unapproved or uncontrolled forms.

C1.1.2.3 **Design**: Forms are designed to provide the user with the minimum required standards for data collection.

Forms typically are fill-in-the blank in format (i.e., designed to be *de facto* checklists) and thus exist in a "blank" state prior to completion. However, forms have adequate space to allow the user to record data and observations beyond the minimum requirements.

C1.1.2.4 **Control:** Forms are controlled in a manner much like the SOPs in the DPAA Laboratory Manual **(A4.3.1)** (see DPAA Laboratory Manual, SOP 1.0, Overview of the Laboratory Manual). Each form contains the following control information. Items marked with an asterisk usually appear on the form in a standardized header or footer.

- **Title of form:** The title is usually a long title (e.g., Preliminary Skeletal/Biological Assessment Form). The form may also be referred to by its form number **(A4.3.2.3)**.
- **Form number***: Each internally generated CIL form is assigned a number (e.g., CIL Form 1301). The first two numbers are keyed to the proponent SOP for that form. In the above example, since the form number begins with "13" it pertains to evidence management and security (i.e., DPAA Laboratory Manual, SOP 1.3, Evidence Management & Security). Current forms may exist in two versions (e.g., a Word version and a fill-in .pdf version). In such cases the form number is followed by a letter suffix (e.g. Form 1301a, 1301b) **(A4.3.2.3)**.
- **Date***: The effective date that the form or form version was adopted. The date usually follows the form number (e.g., CIL Form 1301 dtd 30 May 2007). The form date on analytical forms should not be confused with the dates the analyst enters as part of analysis.
- **Document stop***: The document stop shows which page of the form is present and how many pages there are to the form or form packet and thus identifies the end of the form (e.g., the pages of a three page form is consecutively identified as Page 1 of 3, 2 of 3, 3 of 3). The document stop is not to be confused with the optional page number fields of some forms that are completed by the person using the form (see below).

A CIL Forms Master Log (a "roll up" list of CIL generated forms) is maintained by Quality Assurance as a traceability aide specifically for inventorying and determining current and former versions of approved CIL forms **(A4.3.2.1)**.

C1.1.2.5 **Revisions**: The process for proposing and revising CIL forms parallels that of the Laboratory Manual.

Anyone can suggest a new form as well as additions, deletions, and revisions to existing forms **(A4.1.5k, A4.12.1)**. The proposal/revision procedure is as follows **(A4.3.3.4)**:

- Proposals/changes are forwarded to, and evaluated by, Laboratory Management **(A4.2.3, A4.3.2.1)**.
- Proposals/changes are approved or disapproved by Laboratory Management **(A4.3.2.1)**.
- Quality Assurance is notified to take the relevant action and places new/revised forms on the DPAA network. In addition, Quality Assurance:
  - Posts the summary of the revision(s) for the new form in the CIL Forms Master Log **(A4.3.2.1)**.
  - Removes the old form from the DPAA network, marks as "obsolete" and archives the former version of the form (see below) **(A4.3.2.2c, A4.3.2.2d)**.
  - Notifies the CIL Staff of new/revised forms via email **(A4.3.2.2c)**.
  - Changes SOPs and subordinate documents to reflect new/revised forms, if necessary.
- CIL Staff should replace desktop copies with the new version **(A4.3.2.2c)**.

Individuals performing remote operations use the version of the form in effect on their departure date from the CIL **(A4.3.2.2a)**.

C1.1.3 **Surety Documents:** Quality Assurance manages, controls, and maintains all other documentation produced as a result of the Surety Program including, but not limited to:

- Audit checklists.

- Training manuals and guides.
- Performance check, calibration, and maintenance documentation (e.g., essential equipment lists, performance check schedules, etc).
- Blank proficiency and competency tests and answer keys.
- Management review checklists.
- Subcontractor lists.

Surety documents are controlled in much the same manner as forms **(A4.3.3.4)**. Exceptions occur with the control information appearing in the header or footer. Surety documents are not numbered and are referred to exclusively by their long title and effective date of issue (e.g., Essential Items Inventory, dated 19 June 2007) **(A4.3.2.3)**.

Some documents (e.g., proficiency tests) are identified by a version number (e.g. 2006.0, 2006.1) **(A4.3.2.3)**. See DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education), for details. Additionally, the issuing authority (usually the Lead Quality Manager) is listed.

A CIL Surety Document Control Log (a "roll up" list of Surety Documents) is maintained by Quality Assurance as an aide to inventorying and determining current and former versions of controlled Surety Documents **(A4.3.2.1)**.

C1.1.4 **External Documents:** External, or Tier 1, documents (see DPAA Laboratory Manual SOP 1.0, Introduction to the Laboratory Manual for examples and a discussion) consists of regulatory documents from a variety of organizations external to the CIL which are used to define the CIL as an institution and/or regulate CIL operations.

External documents pertinent to the CIL are listed in DPAA Laboratory Manual, Appendix 5.0 (References). Changes to the Appendix 5.0 are handled the same as any SOP revision (discussed above). A shelf in the library and portions of the DPAA network are dedicated to the storage of external documents.

Regarding the library, Laboratory Management recognizes the utility of these documents and makes them available for staff use. As such, Appendix 5.0 documents should only be removed from the library when necessary, and returned at the earliest possible opportunity**. Staff members who fail to account for and safeguard these documents may face disciplinary action.**

C1.2 **Disposition of Obsolete Documents:** Regardless of the above type of document, Quality Assurance treats obsolete documents in the following manner:

- Immediately removes the obsolete document from the DPAA network **(A4.3.2.2c)**.
- Marks the document as obsolete, superseded (or similar language), usually in red, in a header at the top of the page(s).
- Converts the document to a permanent type of electronic file (e.g., PDF).
- Moves the unalterable file to the appropriate archive folder on the DPAA network.

At all times, the CIL Staff must be cognizant of invalid, uncontrolled, or obsolete documents. Suspected documents are reported to Laboratory Management or Quality Assurance. If confirmed to be obsolete or uncontrolled, the document is promptly removed from all points of issue or use, or otherwise assured against unintended use **(A4.3.2.2c)** using the above procedures, as appropriate.

SOP 4.1: PEER REVIEW

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 30 August 2016
Citation: DPAA Laboratory Manual, SOP 4.1

0.0 PRINCIPLE, SPIRIT & INTENT: *A core component of the analytical process is a scientific peer review that ensures that all findings and test products meet an acceptable and recognized scientific and professional standard* **(A4.2.3, A5.9.2, SA5.9.4, SF4.13.2.1F-2h, SF4.13.2.1F-5)**.

1.0 PURPOSE & SCOPE: This SOP outlines procedures used for internal and external (independent) peer review of all technical/field notes and reports. It also addresses verification of critical findings. In the absence of specific procedures, or in the case of conflicting procedures, the principle, spirit & intent will be met **(A5.9.1 SF4.13.2.1F-2h)**.

2.0 PEER REVIEW PROCESS: Peer reviews can be either internal and/or external. For casework conducted in the blind, peer reviewers have no prior field or technical involvement with the case being reviewed. In all instances, peer reviewers have no immediate involvement with the test being reviewed (i.e., did not perform, assist with, or consult in the test). In particular, peer reviews are not conducted by the author(s) of the examination records or the test report under review **(SA5.9.4.3)**.

The first intent of peer review is to verify that the conclusions of analysts are reasonable, within the constraints of validated scientific knowledge, supported by the examination documentation, and reported in a professional manner **(SA5.9.4)**. As such, the draft report, technical/field notes, and other documentation, as appropriate, are subject to peer review.

At a minimum, the technical component of the peer review includes a review of all examination records and the test report to ensure **(SA5.9.4.1):**

- Conformance with proper technical procedures (test methods) and applicable laboratory policies and procedures.
- Accuracy of test reports and that the data supports the results and/or conclusions in the test report;
- Associations are properly qualified in the test report; and
- The test report contains all required information.

The second intent of the peer review process is to serve as an administrative check of the test report and the technical/field notes in order to judge compliance with various administrative provisions in the CIL SOPs **(SA5.9.5)**.

At a minimum, the administrative component of the peer review includes **(SA5.9.5.1)**:

- A review of the test report for spelling and grammatical accuracy.
- A review of all administrative and examination records to ensure that the records are uniquely identified according to laboratory policy and/or procedure.
- A review of the test report to ensure that all key information is included.

Peer reviews are a search for improvement and are conducted in a professional and objective manner. The peer review process is not:

- A forum for scientific debate for controversial issues (e.g., the race concept") already discussed and caveated within the framework of the Laboratory Manual. The reviewer ensures that the methods and conclusions are valid within the limits set forth by the discipline and the Laboratory Manual.
- An opportunity to impose petty idiosyncrasies.
- An opportunity to further personal agendas.
- A venue for retaliation or payback or, conversely, to court favor or practice sycophancy.

The number of reviews that an individual case undergoes is subject to the discretion of the Laboratory Director. Typical reviews do not involve the full physical retesting of the evidence; however, certain circumstances may require that a reviewer physically check aspects of the tests (see special instructions for critical findings below). Additionally, manual calculations and data transfers are subject to appropriate checks in a systematic manner **(A5.4.7.1)**. The process for internal and external peer reviews is discussed below:

2.1 **Internal Peer Reviews:** Internal peer reviews are done in the CIL in an office setting using a variety of checklists **(SF4.13.2.1F-2h)** as well as in the test areas when evidence has to be examined. When completed, case work is turned over to a Laboratory Manager, who gives it a cursory

management review. Typically, a Laboratory Manager provides a management review for other members of Laboratory Management but does not conduct reviews of their own work.

Note: For the LSI Section, the LSI Supervisor or his/her designee conducts the management reviews and manages other aspects of the peer review process discussed in this section.

If the case work appears acceptable, the Laboratory Manager assigns it to a peer reviewer. The Laboratory Manager who conducted the management review should not be the peer reviewer.

Internal peer reviewers are competency certified and proficiency tested in the discipline for which they are conducting the peer review **(SA5.9.4.2, SF4.13.2.1F-2h)**. As such, LSI Augmentees are ineligible to be peer reviewers.

If a report contains multiple types of analyses (e.g., a CIL portion with dental and osseous elements) each analysis (and critical finding, as appropriate, see below) is reviewed by a qualified peer reviewer who then completes the respective portions of the peer review record.

Continuity in the peer review process is desired. Normally, the same person peer reviews the assigned casework for the duration of the peer review process. In the event that the peer reviewer changes, (due to deployments, issues related to objectivity, etc.) the functional area coordinator for the work being peer reviewed documents the change via email. The email notifies the former and new peer reviewers of the change. The email also explains, for the record, the reason(s) for the change. A copy of the email is included with the peer review record in the case file.

To protect the integrity of the peer review process, and to maximize its value as a surety measure, peer review assignments should be diverse and varied. In other words, an individual should not habitually review another person's (or each other's) work to the extent practical.

Each succeeding draft report, with attached reviewers' notes and analysts' responses, is retained with the circulating document during the peer-review. The initial and subsequent drafts should be dated or marked accordingly to avoid confusion.

The peer review checklist is dated on the date the peer review is completed.

All peer review documentation is filed with the case file at the close of the peer-review process.

At any time during the peer review process the peer reviewer or the analyst may consult Laboratory Management, Quality Assurance, or other subject matter experts in order to answer questions, clarify procedures, or to resolve issues that arise during the peer review.

2.1.1 **Peer Reviewer Responsibilities**: Peer reviews do not shift the responsibility for the case work and scientific findings from the analyst to the reviewer **(SA5.9.4.2)**. Accordingly, the peer reviewers:

- Review all assigned case work documentation in a timely manner and in accordance with the chain of review recorded on the appropriate routing sheet. The precise chain of review varies with the type of tests. The following documentation is reviewed:
  - A draft report previously made available by the author on the DPAA network.
  - Other documentation, as appropriate.
  - Original technical/field notes as defined in DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).
  - Any special tests (e.g., SEM, histology, Optisearch) that may have been performed by another analyst on behalf of the lead analyst.
- Record pertinent comments and suggested revisions, where necessary, in the body of the text of the report drafts and/or the page margins.
- Further document the main points of these suggested revisions on the appropriate peer review record form. A form exists for each type of test and consists of a checklist of key items, along with additional space for comments. There should be a separate record form for each case report and technical/field notes**(SF4.13.2.1F-2h)**. In other words, do not document more than one peer review on a record form (i.e., use a separate form for –I-01, -I-02, -G-01).
- Check calculations and data transfers which do not form part of a validated electronic process. The peer review record should include an indication that such checks have been carried out **(A5.4.7.1, SA4.13, SF4.13.2.1F-2e)**.
- When instrumental analyses are conducted, verify that operational parameters are recorded, if appropriate **(SA4.13.2.5.2, SF4.13.2.1F-2b).**
- When comparative examinations result in the elimination of an individual or object, verify that the pertinent test report clearly indicates the elimination **(SA5.10.3.6).**
- When associations are made, verify that the significance of the association is clearly communicated and qualified in the test report **(SA5.10.3.5).**

- When no definitive conclusions can be reached, verify that the reasons are clear in the test report **(SA5.10.3.7)**.
- Verify that the conclusions are reasonable, within the constraints of validated scientific knowledge, and validated by examination documentation. **(SA5.9.4)**.
- Determine compliance or non-compliance to the appropriate CIL SOPs **(SA4.13)**.
- Ensure the reviewer's name appears on the peer review record form **(A4.13.2.1, SF4.13.2.1F-2f)**.
- If reviewing a consult case, be aware of and comply with any special provisions found in DPAA Laboratory Manual, SOP 1.8 (Consult Case Management).

Special instructions for peer reviewers regarding critical findings (SA4.13.2.12, SF4.13.2.1F-3): A critical finding is a **decision** about an association between items based on observable class **and** individual characteristics of an item(s) of evidence. Critical findings in the CIL comprise:

- The professional opinions that arise from odontological analysis (see DPAA Laboratory Manual, SOP 3.5, Forensic Odontology).
- The professional opinions that arise from chest radiographic comparisons (see DPAA Laboratory Manual, SOP 3.9, Chest Radiograph Comparison).
- Analyses other than individual human identifications that result in removal of evidence from the CIL evidence system (e.g., CIL portions and admin fiats, see DPAA Laboratory Manual, SOP 1.6, General Casework Procedures).

All critical findings are independently checked (i.e., verified) by a second party. When verification is carried out on a critical finding for odontology, chest x-ray comparison or a peer reviewed CIL portion or admin fiat, it is conducted by a peer reviewer(s) competency certified in the analytical work that generated the critical finding.

When the critical finding involves a non-peer reviewed admin fiat or CIL portion, the verification is performed by the Laboratory Manager who signs the Management Review of Non-Evidentiary Items form or other document of disposition (usually a memorandum) that eliminates the accession from the CIL evidence system.

To verify a critical finding the peer reviewer (or Laboratory Manager in the case of non-peer reviewed cases):

- Independently examines the evidence in the same manner as the analyst and reaches the same conclusion(s).
- Documents that the verification was conducted by annotating the appropriate space on the relevant peer review record form or the Management Review of Non-Evidentiary Items form, as appropriate. If the disposition document is a CIL portion or admin fiat memorandum, the Laboratory Manager attests that the verification was performed when he/she signs the memorandum.

2.1.2 **Analyst Responsibilities**: The analyst:

- Write reports on a level of professionalism such that the peer review results in no significant revision.
- Provide complete technical/field notes (including those from special tests [e.g., SEM] conducted by other analysts) along with the complete initial draft of any report in a timely manner.
- Include all special documentation if the tests support a consult case (see DPAA Laboratory Manual, SOP 1.8, Consult Case Management).
- Consider each comment, suggestion, or recommendation. Note and initial on the peer review record sheet and/or in the text of the draft report, agreement, disagreement, and/or what action was taken for each **significant and substantive** comment, suggestion, or recommendation. Significant items are those having bearing on major interpretations and/or conclusions of the report. Substantive items are those relating to the scientific issues (e.g., calculation errors, misuse of methods, misreporting uncertainty), as opposed to those relating to punctuation, grammar, or style.
- If retesting is required, amend technical/field notes, as appropriate in accordance with DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).
- Be mindful of the special provisions for amending CDs and DVDs in conjunction with the peer review process in DPAA Laboratory Manual, SOP 3.0 (Analytical Notes & Documentation).

2.1.3 **Results of Peer Review**: The peer review must result in either a verification of the case work or its referral to Laboratory Management.

2.1.3.1 **Verification:** In the case of verification, the case work may be adequate as is, or there are only minor problems that need attention, and the analyst and the reviewer agree on the changes needed.

2.1.3.2 **Refer to Laboratory Management:** Substantive professional disagreements over

casework that cannot be resolved between the peer reviewer and the analyst is referred by the peer reviewer and/or the analyst to the appropriate Laboratory Manager for timely arbitration. The intent of the referral is to keep trivial and non-substantial issues from burdening of the peer review process.

Note: For the LSI section, referrals discussed in this section are to the LSI Supervisor rather than a Laboratory Manager.

Disagreements leading to referral may include, but are not limited to:

- The methods, techniques, reasoning, and/or conclusions are judged to be faulty, unsubstantiated, inappropriate, and/or outside the standard of the applicable discipline (e.g., hair analysis).
- The case work is unprofessional in preparation or requires extensive revision to clarify content.
- The case work substantially deviates from applicable SOPs or other approved procedures.
- Uncertainty of measurement is misreported or misinterpreted.
- Report contents are not supported by examination documentation.
- Ethical concerns or conflicts of interest (e.g., perceived violations of blind analysis) are evident.

Minor formatting problems, minor typographical errors, issues related to writing style, and similar presentation problems ordinarily are not grounds for referral in that these are administrative rather than technical in nature **(A5.9.5)**.

Ideally, referral should be the exception rather than the rule. The peer reviewer and the analyst should discuss and attempt resolution on all significant issues before seeking a referral. They may utilize other members of the CIL Staff, the Lead Quality Coordinator, or other subject matter experts in order to achieve resolution.

If these differences still cannot be resolved, the case work is referred to Laboratory Management. Typically, the case work is referred to the Laboratory Manager in charge of the functional area respective to the type of report in question.

The Laboratory Manager reviews the case work and considers the positions of the analyst and peer reviewer. The Laboratory Manager then decides to concur or non-concur with the case work. If the Laboratory Manager concurs, the matter is resolved. Minor changes in the report and/or analytical/field notes may result at this point. These, and all other actions related to the referral, are recorded on the peer review record form.

If the Laboratory Manager issues a non-concurrence, the matter is referred to the Peer Review Oversight Committee (PROC). Regarding LSIs, if the dispute reaches this point, the matter is turned over to the Laboratory Manager in charge of Material Evidence Analysis.

2.1.3.3 **Peer Review Oversight Committee (PROC):** In the event that a referral to a Laboratory Manager results in a non-concurrence, the case work in question is automatically forwarded to a Peer Review Oversight Committee (PROC) for review.

The PROC is appointed by the Laboratory Director and is composed of a Laboratory Manager (which cannot include the Laboratory Manager or LSI Supervisor involved in the management referral), and one or more odontologists, anthropologists, or LSIs, as appropriate.

The PROC is empowered to examine all evidence necessary to evaluate the case work in question for the purpose of rendering one of the following decisions with respect to any or all of those involved (i.e., the analyst, peer reviewer and/or Laboratory Manager):

- Uphold the peer review, no corrective action taken.
- Uphold the peer review, corrective action taken.
- Overturn the peer review, no corrective action taken.
- Overturn the peer review, corrective action taken.

Decisions of the PROC are by majority vote. The proceedings and decisions rendered are documented on an MFR that is included in the case file along with the other peer review documentation. The chairperson of the PROC is responsible for preparing the MFR.

2.1.3.4 **Corrective Action:** A decision by the PROC that involves corrective action against a Laboratory Manager, peer reviewer and/or analyst may involve one or more of the below corrective actions:

- The individual may be placed in a probationary period for a duration of up to 12 months.
- The individual may have "needs improvement" included in their job performance evaluation.
- A Personal Improvement Program (PIP) is devised to assist the individual in improvement. The PIP may last for one year, with progress closely monitored by an individual assigned by the

Laboratory Director. PIPs are further discussed in DPAA Laboratory Manual, SOP 4.2 (Training, Tests & Continuing Education). For the first six months of the PIP, all case reports written by the individual must be cosigned by a Laboratory Manager, Deputy Laboratory Director, Laboratory Director, or LSI supervisor, as appropriate. After six months a co-signature is no longer required.

- Should another non-concurrence occur and be upheld during the probationary period, the individual is barred from writing any additional case reports for the remainder of the probation.
- After the second non-concurrence, the individual automatically receives an unsuccessful job performance evaluation. Corrective action, to include modification and extension of the PIP or removal from employment, is undertaken.
- Regardless of the above, receipt of three determinations of non-concurrence within any 24-month period may initiate procedures for termination of employment.

2.2 **External (Independent) Reviews:** Prior to the finalization of the case file, CIL casework may be subject to two types of external review:

- Review by a medical examiner from the Armed Forces Medical Examiner System (AFMES) for each initial identification of an individual.
- Review by independent consultants on contract to the DPAA. This is typically conducted at the discretion of the Science Director.

Both are typically performed outside of the DPAA.

2.2.1 **Review of Casework:** Presently, each case for initial identification is reviewed by a member of the AFMES.

At the discretion of the Science Director, select cases may undergo review by forensic scientists under contract to the DPAA. These reviews are further discussed in DPAA Laboratory Manual, SOPs 1.7 (CIL Case File Management) and 4.0 (CIL Surety).

The Science Director sends each identification to the appropriate AFMES reviewer. The reviewer is typically a board certified medical examiner within the AFMES.

External reviewers under contract to DPAA are usually anthropology and odontology consultants that are Diplomates of the American Board of Forensic Anthropology (ABFA) and the American Board of Forensic Odontology (ABFO), respectively. Other scientific consultants (e.g., DNA specialists) must have credentials reflective of a national or international reputation in their respective fields. Consultants have access to the Laboratory Manual and other documentation to aid in their evaluation of cases. Additionally, each consultant is afforded at least one visit to each CIL location annually to evaluate facilities and procedures, and to administer external proficiency tests.

The following procedures apply to external AFMES reviews:

- CIL casework nearing identification is submitted as an undated, unsigned MESR and all supporting finalized test reports (e.g. FAR, FOR, CXR, MER, message traffic, etc.) to the AFMES.
- Although tasking is the function of the Chief, AFMES, the assigned medical examiner is requested to complete the review of the case within 24 hours (whenever possible).
- The written review is returned to the Science Director. The review should indicate whether the reviewer concurs or non-concurs with the findings and why. The review may be in the form of an email.
- The review is retained as part of the case file. Any additional documentation regarding the review (e.g. an acknowledgement that changes are needed or are completed) is also retained as part of the case file.
- If the medical examiner feels that they cannot adequately evaluate a case based solely on the materials provided, they may request additional materials from the Science Director for clarification.
- Upon receipt of the review, the Science Director may address the concerns and suggestions raised. An electronic copy of the correspondence and, in some cases, a hard copy of the changes to the case packet, is maintained by DPAA.

When consultants are utilized, the following procedures apply:

- CIL casework nearing identification is submitted as an undated, unsigned MESR and all supporting finalized test reports (e.g. FAR, FOR, CXR, MER, message traffic, etc.) to a consultant for review.
- The Science Director, in consultation with Laboratory Management, determines the number of consultants needed based on the nature of the casework and the sensitivity of the case. For example, a case involving primarily dental evidence may be reviewed by two odontologists and an anthropologist, whereas a case involving a complex scene recovery and extensive anthropological testing in the CIL may be reviewed by two anthropologists and an odontologist.

Typical cases are reviewed by 1-2 reviewers, while sensitive cases and cases involving complex testing may be reviewed by more than two consultants.
- External reviewers are requested to complete their review within 72 hours (whenever possible) and to send a written review to the Science Director via Laboratory Administration. The review should indicate whether the consultant concurs or non-concurs with the findings and why. The consultant should also address, in detail, strengths and weaknesses that they perceive in casework.
- When a consultant feels that they cannot adequately evaluate a case based solely on the materials provided, they may request that the Science Director defer final action on the case until the consultant can visit the CIL and examine the evidence in person. Should the Science Director be unable to defer action, he may assign the case to another consultant.
- Upon receipt of the written review and comments, the Science Director and Laboratory Management address all of the concerns and suggestions raised. Individuals addressing external concerns and comments should initial and date the respective entries on the consultant's review. Cases receiving a non-concurrence by a consultant are re-evaluated and re-analyzed before being re-submitted for review.
- The dated reviews are added to the permanent case file and may be used as enclosures to the MESR.

2.2.2 **Independent Review:** Department of Defense Instruction 2310.5 (DODI 2310.07), Past Conflict Personnel Accounting Policy, establishes DoD policy for resolving the fate of missing personnel. Former versions granted families (through the designated PADD) of identified individuals the right of independent review prior to acceptance of the identification. The former policy included identifications made by the CIL. In the current version, independent reviews have been discontinued and thus no longer apply to the CIL.

2.3 **Revisions & Re-Peer Review of Reports & Analytical Notes:** External or internal peer reviews, and CFCs may result in revisions to test reports and/or analytical notes. Revisions may or may not result in the report and/or notes being re-peer reviewed.

Do not confuse revising reports with amending reports. The former is done for reports that are not yet released to the customer. Report revisions are less formal than amendments and are performed in accordance with the below guidance.

Reports are formally amended only after they are released to the customer. The report is formally recalled from the customer by Laboratory Management and amended in accordance with the guidance in DPAA Laboratory Manual, SOP 3.0 (Analytical Reports and Documentation). Amended reports may or may not be re-peer reviewed. The decision by Laboratory Management to re-peer review amended reports is in accordance with the below guidance.

Revised test reports and/or analytical notes are re-peer reviewed when:

- Tests are re-run with changed variables or parameters (e.g., FORDISC).
- New or additional tests are performed, regardless if the original analytical conclusions change or remain the same.
- Type items that are not already analyzed are added to material evidence cases. This does not apply to simple quantity changes of items already analyzed.
- Elements of biological evidence are added that may potentially change the results and/or conclusions.
- Significant problems are discovered with the original peer review, the qualifications or conduct of the peer reviewer and/or the peer review was not performed in accordance with this SOP.
- Decided by Laboratory Management.

Revised test reports and/or analytical notes are not re-peer reviewed when:

- Elements are added or removed from a skeletal inventory provided the change does not impact the analytical conclusions (e.g., non-diagnostic elements such as phalanges, ribs, etc.; elements that were not subject to testing).
- There are simple quantity changes in material evidence cases (see above).
- There are simple administrative adjustments and corrections (e.g., typos, grammar, formatting).

Revised test reports and/or analytical notes needing re-peer review are re-peer reviewed as follows:

- Only the portions that changed since the last revision are addressed.
- Use a fresh peer review checklist to document the current peer review.
- Maintain the same peer reviewer if possible and practical (see above).

Whether or not a test report and/or analytical notes undergo re-peer review, they are revised accordingly. Analytical notes are revised in accordance with the

guidance in DPAA Laboratory Manual, SOP 3.0 (Analytical Reports and Documentation).

When revisions are complete the revised portions of the test report and/or analytical notes are given a final management review by the appropriate Functional Area Coordinator. The Functional Area Coordinator annotates the original peer review checklist for revised reports and/or analytical notes not needing re-peer review. For re-peer reviewed reports and/or analytical notes, the Functional Area Coordinator annotates the fresh peer review checklist (see above). Once the management review is completed the revised report and/or analytical notes are re-checked for compliance by the Quality Assurance Section.

3.0 DOCUMENTATION: Internal peer reviews are documented using the instructions above. Additionally:

- Because these are discoverable documents, the phrasing in the peer review documents should reflect that of a professional.
- Since peer reviews are for the record, documentation should be of a permanent nature. Consequently, annotations should be made with permanent media (i.e., no pencil) on the appropriate record forms or draft reports. Post-it notes, scratch paper, etc., are not to be used.
- Peer review record forms and other pertinent documents should be completed, as appropriate, to include signatures and/or initials, dates of review, names of those involved in the review, etc.
- The results of all peer reviews are filed in the case file.

4.0 SURETY: The peer review process is subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

5.0 SAFETY: There are no safety considerations associated with internal peer review. Handling of remains, if necessary, is in accordance with the safety provisions outlined in DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program).

SOP 4.2: TRAINING, TESTS & CONTINUING EDUCATION

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 2 March 2017
Citation: DPAA Laboratory Manual, SOP 4.2

0.0 PRINCIPLE, SPIRIT & INTENT: *Training and continuing education is integral in maintaining the integrity of the scientific process and the professional standing of the CIL. All training should, at all times, be safe, realistic, relevant, effective, and of the highest standard* **(A4.2.3)**.

1.0 PURPOSE & SCOPE: This SOP outlines procedures for the implementation of CIL Staff training, testing, and continuing education. Training is balanced between the mission and opportunities and resources for continuing education **(A5.2.2)**.

The dynamic nature of the CIL mission gives rise to training and continuing education needs that cannot be anticipated and thus are not covered by this SOP. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

2.0 TRAINING: Laboratory Management and the Lead Quality Coordinator formulate the goals with respect to the education, training, and skills of CIL personnel, identify training needs, and allocate the resources needed for training. The training program is relevant to the present and anticipated tasks of the CIL. The effectiveness of the training actions taken is evaluated **(A5.2.2, SF5.2.2F-11)**.

Training covers areas of general skills and knowledge as well as specialized skills and tasks. The training required depends on the ability, qualifications, and experience of each individual and upon the results of monitoring of their performance**.**

Regardless of the type of training, it instills in the trainee a satisfactory knowledge of the requirements of the operations, investigations or analyses performed as well as the ability to make professional judgments as to compliance with general requirements using examination or investigation results and to report them thereon**.** Additionally, training should allow the analyst or investigator to understand the significance of deviations with regard to normal investigation and/or analytical processes**.**

Not all training events may be immediately recognized as such. However, any activity that results in an employee having greater skills and/or a broader understanding of their job (e.g., counseling, mentoring, maintenance of equipment, unit-wide meetings, proficiency testing, audit remediations) constitutes training. In short, any event can be exploited as a training opportunity if the employee learns. As such every employee is a potential trainer.

In more practical terms CIL training is broken down into various components, each with their own intent, goals, standards, and regimens. Altogether, formal responsibility for training is as follows:

- **Lead Quality Coordinator:** The Lead Quality Coordinator, with guidance from Laboratory Management, is overall responsible for training management. The Lead Quality Coordinator identifies training needs stemming from the results of other surety measures and devises, coordinates, and often executes said training. The Lead Quality Coordinator also works with the FSA, and Laboratory Management to ensure equity of training opportunities between personnel in Hawaii and Nebraska.
- **Forensic Science Academy (FSA) Director:** The FSA Director is responsible for select aspects of competency training for CIL Staff and FSA Fellows. To that end, the FSA Director ensures that an adequate written body of competency training program documentation is maintained and capable of supporting accreditations. This documentation should be accessible by Laboratory Management. Such documentation includes, but is not limited to:

    - Curricula.
    - Programs of Instruction (POI).
    - Lesson plans.
    - Syllabuses.
    - Assessment and grading criteria, standards, and protocols.
    - Training schedules.
    - Individual training records.
    - Performance counseling protocols and records.

- **Laboratory Director, CIL-HQ:** The Laboratory Director, at the request of the FSA Director and the Laboratory Managers, assigns trainers responsible for training individual members of the CIL Staff. Laboratory Directors in Hawaii and Nebraska also work together to ensure equity of training opportunities between the two locations.
- **Deputy Laboratory Director, CIL-HQ:** Also serves as the FSA Director to include signing training documentation.

- **Recovery Leader (RL):** The RL is responsible for training all recovery team personnel prior to and during each mission who have not deployed previously, or have had their expertise lapse in one or more areas. Further, the RL is responsible for determining which personnel at their recovery scene are competent to participate in recovery operations.

The various types of CIL training are as follows:

2.1 **Education:** The educational requirements for the CIL Staff are outlined and fulfilled during the hiring process. All hires arrive at the CIL possessing the requisite educational credentials and knowledge, skills and abilities to perform their duties.

Educational credentials, by duty position, are discussed in DPAA Laboratory Manual, SOP 1.1 (CIL Work Environment) **(SA5.2.6.1.1, SA5.2.6.1.5)**.

Should the CIL require a staff member to subsequently obtain additional educational credentials in order to perform existing or anticipated duties, the CIL assists the staff member in question in acquiring such education.

2.2 **Competency Training:** The Laboratory Director ensures the competence of all CIL staff (including CIL contract employees) who operate specific equipment, perform tests, evaluate results, and sign test reports. When using staff undergoing competency training, appropriate supervision is provided. Personnel performing specific tasks are qualified on the basis of appropriate education, training, experience, and/or demonstrated skills, as required **(A4.1.5g, A5.2.1, A5.2.3, A5.2.5, SF5.2.1F-10, SF5.2.5F-14a)**.

Unless excused by the Laboratory Director, all CIL Staff hired after 1 January 2001 undergo initial competency training on general and specialized skills, typically within their first six months at the CIL, prior to being allowed to exercise these skills unsupervised.

The intent of competency training is to familiarize personnel with the individual SOPs in the Laboratory Manual, as appropriate to the employee's job description, and to verify that they possess the appropriate knowledge, skills, and abilities needed to perform testing **(SA5.2.1.1),** including the relevant knowledge of the technology used.

Special projects and assignments may substitute as competency training for one or more SOPs upon approval by the Laboratory Director provided they meet the intent of competency training.

Housekeeping staff are contract employees hired by external sources, usually by Resource Management or the base contracting activity. Housekeeping staff are not subject to the Competency Program; however, they receive special training by Quality Assurance, prior to being allowed to perform duties in the CIL. Special training consists of the safety/security tour (see below), special instructions for working in evidence areas, and other topics, as appropriate. This training is documented in a memorandum and kept on file by Quality Assurance.

2.2.1 **General Regimen:** The training regimen for each SOP is included, by module, in the CIL Training Manual. Each regimen provides appropriate tasks, conditions, and standards for the subject matter being taught and may have additional training instructions included. The general regimen for competency training includes:

- All CIL Staff undergo training in the general areas with emphasis on CIL physical security, safety, quality assurance, and evidence handling, management, and security.
- The Laboratory Director, in consultation with the Laboratory Managers, designates the areas of specialized training required by individuals and develops and tailors specific training programs accordingly. The Laboratory Director may omit or modify tasks within modules based on a trainee's job description and/or expertise (e.g., evidence coordinators, interns, anthropologists who do not conduct osseous trace evidence).
- All involved with implementing the regimen ensure that the trainee is trained to standard. Trainers are appointed by the Laboratory Director for all individuals undergoing competency training. Qualifications to be a trainer include, but are not limited to:

  - Having subject matter expertise and requisite experience for the training topic at hand.
  - Competency certified in the topic being trained.
  - Free of adverse personnel actions.
  - Time to act as a trainer (i.e., no impending deployments or other major competing requirements).

- The training regimen for any given skill involves familiarization by the trainee with the applicable SOP through:

  - Self study.
  - Select one-on-one training with trainer(s). Typical training of this type includes:

  - Asking the trainer questions that arise through self study.
  - Familiarization with the applicable facilities and resources (e.g., safety/security tour).
  - Formal skills assessments by the trainer(s) for some topics.
  - Hands-on training with actual materials (e.g., teeth, bones, material evidence, casefiles), when applicable (see below).

- For any personnel whose job responsibility includes test report writing, the competency regimen include, at a minimum **(SA5.2.6.2.2)**:

  - Examination of sufficient unknown samples to cover the anticipated spectrum of assigned duties and to evaluate the individual's ability to perform proper testing methods.
  - A written test report (co-authored by a member of the CIL Staff) to demonstrate the individual's ability to properly convey results and/or conclusions and the significance of those results/conclusions.
  - Written and oral examinations to assess the individual's knowledge of the discipline, category of testing, or task being performed (see below).

- The trainee demonstrates competency in the applicable skill usually through passing a written test and/or hands-on practical (see below), followed by preparing one or more peer reviewed test reports, as applicable, with a member of the CIL Staff as co-author.
- The time required for training varies with the skill(s) being trained and with the prior training and experience of the trainee.
- Training is considered finished and competency awarded when the trainee has met the standards of the test(s) or practical exercise(s), the test report(s) successfully passes peer review (as applicable), and the Laboratory Director has signed the appropriate documentation granting competency certification (see below).
- Individuals failing to demonstrate competency in one or more skills (usually by failing select competency tests or practical exercises), or who remain in a trainee status for a given skill for an excessive period of time (determined by the Laboratory Director), may be subject to remedial training or, depending on the skills being trained, termination of employment.
- Upon completion of the training module the trainer evaluates the trainee's performance. The trainer recommends to the Laboratory Director that the trainee:
  - Be removed from trainee status and allowed to operate/perform procedures without direct supervision.
  - Continued on trainee status pending remedial training.
  - Be prohibited from performing the procedures.

- The Laboratory Director considers all recommendations and signs and dates **(A5.2.5, SF5.2.5F-14a)** the requisite documents to "certify" or deny certification of the individual, as appropriate. The training documentation is filed in the employee's Training and Development File. For remote operations and trace evidence analysis, competency certification authorizes the individual to perform unsupervised casework and peer reviews in the area where competency is awarded.

2.2.2 **Retention of FSA Competency:** FSA Fellows who obtain competency in a particular area while attending the FSA may retain competency in that area provided they:

- Graduate from the FSA with a grade of "B" or better.
- Accept employment and arrive at the CIL, within one year of graduating from the FSA.
- Obtain retention endorsement by the FSA Director and Laboratory Director.

In general, any retained competency exempts the individual from having to repeat the respective portions of the competency training program.

2.2.3 **Program:** The competency training program is divided into four modules as follows:

2.2.3.1 **Module 1 (General CIL Procedures):** Module 1 SOPs consist of those located in Part I of the Laboratory Manual and the Appendices (Part V). The proponent for Module 1 training is the Lead Quality Coordinator. All CIL Staff undergo relevant training in Module 1 using the above regimen.

Training typically is conducted over a period of several days, but the length of time necessary may vary. The training includes a safety/security tour of the CIL with emphasis on physical security, safety, and evidence handling, management and security.

2.2.3.2 **Module 2 (Remote Operations):** Module 2 SOPs consist of those located in Part II of the Laboratory Manual. The proponent for Module 2 training is the Laboratory Manager for Field Sciences. Persons designated to be RLs complete Module 2 training **(SF5.7.1F-44)**.

Trainers use the appropriate training manuals, training/mentoring guides, lesson plans, checklists, etc. to execute the training regimen for Module 2.

Prior to deployment, the trainer reviews with the trainee:

- Recovery scene procedures.
- Field evidence collection and management.
- Recognizing unusual situations and understanding significance of deviations with respect to a recovery scene (e.g., a staged scene).
- Report writing responsibilities.

Written competency tests on the appropriate SOPs are completed and passed by the trainee prior to deployment.

The trainee then undergoes training administered by the Laboratory Manager for Field Sciences, or his/her designee (usually the trainer); usually within 30 days of the trainee's arrival at the CIL. The results of the assessment result in two determinations:

1) If the trainee possesses the minimum essential skills to successfully perform remote operations for the CIL. If this is not the case a determination is made by Laboratory Management as to what remedial training, if any, is needed to correct the problem(s). If remedial training is deemed to be overly extensive and not cost effective, the trainee may be terminated from employment.

2) Provided that minimum essential skills are verified, further training, if needed, is then tailored to strengthen any trainee skills that may have been identified as weak or needing improvement.

The Laboratory Manager for Field Sciences, or his/her designee, is responsible for executing Module 2 individual and/or remedial training programs.

Recovery scene processing constitutes the practical exercise for Module 2 (see below).

For a brief period (about the first two weeks), the trainer leads the recovery effort, orientating the trainee to the process. The trainer then assumes the role of "assistant," allowing the trainee to function in the role of the RL. As RL, the trainee assumes overall responsibility for the recovery as detailed in the SOPs comprising Part II of the Laboratory Manual. During the recovery the trainer:

- Observe the trainee in the areas of:
  - Team leadership.
  - Overall recovery scene strategy.
  - Recovery techniques.
  - Note taking.
  - Evidence handling.
  - Interaction with local inhabitants and officials.
- Not intervene with the recovery efforts unless the integrity of the evidence or the recovery scene would be jeopardized by the failure to do so.
- Meet with the trainee regularly to discuss the progress and overall impressions of the recovery and to review the trainee's field notes.

The time spent on in-field training varies with the nature and setting of the recovery site and with the trainee's prior experience and training.

At the completion of the recovery scene practical exercise, the trainee is again assessed for minimum essential skills and an appropriate remedial training program instituted, if needed.

A memo is submitted by the field trainer to the Laboratory Manager for Field Sciences. The memo is unstructured but usually contains evaluations of strengths and weaknesses including, but not limited, to the areas observed, noted above, and any recommended remedial training.

As with the pre-deployment assessment, if remedial training is deemed to be overly extensive and not cost effective, the trainee may be terminated from employment.

Once any remedial training is completed, and the trainee's co-authored SAR(s) successfully clears peer review, competency in remote operations is awarded.

Trainers and the Laboratory Manager for Field Sciences, or his/her designee, ensure that training progress and completion of the training regimen is adequately documented throughout the training process.

2.2.3.3 **Module 3 (Trace Evidence Analysis):** Module 3 SOPs consist of those located in Part III of the Laboratory Manual. The proponent for Module 3 training is the FSA Director.

Individuals designated to perform trace evidence testing are trained in their major areas of expertise (e.g., forensic anthropology, odontology, material evidence, and/or life support testing).

Trainers use the appropriate training manuals, training guides, lesson plans, and checklists to execute the training regimen for Module 3.

Throughout the training process, trainers and the FSA Director ensure that training progress, recommendations, and completion of the below training regimen are adequately documented.

The following steps comprise competency training in trace evidence analysis:

Initial Training & Familiarization: Initially, the trainer reviews with the trainee:

- Relevant trace evidence testing procedures.
- The location of applicable reference materials and equipment.

Written Competency Test: At this point the trainee is administered, and must pass, written competency tests ("SOP Tests") on the appropriate SOPs.

Entrance Assessments (Osseous Trace Evidence Only): The FSA Director, or his designee (usually the trainer), administers an entrance assessment to each trainee (usually within 30 days of the trainee's arrival at the CIL). The results of the assessment result in two determinations:

1) That minimum essential skills are possessed by the trainee to successfully perform trace evidence casework in the CIL. If any skills are lacking, Laboratory Management determines what remedial training, if any, is needed to correct the problem(s) (see below).

2) Provided that minimum essential skills are verified, a remedial training program, if needed, is then tailored to strengthen any trainee skills that may have been identified in the assessment as weak or needing improvement.

Note: The FSA Director, or his designee, is responsible for executing all Module 3 individual remedial training programs.

Remedial Training: Regardless of the type of trace evidence training, trainees must successfully complete any remedial training before being allowed to progress to the next step in training.

Practical Exercise: The practical exercise (see below) involves an appropriate number of representative problems in a specific area (e.g., identification of dental remains by radiographic comparisons, determination of osseous from non-osseous material, sampling trace evidence for DNA). The trainer monitors the trainee as he/she works through the practical exercise.

For osseous trace evidence, the Laboratory Manager in charge of the osseous functional area administers and grades the competency practical.

Supervised Test Reports: Passing the practical exercise, and completing remedial training, if necessary, allows the trainee to prepare one or more test reports under the supervision of an analyst who also coauthors the report.

Recommendations & Awards: For all trace evidence areas, except osseous, once the trainee's co-authored test report(s) is successfully peer reviewed, competency training is completed and the appropriate competencies are awarded by the Laboratory Director.

For osseous trace evidence, the Laboratory Manager evaluates the results of the osseous practical and the peer reviewed report(s) and recommends to the FSA Director that osseous competency be awarded or denied. The FSA Director considers the Laboratory Manager's recommendation, as well as the overall performance of the trainee, and further makes a final recommendation to the Laboratory Director that osseous competency be awarded or denied.

If at any stage during the competency training regimen it is determined that remedial training is overly extensive and not cost effective, the trainers and FSA Director may recommend that the trainee be removed from competency training. The trainee may be further reassigned or terminated from employment. The final decisions are made by the Laboratory Director on a case-by-case basis after considering the totality of the circumstances.

2.2.3.4 **Special Training Instructions for DNA Sampling:** Training is spread out over three days **(SA5.7)**:

Day 1: The Trainee assumes the role of assistant, observing the trainer as he/she evaluates and prepares DNA samples for submission. The trainee assists in the:

- Preparation of chain of custody forms.
- Photography.
- Decontamination of the sampling area.

Day 2: The trainee assists in the actual collection of the DNA samples under the direct supervision of the trainer. This is considered the first hands-on practical exercise.

Day 3: The trainee assumes responsibility for evaluating and preparing DNA samples for submission. The trainer observes and assists the

trainee but does not intervene unless the integrity of the evidence is jeopardized. The final day of training constitutes a second hands-on practical exercise.

2.2.3.5 **Special Training Instructions for Histomorphological Testing:** Histomorphological testing is a specialized analytical technique that requires analysts to have specialized educational qualifications and extensive training.

The FSA Director in consultation with the Laboratory Director reviews qualifications and appoints histomorphological trainers and trainees from personnel within the CIL Staff having the requisite skills. In addition to the requirements specified above, competency training, to include the practical exercise, is tailored to the academic credentials, work and research experience, and the demonstrated ability of the trainee.

2.2.3.6 **Module 4 (Surety):** Module 4 SOPs consist of those dedicated to surety measures located in Part IV of the Laboratory Manual. The proponent for Module 4 training is the Lead Quality Coordinator. All CIL Staff undergo relevant training in surety procedures using the below regimen. Training is similar to that in Module 1, minus the safety/security tour.

2.3 **As Needed Training:** Occasionally, the need for as needed collective training is identified **(SF5.2.1F-10, SF5.2.2F-12)**. This usually occurs when:

- A major change to an SOP has been adopted.
- It is necessary to resolve or clarify confusion or conflicts in current procedures.
- A major safety or security violation has occurred.
- The positive work environment is threatened (e.g., in response to EO complaints).
- A systemic deficiency is identified through one or more surety measures that requires a training component to complete the corrective action (e.g., as part of an audit remediation).
- Unexpected contingencies that may arise (e.g., training on security and handling of classified documents after finding a classified document in a case file).
- Perishable skills need to be maintained **(SA5.2.1.1)**.
- Directed by the DPAA Director or Science Director.
- New regulatory guidance is issued by ASCLD-LAB or other applicable authority.

At the earliest opportunity, the Lead Quality Coordinator or Laboratory Management convene a training session consisting of as many relevant CIL personnel as possible. Makeup training may be required in person, or can be accomplished through email, chain teaching, or written products. The date and topic of training, the trainer, and those attending are recorded and filed in the appropriate individual and collective training files.

2.4 **Remedial Training:** Remedial training is individual training, usually already given to an individual, but again required, usually in response to errors in judgment or violations of procedure—especially those involving safety, physical security, and evidence security **(SA5.2.1.1, SF5.2.1F-10, SF5.2.2F-12)**. All remedial training is carefully documented.

While all attempts are made to improve an individual's performance through a remedial training, success is not guaranteed. Individuals failing to demonstrate rehabilitation after completion of remedial training may be reassigned or dismissed from employment.

2.4.1 **Off Site:** Remedial training may occur off-site (e.g., anger management, sensitivity training) and is usually in response to disrupting the positive work environment, or management directed as a result of other incidents or problems.

2.4.2 **Personal Improvement Plan (PIP):** PIPs are customized plans developed by a rating supervisor to correct one or more behaviors or deficiencies in the performance of a required job skill exhibited by a subordinate employee. The following procedures apply to PIPs:

- Developed by a rating supervisor with input from the employee.
- Address documented deficiencies in skills or work behavior and provides realistic benchmarks by which the employee and the supervisor may assess progress.
- Laboratory Management makes all reasonable resources necessary for improvement available to the employee.
- May involve referring the employee to outside training (e.g., college classes, workshops).
- PIPs are fully documented using the appropriate forms on the DPAA network and through attached MFRs, training records, and other documentation.

2.5 **Continuing Education:** This training, also called professional development, is part of the continuing education program (see below) and is aimed at the analyst or technician. The training is usually technically oriented and provided as opportunity arises. The most common form of this

training is presentations by CIL Staff members or visiting guest lecturers. This training is documented the same as the as needed training.

3.0 TESTING: Testing, as a part of training (not to be confused with the testing of evidence), gauges collective and individual levels of proficiency, the effectiveness of training, and the quality of existing written protocols. Ultimately, testing helps to maintain the integrity of all analytical work.

3.1 **Test Procedures:** Regardless of the type of examination, the following procedures apply:

- The Laboratory Director designates all examiners, both internal and external to the CIL.
- All tests have *a priori* answer sheets.
- Examinees are tested on the subjects and procedures relevant to their assigned duties. Thus, dentists are not tested on procedures for determination of site boundaries in the field and anthropologists are not tested on the techniques of radiographic comparisons of teeth.
- The Laboratory Manual, written notes from training, and other written references designated in the Laboratory Manual may be consulted while taking tests per the test instructions. The examiner makes the appropriate reference materials available during the test. Appropriate reference materials are those that would be typically available when performing the tasks being tested. Violations are considered a breach of the CIL Code of Ethical Conduct.
- Assistance from individuals, other than the examiner, is not authorized. Violations are considered a breach of the CIL Code of Ethical Conduct.
- The desirable result of a test is that no answers are given incorrectly. When answers are given incorrectly, the individual being tested must be provided the correct answer along with whatever explanation is deemed necessary by the examiner to insure that examinee understands the error.
- In the event of a test failure, the examinee is retrained and given another opportunity to take the test. Individuals who fail subsequent tests are subject to corrective action as specified in DPAA Laboratory Manual, SOP 4.0 (CIL Surety) and this SOP.
- To simplify the maintenance of training records and individual tracking, proficiency and/or competency expires at the end of the month of the following year in which the last test was finished. For example, if a proficiency test was completed on 16 November, proficiency is maintained in that area until 30 November of the following year.
- Testing histories (especially proficiency tests) must be documented in an individual's Training and Development File. The following administrative information, if applicable, must be present **(SA5.9.3.5)**.
  - Identity of the examinee.
  - Test title, version, and type. Specifically:
    - The title denotes the discipline being tested (e.g., Osseous Trace Evidence).
    - The version number is the calendar year (CY).
    - Subsequent versions of the same title prepared in the same CY are denoted by the CY, followed by decimal, and then a sequential number denoting the revision number (e.g., version 2001.0 represents the first proficiency test prepared in CY 2001 while version 2001.1 represents the first revision of the test prepared in CY 2001).
    - Tests types are denoted as the type of test (e.g., Proficiency Test, Competency Test). For proficiency tests, whether the test is internally or externally derived is denoted by placing the letter "I" or "E", respectively, in parentheses following the version number, e.g., 2001.0(I).
  - Date of the test.
  - Identity of the examiner.
  - How testing materials/samples were created or obtained.
  - Results of the test **(SF5.9.1F-48)**.
  - Originals or copies of all data and notes supporting the conclusions (full details of the tests and/or examinations undertaken and the results and conclusions obtained).
  - An indication that performance has been reviewed and feedback provided to the analyst. This is usually indicated by the examinee signing or initialing the appropriate acknowledgment block on the test **(SF5.9.1F-48)**.
  - Any remediation/corrective action taken, if necessary **(SF5.9.1F-48)**.

3.2 **Types of Tests:** The following types of testing occur in the CIL:

3.2.1 **General Competency Test Concepts:** In general, competency tests and hands-on practicals are usually internal examinations administered by a trainer to a trainee during and/or at the end of the competency training program (see above) in order to assess competency in a general or specialized job skill **(A4.1.5g, A5.2.1, A5.2.3, SA5.2.1.1, SF5.2.1F-10)**.

In addition to universal testing of the CIL Staff in Modules 1 & 4, the following CIL personnel,

regardless of academic qualifications and/or past work experience, must satisfactorily complete relevant competency tests prior to assuming casework responsibility. Specifically:

- All RLs and select CIL personnel deploying to, and examining, documenting, and processing, a recovery scene **(SA5.2.6.2.2)**.
- All analysts conducting casework testing in a discipline or sub-discipline **(SA5.2.6.2.1, SA5.2.6.2.2)**.
- Technical support personnel assuming independent responsibility for any task that could reasonably be expected to affect the outcome of any test reported by the CIL **(SA5.2.6.2.2)**.

3.2.2 **Written (SOP) Competency Test:** The following procedures apply to written (SOP) competency tests:

- Normally, Quality Assurance or the designated trainer administers the tests.
- The test format is multiple-choice.
- With the exception of FSA Fellows, tests are scored as either a *pass* (60% or greater correctly answered) or *non-pass* (less than 60% answered correctly). FSA Fellows are scored on a numerical/letter grade basis (i.e., A, B, C, D, or F).
- Each test representing a SOP is assigned an independent grade rather than the tests being collectively graded by module or modules. In other words, there is one grade per tested SOP (e.g., SOP 1.3 passed with 90%, SOP 1.4 passed with 100%, SOP 1.8 failed at 55%).
- Records of an individual's competency test results are maintained in the trainee's Training and Development files. In addition to the above information, the SOPs tested are indicated.

3.2.3 **Competency Practical:** A competency hands-on practical exercise must be satisfactorily completed for select specialized skills in both remote operations and trace evidence testing prior to the individual being allowed to perform duties in those areas (see above) **(A4.1.5g, A5.2.1, A5.2.3, SA5.2.1.1, SA5.2.6.2.1, SA5.2.6.2.2, SF5.2.1F-10)**. The competency practical is designed to establish proficiency for the first year of employment. It differs from a proficiency test in that multiple relevant tasks are subject to examination.

The competency practical exercise for remote operations consists of the trainee processing an actual recovery scene in accordance with applicable SOPs. The fieldwork is written into an SAR report that is co-authored and co-signed by the examinee and examiner **(SF5.2.2F-11)**. Tasks that cannot be evaluated during a particular recovery mission can be done at the CIL using appropriate testing materials.

Competency practical exercises for trace evidence testing may utilize pre-established testing materials, actual casework evidence, or a combination of both. When the practical involves evidence, Laboratory Management may opt to have the examinee treat the practical as actual casework and analyze the evidence in accordance with applicable SOPs. In such instances, the casework is written into a trace evidence test report that is co-authored and co-signed by the examinee and examiner **(SF5.2.2F-11)**.

Trace evidence tasks that cannot be evaluated using actual case evidence (e.g., no reconstruction was needed) can be done in the CIL using appropriate testing materials. In such cases the competency practical is administered using the general testing provisions (see above) and those for internal proficiency testing.

As with the written competency tests, competency practicals for FSA Fellows are scored on a numerical/letter grade basis. Competency practicals for non FSA Fellows are graded on a pass/fail basis.

In instances where an actual trace evidence or SAR report is written, the report is subjected to peer review in accordance with DPAA Laboratory Manual, SOP 4.1 (Peer Review). The report must successfully clear peer review for competency certification to be awarded. Since peer reviewers cannot have a standing in the case, the trainer, as co-signer, cannot peer review the report.

3.2.4 **Proficiency Testing:** Proficiency testing is a surety measure consisting of an annual examination administered to an analyst or technician who has previously demonstrated competency in a specialized job skill. Proficiency tests are designed to verify that individuals have maintained sufficient minimum skills to perform the tasks they are assigned **(SA5.9.3)**. As such, a proficiency test is a "spot check" on skills.

Proficiency tests may be classified as either internal or external (i.e., one prepared and administered by the CIL, or one that is obtained from an external agency, respectively).

The Laboratory Director is overall in charge of the CIL Proficiency Test Program. He may delegate select decisions regarding proficiency testing to the Laboratory Director at CIL-OF. The Proficiency Test Program is regularly reviewed (usually during the annual audit [see DPAA Laboratory Manual, SOP

4.3 (Audits)]) and corrective action taken, if needed **(SF5.9.1F-48)**.

The following general rules and procedures apply to administering proficiency tests **(SA5.9.3.1, SA5.9.3.2)**:

- **Scheduling:** Proficiency test scheduling is as follows:
  - The CIL strives to maintain a four year proficiency test plan **(SF5.9.1F-49)**.
  - Test scheduling is inextricably linked to competency certifications. Quality Assurance keeps current roll up records of all competency certifications and the resulting proficiency test schedules. Quality Assurance at any time should be able to report to Laboratory Management the status of individual and collective competency and proficiency.
  - Employees incur proficiency testing responsibilities as a result of competency certification. Newly competency certified employees take a proficiency test in their respective certified areas as soon as the proficiency test is available regardless of the date of certification. For example, an employee certified in material evidence in November 2012 takes the proficiency test in December of 2012.
  - Employees in competency training status are exempt from taking proficiency tests in the area undergoing competency training.
  - Each employee producing test results must **successfully** complete at least one internal or external proficiency test per calendar year in his/her certified discipline(s) (i.e., trace evidence, recovery scene). Proficiency is considered current if it has been demonstrated successfully within the last 12 months. Personnel who have not proficiency tested in over 12 months are returned to a trainee status and must re-establish competency **(A5.9.3.3)**.
  - Each employee engaged in testing activities must successfully complete at least one proficiency test during each five-year accreditation cycle, in each category of testing appearing on the CIL's Scope of Accreditation, in which the individual performs testing **(SA5.9.3.3.2, SF5.9.1F-49)**. In other words, an employee performing osseous, material evidence, and histological analysis has to test in all three sub-disciplines within the accreditation cycle.
  - Although proficiency testing is largely accomplished in December, testing may occur at any time during the calendar year. Employees who are taking extended leaves of absence (e.g., for degree completion), and whose proficiency will lapse during the absence, must arrange with Laboratory Management and the Lead Quality Coordinator to take the requisite proficiency test(s) prior to departure.
- **Format:** Proficiency test formatting is as follows:
  - The test format is a hands-on practical for specific skill areas (e.g., trace evidence-osseous, estimation of age)
  - Proficiency tests can utilize replicate tests, using the same or different methods, or retesting of retained items **(A5.9.1c, A5.9.1d)**.
  - The test is formatted as pass/fail. See below for additional grading instructions.
  - The test format consists of two parts (usually on a separate page), both containing administrative information (see above).
  - The first part is instructions for the examiner and examinee. Included in the instructions are:
    - Task: the task being tested (e.g., estimation of stature) **(SF5.9.1F-48)**.
    - Condition(s): listing the conditions for taking the test (e.g., in a field environment, test materials used, relevant SOPs and/or methods)
    - Standard: the standard that must be achieved (e.g., Stake A is determined to be the datum, stature = 5'4" +/- 2.5").
    - Sometimes a Background Information and Additional Instructions section may be included on the test, as appropriate.
  - The second part is a grade sheet for the examiner including:
    - Indicators that the standards were met or not met (usually a yes/no check block).
    - The standard(s) that must be met.
    - A signed statement from the examinee that they received feedback concerning their performance on this examination **(SF5.9.1F-48).**
    - Comments.
- **Formulation:** Proficiency tests are formulated as follows:
  - Whenever possible and practical, the proficiency test should be formulated to tie in to training or performance gaps identified through other surety measures such as peer review, competency training, audits, etc.
  - Proficiency tests are normally tied to one type of analytical task (e.g., stature determination, re-location of a datum point, formulating a dental identification opinion, etc.). The task should be analytical in nature. Non-analytical tasks may be

added to the proficiency test. For example, properly opening and sealing an evidence container when retrieving the test materials. However, since tangential tasks are non-analytical the test should not be graded based on their outcome.
- The CIL's own documented test procedures are used **(SF5.9.1F-48)**. Tasks that are not outlined, specified, or otherwise supported by CIL Laboratory Manual, Desk Guides, or external references found in DPAA Laboratory Manual, Appendix 5.0 (References) are not used to formulate proficiency tests.
- Proficiency tests are formulated and documented in a manner that makes them fully traceable. In other words, in the future, a trainer should be able to set up, administer, and grade the test from the instructions and information contained solely in the test. Items such as dental charts, photos, etc. should be scanned and imported into the test document. The following items should be recorded either in the test instructions or answer sheets, as appropriate:

  - Administrative information (see above).
  - Test materials (e.g., anatomical exemplars by specimen number, photos, dental charts).
  - Critical measurements.
  - Datum point(s) and other field locations.
  - Azimuths and distances.
  - Instruments and equipment used.
  - Desired result(s).
  - Any other relevant information.

- Anyone on the CIL Staff may be tasked to formulate an internal proficiency test. The test should be submitted to Laboratory Management, as appropriate, and the Lead Quality Coordinator to be checked for adequacy prior to administering the test. The Lead Quality Coordinator has numerous examples of past proficiency tests that can be used as models to formulate a new test.
- All proficiency tests are placed under the CIL Document Control System in accordance with DPAA Laboratory Manual, SOP 4.0 (Surety) prior to their administration. Uncontrolled tests are not used.

- **Administration:** Proficiency tests are administered as follows:

  - For objectivity, only one examiner should administer a particular proficiency test subject (e.g., osseous, dental) during a testing cycle.
  - The examiner safeguards the testing materials and equipment, and the overall security of the test. Actual or suspected compromises of the test are immediately reported to the Lead Quality Coordinator and/or Laboratory Management.
  - The examiner administers proficiency tests in a suitable location, as appropriate.
  - Non-substantive assistance is allowed during a proficiency test (e.g., holding the end of a tape measure, holding a stadia rod, etc.) provided the assistance in no way conveys the test answer, offers an unfair advantage to the examinee, and is made available *a priori* to all examinees. Such assistance should be noted in the testing record.
  - Examinees who have taken the test are not to discuss the test with other members of the CIL Staff other than the examiner, Laboratory Management or the Lead Quality Coordinator, as appropriate. Violations may be considered a breach of the CIL Code of Ethical Conduct.

- **Grading:** Proficiency test grading is as follows:

  - Analytical notes and/or any other documentation are attached to the test, as appropriate, and reviewed by the examiner for sufficient detail given the analysis performed as well as the results and conclusions obtained**.**
  - The test is scored as either a pass (all required standards for that skill achieved) or non-pass (one or more required standards for that skill not achieved) on the answer sheet.
  - If a standards block on the answer sheet is checked as not met, the test is failed and corrective action procedures (see below) must be followed. It is improper to change a failed standard to pass as a result of minor feedback or counseling. If minor correction or counseling, not reaching the level of failure, is all that is required to pass the examinee, the block should be checked as a pass and the counseling or correction annotated in the Comments section of the answer sheet.

3.2.4.1 **Special Instructions for External Proficiency Tests:** The CIL participates annually in at least one external proficiency test for each discipline of forensic science in which it provides services **(SA5.9.3.4)**. In addition to the above considerations, the following procedures apply:

- The Laboratory Director selects the external examiners.
- The Laboratory Director selects individuals to take external proficiency tests in the areas of recovery scene processing and trace evidence testing, to include appropriate persons to sample DNA from osseous and dental materials.
- Accreditation body approved test providers are used where available. Whenever approved test

providers are not available, the CIL locates and uses a source of an external test in the discipline. Usually, the external examiner brings the appropriate test samples and materials **(SA5.9.3.4, SF5.9.1F-49)**.

- External tests are vetted though Laboratory Management and the Lead Quality Coordinator to be checked for adequacy prior to being used in the CIL.
- Once external tests have been administered using the above guidance, they may be used subsequently for internal testing provided the test materials are retained by the CIL and approval is gained by Laboratory Management. If an external test is utilized as an internal test, the general and special provisions for internal testing fully apply. The examiner or Quality Assurance representative annotates on the test sheets that the proficiency test is converted from an external test to an internal test

3.2.4.2 **Special Instructions for Internal Proficiency Tests:** Internal proficiency tests are administered annually in the same manner as the external tests except that internal examiners, samples, and testing materials are used. Additionally:

- Persons who complete an external proficiency test in a given area in a particular year are not required to take the corresponding internal version.
- Externally tested individuals typically test the internal examiners in the respective area. Although this chain of progression is desirable, it is not required.
- The Laboratory Director can authorize postponement of the internal tests for select individuals under exceptional circumstances. Waivered individuals must complete their tests at the earliest opportunity.
- When possible, the tests can be administered to multiple individuals simultaneously for sake of efficiency.

3.3 **Problems Exposed Through Testing:** Specific problems may be discovered during testing that may directly and adversely affect the integrity of either the evidence or the analytical results. Failures fall into three categories. Specifically:

- Test failures occurring from procedural, technical or other systemic problems (i.e., the examinee performs the procedure correctly but does not obtain the desired results) are reported to the Lead Quality Coordinator immediately upon discovery. If the problem is verified, the Lead Quality coordinator reports the matter to the Science Director. All work in the suspect area is suspended until Laboratory Management can further investigate and resolve the problem. These corrective action procedures are further discussed in DPAA Laboratory Manual, SOP 4.0 (CIL Surety).
- Test failures due to lack of individual proficiency result in the appropriate remedial training (see above). Mistakes that do not directly and adversely affect the integrity of either the evidence or the test results (e.g., failure to initial each page of notes)—while requiring remediation—do not constitute grounds for failing the applicable portions of the proficiency test. Typically, problems of this nature become significant only if demonstrated to be systemic which are then handled as described above. When in doubt, the examiner should consult with Laboratory Management and/or the Lead Quality Coordinator before failing an individual on a proficiency test.
- Test failures due to a problematic or inadequate test are reported immediately to the Lead Quality Coordinator and Laboratory Management. If possible and practical, the test is adjusted and administered as a different version number. The Laboratory Director may allow the examinee to retest on the subsequent version, usually without prejudice.

Regardless of the type of failure, the investigation, including the cause analysis, and any corrective action, is fully documented. Corrective action in the form of a PIP (see above) or other remedial training is documented in accordance with the provisions of this SOP. Documentation for corrective action other than training (e.g., fixing a problematic test) is maintained by the Lead Quality Coordinator.

4.0 CONTINUING EDUCATION: Continuing education (also called professional development) covers development and maintenance of general skills within the employee's career field (e.g., anthropology, odontology) as well as the acquisition of new and specialized knowledge and skills, especially those relevant to employing relevant new technology **(SF5.2.1F-10, SF5.2.2F-12)**. In addition to advancing the technical capability of the CIL, continuing education is an essential component to employee job satisfaction, morale, and the maintenance of a positive and productive work environment.

Laboratory Management is committed to assisting employees in developing and realizing their personal and continuing education goals. All CIL Staff are expected to strive to develop personally and professionally to include **(A5.2.1, A5.2.2)**:

- Completion or attainment of academic degrees.

- Certification by professional boards.
- Acquisition of new skills.
- Recognition within the applicable professional community.
- Publication of research (especially research conducted at the CIL).
- Attending appropriate coursework, professional meetings, and seminars.

The identification of continuing education and professional development training needs for each person should normally take place at least once per year, usually in conjunction with the employee's annual evaluation and/or interim performance assessments and reviews. These events should result in documented plans for further training or a statement that further training for the individual is not needed during the present evaluation period.

Various aspects of the CIL Continuing education Program are detailed below:

4.1 **Continuing Education (External):** Anthropologists, odontologists, historians, and technicians are expected to maintain a professional standing within their respective areas of training. The CIL is committed to assisting individuals in fulfilling their continuing education (CE) and training needs**.** It is the responsibility of the individual to:

- Convey external CE requirements to Laboratory Management.
- Devise and implement a professional-development program tailored to their individual needs and interests in conjunction with Laboratory Management.

4.1.1 **Odontologists:** Typically, odontologists are required to complete a minimum number of hours of external CE to maintain their credentials and licensing.

4.1.2 **Anthropologists:** Typically, anthropologists are not required to complete a minimum number of hours of external CE to maintain their credentials. Anthropologists are, however, urged to seek credentialing in applicable anthropology and forensic organizations (e.g., ABFA, ABC, ABMDI) and expected to take advantage of CE possibilities whenever possible (e.g., AAFS workshops).

4.1.3 **Technicians & Support Personnel:** Support and technical personnel are urged to take advantage of CE possibilities whenever possible (e.g., DoD and Navy sponsored workshops).

4.2 **Continuing Education (Internal):** The Scientific Staff is also required to maintain currency in their respective field(s) through ongoing internal continual education. Refer to the table and provisions outlined in Annex A (Reporting Continuing Education) for calculating and reporting continuing education hours.

CE hours are self tracked through the evaluation year (EY) with an eye toward annual evaluations of the staff. At the turn of the EY an itemized list of an individual's CE hours is included in their Training and Development File. The breakdown of the hours should parallel the table in Annex A.

4.3 **Attendance at Professional Meetings**: Regular attendance at professional meetings is another key component in maintaining status in the scientific community as well as in personal career advancement. The CIL is committed to supporting meeting attendance with time and resources; however, it is the responsibility of the individual, in conjunction with Laboratory Management, to effectively balance meeting attendance with work assignments.

The CIL supports attendance at two professional meetings per calendar year. The following procedures apply:

- The choice of meetings lies with the individual staff member but is subject to approval by Laboratory Management.
- Meetings should be directly applicable to the job duties of the staff member and the mission responsibilities of the CIL. Laboratory Management strongly encourages members of the Scientific Staff to attend the American Academy of Forensic Sciences (AAFS) meeting as one of their two supported meetings.
- At least one of the two meetings must be a national meeting of one of the principal professional organizations in forensic science (e.g., AAFS), odontology, physical anthropology, or archaeology.
- Scientific Staff also are expected to present a poster or paper at one of their two meetings. If the staff member attends one national and one regional meeting, the paper or poster must be presented at the national meeting.
- Laboratory Management may waive the presentation requirement in lieu of board examinations or similar time-intensive professional activities.

4.4 **Research & Publication**: The Scientific Staff is encouraged to maintain an active level of research

and to promulgate the results of research in applicable professional journals and meetings.

Presentation or publication of ongoing research is an important component in maintaining professional status in the scientific community—both for the individual staff member and the organization as a whole. The CIL is committed to supporting research with time and resources; however, it is the responsibility of the individual, in conjunction with Laboratory Management, to effectively balance case assignments with research requests.

Additionally, Laboratory Management oversees CIL research presentations and publications for the following reasons:

- Some case related material is sensitive in nature.
- Some case related materials may be subject to on-going litigation.
- Presentations are factored into performance evaluations (e.g., CE credits) and resource allocation.
- The reputation of the CIL and its members are directly affected by presentations or publications of any individual member of the staff.

Consequently, members of the CIL Staff must notify Laboratory Management of their intent to give a presentation or publish material when said material is:

- DPAA related.
- Funded or supported by the DPAA.
- Being presented or published at DPAA expense.

The Science Director retains the right to restrict or limit the presentation or publication of case related information as well as the results of research funded, or otherwise supported, by the CIL. The intent of this policy is not to impose censorship, but rather to provide a mantle of security to the professional reputations of individual CIL members.

Publication rights are managed in accordance with Annex B (Publication Rights) to this SOP.

4.5 **Trial Testimony:** The CIL periodically offers individual or collective training on effectively conducting trial testimony. Trial testimony training and performance evaluation is discussed in DPAA Laboratory Manual, SOP 1.8 (Consult Case Management) **(SF5.2.2F-13)**.

4.6 **Fellowships:** The Oak Ridge Institute of Science and Education (ORISE) Program is the DPAA's primary fellowship program. This program is discussed in the DPAA Laboratory Manual, SOP 1.1 (CIL Work Environment). Each fellow is assigned a mentor who is usually a member of the permanent CIL Staff. Typically, mentors supervise and provide feedback on participant's work, advise them on, and monitor, their research, and complete counseling and evaluations of their progress as needed. Mentors also track daily participant activity. Annually, each mentor recommends to the Laboratory Director that the participant's fellowship be renewed or terminated.

In addition to their prescribed CIL duties, CIL fellows are expected to develop an independent research project. Typically, the research should be related to the DPAA mission. The research proposal should be presented within three months after arriving at the CIL with a progress report every 6-9 months. This is only a guide, since field and casework responsibilities may prevent adherence to a firm schedule.

The ORISE research committee reviews proposals and their possible funding by the DPAA. The committee can approve, disapprove or send the proposals back for revision, as appropriate. ORISE participants are strongly encouraged to publish or present their results at professional meetings.

4.7 **Internships:** The CIL offers paid and non-paid internships to qualified individuals. A member of the CIL Staff serves as Intern Program Coordinator (IPC) as an additional duty. The IPC advises Laboratory Management on issues pertaining to the internship program, addresses routine matters related to it, and works with interns and intern candidates on all matters relevant to the internship program.

The Laboratory Director tailors the security access, competency training/certification, etc. of the intern to the nature of their work, as appropriate. As a minimum, all interns must successfully complete select portions of Modules 1 and 4 of the competency program. Further specialized training may be required depending on the nature of their work **(A4.1.5f)**.

The internship program is discussed in detail in Annex C (Guide for the CIL Internship & Volunteer Program) of this SOP. The provisions of Annex C may be extended, as appropriate, to visiting scientists, non-ORISE fellows, and other individuals whose work at the CIL may be of a temporary or transient nature.

4.8 **Visiting Scientists:** Scientists may be invited to visit the CIL to contribute to its scientific mission and to provide training opportunities for the staff. The

FSA Director is the overall proponent and coordinator of the Visiting Scientist Program. The Visiting Scientist Program includes all guest speakers.

Visiting scientists must possess the appropriate academic and professional credentials and a body of work that warrants speaking on the topic of invitation. When a visiting scientist is being considered for a visit to the CIL, and prior to extending a formal invitation to, comply with the following guidance:

- Requests and referrals to participate in the Visiting Scientist Program are forwarded to the FSA Director. Forward the following information to the FSA:
  - The point of contact (POC) for the requester, including phone number and email.
  - Visiting scientist's/guest speaker's name and POC information.
  - Proposed date(s) of visit.
  - Visitor's institution affiliation (e.g., university, laboratory).
  - Topic to be researched or presented, or training to be provided.
  - Where the research/training is to take place (e.g., CIL-HQ, CIL-OF, CIL-PH/FSA).
- Official invitations extended to non-U.S. citizens require coordination with J5. The FSA typically handles coordination. The information provided to Policy, Plans & Strategy includes:
  - Name.
  - Country of origin.
  - Passport number.
  - Length of stay.
- Once the request is received at the FSA it is forwarded to Top Management for approval. If CIL funding is needed, the FSA notifies Laboratory Administration.

Once approved by Top Management and confirmation of available funds, the requester is notified and a formal invitation is forwarded to the visitor. Formal invitations may require a Letter of Invitation. These are typically arranged through Laboratory Administration or the FSA. The requester inviting the visiting scientist is responsible for:

- Sponsoring the visiting scientist or guest speaker.
- Arranging base access through the appropriate base, DPAA, and CIL security coordinators.
- Reserving classroom space or a conference room for training and presentations.
- Arranging guest transportation and/or providing directions on how to get on base and to the training site.
- Arranging any competency training, security briefings, etc. once the visitor arrives. The Laboratory Director or his representative tailors the security access, competency training/certification, etc. of the visiting scientist to the nature of their visit, as appropriate. Further specialized training may be required depending on the nature of the visit and work/training being performed **(A4.1.5f)**.

4.9 **CIL Library:** The CIL maintains a Library designed to assist its staff with casework, research, and continuing education **(SA5.2.7)**. A member of the CIL Staff is designated as the Librarian as an additional duty.

The Library is divided into specific subject areas (e.g., odontology, anthropology) including shelves for accreditation material, equipment user manuals **(A5.5.3),** and DPAA Laboratory Manual references. The accreditation shelves are numerically arranged by SOP. As a matter of convenience, some Library material may be on loan, on a semi-permanent basis, to other areas of the CIL (e.g., material evidence references in the material evidence lab at CIL-PH).

Regular perusal and reading is an integral part of continuing education. Accordingly, shelves are dedicated to new material coming into the Library. Occasionally, Laboratory Management, through email or announcements at the staff meetings, may direct the staff to read recently published material. In such instances Quality Assurance or the Librarian ensures that the appropriate material is made available to the CIL Staff by placing the item(s) on a shelf in the Library for a designated period of time.

Any member of the CIL Staff can recommend acquiring a new title for the Library. The request is given to the appropriate member of Laboratory Management for review. If approved, the request is forwarded to the CIL Support Coordinator who then orders the title.

Accountability of Library materials is extremely difficult to maintain. Borrowers should utilize the place-cards in the Library to indicate Library items in use. Aside from facilitating accountability, using the systems is considered to be common courtesy since it assists analysts in locating materials that may be in the possession of others. The Librarian should periodically inventory the stacks (a 10% per month line item inventory is recommended) and attempt to locate/re-order missing items.

4.10 **Other Mandated Training:** Training for all or part of the CIL Staff may be mandated by outside agencies such as ASCLD-LAB. Training of this nature may include the application of ethical practices in forensic sciences, a general knowledge of forensic science, and applicable criminal and civil law and procedures **(SA5.2.1.3)**.

5.0 DOCUMENTATION: Quality Assurance maintains documentation of all non-FSA training, testing, and continuing education, via Training and Development Files for each individual in the CIL **(A5.2.5, (SF5.2.5F-14c)**. Records should be sufficiently detailed to provide evidence that staff members performing particular tasks have been properly trained and that their subsequent ability to perform these tests has been formally assessed **(SF5.2.5F-14b)**. The files contain the following sections:

- Personal (*curriculum vitae*, job description **(A5.2.4, (SF5.2.5F-14d)**, etc.).
- Competency (competency training records and tests, by module). Competency records should be sufficiently detailed to provide evidence that the individual has been properly trained and their ability to perform their tasks was formally assessed **(SF5.2.5F-14a)**.
- Proficiency (proficiency test records).
- Continuing education (workshops, college courses, etc.) **(SF5.2.5F-14d)**.
- Miscellaneous (Trial Appearance Evaluation Log, miscellaneous training documents, etc.).

Internal collective training is documented and maintained in a binder by Quality Assurance. Documentation largely consists of the attendance rosters signed by those attending the training. Copies of these are also filed in the individual's Training and Development File.

Individuals are responsible for forwarding copies of any external training to Quality Assurance for inclusion into their file.

Testing histories are documented using the above guidance.

Training records, to include proficiency testing records, are retained not less than one full accreditation cycle **(SA5.9.3.6)**.

6.0 SURETY: The provisions of this SOP are subject to internal and external audits in accordance with DPAA Laboratory Manual, SOP 4.3 (Audits).

Additionally, the Lead Quality Coordinator, Laboratory Directors, FSA Director, and other members of Laboratory Management, should periodically conduct management reviews to ensure that training, testing, and continuing educations remains congruent and equitable between CIL locations in Hawaii and Nebraska.

7.0 SAFETY CONSIDERATIONS: Safety considerations are commensurate with those in the SOP being trained. For training on topics outside the scope of the Laboratory Manual, DPAA Laboratory Manual, SOP 1.4 (CIL Safety Program) should be consulted.

Annex A (Reporting Continuing Education)

CE Type	"Hours"	Total
MEETINGS		
Premier Meeting (AAFS, SAA, SMH, etc.)		
Attendance	25	
Presentation	8	
Workshop (taken)	Actual Hours or CE Credit	
Workshop (presenter)	2X CE Credit	
National/International Meeting		
Attendance	20	
Presentation	8	
Workshop (taken)	Actual Hours or CE Credit	
Workshop (presenter)	2X CE Credit	
Regional Meeting		
Attendance	10	
Presentation	4	
Workshop (taken)	Actual Hours or CE Credit	
Workshop (presenter)	2X CE Credit	
EDUCATION		
In-House [CIL] Training Attendance Presentation	Act. Hrs. (Rd to Nearest 30 min) 2X Act. Hrs. (Rd to Nearest 30 min)	
Lecture (Univ. Colloquia, Brown Bag Lunch, etc.) Attendance Presentation	Act. Hrs. (Rd to Nearest 30 min) 2X Act. Hrs. (Rd to Nearest 30 min)	
Journal Study [Self]	1 per Month	
Board Examination		
Passed	50 (Must Produce Certificate)	
Not Passed	25	
University Course (Taken or Taught)	15 per Credit Hour	
On-Line Course	Actual Hours or CE Credit	
DoD Course	Actual Hours or CE Credit	
Short Course (<2 Weeks)	4 per day or CE Credit	
Other Course (Approved by Supervisor & Laboratory Director.)	40-50	
PhD Award (Upon Defense of Dissertation)	50	
Other Education (Approved by Supervisor & Laboratory Dir.)		
PUBLICATIONS		
Journal Article		
National	10	
Regional	5	
Book Chapter	10	
Book/Monograph		
Author	50	
Editor	25	
Publication Review (Flat Rate)	2	
Other (Approved by Supervisor & Laboratory Director)		
RESEARCH (Approved by Supervisor & Laboratory Director)	0-50	
OTHER (Approved by Supervisor & Laboratory Director)		
	TOTAL	

Rules: The following rules are applied when awarding CE hours:

- **General:**
  - CE hours, events, and goals, and related issues should be discussed on a continuing basis by the individual with their supervisor. All CE activity is ultimately subject to approval by the individual's supervisor. Pre-approval of events that are non-routine in nature is required (a routine event would be In-House [CIL] Training).
  - CE participation and events should support the mission, goals and objectives of the CIL.
  - CE participation and the awarding of hours are based on fiscal year and hours are not normally retroactive. However, in some instances where the event or activity is protracted (e.g., research, dissertation writing, university course) awarding hours incrementally may be approved by Laboratory Management.
  - When CE hours or credits are awarded by the sponsor of a workshop, short course, university course, on-line course, or similar event, these are used toward CIL CE rather than the actual hours. When CE hours or credits are not formally awarded, actual hours are used instead at the discretion of the Supervisor.
  - Apportionment of hours for CE events involving multiple individuals, such as presentations and workshops, publications, and research, is at the discretion of the individuals involved. If said individuals cannot reach a consensus, apportionment is determined by Laboratory Management.
  - In general, awarding an average score for CE is based on three CE events: 1) Attendance at a premier meeting, 2) Journal Study, and 3) Attending Internal CIL Training. Laboratory Management feels that if these are accomplished, the individual has fulfilled the minimum CE requirements for the annual rating cycle.
- **Meetings:**
  - A premier meeting is a meeting that is most applicable to the functional area duties performed by the individual. For example, premier meetings for anthropologists and odontologists are usually the Annual AAFS meetings while for archaeologists it may be the SAA meetings. Attendance is contingent on availability of the individual. If an individual is deployed or otherwise supporting DPAA mission requirements, the individual and his/her supervisor may make alternate meeting arrangements.
  - Presentations include posters, papers, or similar product. Workshops are as defined by the professional organization sponsoring the meeting and must comply with the sponsor's criteria and standards.
- **Education:**
  - In-House [CIL] Training: Training is rounded to the nearest half hour with the minimum being 0.5 hours. In other words, 13 minutes of training, for example, cannot be rounded down to zero. Presenters are awarded 2X the number of hours of the training, rounded accordingly.
  - Lecture Attendance & Presentation: Laboratory Management generally does not consider the lecture topic when approving lecture attendance. Topics, however, should have some relevance to the mission, goals, and objectives of the CIL, however remote. Hours are awarded for actual lecture attendance only, rounded accordingly. Commuting time to lecture events away from the CIL does not count toward CE hours. DPAA "All Hands Meetings," CIL Staff Meetings, and similar events do not constitute lecture attendance. Lecture presenters are awarded 2X the number of hours of the training, rounded accordingly.
  - Board Certification: The board certification must be a national certification (e.g., ABFA, ABFO). Lesser hours may be awarded for other certifications at the discretion of Laboratory Management. The diploma, certificate, or equivalent documentation must be presented before hours are awarded. Hours may be awarded incrementally--25 in one FY and 25 in the next is usually the norm. Incremental awarding of hours must be pre-approved by the supervisor and the Laboratory Director. 50 hours is the cap. In other words, if a person takes the board exam twice and fails, and passes on the third try, 50 hours (rather than 75) is the maximum awarded
  - University Course, On-Line Courses and/or DoD or Similar Government Courses: The courses must have relevance to the individual's duties at the CIL and/or be in the best interest of the CIL. The diploma, certificate, or equivalent documentation must be presented before hours are awarded. Recurring DoD courses such as SERE, Information Awareness, etc. are not considered for CE hours.
  - Short Course: Short courses are usually intensive topic specific training programs of less than two weeks (10 working days) duration. Examples of short courses include Death Investigator's Courses, Forensic Photography Courses, ASCLD-LAB International Program

Assessors Course, etc. The diploma, certificate, or equivalent documentation must be presented before hours are awarded. CIL competency training, pre-deployment training, etc. are not considered short courses.

- PhD Dissertation: Defense of the PhD dissertation is considered separately from its related research. The PhD is worth 50 hours maximum and can be awarded incrementally in accordance with the goals defined by the supervisor and the individual, e.g.,

  Completion of Comps = 10 hours
  Completion of Data Collection = 10 hours
  Defense of Draft = 20 hours
  Award of Degree = 10 hours

- **Publications:**
  - National journal articles are defined as appearing in major publications recognized across a particular profession (e.g., JFS, AJPA).
  - All publications are peer reviewed works and may be either in print or on-line
  - Research hours connected with the publication and/or presentation are considered separately from preparing research for publication and/or presentation.

- **Research:**
  - Hours do not apply to research supporting a dissertation.
  - All research is approved by the Supervisor and the Laboratory Director. The research must have relevance to the individual's duties and support the CIL's mission, goals, and objectives.
  - Research must lead to a publication or other recognized or approved product for hours to be awarded.
  - Preparing research for publication and/or presentation is considered separately and is subject to the above CE provisions.
  - Research hours may be awarded incrementally in accordance with the goals defined by the supervisor and the individual.

Annex B (Publication Rights)

B1.0 GENERAL: It is expected as a part of their career development that all members of the Scientific Staff engage in an active program of research in fields relating to their employment, including but not limited to:

- Physical anthropology.
- Archaeology.
- Forensic studies.
- Taphonomy.
- Military history.
- Biology.
- Related subjects.

In all cases where the Scientific Staff have engaged in research through their employment, either wholly or in part, conducted as a result of, or in conjunction with, the recovery and identification activities of the CIL, they cede right of first publication to the CIL.

B2.0 RIGHT OF FIRST PUBLICATION: The following procedures apply:

- This right of first publication is not reciprocal. The CIL, through any current or future publication venue, including books, bulletins, journals, internet, symposia, or any other medium is in no way obligated to publish research produced by Scientific Staff members.
- All such derived manuscripts must be submitted for approval to the CIL Editorial Board, whose decisions are based primarily upon quality of research, presentation of results, literary merit, and availability of editorial direction and topical/manuscript length suitability. The Laboratory Director, as Managing Editor, retains final approval authority.

- This right to first publication extends to:

  - Permanent civilian members of the Scientific Staff.
  - Active-duty military members assigned to the CIL.
  - Temporary employees/contractors assigned to the CIL as part of a fellowship program.
  - Any other person participating in research with a scientific staff member as designated in the first three categories.

- In any case where a Scientific Staff member is collaborating in research with a non-member, and that non-member is also under obligation to submit research to another institution for first refusal, the potential conflict is conveyed to the Editorial Board in a timely fashion prior to initial manuscript submission. Any such potential conflicts are resolved at the discretion of the Editorial Board prior to significant manuscript completion.
- In any case where an external professional organization, such as the American Academy of Forensic Sciences, claims term right of first refusal as a precondition to acceptance of a presented paper, that external organization's claim takes precedence over that of the CIL. If this right is not acted upon in the required time by the external organization, then the claim by the CIL extends from the termination point of the external organization's claim period (from the point of expiration or voluntary refusal), for a subsequent period described below.
- The period of first refusal for all manuscripts deemed ready for initial editorial submission extends to no more than six months, after which all members of the Scientific Staff are released to pursue other publication options.
- For manuscripts where no such appropriate publication medium exists at the time of submission (such as lone journal/book chapter-sized articles produced in the absence of a DPAA journal or appropriate edited volume), no such proprietary right of first publication exists.
- This right of first refusal does not pertain to previous, concurrent external, or post-employment research conducted by Scientific Staff members unrelated to or unsupported by DPAA mission activities.
- The right of first refusal is also waived in any case where a severe publication delay occurs, such that a period greater than two years is exceeded between the point of completed manuscript submission and acceptance by the suitable publication venue, except where this delay is caused by the submitting author(s) or force majeure.

Annex C (Guide for the CIL Internship & Volunteer Program) (A4.1.5f)

C1.0 GENERAL: The CIL has a limited number of unpaid academic internships (herein simply referred to as "internships") available and strives to accept quality interns that can make a meaningful contribution to the CIL mission. Similarly, the CIL accepts administrative volunteers (herein simply referred to as "volunteers") having skill sets that are useful to the CIL.

The objective of the CIL internship and volunteer program is **to immerse the participant in a forensic work environment in an accredited laboratory setting.**

Internships and volunteer positions are largely provided at CIL locations at Joint Base Pearl Harbor-Hickam, Hawaii or Offutt AFB outside Omaha, Nebraska. Occasionally, off-site interns and volunteers may be utilized (e.g., individuals living in the Washington, DC area who conduct historical research at the National Archives).

CIL internships and volunteer positions are offered to people of nearly any educational level, although almost all of the CIL interns and volunteers have at least some college experience. All interns and volunteers must be at least 18 years of age and hold US citizenship.

Regarding internships, this guide pertains largely to unpaid internships. As a general rule, the CIL does not fund paid internships. Occasionally, external funding is available for paid internships. Since eligibility, qualifications, and pay and benefits are dependent on entities external to the CIL these are addressed on a case-by-case basis. Otherwise the provisions of this annex also pertain to paid internships, as appropriate.

The following provisions outline the application, selection, and acceptance process for internship and volunteer candidates at the CIL. These provisions are flexible and may be adapted or tailored by Laboratory Management to meet the needs of the CIL. Further, the provisions in this annex, in whole or in part, may be extended to visiting scientists, non-ORISE fellows, and other individuals whose work at the CIL may be of a temporary or transient nature.

C2.0 PROGRAM MANAGEMENT: The Intern Program Coordinator (IPC), or simply the "Intern Coordinator," is an additional duty assigned to a member of the CIL Staff. CIL-OF IPC duties may be delegated to a coordinator in Nebraska. The IPC is the first point of contact for any questions, concerns, or ideas concerning the internship and volunteer program. The proponent for the internship and volunteer program is the FSA Director with oversight by the remainder of Laboratory Management.

C3.0 STAFF REFERRALS & INVOLVEMENT: Any member of the CIL Staff could be approached or contacted by individuals interested in internships and/or volunteer positions. If approached or contacted by a candidate, CIL Staff are authorized and encouraged to inform them about the internship and volunteer program. Try to obtain point of contact information and any other pertinent information (e.g. CVs, project interest) so that the IPC can follow-up, as appropriate. Alternately, refer the individual to the relevant IPC. In either instance, the IPC contacts the candidate and initiates the application process.

With prior permission from the IPC, CIL Staff are allowed to recruit their own qualified interns and volunteers in pursuit of CIL projects. In such cases the provisions of this annex fully apply. In general, interns and volunteers recruited by the staff member will work for that person once they arrive at the CIL and complete competency training and in-processing.

In order to prevent confusion and to manage the expectations of the candidates, the CIL Staff should be aware of the below general rules and guidelines regarding internships and volunteer positions at the CIL. **Most importantly, do not promise the candidate anything that conflicts with the below guidance!** This guidance is sent to all candidates inquiring about internships and volunteer positions in a separate guide. This guidance is reprinted below:

C4.0 GENERAL RULES & GUIDELINES FOR INTERNS & VOLUNTEERS: The difference between interns and volunteers is that intern participation is pursuant to an education in forensics or a closely related field (hence the term "academic intern"). As such, the internship candidate must utilize the internship for course credit in their academic program (e.g., "Intern Practicum" for 4 credits) or as extra credit for coursework within their program (e.g., 5 extra credit points for a Forensic Anthropology course). Intern work is more scientific in nature. Interns are exposed to security and evidence handling procedures, analytical techniques and strategies, equipment used to conduct forensic analysis, and other related topics. Internships may also involve research or related project participation (see below).

Volunteer positions are open to individuals who are not enrolled in an academic program. Volunteer

work is more administrative in nature. As such, volunteers may have skill sets that are not strictly forensic in nature but are still of use in the CIL (e.g., library skills, IT expertise, laboratory administrative background). Regardless of educational background, typical volunteer assignments in the CIL include, but are not limited to:

- Working in laboratory administration.
- Performing quality assurance tasks.
- Staffing the front desk.
- Library work.
- Scanning and digitizing records and references.
- Supporting clerical duties of the CIL Staff.

Volunteers may be utilized, as appropriate, for intern type tasks or projects (e.g. cleaning and processing of disinterred remains) if there is a short- or long-term shortage of interns for said work. In such cases the provisions for interns are followed, as appropriate and practical.

The dichotomy between the functions of interns and volunteers does not convey any rank hierarchy or precedence relative to the two positions.

The following guidance is sent to all intern and volunteer candidates:

- The CIL usually does not start interns and volunteers in December due to the holidays or the last two weeks of February due to most of the staff attending meetings.
- No salary, per diem and/or benefits are paid.
- Interns/volunteers are required to submit current resumes and curriculum vitae (CV), proof of health insurance, fingerprints, unofficial and official transcripts.
- Interns/volunteers are subject to drug screening
- Interns/volunteers cannot begin any programs until approved by Washington Headquarters Service (WHS).
- The intern or volunteer is responsible for his/her:
    - Transportation to and from Hawaii or Nebraska, as appropriate.
    - Transportation to and from the CIL once in Hawaii or Nebraska, as appropriate.
    - Health care.
    - Meals and lodging.
    - All other expenses.
- Because of the CIL's accreditation, interns and volunteers must be competency certified prior to being allowed to work unsupervised in the CIL. Certification usually takes about 10 hours and consists of studying the Laboratory Manual and then passing open book tests on the subject material. Time spent on competency certification counts toward internships and volunteer hours (if there is a minimum time requirement for the latter). When the applicant is approved, competency may be started prior to arrival at the CIL. The IPC ships the necessary materials to the intern or volunteer free of charge.
- Interns and volunteers must provide the following as part of in-processing:
    - 2 photo IDs (to be able to obtain an ID card and base security pass).
    - Cheek swab for DNA sequencing.
- Interns and volunteers are required to keep a daily log of their activities at the CIL. The CIL numbers of any evidence examined or worked on must be recorded in the log. The log is reviewed at the end of the internship and a copy kept by the IPC.
- The IPC is responsible for the completion and submission of intern evaluations.
- CIL staff should report any performance problems with interns and volunteers to the IPC for corrective action. The CIL reserves the right to terminate internships and volunteer positions at any time for, but not limited to, the following:
    - Illegal drug use or working while under the influence of alcohol or drugs.
    - Failure to act or dress in a professional manner.
    - Excessive absence or tardiness.
    - Mishandling of evidence.
    - Repeated security violations.
    - Professional or personal misconduct.
    - Disregard of safety rules and practices.
    - Inability to get along with the staff.
    - Inability to follow directions.
    - Poor work ethic.
    - Problems with the military authorities (CIL facilities are located on military bases).
    - Misuse or misappropriation of government property or facilities.
    - Creation of, or contributing to, a hostile work environment.
    - Failure to comply with any of the other provisions of the internship and volunteer program.

C4.1 **Special Instructions for Academic Interns:** The following guidance is sent to all intern candidates:

- The candidate must have permission from his/her academic institution to include a WHS Educational Institution Permission form to participate in the internship (see above).

- The candidate must be taking the internship for academic credit (see above).
- Hawaii interns do not deploy off island to conduct recoveries or fieldwork. Nebraska interns may participate in local recoveries provided no travel benefits are paid.
- Interns are not allowed to perform casework due to limitations imposed by accreditation. Whenever possible, the CIL allows interns to observe actual case work and tests in the CIL.
- Interns are given an important and meaningful project to complete during their tenure. Most interns assist CIL scientists in projects involving data entry, cataloging, evidence management, and archival research. The CIL IPC coordinates intern projects with the relevant staff initially, and on a continuous basis. While the CIL attempts to match the intern's research interests to a project, this is not always possible. Lists of projects are sometimes available prior to candidates accepting internships.
- Candidates may also propose relevant projects. If selected, candidates may be required to present a research proposal for approval for the project they proposed during their tenure. Research proposals must be approved by a Laboratory Director. With some exceptions, interns are allowed to use the CIL osteological and material evidence collections for independent research.
- Interns are responsible for arranging with their academic institutions any course credits to be earned as a result of the internship and the requirements for fulfilling those credits. The IPC and academic advisor can communicate directly on this issue.
- The CIL typically requires at least 90 hours of work (in order to make the time spent on in-processing and training worthwhile), however, 120-150 hours (6-8 weeks during the summer, or one semester during the regular school year) is more desirable. "Compressed" internships (e.g., 120 hours in three work weeks) are not allowed. It often takes 2-3 weeks just to obtain the intern's base pass and computer network access.
- Interns work during regular CIL duty hours. Evening/night work and weekend work is generally unavailable to interns. Some intern work may be done from home with prior permission from the IPC.
- The CIL is willing to sign agreements with academic institutions. The agreements should be as informal as possible. Agreements requiring legal review are not entertained.
- The success of the internship (and the intern) is gauged not only by the quality and quantity of project work tendered, but also by how the participant is able to function overall within the forensic laboratory setting. While there is no formal CIL evaluation process for interns, the CIL Staff provide feedback on topics of interest to the academic advisor, through the CIL IPC, including completing any evaluation forms the academic institution may wish to provide.
- After the intern receives course credit they may request to continue service to the CIL as an administrative volunteer. Interns are not guaranteed follow-on volunteer status. Volunteer service is contingent on the intern's performance; and the follow-on service being mutually beneficial (that is, as long as it is working out for the individual and fits the CIL's needs at the time). If the intern continues as a volunteer, the provisions in this annex applying to volunteers (see below) fully apply (see below).

C4.2 **Special Instructions for Administrative Volunteers:** In addition to the above provisions, the following guidance is sent to all volunteers:

- A commitment of at least 4-6 months is preferred. Lesser periods may be considered by the IPC for exceptional circumstances (e.g., volunteering to gain experience prior to starting graduate school).
- Volunteer hours do not exceed 18 hours per work week. Volunteers work during regular CIL duty hours. Evening/night work and weekend work is generally unavailable to volunteers.
- All volunteer work is normally performed in the confines of the CIL facilities in Hawaii and Nebraska unless the volunteer is tasked to perform intern type functions (see above). In some cases volunteer work may be done from home. with prior permission from the IPC.
- Volunteers may be supervised by non-scientific staff.

C5.0 APPLICATION PROCESS: The CIL has a flexible application and admissions process, meaning that interns and volunteers can apply and start at any time that is convenient for them and the CIL.

C5.1 **Interns:** Internships generally fall into two categories having slightly different application processes:

C5.1.1 **Fall & Spring Semester:** Participants during the school year tend to be local residents. Usually, the intern is referred to the CIL by their faculty, someone who is familiar with the CIL, or a member of the CIL Staff who can vouch for the quality of the candidate. Whoever receives the referral should forward it to the respective IPC.

C5.1.2 **Summer:** In Hawaii, summer internship preferences are given to off-island long distance candidates. The IPC contacts candidates, initiates the application process, and collects applications.

C5.1.3 **Application Materials:** Regardless of the time of year of the internship being applied for, candidates are required to supply the following with their application:

- CV.
- Current Resume
- Unofficial Transcript
- Completed application form signed by the intern and intern candidate's faculty advisor, committee chair, school intern coordinator, department head, or similar authority. By signing the form, the candidate and the authority attest that that the intern:
  - Is qualified for the internship.
  - Has the academic institution's permission to intern at the CIL.
  - Is taking the internship for credit.
- Copies of any agreements needed between the academic institution and the CIL (alternately, these may be presented during in-processing).
- Proof of health insurance.

C5.2 **Volunteers:** Volunteer candidates who are already CIL interns, and who wish to continue service to the CIL after the internship is fulfilled, are required to submit a DD2973 form to WHS. The IPC provides guidance to the applicant and supervisor in support of the volunteer application.

Volunteers are also required to submit the following with their application:

- CV or resume'.
- Completed application forms.
- Proof of health insurance.
- One or more letters of recommendation (email is fine) to the CIL IPC in Hawaii or Nebraska (as appropriate), from a professional person in good standing attesting to the abilities and character of the candidate. Letters of recommendation may come from a former:
  - Faculty advisor.
  - Committee chair.
  - Academic department head.
  - Laboratory section chief.
  - Police department supervisor.
  - A person of similar authority as approved by the CIL IPC.

Preference for volunteer candidates may be given to individuals planning on obtaining an education and/or furthering a career in forensics. An example is a person who has applied to or has been accepted by a forensic academic program and, as such, cannot yet claim an internship for academic credit.

C6.0 SUPERVISION: Once the intern or volunteer is at the CIL, the IPC supervises the competency training and overall in-processing prior to turning them over to a supervisor. Any CIL Staff member may be assigned to supervise an intern or volunteer. Assignments are usually coordinated in advance of the intern's or volunteer's arrival.

Supervisors may also be required to assist with the intern's or volunteer's in-processing. Supervisors are responsible for ensuring the intern or volunteer is meaningfully utilized while at the CIL and that the intern or volunteer complies with this annex, as appropriate. Work should be adequately planned and checked and work schedules coordinated. Supervisors who are deploying, or are absent during their intern's or volunteer's tenure, need to ensure that alternate supervision is in place and that work is programmed for the duration of the absence.

SOP 4.3: AUDITS

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 6 February 2015
Citation: DPAA Laboratory Manual, SOP 4.3

0.0 PRINCIPLE, SPIRIT & INTENT: *A robust, structured, and well-documented audit system is integral in maintaining the integrity of analytical notes and reports. The CIL's scientific work and associated work products should, at all times, be above reproach* **(A4.2.3, A4.10)**.

1.0 PURPOSE& SCOPE: This SOP outlines the procedures for conducting audits of select procedures contained in the Laboratory Manual. The CIL Staff and all of the CIL policies, procedures, operations, training regimens, and test results are subject to internal and external audits at any time. In the absence of specific procedures or in the case of conflicting procedures, the principle, spirit & intent will be met.

Audits are an important surety measure for monitoring the validity of tests and other procedures. Audit records allow trends to be detectable and, where practicable, allow application of statistical techniques in reviewing of the results **(A5.9.1, SF5.9.1F-47)**. Analyzed data, found to be outside pre-defined criteria, are subject to planned action taken to correct the problem and to prevent incorrect results from being reported **(A5.9.2)**.

2.0 PROCEDURES: Surety is ascertained, in part, through a system of internal and external audits **(SF4.14.1F-7)**.

2.1 **External Audits:** External audits involving the CIL may be conducted periodically by a variety of agencies. The most important and comprehensive external audit is the accreditation assessments (often incorrectly referred to as an "inspection") conducted by ASCLD-LAB every five years. The conduct of the assessment parallels the internal audit procedures discussed below. The procedures are outlined in the relevant accreditation body documents.

Additionally, external audits may be conducted to a variety of agencies external to the CIL, both within and outside of the DPAA. Examples include:

- Accountability of supplies, funds, equipment, etc. (Logistics Directorate).
- Safety or its sub-functions (e.g., fire prevention) (OSHA, Base Safety Office, Fire Marshall).
- Personnel policies (Human Capital Directorate).
- Evidence and/or physical security (Security Section, Base Police).
- Various areas based on specific complaints or concerns (Inspector General, GAO, OSD).

These audits may be scheduled or unannounced and are conducted using criteria and checklists developed by the auditing agency. The Lead Quality Coordinator or functional area manager of the area being inspected should maintain up-to-date criteria and checklists from the external agencies, if possible, or obtain them well in advance of any announced audit.

2.2 **Internal Audits:** The CIL, in accordance with a predetermined schedule and procedure, conducts internal audits of its activities to verify that its operations continue to comply with the requirements of the Surety Program, ISO 17025, and supplemental criteria.

The internal audit program addresses all elements of the Surety Program, including testing activities. The Lead Quality Coordinator is responsible to plan and organize audits as required by the schedule and requested by Laboratory Management. Such audits are carried out by trained and technically qualified (though not necessarily competency certified) personnel who are, wherever resources permit, independent of the activity to be audited **(A4.14.1, SF4.14.1F-7)**. Normally, these personnel have completed CIL Auditor Training.

Audits conducted by CIL auditors from one facility (e.g., CIL-HQ) at another CIL facility (e.g., CIL-OF) are considered internal audits.

There are two types of internal audits, MOD audits and annual reports:

2.2.1 **MOD Audits:** An audit team, designated in writing by the Laboratory Director, and trained and supervised by the Lead Quality Coordinator, conducts most internal audits also known as Management Operations and Disciplines of the CIL (MOD) audits. MOD audits verify that standards and procedures set out in the Laboratory Manual are being upheld, specifically with regard to:

- Overall practices and procedures.

- Results of tests.
- Management standards and practices.

MOD audits are also a means by which the needs for corrective action, systematic training and/or new and improved internal control activities are identified.

MOD audits are planned by the Lead Quality Coordinator and follow an annual schedule based on the calendar year **(SA4.14.1.1, SF4.14.1F-7)**. All SOPs are audited at least once during this period or at the discretion of the Top Management.

Additionally, supplementary or non-scheduled MOD audits may be conducted. Where the identification of non-conformances or departures casts doubts on the CIL's compliance with its own policies and procedures, or on its compliance with ISO 17025 and supplemental criteria, the CIL ensures that the appropriate areas of activity are audited in accordance with this SOP as soon as possible **(A4.11.5)**. Follow-up audit activities may be needed to verify and record the implementation and effectiveness of the corrective action taken **(A4.14.4)**.

There are two basic types of MOD audits:

- **Vertical:** Most MOD audits occur **within** the confines of an SOP and the audit checklists are constructed accordingly.
- **Horizontal:** Special audits may be needed to assess or troubleshoot problems common to like areas (e.g., safety, evidence handling, note taking) **across** SOPs. These are termed horizontal audits.

2.2.1.1 **Conduct:** Audits are usually scheduled well in advance.

When an auditor(s) other than the Lead Quality Coordinator conducts an audit, a pre-audit with the Lead Quality Coordinator usually takes place. The pre-audit is a coordination meeting between the auditor(s) and the Lead Quality Coordinator. During the pre-audit the Lead Quality Coordinator discusses with the auditor the following:

- Any questions or ambiguities raised by the auditor regarding the SOP or subordinate documentation.
- Any questions or problems regarding the adequacy of the audit checklist.
- Assignment of tasks or sections of the audit to individual auditors (i.e., formulating an audit plan).
- Any recurring problems or special concerns that have arisen since the last time the respective area was audited.
- Any recusals of auditors based on conflicts of interest or other reasons that may bias an audit.
- Auditors are disinterested. Auditors do not audit their own work or any work they have peer reviewed.
- Any other auditor or Lead Quality Coordinator concerns.

The audit procedure depends on the area being audited but usually consists of the auditors conducting the audit using one or more checklists. General and specific instructions for completing MOD audits are found in the respective audit checklists for each SOP.

At the conclusion of the audit, the auditors compile a detailed list of the findings and observations that is eventually forwarded to the Lead Quality Coordinator.

Note: For more extensive and complicated audits, a Lead Auditor may be designated by the Lead Quality Coordinator. The auditors work for the Lead Auditor who coordinates and supervises the overall audit under the direction of the Lead Quality Coordinator.

2.2.1.2 **Findings & Observations**: The audit results in a series of findings and observations that are detailed in an audit report **(A4.14.3)**. Findings are non-compliances with established policies and procedures.

Findings may be incidental (e.g., isolated instances or unrelated multiple occurrences) or they may be systemic (i.e., having an underlying commonality of cause). Select systemic causes are discussed in corrective action. Regardless if findings are systemic or incidental, cause analysis (see below) must be conducted (see below).

Note: Findings merely detect non-compliances. They do not assign blame. Attribution is done during the corrective action process, as appropriate (see below).

Observations represent opportunities for improvement and are a form of preventive action. Observations, while not considered non-compliances, have the potential to cause future problems in the organization. On the other hand, observations may be positive, such as remarking on innovative procedures that may be of interest to other areas within the CIL, and which may warrant incorporation into the Laboratory Manual **(A4.10, A4.12.1, A4.12.2)**.

Findings are categorized into the following three levels:

2.2.1.2.1 **Level I:** Level I findings are those that:

- Are minor in nature (e.g., stylistic "guidelines" being violated, isolated typographical errors, minor variations in report format).
- Do not undermine analytical conclusions.
- Do not compromise security.
- Do not threaten the integrity of evidence.
- Do not impact accreditation.
- Do not pose a safety hazard to life, limb, vision, or property.

Normally, incidental level 1 findings do not require intricate corrective action. Laboratory Management may opt to defer corrective action or choose not to implement corrective action on incidental level I findings.

Several level I findings in one specific area may point to a systemic problem which requires corrective action. Level I corrective action, when taken, is normally addressed via reminders through CIL wide emails, announcements at staff meetings, individual counseling, etc.

2.2.1.2.2 **Level II:** Level II findings are those that consist of SOP violations that can **potentially**:

- Undermine analytical results or result in false analytical conclusions (e.g., faulty equipment).
- Compromise security (e.g., failure to complete the alarm checklist).
- Adversely affect the integrity of evidence (e.g., failure to conduct an inventory on time).
- Threaten safety with regard to life, limb, vision, or property (e.g., inoperable eye wash station).
- Threaten accreditation if the finding is systemic in nature (e.g., improper analytical notes).

Not all level II findings are correctable. Correctable incidental level II findings may or may not be partially or fully corrected at the discretion of the Science Director. However these are usually addressed in some manner for the good of the CIL.

Systemic level II findings are corrected whenever possible. If corrective action is feasible, easily corrected level II findings are usually addressed immediately while corrective action for more complicated issues may be deferred for up to one year by the Science Director.

2.2.1.2.3 **Level III:** Level III findings are those that consist of SOP violations and other conditions that clearly show:

- Faulty analytical conclusions (e.g., a botched test). When audit findings cast doubt on the effectiveness of the operations or on the correctness or validity of the CIL's test results, the CIL takes timely corrective action, and notifies customers in writing if the test results may have been affected **(A4.14.2)**.
- Untrained personnel completing analyses and/or peer reviews (e.g., person not competency certified or proficiency tested in a respective aspect of case work).
- A compromise in security (e.g., an unauthorized person having alarm privileges, breaches in security of case files).
- Loss of accountability of case files (e.g., systemic problems with inventories, case files not being signed out).
- A threat to, or the actual compromise of, the integrity of evidence (e.g., unauthorized entry into evidence storage, spoiled or unaccounted for evidence, etc.).
- A safety hazard to life, limb, vision, or property (e.g., leaking radiographic equipment).
- A serious threat to accreditation to the point where the problem is reportable to the accreditation body (e.g., unethical conduct or behavior such as falsifying reports).

Level III findings are reported immediately to the Lead Quality Coordinator and/or to Top Management.

Recurring level II findings from the previous audit indicate that corrective action did not work. As such, recurring level II findings, whether incidental or systemic, may be designated as level III findings at the discretion of the Lead Quality Coordinator or Top Management **(A4.14.4)**.

While the finding itself may not be immediately and directly correctable, all level III findings have a cause that must be identified and corrected. Corrective action is based on cause analysis of the finding (see below). Elaborate corrective actions may be necessary to include the formation of committees, working groups, etc. to adequately trouble shoot and correct the finding and/or the cause.

2.2.1.3 **Audit Reports & Documentation:** The Lead Quality Coordinator or designee prepare the audit report as follows:

- Audit notes and checklists are assembled. Lengthy lists of non compliances may be first collated (usually by case number or similar scheme) into one or more annexes.
- The assembled documentation is used to establish findings and observations which are then synthesized into an audit report. The audit report form is found on the DPAA network. Note: A non compliance is not always a separate finding in

itself. Several non compliances may be grouped together to substantiate a finding (e.g., two or more distinct problems with analytical notes may be combined into a finding entitled 'improper analytical notes').
- Regardless of the author, within the audit report, the Quality Coordinator reviews each finding and **recommends** levels I, II, or III for each. Similarly, the Quality Coordinator determines if each finding is incidental, or if it has a systemic cause.
- A summary of the audit results is also prepared and is usually found at the end of the audit report. The summary should address strengths as well as widespread problems in the area audited as opposed to individual findings. The summary may also propose causes of systemic findings, if warranted.
- The Quality Coordinator also completes and maintains the Corrective Action Report (CAR) form (found on the DPAA network). The CAR is the checklist for, and summary of, the entire corrective action process. The Quality Coordinator may recommend causes (see below) and corrective actions on the CAR form.

2.2.1.4 **Corrective Action:** Once the audit report is completed, the following corrective action (also called remediation) process is completed and documented in a corrective action packet **(A4.14.3)**. The packet is ultimately composed of:

- Corrective action report (CAR) form.
- Audit checklist(s).
- Audit report and annexes (if present).
- Corrective action plan (if written).
- Separate corrective action report or memo (if necessary).
- Other attachments (as necessary).

Any corrective actions resulting from the audit are taken in a timely and appropriate manner.
Laboratory Management has overall responsibility for the corrective action process for any given audit. Overall coordination of the corrective action process and monitoring its progress and efficacy is usually delegated to the Lead Quality Coordinator.

The corrective action process is as follows:

2.2.1.4.1 **Assign Responsibilities:** The audit report and any other relevant documentation are presented to Laboratory Management and the functional supervisor of the audited area or topic (e.g., Safety, Odontology) and any other relevant personnel**.** The latter is usually (but not always) designated as the person in charge of coordinating corrective action. Laboratory Management may assign additional tasks and responsibilities for corrective action, as appropriate.

Note: In some instances, although auditing is done vertically, an audit may cut across functional areas (e.g., case file audits may involve documentation from the Evidence Coordinator). The Lead Quality Coordinator usually coordinates corrective action when it involves two or more functional areas.

2.2.1.4.2 **Resolve Contention:** Any challenges to the efficacy or the quality of the audit or any bias or other suspected problems related to the auditing process are not part of the corrective action plan (see below) and should be resolved before corrective action planning is undertaken. The Lead Quality Coordinator, Laboratory Director, or Science Director, as appropriate, mediates disputes related to the auditing process, and makes decisions accordingly to include adjustments in the audit report (see below).

2.2.1.4.3 **Corrective Action Plan:** A corrective action plan is formulated. Specifically:

- **Corrective Action Plan Meeting:** As a minimum, the primary person responsible for corrective action and the Lead Quality Coordinator meet, or otherwise collaborate on, and agree to a corrective action plan. Laboratory Management and other CIL Staff, as appropriate, may also be drawn into corrective action planning. The plan can be verbal or written, depending on its complexity.
- **Conduct Cause Analysis:** The corrective action plan is partially based on cause analysis, which determines the basic cause(s) of the finding. Cause analysis is an essential component of the corrective action plan which cannot be finalized until the analysis is completed. Typical causes include, but are not limited to:

  - Inadequate SOP.
  - Lack of training.
  - Poor supervision.
  - Ignoring SOP.
  - Lack of resources (e.g., supplies, personnel, time).
  - High operations tempo.
  - High personnel turnover.
  - Problematic employees.
  - In adequate organization.
  - Factors external to the CIL.

- **Finalize the Plan:** Altogether, the corrective action plan should address the causes of the findings as well as fix individual non compliances found during the audit (when possible and practical).

2.2.1.4.4 **Adjust Findings & Recommendations:** As a result of corrective action planning, and/or as more information becomes available, Laboratory Management may adjust any recommendations made by the Lead Quality Coordinator at any time during the corrective action process. This applies to finding levels and the determination of a finding as incidental or systemic. However, only Top Management can down grade a level III to a level II finding.

2.2.1.4.5 **Implement Corrective Action:** The corrective action plan is executed. Adjustments and revisions to the corrective action plan may be needed as corrective action is implemented. Those involved in formulating the plan should be involved in any of its changes, as appropriate.

2.2.1.4.6 **Prepare Corrective Action Report:** Once corrective action has been completed, a corrective action report (usually in the form of a MFR), and any related documentation, detailing the corrective action taken, is submitted to the Lead Quality Coordinator by the person(s) responsible for the corrective action by the agreed upon suspense date **(A4.14.3)**.

Note: The corrective action plan is often confused with the corrective action report. The corrective action plan details what **will** be done. The corrective action report details what **was** done.

The corrective action report is prepared as follows:

- The corrective action documentation is attached to the CAR form which is completed by the Lead Quality Coordinator. The Lead Quality Coordinator ensures all corrective action was taken in accordance with the corrective action plan. If a part of the corrective action is protracted (i.e., spread out over a period of weeks or months) the corrective action report can still be submitted for the more timely corrections. However, the individual in charge of corrective action and the Lead Quality Coordinator are responsible for following up on the uncompleted corrective action, it is completed as planned, and that follow on reports are submitted **(A4.14.3)**.
- If the corrective action is deemed unsatisfactory, the report is returned to the responsible individual with a request for further corrective action. The Laboratory Director or Science Director, as appropriate, may be asked to mediate disputes between the Lead Quality Coordinator and others involved in the sufficiency of corrective actions.
- Once corrective action is completed and approved by the Lead Quality Coordinator, the CAR form is closed out and the corrective action packet maintained by the Lead Quality Coordinator, completing the audit process **(A4.14.3)**.

2.2.2 **Annual Reports:** Various reports are due to different agencies on an annual basis.

2.2.2.1 **Annual Report to ASCLD-LAB:** The CIL submits an Annual Report to ASCLD-LAB by the CIL's accreditation anniversary date (27 April) **(SA4.14.5)**. The Annual Report to ASCLD-LAB also serves as the application for the annual surveillance visit by ASCLD-LAB, should one be required. Annual reports may also be prepared for other accreditation bodies.

2.2.2.2 **Audit of the CIL Surety Program:** After the MOD audits are completed for a given year an overall assessment of CIL Surety Program is conducted by the Lead Quality Coordinator to identify factors contributing to the strengths and weaknesses of CIL operations. The overall goal of this audit is to ensure that Laboratory Management is confident that the products and services being provided are of the highest quality and integrity.

With respect to the Surety Program, the following topics are recommended for, but not limited to, consideration during the surety audit:

- What are the general Surety Program trends and tendencies within the CIL?
- Is the Surety Program congruent with CIL operational requirements?
- Are surety measures being effectively implemented?
- Are there any specific procedural or personnel problems that directly and adversely affect the integrity of either the evidence or the test results?
- Do "state of the art" procedures exist for each forensic discipline?
- What new technologies have become available that should be incorporated into CIL operations?
- Are any modifications to the Surety Program needed?

This surety audit should be conducted with an eye toward annual reports due to the accreditation body (see above) and the calendar year end annual management review conducted by the Lead Quality Coordinator and Laboratory Management (see DPAA Laboratory Manual, SOP 4.0, Surety).

Following the audit, the Lead Quality Coordinator writes an internal Annual Quality Assurance Report to the Science Director and the DPAA Deputy Director. The report summarizes the agenda and the results and conclusions reached during the audit and any recommendations or issues discussed. This report serves as a working document for preparing the Annual Report to the accreditation bodies.

3.0 DOCUMENTATION: The Lead Quality Coordinator retains the documentation relevant to all audits for at least one accreditation cycle (**A4.13.1.1, SA4.14.1.2, SF4.13.2.1F-2**).

4.0 SAFETY CONSIDERATIONS: The safety considerations relevant to audits are commensurate with the SOP being audited.

SOP 4.4: OUTSOURCING SCIENTIFIC WORK

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 28 March 2017
Citation: DPAA Laboratory Manual, SOP 4.4

0.0 PRINCIPLE, SPIRIT & INTENT: *All scientific work that outsourced by the Laboratory to external organizations should meet the same levels of scientific integrity as that conducted organically. The scientific work and associated work products conducted by external partners, like that conducted by the Laboratory should, at all times, be above reproach.*

1.0 PURPOSE & SCOPE: This SOP provides guidance, establishes procedures, and sets standards for the Laboratory to ensure that external partners (aka strategic partners, third-party entities) conducting outsourced scientific work on behalf of the DPAA provide testing, products, and deliverables that are scientifically sound, legally defensible, and ethically above reproach.

2.0 GENERAL PRINCIPLES: The DPAA charter (DODD 5110.10, dtd January 13, 2017) encourages the agency to increase its operational tempo with the use of outsourced third party entities. The charter also stipulates laboratory accreditation and implies that DPAA will continue to meet the highest possible standards in scientific testing and reporting.

The Laboratory is the scientific component of the DPAA and holds forensic accreditation. Consequently, the Laboratory is charged with ensuring that appropriate standards are met by Agency partners and contractors doing scientific work.

In this regard, outsourcing scientific work presents both opportunities and challenges. Laboratory management takes measures, detailed below, to ensure that entities conducting scientific work on behalf of DPAA involve qualified staff, use appropriate procedures, and provide required documentation and reporting in a timely manner.

To this end, Laboratory Management may determine that guidance or directives in addition to this SOP are necessary to maintain the scientific integrity of outsourced scientific activity.

3.0 OUTSOURCING: Appendix 5.1 (Glossary) of the Laboratory Manual defines an outsourced activity as "An activity within the scope of the DPAA mission that has been referred to a third party whether through a contract, cooperative agreement, or other arrangement. The activity could be done solely by the third party or in cooperation with DPAA".

Outsourcing is not necessarily synonymous with the term **subcontracting**, which is defined in the same reference as such; "Regarding accreditation, outsourcing of testing to external laboratories, for whatever reason, in disciplines where the Laboratory is already accredited." Simply put, subcontracting is outsourcing scientific work of a type that the Laboratory performs organically (e.g. site surveys, excavating sites, skeletal analysis) **and for which the Laboratory is accredited.**

Work subcontracted by the Laboratory consists primarily of field sciences.

Examples of outsourced scientific work include, but are not limited to isotope analysis, radiocarbon dating, and DNA testing. DNA testing comprises the majority of outsourced work. DNA testing is outsourced to the Armed Forces DNA Identification Laboratory (AFDIL) only.

The Laboratory does not outsource forensic identifications.

Annex A (Oversight of Subcontracted Work) to this SOP provides further guidance on subcontracting scientific work. Some of the annex's provisions also apply to outsourced work.

Within DPAA, four classes of outsourced activity are recognized:

- ***Class 1*:** Contracting laboratory, field, or other services to a professional organization. Professional organizations include government, private, and non-governmental (not-for-profit) entities whose funding is closely tied to performing work in the forensic discipline in question. DPAA ensures that the organization meets appropriate standards of personnel qualifications, evidence handling, general procedures, and quality assurance. This is accomplished by verifying that the organization is accredited (ISO-based), or by certifying that the organization meets DPAA standards through a certification process performed under the direction of Laboratory Management.
- ***Class 2:*** Relying upon a host nation government organization to perform services for DPAA. This work is done through negotiated agreements, and may or may not include funding from DPAA. For these

activities, the Laboratory often provides the training necessary to ensure successful execution. One example is the Ministry of National Defense Agency for Killed in Action Recovery and Identification (MAKRI), who regularly performs field investigative and recovery work for DPAA at their own expense. In return, we provide extensive training and also turn over South Korean remains in our custody as they are discovered. A second example is the Vietnam Recovery Team (VRT), for which we fund the activities entirely and often provide a Scientific Recovery Expert to augment their team as they have no scientists on staff. The Laboratory has provided extensive training to the VRT personnel over several years.

- ***Class 3:*** Non-governmental organizations with professional capability. These are entities that work at their own expense, with their own agenda, but are capable of professional quality work. *Bent Prop* is a good example of this type of organization. These organizations can function at a Class 1 level if appropriate agreements are put in place.

- ***Class 4:*** Non-governmental organizations and individuals who are generally not capable of professional quality work. There are many more Class 4 entities operating than other classes, and they are typically self-funded. Some are interested in collecting artifacts, some are "adventurers" pursuing hobbies or seeking attention from the media. Others are enthusiasts who simply want to support the DPAA mission. Appropriate caution is exercised in working with these organizations.

4.0 PROCESS FLOW: The overall process flow for outsourcing scientific work is detailed in Annex B (Process Flow for Outsourcing Scientific Work) of this SOP.

5.0 SURETY: The Laboratory takes the necessary measures to ensure that agency partners and contractors doing scientific work meet appropriate standards. Information concerning the quality assurance measures taken are documented and retained by the laboratory.

5.1 **Scopes of Work:** The most common means of quality control centers around the production of a scope of work that details what work will be performed, by whom, in what manner, and how to ensure the scientific integrity of the work. The Laboratory develops scopes of work for laboratory testing. For field science work, the Laboratory works with the respective Regional Directorate staff and, as required, the Strategic Partnership Directorate to produce scopes of work that meet the requirements of the Laboratory Manual.

5.2 **Training:** The Laboratory also coordinates with Strategic Partnerships and the Regional Directorates to provide training for prospective partners and contractors, as needed, to ensure the appropriate quality for field science is achieved.

The DPAA Academy is the proponent for conducting partner training. Training is done in accordance with the Laboratory Quality Assurance Program, in particular DPAA Laboratory Manual SOP 4.2 (Training, Tests & Continuing Education).

The DPAA Academy in consultation with the Scientific and Quality Assurance Staff of the Laboratory, the Regional Directorates, and the Strategic Partnerships Directorate, determines the level and amount (if any) of training required for external partners to conduct outsourced work. Some external partners (e.g. Class 1 and 3) may require little to no training in advance of their scientific activity. Other external partners may require a significant amount of training.

The DPAA Academy determines where training is conducted. The default location of training is the headquarters facilities in Hawaii; however, other areas may be used such as the Nebraska Laboratory and the home institution of a partner.

Training involves at a minimum an orientation to DPAA evidence management and chain of custody requirements. It can include at a maximum, instruction in basic procedures (mapping, screening, etc.). The DPAA Academy is not intended to fulfill the role of university education, and does not grant degrees or academic credits. However, it serves the Laboratory by certifying competence in many of the basic procedures covered in this Laboratory Manual. See Annex A (Oversight of Subcontracted Work) to this SOP for further guidance on training topics needed for certification.

5.3 **Scientific Oversight:** On behalf of DPAA, the Laboratory performs scientific oversight functions related to outsourcing. Oversight includes archaeological science activities as well as laboratory activities.

Outsourcing for field science is typically planned by and funded through the Regional Directorates (or the Strategic Partnerships Directorate on their behalf). Laboratory Management coordinates with these directorates to ensure that appropriate standards are met.

A Laboratory representative conducts on-site visits to evaluate the current efficacy of the external partner, if warranted.

If the work is subcontracted, the Laboratory determines the specific processes, methods, techniques, and procedures being employed in accordance with Annex A (Oversight of Subcontracted Work) to this SOP.

Technical advising during specific field operations may be warranted in some situations. If necessary, Technical advising is coordinated with the contracting officer and the Regional Directorate and managed through the DPAA Academy as part of the training regimen.

6.0 PRODUCTS AND DELIVERABLES: The Laboratory determines what products and deliverables are expected for all outsourced scientific activities. Milestones are established either through contract or a memorandum of understanding related to what deliverables/products are required and when they are turned over to the Laboratory for review.

6.1 **Review:** All scientific products and deliverables provided to the DPAA by external partners are reviewed and evaluated by Laboratory Management in accordance with the DPAA Laboratory Manual. Details of the review process for external partners are found in DPAA Laboratory Manual, SOP 4.1 (Peer Review).

The level of review is dependent on various factors, including, but not limited to, whether the work was solicited by DPAA and the outsourcing category of the third party entity. Class 2 and Class 4 organizations in some cases may require assistance in producing reports. The level of review can vary and can include a technical review, an analytical peer review, or both. Some reports (e.g., from Class 2 partners) may require translation which is performed by DPAA.

If the outsourced work was conducted through a contract, cooperative agreement, or some other type of agreement with the DPAA, the Laboratory determines if the scientific products and deliverables have met the expectations of that contract, cooperative agreement, or other type of agreement. The Laboratory reports the adequacy of work with the appropriate contracting authorities, as appropriate.

If the outsourced work was not conducted through a contract, cooperative agreement, or some other type of agreement with the DPAA, the Laboratory nevertheless reviews and evaluates the quality of the work as well as the overall scientific results and interpretations.

If the product and/or deliverables do not meet the Laboratory accreditation standards, the Laboratory can still accept them into the DPAA archive. In such cases it is clearly documented that the work was not confirmed to meet quality standards.

If it is not possible to confirm that the products meet Laboratory standards (e.g. qualifications of staff unknown), then the work is treated as sub-standard and appropriate caveats recorded. Scientific products and deliverables deemed below DPAA Laboratory accreditation standards are addressed using Laboratory Form 4004 placed in DPAA archives and with DPAA reports when they are released.

6.2. **USE AND RELEASE:** The Laboratory ascertains whether scientific products and deliverables created by a third-party entity should be utilized in drawing conclusions and/or interpretations in support of a substantive finding. Reports and other information gleaned from outsourced scientific work are identified clearly as such in all official releases from DPAA.

Reports and other information that do not meet the standards in this Laboratory Manual are identified as such using CIL Form 4004. CIL Form 4004 is attached to said reports if they are released to outside agencies.

Annex A (Oversight of Subcontracted Work)

A1.0 PURPOSE & SCOPE: This annex outlines the requirements for the Laboratory oversight of subcontracted work. The provisions of this annex also apply to outsourced work, as appropriate.

A2.0 GENERAL: The Laboratory may subcontract work to external agencies. In such instances, the Laboratory ensures the work performed complies with the provisions of ISO/IEC 17025 to the fullest extent needed, and appropriate **(A4.5.1, A4.5.4)**. In such instances, the following conditions are met:

A2.1 **Competence:** The work is placed with a competent subcontractor. Specifically:

- The Laboratory determines the competency of the subcontractors. Accreditation by an accreditation body relevant to the subcontracted services performed is preferred but not required **(A4.5.1)**.
- For non-accredited subcontractors, the Laboratory maintains an objective certification program to evaluate their capability to do the work and evaluation of the work thereof. The program can be tailored to fulfill the needs of the Laboratory and the subcontractor.
- Regardless of accreditation status, the focus of Laboratory certification, in general, is based on the subcontractor's competency in the following core areas:

    - Personnel qualifications.
    - Evidence handling, security, chain of custody, and management standards.
    - General and specialized recovery methods, techniques, and procedures.
    - Test and/or inspection reporting.
    - Protection of customer information.
    - Quality assurance program and practices.
    - A comprehensive body of documentation, including a laboratory manual that details the above topics.

- The DPAA Academy must be prepared to assess subcontractor competency and to assist, as appropriate, in training them to competency in the above areas.

A2.2 **Customer Considerations:**

- If practical, the Laboratory advises the customer of the arrangement in writing and, when appropriate, gains the approval of the customer, in writing. Email correspondence is acceptable **(A4.5.2)**.
- The Laboratory is responsible to the customer for the subcontractor's work, except where the customer or a regulatory authority specifies which subcontractor is to be used **(A4.5.3)**.

A3.0 DOCUMENTATION: The following documentation is maintained:

- The Laboratory maintains a record in the case file of all subcontractors that it uses for casework **(A4.5.4)**.
- The Laboratory maintains a register of all subcontractors that it uses for tests **(A4.5.4)**.
- When the test report contains results of tests performed by subcontractors, these results are clearly identified. The subcontractor reports the results in writing or electronically **(A5.10.6)**.

Annex B (Process Flow for Outsourcing Scientific Work)

To be written

DPAA Laboratory Manual

(Current and Updated Version Located on DPAA Intranet)
Last Revised: 5 February 2015
Citation: DPAA Laboratory Manual, Part V Cover Page

PART V: APPENDICES

Part V of the Laboratory Manual is supplemental information contained in the following appendices:

APPENDIX 5.0 (References): References either cited or used in a more general base-line context are listed.

APPENDIX 5.1 (Glossary): This appendix is a collection of defined terms, expressions, acronyms, abbreviations, and jargon (slang) commonly encountered by the CIL Staff in the course of performing their assigned duties. The Glossary does not repeat terminology defined or discussed in the body of the Laboratory Manual. The Glossary is structured to aid employees, especially those new to the military or federal service, in navigating the often-confusing world of acronyms and jargon.

APPENDIX 5.2 (Style Guide): The Style Guide is intended as a guide to facilitate uniformity in style and format. The intent is not to dampen individualism or creativity but rather to structure written material in a manner so that it presents a uniform, professional appearance, while reducing sources of confusion, misinterpretation, and error. The Style Guide covers areas such as punctuation, spelling, abbreviations, word usage, number use, etc., with special emphasis on usages common to the DPAA or military correspondence but uncommon in general use.

APPENDIX 5.3 (Forms): This appendix contains forms required by the Laboratory Manual as well as those commonly used by employees in non-technical aspects of their job (e.g. travel vouchers, TDY request forms, etc.). This appendix exists as an electronic folder found only on the DPAA intranet.

APPENDIX 5.4 (Flow Charts & Diagrams): Due to its bulk and frequent changes, this appendix is no longer maintained by the CIL.

APPENDIX 5.5 (Revisions): This appendix documents Class II & III revisions to the Laboratory Manual and relevant related information (e.g. date and type of revision, the SOP(s) affected and sub-section(s), and a brief description of the nature and extent of the revision). Due to its frequent changes, this appendix is found only in electronic format on the DPAA intranet.

APPENDIX 5.0: REFERENCES

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 13 March 2017
Citation: DPAA Laboratory Manual, APPENDIX 5.0

The following references are either cited in the Laboratory Manual or used in a more general base-line context. The numbers in the brackets at the end of the reference (e.g. **[1.4]**) refer to the SOP(s) relevant to the reference.

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APPENDIX 5.1: GLOSSARY

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 30 August 2016
Citation: DPAA Laboratory Manual, APPENDIX 5.1

/S/	Used before an individual's name on a reproduced document indicating that the original was signed.
11 Bravo (11B)	Pronounced Eleven Bravo. Military occupational specialty (MOS) for a US Army Infantryman.
24/7 (var. 7/24)	Twenty-four hours a day, seven days a week.
59-Minute Rule	59 minutes of time off granted at the Commander's discretion. Does not apply to the military (see ADONSA and Training Holiday).
92 Mike (92M)	Military occupational specialty (MOS) for Mortuary Affairs. Formerly Graves Registration (57F).
A	Alpha (Prior to 1955: Abel)
A-	Designator for attack aircraft (e.g., A-1 Skyraider)
AAF	(1) Army Air Force (2) Army Air Field
AAFS	American Academy of Forensic Sciences
AAPA	American Association of Physical Anthropologists
AAR	After Action Report
ABFA	American Board of Forensic Anthropology
ABFO	American Board of Forensic Odontology
ABMC	American Battle Monuments Commission
AC-	Designator used for a cargo aircraft converted into an attack aircraft (e.g., AC-130 Spectre)
Accession	A collection of evidence that includes at least one item that has been added into the CIL evidence management system. Each accession has an associated file that is tracked under the accession number.
Accession Number	Also: CIL Accession Number. A number given to record and track test items added to the evidence management system. The first four digits represent the year the test item(s) were received. The last three digits represent the sequential order in which the test item(s) were received for that year.
Accounting	Determining the fate of a Missing Person. According to Title 10 USC, a missing person from a past conflict is accounted for when either they are brought home alive or their remains have been identified by a practitioner of an appropriate forensic science.
Accuracy of Information	See evaluation (from DoD Dictionary).
ADONSA	A Day Of No Scheduled Activities. A day off given to the military when no activities are scheduled. Does not apply to civilians (see 59-Minute Rule) (pronounced A-don-za).
AEL	Additional Equipment Listing. Refers to items (non-ASL) that must be purchased in support of a mission.
AFB	Air Force Base
AFDIL	(Pronounced Aff-dill) Armed Forces DNA Identification Laboratory. Supports the DPAA in DNA analysis. A division of the AFMES
AFIP	The former Armed Forces Institute of Pathology (pronounced either A-F-I-P or A-fib), now disestablished.
AFIRB	Armed Forces Identification Review Board. Consists of a three-person board convened to scrutinize identifications. It consists of one member from the Army, Navy (or Marine Corps), and Air Force (pronounced A-furb).
AFMES	Armed Forces Medical Examiner System (pronounced Aff-mees).
AGO	Adjutant General's Office
AGRC	Army Graves Registration Command
AH-	Designator for attack helicopter (e.g., AH-1 Huey Cobra)
AIR	Additional Information Report. A short report (military format) used by field teams to report information obtained on a case not in their investigation plan. This is usually used when no other format is appropriate.
AJPA	American Journal of Physical Anthropology

AKA	Also Known As
AMSL	Above Mean Sea Level. Used with elevation figures (e.g., 600 ft AMSL).
ANC	Arlington National Cemetery
Antemortem	Before death (see postmortem and perimortem)
Anthropology	Study of humans and their culture. Includes the primary 4 sub-disciplines of socio-cultural anthropology, archaeological anthropology (archaeology), linguistics and biological anthropology.
AO	Area of Operations
AOR	Area of Responsibility
APO	Army Post Office or American Personnel Overseas
AR	Army Regulation. Usually followed by the regulation number (e.g., AR 638-2 Care and Disposition of Remains and Disposition of Personal Effects).
Archaeological Assessment	A scientific evaluation of a physical location that employs the methods and techniques of archaeological survey, excavation, and analysis in order to evaluate physical locations and material evidence in terms of time, space, and context/content. Archaeological assessments at DPAA typically are used to (1) determine the presence or absence of physical evidence at a reported loss location; (2) define the extent and boundaries/perimeters of physical evidence distributions; (3) evaluate that physical evidence in terms of the circumstances of the loss event (vehicles, spatial relationships, context affiliation, presence or absence of human remains, etc.); (4) evaluate areas within a site boundary/perimeters to determine the area with the highest potential to yield human remains; (5) identify site transformation processes and anthropogenically-altered soils to determine the level of site disturbance and assess the level of site integrity remaining; 6) document these activities; and (7) derive conclusions and report upon the results of the assessment.
Archaeological Context	The position of objects and the relation between and among other objects in three-dimensional space within an archaeological assemblage and site. Archaeological context must be established to make use of the Law of Association, Law of Superposition, and Law of Stratigraphy. These laws, in turn, are required to interpret the temporal and spatial meaning of evidence as it is found in a site.
Archaeological Context-Primary	An object remaining in its original position of discard or deposition within an archaeological site.
Archaeological Context-Secondary	An object and its relation among and between other objects wherein its position in an archaeological site has been altered (moved) from its original position of discard or deposition.
Archaeological Feature	Non-transportable artifacts of human behavior. Features may be identifiable on the surface (berm, mound, depression), or may be found in subsurface contexts (pit, filled-in trench, filled in grave). Features are the observable traces of human behavior that are irreversibly destroyed through the process of discovery through excavation.
Archaeological Methods	Recognized and validated procedures, processes, and techniques employed to excavate, document, and analyze archaeological phenomena (sites, physical objects, and the three-dimensional relationships among and between physical objects and the landscape). All interpretations of archaeological context depend upon the methods used.
Archaeology	Short for Archaeological Anthropology. A scientific/historical discipline focusing on the study of humankind through the study of material culture.
Area of Interest	Circumscribed spaces on the landscape that are not defined by the presence of physical evidence. These areas typically defined by a witness and/or informant as the possible location of a loss event. Boundaries/Perimeters of these locations can only be defined via a witness' description and are ephemeral and undiscoverable through any known archaeological technique or method. Areas of Interest are tracked using the DPAA Site Numbering System. Archaeological methods can be used to subsequently confirm or reject the relative significance of an Area of Interest.
ARPA	Archaeological Resource Protection Act. This federal statute provides penalties to individuals and agencies that damage cultural resources on Federal lands. Should a Federal agency not follow appropriate Federal Historic Preservation Statutes, agency employees and/or the agency can be convicted of misdemeanor or felony crimes.
ART	Archival Research Team. A JTF-FA team that conducts searches of Vietnamese, Cambodian and Laos archives.

ARVN	Army of the Republic of Viet Nam. Name of army of the former South Vietnam (pronounced Ar-Vin).
ASCLD	American Society of Crime Laboratory Directors
ASCLD-LAB	American Society of Crime Laboratory Directors—Laboratory Accreditation Board. The accrediting arm of ASCLD.
ASL	Authorized Stockage Level. Refers to items kept in stock in the DPAA warehouse. Also, Above Sea Level.
ASGRO	Armed Services Graves Registration Office. Military office formerly charged with approving identifications. Succeeded by the AFIRB.
Associated Site	A site that is believed, but not confirmed, to be the loss location for a missing individual(s).
ATTN	Attention. Used in memoranda to denote whose attention is intended
Auger Test	A form of soil testing that utilizes an "Archimedes screw-type" device to excavate small (typically < 8 inches in diameter) areas to conduct subsurface evaluation of soil at an archaeological site.
B	Bravo (Prior to 1955: Baker)
B-	Designator for Bomber aircraft (e.g., B-17 Flying Fortress)
Baht	Thai currency
Balk (var. baulk)	A column of unexcavated sediments between two or more archaeological excavation units. Also called a plinth.
BDO	Basic Diving Officer (Army term)
BDU	Battle Dress Uniform. Basic camouflaged work uniform of the US military. Replaced fatigues. Replaced by ACU (Army Combat Uniform) and DCU (Desert Camouflage Uniform).
Berm	Typically artificially-made linear ridges of soils or sediments. Natural forces such as erosion can create berms as well. A blast berm may be formed by impact of an aircraft or bomb; typically circular or ovoid in shape.
Biological Evidence	Physical items that have an organic, once-living source. As used at DPAA, biological evidence typically refers to, but is not necessarily limited to, human skeletal elements, teeth, hair, skin, soft tissues, bodily fluids, or other portions of the human body.
BNR	Body not recovered.
Bombee (var. Bombie)	Slang term for baseball-sized antipersonnel bomblets (see CBU)
BP	(1) Base Pair (DNA) (usually lower case bp) (2) Before Present (Archaeology)
Bright Light	(1) Code name for Vietnam-era program to monitor US personnel MIA and POW (2) Database containing information on US MIAs and KIA/BNRs.
BTB	Believed To Be
BuMed	(Navy) Bureau of Medicine and Surgery. When written as BUMED the term refers to the Chief, BuMed.
BUNO or BuNo	Bureau Number. Unique aircraft serial number assigned to US Navy aircraft by the Navy Bureau of Aeronautics.
BuPers	(Navy) Bureau of Personnel. When written as BUPERS the term refers to the Chief, BuPers.
Burial	At DPAA, a burial is defined as human remains typically intentionally placed in a subsurface environment and covered with soils, sediments, or other materials. Burials are also defined as human remains interred in crypts, tombs, mausoleums, or other created structures. Additionally, human remains inadvertently covered with soils and sediments are also considered burials, but comprise a specific subset of the larger definition. Human remains deposited on the ground surface are not considered to be burials but fall into the subclasses of "Scattered Surface Remains" or "Surface Remains" (see below).
Burial Markers	Physical objects or evidence of the location of a burial (see above). Burial markers may include, but are not limited to, grave or head stones, wooden markers, rock cairns (see below), fences, berms, mounds, depressions, or other items placed in immediate proximity to the burial.
C	Charlie (Prior to 1955: Charlie)
C-	Designator for cargo aircraft (e.g., C-130 Hercules)
C/W	Consistent with
Calcined	Heated to a high temperature but without fusing. Calcined bone typically is exposed to a

	very high temperature, but not necessarily to direct flame, resulting in a loss of organic material. Often chalk-like in appearance, texture, and consistency. The light color and chalky texture are the result of physical and chemical changes to the bone at high temperature.
Campaign Plan	At DPAA, a broad spectrum plan that is used to align the yearly OPLAN and resourcing to the Agency Strategy.
CAPMI	(Pronounced Cap-me). Computer Assisted Post Mortem Identification is a computer program that compares the dental characteristics of human remains to a database of antemortem dental profiles of service members lost from the Vietnam War. This comparison results in a ranked list of possible casualties.
CARIS	Centralized Accounting Repository and Information System.
Case	Refers to the body of information concerning a Missing Person (see definition), the circumstances under which they became missing, and the efforts to locate them.
CBU	Cluster Bomb Unit, aka "bombie." Small explosives released from a canister.
CCF	Chinese Communist Forces. PRC troops serving in Korea during the Korea War.
CDR	(1) Commander (2) Computed Dental Radiography. A digital dental x-ray software system used in the CIL.
CDR JPAC	Commander Joint POW/MIA Accounting Command. Used with messages sent from the former JPAC headquarters (see CJPAC).
CEODD	Center for Explosive Ordnance Disposal and Diving
Cesium Magnetometer	A remote sensing device that measures differences in the earth's magnetic field
CG	Commanding General
CH-	Designator for Cargo Helicopter (E.g., CH-53 Super Stallion)
CHR	Commingled Human Remains Report
Charlie	(slang) Short for Victor Charlie, or Viet Cong
CID	Criminal Investigation Division
CIF	Central Issuing Facility. A warehouse where military equipment is issued.
CILHI or USACILHI	(US Army) Central Identification Laboratory, Hawaii (pronounced Sill-High). One of the units that combined with JTFFA to form JPAC. Former designation of the CIL. From a historical standpoint, CILHI was established in 1947 at Schofield Barracks with Dr. Charles Snow as the director.
CILTHAI	Variation of THCIL. CIL located in Camp Samae Son, Thailand for approximately two years after the Vietnam War.
CINC	Commander In Chief (pronounced Sink)
CINCPAC	Commander-In-Chief Pacific. The CINCPAC, located at Camp H.M. Smith, Hawaii, is the operational commander of all military forces in the Pacific region, i.e., PACOM. The JTF-FA is under the control of CINCPAC (pronounced Sink-pack).
Circle Search	A circular geographic search for downed aircraft, missing personnel, etc., centered on a grid coordinate or incident location. Similar to a Field Search Case.
Circumstantial	Implies an attention to detail that fixes something described in time and space. According to Webster, circumstantial is synonymous with Minute- implying a close and searching attention to the smallest details; Particular- implying a precise attention to every detail; and Detail- stressing an abundance or completeness of detail.
Circumstantial Correlation	Reliance upon historical documentation and witness information in the absence of relevant physical evidence to correlate a loss event to a physical location on the landscape. A circumstantial location does not individuate that location from all other potential loss events and locations but does provide general indications that the location may be associated with the loss event.
Circumstantial Evidence	Evidence that tends to prove a fact by proving other events or circumstances which afford a basis for a reasonable inference of the occurrence of a fact at issue.
CJPAC	(Detachment) Commander Joint POW/MIA Accounting Command. Used with messages sent from a former JPAC Detachment (e.g., CJPAC DET ONE BANGKOK TH) (see CDR JPAC).
CMAOC	Casualty and Memorial Affairs Operations Center (pronounced Sea-mock)
COB	Close Of Business. Used as a deadline, as in "report is due by COB today."
COIN Assist	Coincidental Assistance. Policy of USG paying travel expenses for NOK attending annual

	NLF meeting in Washington DC.
COMAIR	Commercial Aircraft (pronounced Com-air) (see MILAIR)
Commingled (or commingling)	To mix or combine together. Typically used when multiple sets (or potions of sets) of remains are mixed up and need to be sorted out.
Compliance	As used at DPAA, compliance refers to DPAA's adherence to U.S. and foreign laws, statutes, regulations, and guidelines that dictate certain actions be taken in order for DPAA to conduct work within that political organization's sphere of control and influence. Typically, compliance activities are necessary to meet the requirements of environmental and cultural resource preservation issues, but they may also relate to other legal requirements as well. Compliance can also refer to the CIL's adherence to the regulations and guidelines set forth by the American Society of Crime Laboratory Directors Laboratory Accreditation Board (ASCLD-LAB) based on International Standards Organization (ISO) 17025.
Concurrence	A formal agreement to a Federal Agency project plan. Concurrence is achieved by the Federal agency developing written mechanisms to address cultural resources issues within the context of a Federal Undertaking. The concurrence process allows all parties with an interest in the project and resources to comment on the plan. Signed agreement is usually sought from State Historic Preservation Officers, Historic Preservation Officers (or similar foreign entities), and Native groups.
Confirmation Brief (CB)	Final brief for the Deputy Director detailing the operation plan for a mission. Previously referred to as the CG Back Brief.
Confirmed Correlation	At DPAA refers exclusively to the recovery or observation of physical evidence that directly, and exclusively, links a loss event to a physical location on the landscape. A confirmed correlation individuates the archaeological site and associated evidence from all other potential loss events and locations.
Consultation	A formal process of discussion for the processes, procedures, and implementation of archaeological projects so that the concerns of governments are met. That is, consultation is undertaken to ensure that the project proponent follows all appropriate historic preservation laws, statutes, regulations, and guidelines.
Contact Sheet	Small-scale prints of photographs existing electronically or hard copy.
Contamination	Presence of foreign materials. At the DPAA contamination is usually used to describe the introduction of extraneous DNA to a sample.
Contract	Contracts are reciprocal agreements by two or more parties that entail (1) an offer, (2) an acceptance of the offer, and (3) a resulting exchange of "consideration," i.e., items or services of value.
Contract Employees	Employees working at United States Government facilities under contract. Supervision of these employees is not the responsibility of government employees but of the Contracting entity. Point of contact with government employees often is the Contracting Officer's Technical Representative (COTR).
CONUS	CONtinental United States, i.e., not Alaska or Hawaii (pronounced Cone-us)
Cooperative agreement	A legal instrument reflecting a relationship between the United States Government and a State, a local government, or other recipient when: (1) the principal purpose of the relationship is to transfer a thing of value to the State, local government, or other recipient to carry out a public purpose of support or stimulation authorized by a law of the United States instead of acquiring (by purchase, lease, or barter) property or services for the direct benefit or use of the United States Government; and (2) substantial involvement is expected between the executive agency and the State, local government, or other recipient when carrying out the activity contemplated in the agreement.
Correlation	The establishment of a mutual or reciprocal relationship between two or more phenomena. At DPAA, correlation typically is applied to establishing a relation between a loss event and a location on the landscape through the evaluation of multiple lines of evidence or documentation. This is not to be confused with statistical correlation.
CPAC	Civilian Personnel Advisory Center (pronounced see-pack)
CPO	Civilian Personnel Office
Cremains	The ashes, burned fragments, and calcined bone remnants resulting from cremation.
Cremation	The use of intense heat to reduce human remains to ashes, burned fragments, and calcined bone.

Cross-contamination	The act of contamination between items or sets of items so that elements of the items become commingled (e.g., transfer of fibers from one item to another).
CY or Cy	(1) Calendar Year (see FY) (2) Copy. Often used with military correspondence (e.g., cy w/d [copy withdrawn]).
CXR	Chest Radiograph Comparison Report
D	Delta (Prior to 1955: Dog)
DA	Department of the Army
DAC	Department of the Army Civilian (pronounced Dack)
DAD	DaNang Mortuary. US Army mortuary that operated in DaNang, South Vietnam during the Vietnam War.
DASD	Deputy Assistant Secretary of Defense. DPMO is directed by the DASD for POW/MIA Affairs (pronounced Daz-dee).
DAT (or DATT)	Defense Attaché
Date-Time-Group (DTG)	Military date/time format used on messages. Format is ddtttt mmm yy (e.g., 011500 FEB 99 indicates 01 February 1999 at 1500 hours).
DB	Decision Brief. A planning meeting run by Operations in preparation for a mission whereby the Deputy Director makes the initial decision on whether a mission is a GO/NO GO. Normally held 30 days prior to each mission and results in the production of the operations order.
DC	Dental Corps (used by US Navy) (see DE)
DCINC	Deputy Commander In Chief (pronounced Dee-sink)
DCO	Deputy Commanding Officer
DCSLOG	Deputy Chief of Staff for Logistics (pronounced Des-log)
DCSPER	Deputy Chief of Staff for Personnel (pronounced Des-per)
DD	Defense Department. Used with forms (e.g., DD Form 1300).
DDS	Doctor of Dental Surgery
DE	US Army Dental Corps
Declination	The difference between magnetic north and true north.
DEROS	Date of Estimated Return from Over Seas. Date on which military personnel return to CONUS from overseas assignment.
Desecration	Any act designed to insult. In this context intentional disturbance of remains and evidence.
Det	See Detachment
Detachment	An outpost or office located apart from the main command. Used to refer to DPAA overseas offices.
DFAS	Defense Finance and Accounting Service (pronounced Dee-fass)
DFE	Defense Forensics Enterprise
DIA	Defense Intelligence Agency
DIC	Died In Captivity
Disinterment	To remove human remains from the earth or grave or tomb.
Disorganized Mass Grave	Interments containing the remains of two or more individuals within the same burial feature or context wherein no discernable pattern of interment can be delineated.
Disturbance Processes	Natural and cultural processes that affect the context and preservation of items and the relations among and between items at an archaeological site. Natural turbation processes (faunal, floral, cryo, mass, fluvial, etc.) and cultural disturbance processes (excavation, development, salvage activities, farming, etc.) have the potential to disturb an archaeological site to the point where interpretation of the site is null and void.
DMD	Doctor of Medical Dentistry
DMO	Dive Medical Officer
DMT	DMT Dive Medical Technician
DO	Diving Officer (Navy term)
DOD	Department of Defense
DODD	Department of Defense Directive. A DOD directive on a specific action or area. Followed by the number of the directive (e.g., DODD 2310.2 Personnel Recovery).
DODI	Department of Defense Instruction. A DODI on a specific action or area. Followed by the number of the instruction (e.g., DODI 2310.5 Accounting for Missing Persons).
DODI 2310.5	Department of Defense Instruction, Subject: Accounting for Missing Persons.

Dong	Vietnamese currency
Doxycycline	An antibiotic that may be used prophylactically to prevent malaria, usually in the form of tablets taken daily prior to, during, and following a mission.
DPAA Number	An in-house number sequentially assigned to each case the medical examiner makes an identification on per calendar year. The number follows the format of DPAA 201X-XXXX. The number is used as a unique identifier so that the medical examiner may enter cases into the AFMES database.
DPMO	Defense Prisoner of War/Missing Persons Office. Established in 1993 to oversee policy issues relating to the recovery of US personnel missing or killed in military conflict. Located in Crystal City, VA (pronounced either D-P-M-O or Dip-mo). Deactivated on 30 January 2015.
DPRK (var. D.P.R.K.)	Democratic People's Republic of Korea. Official name for North Korea.
DRE	Detailed Report of Excavation. See ESR.
DRI	Detailed Report of Investigation. A report which documents in detail the investigation or re-investigation of a particular incident or case and relates the information obtained during that process. Currently, the SEA section of R&A writes DRIs in military message format while Korea and World Wide sections write it in document report format. Formerly called the FIR (Field Investigation Report).
DTG	See Date-Time-Group
DTS	Defense Travel System. Paperless system whereby most government employees submit travel expenses for reimbursement for official government travel.
E	Echo (Prior to 1955: Easy)
E-	(1) Prefix used with enlisted pay grades. The prefix is followed by a number that indicates the grade from E-1 (lowest) to E-9 (highest) (2) Designator for Electronic countermeasures aircraft (e.g., E-2 Hawkeye).
E&E	Escape and Evade
EA-	Designator for an Attack aircraft reconfigured as an electronic countermeasures aircraft. (e.g., EA-6 Prowler)
EDB	Excavation Decision Brief. The forum in which Agency approval is granted to add a site to the Master Excavation List (MEL- see definition).
EF-	Designator for a Fighter aircraft reconfigured as an electronic countermeasures aircraft. (e.g., EF-111 Electric Fox)
EGS	Emergency Gas System
EOD	Explosive Ordnance Disposal. A specialist trained in the recognition, and safe handling of explosive devices.
EODD	Explosive Ordnance Disposal Diver
EPs	Emergency Procedures
ESR	Excavation Summary Report. A summary report (military format) produced by the RL which details a brief summary of the activities conducted during the excavation of the site. The report is sent to the R&A for editing before the redeployment of the team. Previously known as the DRE (Detailed Report of Excavation).
EWO	Electronic Weapons Officer. Back-seater in some two-man fighter and bomber aircraft; responsible for electronic countermeasures and weaponry.
Evaluation	In intelligence usage, appraisal of an item of information in terms of credibility, reliability, pertinence, and accuracy (from the DoD Dictionary).
Evidence	Something that furnishes truth. At DPAA there are three categories of evidence: 1) Biological (see above), 2) Material (see below), and 3) Life Support Materials (see below).
Excavation	Systematic and controlled processes of removing soil from an excavation unit (see below) to recover incident related materials, as well as to interpret site transformation processes in order to evaluate the likelihood that incident related materials were ever present at that location.
Excavation Grid	An artificial grid established on a physical location used to maintain spatial control. It is a mapped network of uniform squares that divides a site into excavation units (see below). Although an excavation grid is mapped and placed in two-dimensional-space, the grid actually encompasses three-dimensional-space. The function of an excavation grid is to measure and record objects, features, and stratigraphy, and relations among and between objects, features and stratigraphy in order to maintain site provenience (see below).

Excavation Unit	Typically a square or rectangle within an excavation grid. Excavation units may, however, be located outside of a formal excavation grid when non-systematic, non-probabilistic samples are excavated to evaluate an archaeological site.
Exhumation	The formal removal of human remains from a known and documented cemetery. Exhumations differ from "recoveries" in that human remains are in a known location, typically are in a contained environment (e.g., casket), and are located in an active and regulated cemetery.
Exploratory (Discovery) Excavation	Formal systematic excavations at a small scale consisting of controlled subsurface tests to locate, assess, and document physical evidence and the distribution thereof. In DPAA, it is used as a subsurface discovery technique to evaluate the whether a field location is incident related. Typically involves systematic or non-systematic, probabilistic or non-probabilistic sampling of a site area or landscape. Discovery excavations may include shovel and auger tests, and/or test excavations (excavations 1-x-1-m units or larger). Typically used in burial sites, Exploratory Excavation is often mistaken for a P2T (see below). Also known as Discovery Excavation.
F	Foxtrot (Prior to 1955: Fox)
F-	Designator for fighter aircraft (e.g., F-4 Phantom)
F/A-	Designator for a combination fighter/attack aircraft (e.g., F/A-18 Hornet)
FA	Field Artillery
FAC	Forward Air Controller
Family Update	A monthly meeting sponsored by DPAA in different regions of the US in which government officials update families about the status of the DoD's efforts to resolve the POW-MIA issue.
FAR	Forensic Anthropology Report
Feature	see Archaeological Feature
FFR	Field Forensic Review. A scientific assessment of human remains to determine the likelihood that the remains are from individuals originating in a specific country. The FFR is conducted by a US-only forensic team (FT).
Field Expedient Burial	Circumstances where the complete or partial remains of a deceased individual(s) are interred in a subsurface context where minimal preparation of the burial site is performed. This may include, but is not limited to, caving in the side of a trench, ditch, or bomb/shell crater over the remains, digging a shallow hole and burying the remains with minimal sediment cover over the remains, removing remains to shallow depressions and covering the remains with biodegradable materials. Field expedient burials are most frequently conducted upon the enemy dead or in cases where rapidly advancing forces depart the area.
FIR	Dee DRI.
FM	Field Manual. Usually followed by the manual number (e.g., FM 10-286 Identification of Deceased Personnel).
FOIA	Freedom of Information Act
FOR	Forensic Odontology Report
Formal Burial	The application of distinct cultural practices upon the interment of remains. That is, cultural practices of the combatant or enemy, whoever buries the remains, are known and those practices leave an archaeological signature. Formal burials primarily are located in known cemeteries but may be in isolated locations (e.g., POW burials adjacent to a POW camp).
Formation Processes	Natural and cultural processes that are at work in the creation of an archaeological site. These processes include, but are not limited to intentional burial activity, discard behavior, aircraft crash dynamics, cultural land use, agricultural land use, pedagenesis, anthropogenic alterations of soils and sediments, etc.
FOUO	For Official Use Only
Forensic anthropologist	An anthropologist with specialized training and experience in human skeletal biology, field recovery methods, and general forensic science.
Forensic archaeologist	An anthropologist with graduate level education in the field of archaeology with specialized experience in the field excavation of sites with a forensic interest.
Forensic odontologist	A dentist with specialized training and experience in the forensic applications of dentistry.
Forensic pathologist	A medical doctor with specialized training and experience in the determination of the cause and manner of death.

FRG	Family Readiness Group (formerly Family Support Group). DPAA family/spousal support group.
FRS	Family Reference Sample. A biological sample, usually blood or buccal swab, supplied by a family member of an unaccounted-for individual for use in DNA testing.
FSC	Field Search Case. A geographically circumscribed list of unaccounted-for personnel. Followed by the FSC number (Example FSC 350). Specific to the Korean War.
FT	Forensic Team. Typically consist of a board certified forensic anthropologist and a forensic odontologist. FTs conduct forensic reviews of remains, participate in scientific exchanges, and support technical talks.
Fullest Possible Accounting	An expression used to emphasize that the USG will make every reasonable effort to account for its missing persons, as defined in Title 10.
FY	Fiscal Year (see CY). The USG Fiscal Year begins on 1 October.
G	Golf (Prior to 1955: George)
G-1	Personnel and Administration section at a General Staff level (see J-1 and S-1)
G-2	Intelligence and Security section at a General Staff level (see J-2 and S-2)
G-3	Operations section at a General Staff level (see J-3 and S-3)
G-4	Logistics and Supply section at a General Staff level (see J-4 and S-4)
G-5	Policy section at a General Staff level (see J-5)
G-6	Communications and Automation section at a General Staff level (see J-6)
GC	Grid Coordinate(s). The military system typically is written with a prefix indicating the UTM Grid Zone (e.g., 52S), followed by a two-letter 100,000 meter square reference (e.g., YE), followed by the easting grid coordinates (e.g., 123), followed by the northing coordinates (e.g., 321). The third digit in the grid coordinates is an estimate to the nearest 100 meters. A fourth coordinate estimates to the nearest 10 meters. (e.g., 52SYE 1234 3210).
GMT	See Zulu
GO	General Officer
GR	Graves Registration (same as Mortuary Affairs)
Grant	Unilateral transfers of something of value—either real or symbolic—with no required reciprocal act (vice Contract, which must be reciprocal). At law, the term "grant" commonly is associated with the transfers of real property (e.g., land grants) or items with title. Grants of non-real property typically are considered "subsidies."
Grid North	The orientation of an excavation grid in relation to either true or magnetic north. Grid north on a map typically is toward the top of the page. In order to state a "grid north" on a map, a formal spatial grid must be established.
GS	General Schedule. Government civilian employee wage scale that runs from GS-1 (low) to GS-15 (high). Each grade has 10 "steps."
GVN	Government of Vietnam. Refers to government of the former South Vietnam (see RVN).
H	Hotel (Prior to 1955: How)
Hanoi Hilton	Unofficial name of Vietnamese POW camp where many US pilots and aircrew were held in downtown Hanoi during the Vietnam War.
HE	High Explosive
HH-	Designator for heavy-lift Helicopter (e.g., HH-53)
HPP	Historic Preservation Plan. A variant of a CRMP.
HUMINT	Human Intelligence
I	India (Prior to 1955: Item)
IAW	In accordance with
ICRC	International Committee of the Red Cross
ID	(1) Identification (2) Infantry Division
IDB	Investigation Decision Brief. The forum in which Agency approval is granted to add an investigation plan to the Master Investigation List (MIL- see definition).
Identification	The state of being identified, or to establish the identity of. At DPAA, this generally refers to the determination of the individual identity of a single and specific set of biological remains.
Identification Media	Any form of physical object that exhibits the name, service number, or other restricted data (e.g., PII) that relates directly to the missing U.S. service member. Identification media

	may include, but are not limited to, ID tags, ID cards, name tapes, credit cards, drivers' licenses, and initials placed on objects.
Identification Memorandum	See MESR
Memorandum for Record for Additional Portions	See MESR
IDPF	Individual Deceased Personnel File. A file generated by the parent service of a deceased service member that includes all personnel and medical records.
IFR	Institute of Forensic Medicine, Hanoi.
Inadvertent Burial	Human remains that are left in place and are covered by soils, sediments or other materials via natural processes rather than cultural processes. An example of an inadvertent burial is the remains of a deceased individual(s) left in a fighting position where those remains are covered by natural erosional processes.
Incident	The event(s) which led to a missing person (see definition) case (see definition). An incident can include one or multiple cases. In DPAA, a loss incident is referred by numbers (e.g., REFNO 1203, MACR 11985, BuNo 6969, WWII 00285-J). Incidents should not be confused with cases and sites.
Independent Interview	When multiple witnesses or informants with knowledge of a loss interview are spoken with separately to allow for an assessment of consistency and to insure that they aren't influencing each other's recollections. Witnesses/informants should also indicate locations on the landscape separate from one another.
Informal Burial	Similar to Field Expedient Burials in that no standard cultural burial practices are followed. Typically, the smallest possible grave is excavated and remains are placed in that excavated feature in a manner where the remains fit into the hole (e.g. body or body parts are folded, flexed, or shaped to fit within the excavated hole.) Conversely, informal burials may take advantage of the topographic features on the landscape (ditches, depressions, rock piles, etc.) wherein the remains are placed in the feature and sediments, soils, or other materials are placed on top of the remains.
Informant	An individual who provides information in response to questions from an investigator. At DPAA, informants are separated from witnesses (see definition) as they do not typically have knowledge about a specific historical event but may have knowledge concerning remains or evidence at a specific location, land use practices at a site, or other information pertinent to a recovery.
Inhumation	Bury or inter (see below).
In Situ	Roughly translated as "an item located in its original position as a result of the loss incident when found."
Inter	To deposit a dead body in the earth or in a grave or tomb.
Interment	The act of depositing a dead body in the earth or in a grave or tomb.
Investigation	A searching inquiry for ascertaining facts; detailed or careful examination. At DPAA, it is an activity to determine the location of a loss incident and gather as many pertinent details about that location as possible. This may include examination of historical documents and photographs, interviews, and site surveys.
Investigator in Charge	aka IIC. Former name for the Recovery Leader/Anthropologist.
IPR	In-Progress Review (var. Interim Progress Review). A meeting to update status of a project.
IRDB	Investigation and Recovery Decision Brief. A pre-mission meeting by Operations that is no longer in use.
IRT	In Regards To
J	Juliet (Prior to 1955: Jig)
J-1	Personnel and Administration section of a Joint Organization (see G-1 and S-1)
J-2	Intelligence and Security section of a Joint Organization (see G-2 and S-2)
J-3	Operations section of a Joint Organization (see G-3 and S-3)
J-4	Logistics and Supply section of a Joint Organization (see G-4 and S-4)
J-5	Policy section of a Joint Organization
J-6	Communications and Automation section of a Joint Organization (see G-6)
JAG	Judge Advocate General. Military lawyer.

JCRC	Joint Casualty Resolution Center. Formed in January 1973 to resolve the fates of the unaccounted-for American servicemen from the war in Southeast Asia. JCRC was replaced by the JTF-FA in 1992.
JCS	Joint Chiefs of Staff. A collective body of chiefs of the four military services headed by a chairman who serves to advise the President, National Security Council, and the Secretary of Defense. The Chairman, Joint Chiefs of Staff is the principal military advisor to the President.
JFA	Joint Field Activity. Field activities that are planned and executed jointly with other governments.
JFR	Joint Forensic Review. A scientific assessment of human remains to determine the likelihood that the remains are from individuals originating in a specific country. The JFR is performed by scientists from at least two governments which distinguishes it from the FFR.
JFS	Journal of Forensic Sciences
JPAC	Joint POW/MIA Accounting Command. Deactivated on 30 January 2015.
JRO	Joint Recovery Operation. Specific to operations in the DPRK.
JTF-FA	Joint Task Force—Full Accounting. Successor of the JCRC. Later merged with CILHI to form Joint POW/MIA Accounting Command (JPAC) in 2003.
K	Kilo (Prior to 1955: King)
K/CW	Korea/Cold War.
Kampuchea	Name for Cambodia adopted by the Khmer Rouge in the late 1970s. Since renamed K.O.C.
KATUSA	Korean Augmentation to the US Army. South Korean soldiers attached to US Army units (ronounced Kah-two-suh).
KC-	Designator for tanker aircraft (e.g., KC-135 Stratotanker). Also used for passenger transport.
Khmer Rouge	Communist Cambodian forces
KIA	Killed In Action
KIA/BNR	Killed in Action, Body not Recovered
Kip	Lao currency
Klick (var. Klic)	(slang) Kilometer
KOC (var. K.O.C.)	Kingdom of Cambodia. Replaced State of Cambodia (S.O.C.) as official name for Cambodia.
KPA	Korean People's Army. Army of the Democratic People's Republic of Korea (North Korea).
KR	Khmer Rouge
L	Lima (Prior to 1955: Love)
LBE	Load Bearing Equipment. A suspender-like belt system designed to assist in carrying military equipment.
League	Short for National League of Families. The full name is the National League of POW/MIA Families of American Prisoners and Missing in Southeast Asia.
Life Support Materials	(Also Life Support Items, Life Support Equipment) are typically associated with aircraft loss sites. Life support materials can be relegated into two categories- aircraft related items and aircrew related items. Aircraft related items include but are not limited to ejection seats and their component parts, escape devices (axes), seat pan survival kits, and other items. Aircrew related items are those items worn by the aircrew while flying the aircraft and include but are not limited to flight suits, helmets, g-suits, survival vests, and their contents, boots, etc. Aircrew-related Life support materials vary by conflict and vehicle. Their significance is relative. Life support materials are used in Southeast Asia, where preservation of remains is poor, as a proxy for human remains. That is, these materials were in direct contact with the loss individual(s) at the time of the crash. In larger aircraft with numerous personnel, life support materials may not be suggestive of lost individuals (for example, if flak vests were not actively worn by the aircrew the at the time of crash, spatial presence of flak vest portions throughout the debris field is not a proxy for human remains).
LKA	Last Known Alive. Cases in which the US has information that the individual survived the loss incident and fell into enemy hands. In the case of the air incidents, this includes cases

	in which the crewmembers are believed to have successfully exited their aircraft and to have been alive on the ground. In the case of ground incidents, this includes cases in which the individuals were last known alive, were not gravely wounded, and were in proximity to enemy forces.
LNO	Liaison Officer
Loss Incident	The event(s) which led to a missing persons case (see definition of a case). A loss incident can include one or more cases. In DPAA, a loss incident is referred by numbers (e.g., REFNO 1203, MACR 11985, BuNo 6969, WWII 00285-J). Through the course of investigation and recovery operations, a loss incident will typically have one associated site (e.g. a single crash site), but may also have numerous sites associated to the incident. Incidents should not be confused with cases and sites.
Loss Location	Specific locations on the landscape directly associated with the historical event of the loss (loss event) of a U.S. service member. Loss locations recorded at the time of a loss event frequently are imprecise. Upon confirmation by physical evidence at the loss location, a loss location is termed a "site."
LPDR (var. L.P.D.R.)	Lao People's Democratic Republic
LSEL	Life Science Equipment Laboratory. Located at Wright Patterson Air Force Base, Dayton Ohio (pronounced L-sell). Merged with the CIL in January 2015
LZ	Landing Zone
M	Mike (Prior to 1955: Mike)
M&IE	Meals and Incidental Expenses (daily "allowance" paid while on TDY)
MA	(1) Mortuary Affairs (2) Master of Arts (3) Milli Amps (see KvP) (4) Military Assistant
MACOM	Major Army Command
MACR	Missing Air Crew Report (pronounced Mack-er). Sometimes referred to as Missing Aircraft Report.
MACV	Military Assistance Command, Vietnam
Magnetic North	North determined by the use of a magnetic compass not adjusted to a local declination to True North.
MAKRI	MND Agency for KIA Recovery and Identification. The South Korean equivalent of DPAA.
Map North	Orientation of a paper or digital map wherein the top of the map is referred to as north although actual true or magnetic north is not oriented directly toward the top of the paper or digital "page."
Material Evidence	Physical items (see Physical Evidence below) that are directly or indirectly associated with a loss event, site, or combination thereof. Material evidence may fall into two categories; (1) general evidence (generic materials that are identifiable to the level of association); and (2) relevant evidence (specific materials that aid in the circumstantial identification of a missing individual(s). The concept of personal effects (items not issued by the U.S. military and typically "owned" by an individual) fall within the realm of material evidence. The DPAA-CIL does not typically use the term personal effects in message traffic or formal reports, but lumps all relevant evidence under the concept of material evidence.
MCB	Marine Corps Base
McCain Bill	Senate bill authorizing release of information on unaccounted-for US personnel only upon approval of the next-of-kin.
MD	Doctor of Medicine or Medical Doctor
MDV	Master Diver
ME	(1) Medical Examiner (2) Material Evidence
MEL	Master Excavation List. The official list of sites that has been approved for recovery operations. Operations maintains the list.
MER	Material Evidence Report.
MESR	Medical Examiner Summary Report. DPAA Science Director document that summarizes the scientific findings of the case and also evaluates and accounts for all information pertaining to it, including biological, historical, physical, and/or circumstantial information. The MESR contains the Identification Memorandum (or in the case of additional ["X" portions], the Identification MFR) that specifies the name, rank, date of identification, and service number of the person identified.
Metal Detector Survey	Partial or site-wide systematic or non-systematic sweeps of the ground surface with an

	operating metal detector to identify and pin-point subsurface metal objects. Typically, in an initial site survey, a sample of metal objects may be excavated to determine the nature of the objects and the overall distribution of metal in the subsurface environment. Metal detector surveys as a part of an archaeological assessment may result in the excavation of 100% of metal signals within a transect or other defined area.
Method	A systematic procedure, process, or technique for doing something.
Methodology	A body of methods employed by a discipline; the analysis of the principles or procedures of inquiry in a specific field.
MFR	Memorandum For Record
MGRS	Military Grid Reference System. A variation of the UTM mapping system that employs map designators to reduce the length of written coordinates (see UTM and GC).
MI	(1) Military Intelligence (2) A designator for certain Russian-built helicopters (e.g., MI-8, MI-17)
MI-8, MI-17	Soviet-built helicopters commonly used in Vietnam and Laos (the MI-17 is the more powerful of the two) – holds approximately 20 passengers and limited baggage/equipment.
MIA	Missing in Action
MIA-CAP	Missing in Action, Captured
MiG (var. MIG)	Mikoyan-Gurevich. Soviet manufacturer of aircraft (e.g., MiG-25). Used as a catch-all term for a wide variety of Soviet-made aircraft (pronounced Mig).
MIG-CAP	MiG (as in Soviet-made aircraft) Combat Air Patrol. Combat mission designed to look for and engage enemy (e.g., Soviet-built MiGs) aircraft (pronounced Mig-cap).
Mike-Mike	(slang) Millimeter. Used as in "UXO consisted of 20-Mike-Mike shells."
MIL	Master Investigation List. The official list of sites that has been approved for field investigation. Operations maintains the list.
MILAIR	Military Aircraft (pronounced Mill-air) (see COMAIR)
MILCON	Military Construction
MIPR	Military Interdepartmental Purchase Request (pronounced Mip-ur)
Missing Person	Under Title 10, USC, refers to individuals who perished in combat operations during World War II, the Korean War, the Vietnam War, or later conflicts and whose remains have not been recovered or otherwise accounted for.
Mission	At DPAA, a scheduled field activity that is planned and funded by the Operations Directorate. Missions have a number that includes the year, country, and sequential occurrence within the fiscal year.
MOA	Memorandum of Agreement
MOS	Military Occupation Specialty (military job code)
MOU	Memorandum of Understanding
MP	Military Police
MRE	Meal Ready to Eat. Military ration.
MS	Master of Science.
MSc	Master of Science (usually associated with European universities)
MSG	(1) Official Message (2) Master Sergeant
MSR	Main Supply Route
MUDSU	Mobile Underwater Diving and Salvage Unit. Navy mobile salvage unit (pronounced Mud-sue).
N	November (Prior to 1955: Nan)
NAF	(1) National Alliance of Families (2) Not a Fatality (3) Non-appropriated funds
NARA	National Archives and Records Administration
Narrative	A descriptive summary of historical events that relate to an incident and/or case.
NAS	1) Naval Air Station. 2) National Academy of Sciences.
NAS report	Report produced in 2009 for Congress by the National Academy of Sciences, called *Strengthening Forensic Science in the United States: A Path Forward.* The report recommended mandatory accreditation for all forensic laboratories.
NCO	Non-Commissioned Officer. Enlisted ranks between E-4 and E-9 (i.e., sergeants and petty officers).
NDSTC	Naval Diving and Salvage Training Center
NGO	Non-Government Organization

NIS	Naval Investigative Service
NLF	Short for National League of Families of American Prisoners and Missing in Southeast Asia. Also National Liberation Front
NLT	No Later Than
NMCP	National Memorial Cemetery of the Pacific (aka The Punchbowl)
NOFORN	NO Foreign Access. Qualifier used with classifications to indicate that the material is not to be made accessible to foreign nationals (e.g., Top Secret NOFORN).
Non-probabilistic sample	Samples selected without using the concept of randomness from probability theory. It is a mistake to call these types of samples "random samples" without further justification. "Grab samples" are an example of a non-random sampling procedure.
Non-systematic sample	Samples selected with no prior plan of sampling.
NPRC	National Personnel Records Center located in St. Louis, MO.
NSPS	National Security Personnel System. Paperless human resource system that regulates and synchronizes job descriptions, job objectives, performance evaluations, promotions, pay and bonuses between DOD supervisors and civilian employees.
NVA	North Vietnamese Army. The regular army of the North Vietnamese government during the Vietnam War.
O	Oscar (Prior to 1955: Oboe)
O-	(1) Prefix used with officer pay grades. The prefix is followed by a number that indicates the grade from O-1 (lowest) to O-10 (highest). (2) Designator for an observation aircraft (e.g., O-1 Bird Dog).
O/A	On or About
OAFME	Office of the Armed Forces Medical Examiner (pronounced Oaf-me). A division of the AFMES.
ODP	Orderly Departure Program
OF	Optional Form. Used with forms (e.g., OF41 Routing and Transmittal Slip).
OH-	Designator for Observation helicopter (e.g., OH-6A Cayuse)
OHP	Oral History Program. A research program to interview individuals in Vietnam, Laos, and Cambodia to expand the general knowledge of the handling and disposition of Prisoners of War/Missing Personnel.
OMB	Office of Management and Budget
OPCON	Operational Control
OPD	Officer Professional Development
Operation Big Switch	Large exchange of UN soldiers for North Korean and Chinese soldiers begun on 5 August 1953.
Operation Glory	Repatriation of the remains of war dead between the UN and the North Korean-Chinese axis beginning 22 July 1954 and ending o/a 21 September 1954. Included the remains of approximately 850 US soldiers.
Operation Homecoming	Return of US POWs from Vietnam in 1973
Operation Little Switch	Small-scale initial exchange of UN soldiers for North Korean and Chinese soldiers from 20 April-3 May 1953.
Operations	See J-3, G-3, or S-3
OPLAN	Operations Plan. The annual plan issued by DPAA to all supporting and supported commands that describes the plan and assigns responsibilities for execution of DPAA operations for each Fiscal Year (FY). Normally issued in the third quarter (APR - JUN) of each year.
OPORD	Operations Order. The formal order that follows the Decision Brief which is used to task supporting commands. It defines: task organization, situation, mission, execution, administration and logistics, and command and signal plans. The OPORD describes the plan and assigns responsibilities for each JFA. Normally issued 30 days prior to each JFA.
OPT	Operational Planning Team. OPT's are formed to address specific problems and typically include members from multiple Directorates.
OPTEMPO	Operation Tempo
OQMG	Office of the Quartermaster General. Usually seen on forms.
Organized Mass Grave	The interment of two or more individual sets of remains wherein the skeletal remains are interred in a systematic manner forming a consistent pattern. This may consist of a side-

	by-side, orderly stacking, or other discernable interment practices.
ORAU	Oak Ridge Associated Universities
ORISE	Oak Ridge Institute for Science and Education
Osseous Materials	Bone or bony material (osseous is derived from the Latin word *os,* meaning bone). Osseous material is a phrase typically used in a DPAA SITREP to connote materials recovered or collected from a site that have the appearance of bone but cannot be determined via field analysis to actually be bone. The term "Osseous Materials" should not be conflated with the term human remains.
Osseous Remains	Term used when sure that material is bone but unsure if it is human or nonhuman in origin.
Osseous Remains, Possible	Material is known to be non-human bone or when the material is of unknown type but expertise and SOP dictates it to be returned to the CIL.
Outsource Activity	An activity within the scope of the DPAA mission that has been referred to a third party whether through a contract, cooperative agreement, or other arrangement. The activity could be done solely by the third party or in cooperation with DPAA. Four classes of outsource activity are recognized: *Class 1*: To subcontract laboratory, field, or other services to a professional organization. DPAA ensures that the organization meets CIL standards of personnel qualifications, evidence handling standards, general procedures, and quality assurance. This can be accomplished by verifying that the organization is accredited (ISO-based), or by certifying that the organization meets DPAA standards through a certification process. *Class 2*: Relying upon a host nation government organization to perform services for DPAA. This work is done through interagency agreements, and may or may not include funding from DPAA. For these activities, The CIL often provides the training necessary to ensure successful execution. One example is MAKRI, who regularly performs field investigative and recovery work for DPAA at their own expense. In return, we provide extensive training and also turn over South Korean remains in our custody as they are discovered. A second example is the Vietnam Recovery Team (VRT), for which we fund the activities entirely and typically provide a Recovery Leader to augment their team as they have no scientists on staff. The CIL has provided extensive training to the VRT personnel on several years. *Class 3*: Non-governmental organizations with professional capability. These are entities that work at their own expense, with their own agenda, but are capable of professional quality work. *Bent Prop* is a good example of this type of organization. These organizations can function at a Class 1 level if appropriate agreements are put in place. *Class 4*: Non-governmental organizations and individuals who are not capable of professional quality work. There are many more Class 4 entities operating than other classes, and they are typically self-funded. Some are interested in collecting artifacts, some are "adventurers" pursuing hobbies or seeking attention from the media. Others are enthusiasts who simply want to support the DPAA mission. Appropriate caution must be exercised in working with these organizations.
OV-	Designator for an Observation (Vehicle) aircraft (e.g., OV-10 Bronco)
P	Papa (Prior to 1955: Peter)
P-	Designator for Patrol or Pursuit aircraft (e.g., P-51 Mustang)
PA	(1) Privacy Act (2) Public Affairs
PACAF	Pacific Air Force. The major USAF command in the Pacific. Headquartered at Hickam AFB (pronounced Pack-aff).
PACOM	Pacific Command (pronounced Pay-kahm) (see CINCPAC)
Palletize/palletization	Placing of all team equipment and supplies that is strapped down on a moveable steel platform and then loaded on board a military aircraft. These pallets hold approximately one month's food, equipment and supplies for a team deploying on a mission.
PAO	Public Affairs Officer
Pathet Lao	Communist Laotian forces
Pax	Passengers
PBY	Designator for a Patrol-Boat aircraft (e.g., PBY-5 Catalina)
PCIT	Priority Case Investigation Team. A DPAA team assembled to investigate high priority cases (pronounced Pick-it).
PCS	Permanent Change of Station. The arrival or departure of military of civilian employees

	from one duty station.
PE	(1) Personal Effects (2) Physical Evidence (same as Material Evidence)
Pedestrian Reconnaissance	Often referred to as "ground searches," the systematic surface search and survey of a field location to locate physical evidence and features exposed on the ground surface. Effective pedestrian reconnaissance typically is performed by either a line search (searchers lined up with a small interval between searchers) or with other systematic procedures (e.g., block search).
Pelican Case	Brand of hard plastic, foam-lined, lockable cases used to transport remains and material evidence.
Pending Case	Pending cases are those finished with analysis. They are marked Pending when the files are sent to consultants and remain in this status until the remains are removed from DPAA. These files are held in green folders in the File Room.
PERSCOM	US Army Personnel Command (pronounced Purse-com). Formerly US Army Total Army Personnel Command.
Personal Effects	See Material Evidence
PERSTEMPO	Personnel Tempo. Personnel Deployment tempo (pronounced Purse-tempo).
PFM	Porcelain Fused to Metal. An esthetic and permanent (fixed) dental restoration (crown or pontic)
Phase Two Testing (P2T)	At DPAA, a systematic subsurface archaeological testing strategy employed at an archaeological site in order to evaluate the overall distribution and pattern of evidence at the site. This typically involves pedestrian reconnaissance, metal detector surveys, systematic subsurface testing, and archaeological assessment of a field location. P2T can be executed with square or rectangular test pits or linear trenching. In DPAA, a P2T might be employed by an anthropologist in order to better evaluate an area on the landscape that has the highest potential to yield human remains and narrow down the area needed for excavation. P2T is not normally employed on burial sites since it is testing strategy used to better understand the distribution of evidence in a large area. P2T is similar to Exploratory Excavations, but instead is used for large sites and on a much large scale (see above).
PhD	Doctor of Philosophy
Physical Evidence	Items that are directly associated with a loss event. Physical evidence includes, but is not limited to, vehicle parts and data plates, personal effects, biological material, military equipment, archaeological features, and other items which may or may not be transportable.
Plan Map	A two-dimensional map drawn to scale incorporating measured distances and angles.
Planning Conference	A pre-mission planning meeting run by Operations, referred to as Initial (IPC), Mid (MPC) and Final (FPC).
PNG (var. P.N.G.)	(1) Papua New Guinea (2) Persona Non Grata
POC	(1) Point Of Contact (2) Personally Operated Conveyance
Political/Cultural Constraints	Situations in foreign countries where host governments, and/or local indigenous people attitudes or concerns influence the definition and/or placement of the recovery scene or recovery scene perimeter.
Pontic	Artificial tooth/teeth suspended between abutment tooth/teeth of a bridge
Possible Osseous Remains	See Osseous Remains, Possible
POV	Personally Owned Vehicle or Privately Owned Vehicle
POW	Prisoner of War
PRC (var. P.R.C.)	People's Republic of China
Pre-Deployment Brief	A pre-mission planning meeting that usually occurs immediately before a mission. This is usually the first time an entire RT is together.
Primary Burial	Human interments wherein the complete, or nearly complete, body of a deceased individual(s) is placed within the burial feature without significant disturbance or alteration to the standard anatomical positions of the skeletal elements.
Primary Context	See Archaeological Context-Primary
Primary Witness	Participants in an event and/or are in direct proximity to an event wherein they can directly observe all aspects of the event (e.g. watching a plane crash or observing and or participating in a burial).
Probabilistic Sample	Sample drawn using elements of probability theory. Typically random, systematic, and stratified (random or systematic) samples are selected for archaeological testing to assess

	the distribution and frequency of physical evidence at a site.
Project Area	The specific area at a location designated for excavation or other testing (e.g. Phase Two testing) during a specific mission. A project area is not necessarily a site, as the latter term is reserved for location known to contain evidence.
Procès-verbal (var. Process Verbal)	Official report of a meeting. Repatriations of remains from Vietnam to the US are always accompanied by a Procès-verbal.
Provenience	The three-dimensional context (including geographical location) of objects and features, and the relation among and between the objects in an archaeological site or survey area.
Public Private Partnership (PPP, P3)	A government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies.
Punchbowl	See NMCP
PW	Same as POW
Q	Quebec (Prior to 1955: Queen)
QA	Quality Assurance
QAP	Quality Assurance Program
QC	Quality Control
QM	(1) US Army Quartermaster Corps (2) Quality Manager
R	Romeo (Prior to 1955: Roger)
RCT	Regimental Combat Team. Root canal therapy.
Recovery Scene	Locations where human remains and associated material evidence have been, or are believed to be, deposited.
Recovery Excavation	Recovery excavations employ the methods, techniques, and scientific standards of archaeological excavation to recover the human remains and associated physical evidence of missing U.S. service members. Recovery excavations at DPAA typically have to be authorized via the decision of the Excavation Decision Board before a recovery effort can take place. Recovery excavations driven and sanctioned by DPAA require professional CIL Recovery Leaders to direct the scientific processes on site, or to ensure that the scientific decisions made on site are made by appropriate professionals.
REFNO	Reference Number. A case number assigned to US personnel MIA during the Vietnam War (pronounced Ref-no).
Relevant Evidence	Physical items that serves to aid circumstantially in (1) correlating a loss location with a loss event; (2) explaining formation and disturbance processes at an archaeological site; (3) assisting in developing short lists of possible individuals; (4) supports the reported circumstances of a loss event; (5) assists in circumstantially supporting the identification of an individual.
Remains	A generic term typically referring to osseous (bone) materials. Remains may include, however, other biological materials as well as osseous materials.
Remote Sensing	The acquisition of information about an object or phenomenon, without making physical contact with the object. Techniques commonly used by DPAA include aerial photography, ground penetrating radar, soil resistivity, magnetometry, and multi-beam side scanning sonar.
Repat	Short for "Repatriation"
Repatriation	The procedure by which American remains are returned to the United States.
Report	Any written findings that result from DPAA testing, analysis, or research. Reports can be formal documents, emails, memoranda, etc. For the CIL, test reports must clear quality assurance prior to release.
Research	At DPAA, "research" often refers to the study of primary reference material concerning cases and incidents. For the CIL, research has the more traditional meaning common to scientists.
RMI	Republic of the Marshal Islands
Roger	Affirmation and acknowledgment. Often used with "that," as in "Roger That."
ROI	Report of Investigation. Produced by R&A detailing activities conducted during an investigation mission. This report is produced by the WWII section and is produced within three weeks of the return of the investigation team.
ROK (var. R.O.K.)	Republic of Korea. Official name for South Korea.
Rolling Thunder	US bombing campaign of North Vietnam begun in 1965

RPA	Register of Professional Archaeologists
RVN (var. R.V.N.)	Republic of Viet Nam. Official name for former South Vietnam.
RVNAF	Republic of Vietnam Armed Forces (see VNAF)
S	Sierra (Prior to 1955: Sugar)
S-1	Personnel and Administration section at a brigade or battalion level
S-2	Intelligence and Security section at a brigade or battalion level
S-3	Operations section at a brigade or battalion level
S-4	Logistics and Supply section at a brigade or battalion level
SAA	Society for American Archeology
SAM	Surface-to-Air Missile
Sampling Paradox	Sampling processes are designed to draw a sample (n) from a population (N) to develop interpretations from the sample about the larger population of a whole. Sampling strategies assume a random distribution of phenomena in the population. The paradox in archaeology has two elements: (1) there is a non-random distribution in the population; and (2) excavation of a sample does not sample the population, it samples three-dimensional space.
SAR	1) Search and Rescue. A term for forces (aircrafts, ships, and supporting troops) that attempt to locate and rescue downed aircrews and other isolated US personnel. 2) Search and Recovery Report written by the CIL.
SATCOM	Satellite Communication (pronounced Sat-com)
Screening	The process of separating incident related material from its sediment matrix through a wire sieve.
SCUBA	Self Contained Breathing Apparatus
SE	(1) Standard Error (2) Southeast
SEA	Southeast Asia
SecDef	Secretary of Defense
Secondary Burial	Interment of remains that typically are not fully articulated and the skeletal elements are not fully in standard anatomical position. Secondary burials frequently result from either the transport of remains from one burial context to a second context or result from the collection of surface remains for deposition into a burial context.
Secondary Context	See Archaeological Context-Secondary
Secondary Witness	Individuals that receive information directly from Primary (eye) witness. Better referred to as Informants (see above).
Secret Squirrel	(slang) A classified mission
SecState	Secretary of State
Security Clearance	The result of a formal investigations by agencies of the United States Government. Multiple levels of clearance are awarded based on background, need, and other factors.
Sediment	Solid fragmented material, such as silt, sand, clay, gravel, chemical precipitates, and fossil fragments, that is transported and deposited by water, ice, or wind or that accumulates through chemical precipitation or secretion by organisms, and that forms layers on the Earth's surface. At DPAA, sediment refers to soil that has been disturbed by excavation.
SERE	Survival, Evasion, Resistance, Escape. Program to train US personnel on survival techniques.
SES	Senior Executive Service. Government civilian employee wage scale above the GS system. The grades run from SES-1 (low) to SES-5 (high). The SES grades are equivalent to general officers.
SF	(1) Standard Form (2) Special Forces
Shovel Test	A type of test excavation (see below). These are small scale controlled and documented excavations typically not exceeding 50 cm on any horizontal axis that are executed to assess the distribution and types of physical evidence at an archaeological site. Shovel tests are a common form of site sampling. A loss incident (see definition) may have several associated sites on the landscape defined by the distribution of physical evidence.
SIGACTS	Significant Activities. A report of significant activities for a certain period of time pronounced Sig-acts).
SIGINT	Signals Intelligence
Site	Circumscribed space on the landscape defined by the distribution of physical evidence. A physical location that has simply been surveyed should not be elevated in significance to

	merit consideration as a site until interpretation of the survey results yields sufficient evidence to do so. A loss incident may have several associated sites. Sites are numbered with unique numbers (see Site Numbering System).
Site Area/Locus	Smaller areas of circumscribed space within, or adjacent to, a larger site (e.g., a burial location within a larger crash site or an engine impact crater adjacent to a fuselage impact crater). Site areas/loci must be directly correlated with the attributes of the larger sites. Adjacent to can be roughly defined as if it is in proximity on the same topographic feature or within 50 m of a larger site. A site area/locus might or not be the same space identified as a "project area" (see definition).
Site Boundary/Perimeter	The edge of a site as defined by the interface of the presence and absence of physical evidence. Determination of site boundaries must be done prior to developing an excavation strategy in detail.
Site Numbering System (CARIS Number)	An alpha-numeric numbering system to track individual circumscribed locations (sites) on the landscape (e.g. LA-99999). Site numbers are typically assigned to physical locations that have yielded physical evidence or a surveyed area that may eventually yield association. A site number is tied to the physical location. That is, once a site number has been assigned to a physical location, that site number is used to define that physical location, regardless if that location is subsequently determined to be associated with a different loss incident correlated with a specific loss location.
Site Survey	An archaeological assessment of a field location (see above) and is used to determine if a physical location on the landscape is correlated with an historical event. Site surveys employ archaeological methods to include pedestrian reconnaissance, metal detector survey, remote sensing when appropriate, and subsurface testing. Site surveys serve not only to evaluate a field location but to document the distribution of physical evidence within the boundaries of the site. Typical goals of a site survey can include: record grid coordinates, document site and evidence with written and photographic methods, conduct search systematic activities, develop an accurate and scaled map delineating all salient data, evaluate and assess anthropogenically altered soils and sediments, evaluate site formation and disturbance processes, assess the distribution of evidence, identify patterns of evidence and features on the landscape, and produce a written report describing the location, condition, and context of the site and evidence, as well as producing appropriate logistical and recovery recommendations. These findings are used to develop the full recovery plan.
SITREP	SITuation REPort. Status report, usually issued from field (pronounced Sit-rep)
Sketch Map	Informal maps that are not consistently drawn to scale.
Sling Load	Large equipment loads suspended underneath the belly of a helicopter
SOC (var. S.O.C.)	State of Cambodia (see K.O.C.)
SOG	Studies and Observation Group. An unconventional warfare group during the Vietnam conflict. Often used in conjunction with MACV. Also, Special Operations Group.
Soil	The loose top layer of the Earth's surface, consisting of rock and mineral particles mixed with decayed organic matter (humus), and capable of retaining water, providing nutrients for plants, and supporting a wide range of biotic communities. DPAA typically uses soil in reference to intact sediment that has not been disturbed due to excavation.
Soil Profile (Section Drawing)	A to-scale drawing of a unit profile showing the different layers of soil/sediment, and their characteristics, which serves to establish the 3-dimensional context of evidence within a site.
SOW	Scope of Work
SP	Security Police
Squirrel	A small, French-made helicopter used extensively by Lao West Coast Helicopter Company in SE Asia.
SR	Summary Report. The initial report released after the completion of a JFA. It provides an overview of the results of the activity, including a statistical summary of the cases addressed and a narrative assessment of host nation cooperation and other significant subjects.
SR-	Designator for a Strategic Reconnaissance aircraft (e.g., SR-71 Blackbird)
SRV (var. S.R.V.)	Socialist Republic of Vietnam. The official name for the communist state formed in 1975 by the takeover of South Vietnam by North Vietnam.
SSDS	Surface Supplied Diving System

(b)(3):10 USC § 424

Subcontracting	Regarding accreditation, outsourcing of testing to external laboratories, for whatever reason, in disciplines where the CIL is already accredited.
Subsurface	Below the surface of the ground or water.
SUPSALV	Supervisor of Salvage
Surface Remains	Human remains representing a deceased individual(s) that have not been buried or covered with any type of material by either natural or cultural mechanisms. Two subcategories exist- scattered surface remains such as those associated with an aircraft crash site wherein portions of a body are widely scattered among the wreckage and their distribution is a result of the crash dynamics; and surface remains that are relatively intact at the time of death and become scattered due to site formation processes (e.g., faunal turbation, erosional processes).
Survey	The act of searching for, or inventorying a loss location. Surveys are typically performed in a systematic manner employing pedestrian reconnaissance and metal detector procedures to delineate the form, extent, and position of sites and physical evidence.
Suspense (Date)	Date by which an action (e.g., a report) is due. Known in the civilian world as a "deadline."
Systematic	Methodological in procedure marked by thoroughness and regularity.
Systematic Sample	Samples (typically small scale excavation units) systematically excavated at a site using a pre-determined plan. Systematic samples could include, but are not limited to, shovel tests at known intervals along a transect, test excavations at spaced intervals on an excavation grid (e.g., the southwest 1-x-1 m square every fifth square in a row of excavation units, or any other precise and systematic sampling plan. The purpose of a systematic sample is to provide an estimate of total site content without excavating the entire site.
T	Tango (Prior to 1955: Tare)
T-	Designator for a Training aircraft (e.g., T-28 Trojan)
TA-50	Equipment and clothing issued to military service members and DoD civilians
TAG	The Adjutant General of the Army (pronounced Tag)
TAGD	The Adjutant General Directorate of the Army (pronounced Tag-dee)
TAMC	Tripler Army Medical Center (Hospital) (pronounced Tam-see)
TAT	Technical Assessment Team. Specialized team doing preliminary assessment of a site prior to recovery (pronounced Tat)
TDA	Table of Distributions and Allowances. Table of allocated resources (e.g., manpower).
TDY (TAD for Navy)	Temporary Duty
Tech-Talks	Technical Talks. Talks held with foreign countries to arrange recoveries, repatriations, etc.
Terminus a quo	An initial point in time (see terminus post quem)
Terminus post quem	A terminal point in time (also terminus ad quem) (see terminus a quo)
Tertiary Witness	Witnesses have some knowledge of an event. Their knowledge of an event is received through several generations of individuals, or derived from another sources such as books, reports, or photographs. Also known as an Informant.
Test Excavation	Small scale controlled and documented excavation units of varying sizes and depths that are completed to evaluate the distribution and contents (types of physical evidence) of archaeological sites. See Exploratory Excavation.
THCIL	Thailand Central Identification Laboratory. Moved to Hawaii in 1976 and became CILHI (pronounced Sill-tie or Tie-sill).
THREATCON	(Terrorist) THREAT Condition. A system of 5 security levels ranging from "Normal" (lowest) through "Delta" (highest). Each level prescribes specific security measures to be taken (pronounced Threat-kon).
TM	Technical Manual. Usually followed by the manual number (e.g., TM 8-231 Orthopedic Specialist).
TOC	Tactical Operations Center, sometimes known as the communication center. These structures were often built underground to afford protection during an assault.
Training Holiday	A day off given to the military, i.e., a holiday from training. Does not apply to civilians (see 59-Minute Rule).
Trilateral Witness	Witnesses brought into a country from another country. Witnesses are considered trilateral

	as interviews are conducted in concert with the U.S., the host nation wherein an event occurred, and the country of origin of the witness.
True North	The geographic north pole. True north is determined using a compass that is set to the appropriate published declinations for an area.
TS	Top Secret
TSN	Tan Son Nhut. US Army Mortuary that operated near Saigon during the Vietnam War.
Turbation	Typically the disturbance of sediments and objects within the three-dimensional area of a site.
U	Uniform (Prior to 1955: Uncle)
UBA	Underwater Breathing Apparatus
UBL	Unit Basic Load. Refers to all items compiled together in support of a mission.
UCT	Underwater Construction Team
UET	Unilateral Excavation Team
UFR	Un-Funded Requirement. A requirement for which no budgetary allowance was made (pronounced You-fur).
UH-	Designator for Utility Helicopter (e.g., UH-1 Iroquois [aka Huey])
UNCMAC	United Nations Command Military Armistice Committee. Committee represented by the 16 nations that joined South Korea in the Korean War, and continues to press for the repatriation of the remains of unaccounted-for United Nation servicemen (pronounced Unk-mac).
Unilateral Recovery	Any recoveries, either through excavation or systematic surface collection of U.S. human remains, conducted outside of the direct supervision of a DPAA Recovery Leader. Typically unilateral recoveries are conducted by individuals, organizations, or foreign governments.
Unilateral Turn Over	Relinquishing collected or excavated human remains and/or physical evidence from an individual, organization, or foreign government to U.S. control.
URT	Underwater Recovery Team
USA	US Army. When followed by an "R" indicates Reserves.
USAAC	US Army Air Corps. The aviation arm of the US Army created in July 1926.
USAAF	US Army Air Forces. Replaced US Army Air Corps in June 1941.
USACIL	US Army Criminal Investigation Laboratory. The Central USA CID Laboratory located at Fort Gillam, GA.
USACILHI	US Army Central Identification Laboratory, Hawaii
USAF	US Air Force. Replaced US Army Air Forces on 18 September 1947.
USAMAA-E	U. S. Army Memorial affairs Activity-Europe. The USA memorial affairs office for all of the European theater. Headquartered in Landstuhl, Germany.
USARPAC	US Army, Pacific. The major USA command in the Pacific. Headquartered at Forth Shafter (pronounced Yoo-sar-pack)
USCG	US Coast Guard. When followed by an "R" indicates Reserves.
USG	United States Government
USMC	(1) US Marine Corps. When followed by an "R" indicates Reserves. (2) United States Memorial Cemetery.
USN	US Navy. When followed by an "R" indicates Reserves.
USRJC	United States-Russia Joint Commission on Prisoners of War/Missing in Action
U'Taphao (var. U'Tapao)	Thai Navy airbase where US teams stage out of to Vietnam, Laos and Cambodia
UTC	See Zulu
US Territory	Any land area and adjacent oceans under the direct or indirect control of the US government.
UTM	Universal Transverse Mercator. A mapping system whereby a 1000-x-1000-meter grid is superimposed over the world. The grid squares may then be sub-divided into smaller segments (see GC and MGRS).
UXO	Unexploded Ordnance. Explosive devices that have not been triggered. UXO includes all devices ranging from small arms ammunition to large aerial bombs and missiles.
V	Victor (Prior to 1955: Victor)
V/R	Very Respectfully. Used as a closing before the name or signature in an informal letter or message.

VC (var. V.C.)	Viet Cong. South Vietnamese guerillas fighting for the North Vietnamese government during the Vietnam War. Known in military nomenclature as Victor Charlie, often shortened to Charlie.
Verisimilitude	Having the appearance of truth.
VNAF	Vietnam Air Force. Name of air force of the former South Vietnam (pronounced Vee-naf)
VNOSMP	Vietnamese Office for Seeking Missing Persons. A Vietnamese government office that coordinates US recovery efforts in that country
W	*Whisky (Prior to 1955: William)*
W-	Prefix used with Warrant Officer pay grades. The prefix is followed by a number that indicates the grade from W-1 (lowest) to W-5 (highest). Grades from W-2 through W-5 may be designated as Chief Warrant Officers, CWO-2 through CW-5 (Army W-5s are known as Master Warrant Officers).
W/D	Withdrawn. Often used with military correspondence (e.g., cy w/d [copy withdrawn]).
WD	War Department
WILCO	Will Comply. Affirmation and acknowledgment.
Wild Weasel	Name for an aircraft reconfigured as an electronic or radar countermeasures aircraft.
Witness	An individual with knowledge of an incident that is based on direct observation of events and/or evidence.
World Wide	On a global scale. DPAA's World Wide missions take place wherever there are known US service losses. Typically used to describe recoveries not associated with the Vietnam or Korean wars (e.g., World war II, Cold War, etc.).
X	X-ray (Prior to 1955: X-ray)
X-	(1) Unknown. Used by military recovery teams to denote unknown (unidentified) remains (e.g., Unknown remains X-57) (2) Designator for experimental aircraft (e.g., X-15).
XLDS	Extreme Light-Weight Dive System
XO	Executive Officer. Acts as a Deputy Commander and Chief of Staff for smaller units.
Y	Yankee (Prior to 1955: Yoke)
Z	Zulu (Prior to 1955: Zebra)
ZOE	Zinc oxide and Eugenol. Temporary dental restorative material.
Zooarchaeology	Study of animal bone from archaeological contexts.
Zulu	Zulu Time. Same as Coordinated Universal Time (UTC), formerly Greenwich Mean Time (GMT). From Hawaii, add 10 hours to local time to obtain Zulu Time.

APPENDIX 5.2: STYLE GUIDE

(Current and Updated Versions Located on the DPAA Intranet)
Last Revised: 27 April 2016
Citation: DPAA Laboratory Manual, APPENDIX 5.2

0.0 SPIRIT, PURPOSE & INTENT: To the maximum extent practical, CIL reports should be internally consistent in style and format.

1.0 PURPOSE & SCOPE: The purpose of the Style Guide is to assist in producing written material that is internally consistent in terms of style and format. In addition to letters and memoranda, the CIL produces the following basic test reports of analysis:

- Search and Recovery Report (SAR).
- Report of Investigation (ROI).
- Forensic Anthropology Report (FAR).
- Forensic Odontology Report (FOR).
- Chest Radiograph Comparison (CXR).
- Material Evidence Report (MER).
- Commingled Human Remains (CHR).
- CIL Portions.
- Administrative Fiats.

Although it does not rise to the level of a test report, the site survey form (SSF) is also prepared using this Style Guide.

FARs and FORs include abbreviated formats. SAR and MER are always written as "stand-alone" reports (since they sometimes function in this manner). SARs have short forms for reporting on limited activities. Two report types—CIL Portions and Administrative Fiat reports—are written in memorandum format.

2.0 EXTERNAL STYLE GUIDES: No single style guide can encompass all contingencies encountered by an author. The CIL Style Guide is intended to be the primary source for stylistic guidance for CIL Staff authoring reports, memoranda, and letters.

Other useful references are listed in Appendix 5.0 (References). In particular, the CFC Guidebook contains additional guidance. The CFC Guidebook can accessed at J:\ASCLD-LAB\Misc. Guides, Procedures & Instructions\SOP 1.7

3.0 INTELLECTUAL PROPERTY & PLAGIARISM: Plagiarism is a crime, covered under U.S. Government statute Title 17, Chapter 5, Section 504, carrying with it a maximum statutory penalty of $150,000 plus accumulated damages (U.S. Copyright Office 2001:117). For the purpose of this guide, plagiarism is defined as theft of intellectual property, most commonly manifested as the intentional or unintentional adoption, in print, of another individual's words or ideas without proper acknowledgment or citation. With regard to plagiarism, this guide is designed primarily for analytical or narrative reports prepared for distribution outside of the DPAA rather than internal memoranda, email, notes, and correspondence.

Plagiarism of any kind is at fundamental odds with the stated DPAA mission and as such cannot be tolerated under any circumstances. The absolute integrity of the CIL Staff is at all times the underpinning of the identification process, including scientific procedures, historical narrative, and personal work-related issues such as evidence handling. This integrity includes any non-DPAA academic endeavors, including publishing of personal research or teaching, since failure in these other areas naturally draw suspicion upon CIL endeavors.

Much of the work that the CIL produces is not reproducible and therefore relies wholly or in part upon the integrity of the staff for its validity in producing identifications that satisfies relevant legal standards as well as relatives of the recovered individuals. CIL Staff are also regarded as professional witnesses under U.S. law and therefore may render professional testimony in court, even if that testimony relies only upon their professional opinion. Failures in integrity of any kind, and in particular plagiarism, thus constitute a serious violation of policy. Peer reviewers are directed to query all primary authors regarding any possible failure to cite source materials properly.

- **Instructions for Fair Use**: Guidelines for fair use of copyrighted materials are outlined under U.S. law (U.S. Copyright Office 1995). All such guidelines have derived from accumulated courtroom decisions and are therefore indicators only and not templates. Guidelines for situations encountered regarding typical CIL usage of intellectual sources are listed below. The Laboratory Director resolves any situations not covered by these guidelines.
- **Citation of Academic Sources:** Any intellectual property derived from any source including those published under traditional means, obtained from the internet, and unpublished manuscripts and the

like, typically shall be cited and included in the references section of a report or memorandum, following the formats outlined in this guide and the relevant report templates. Citation of these sources shall be included whether the source material is repeated verbatim or paraphrased. Examples of information that should be cited include skeletal characteristics attributed to ancestry or sex and computations derived from computer programs and databases (e.g., FORDISC 2.0), when the information cannot reasonably be assumed to derive from common knowledge within the professional field (see below).

- **Citation of Reports/Records:** Information derived from other DPAA or U.S. Government sources (such as the citation of information from a FOR in a FAR regarding the same accession) is cited within the body of a report (see below) rather than listed in the References. Other sources of this nature commonly include e-mail traffic, letters or notes included with remains and material evidence accessioned via unilateral turnover, U.S. military message traffic, dental records, medical records, and Missing Air Crew Reports (MACRs). Personal communications from acknowledged experts or relevant sources may also be listed within the text of a report rather than included in the References.
- **Common Knowledge:** Any information that can reasonably be assumed to be common knowledge within the professional field does not have to be cited/referenced, even if a specific reference source was utilized in their confirmation. Examples include common sexually or racially diagnostic skeletal features detailed in anthropological or odontological textbooks. Similarly, common or well-known historical facts which could have been obtained from any number of historical works covering that subject (even if they were obtained from a specific historical work) do not require citation provided the language is not directly copied or paraphrased. In a further example, the fact that the M-1 Garand rifle was a common infantry weapon during WWII does not have to be cited, but further details such as its dimensions, modifications, component parts, dates of issue, etc. are not common knowledge and as such must be cited from an acknowledged expert source, whenever possible those already covered in relevant CIL SOPs.
- **Illustrations/Graphics:** The reproduction of illustrations and other graphics including tabulated data is included under normal rules of fair usage, provided proper citation is included. Specific graphic computer programs such as PowerPoint or SmartDraw do not have to be cited as such, since all images produced are covered under their fair usage.
- **Databases:** Information contained in DPAA-derived databases, such as that compiled in, but not limited to, CARIS, does not have to be cited, as this is considered institutional common knowledge. In all cases where the original source documents are cited (as with odontological comparisons to specific service dental records) these should be referenced per this guide.
- **Intent:** In any case regarding suspected plagiarism, the controlling guideline is the intent of the offending author to pass off as originating with that person material that has originated elsewhere, without crediting that source. This includes the information itself, whether or not its form has been altered through paraphrasing, or the unique form of the information (i.e. information that is itself common knowledge, but the unique form of its phrasing has been copied or slightly paraphrased).
- **Self-Plagiarism:** Individuals are allowed to reuse their own phrasing, narrative structure, styles, etc. from previous reports without citation. Information content should be cited per this guide.

4.0 STYLE GUIDANCE: CIL reports have numerous audiences including family members, government employees, and professionals in the respective disciplines. All reports should be written with the entirety of the audience in mind. Family members who are not anthropologists or archaeologists read SAR reports and final case files. These documents should illustrate the authors' technical knowledge and competency without a reliance on jargon. Additionally, follow the below general guidance:

- **Brevity:** A paragraph should not be used to discuss what could be presented in a couple of sentences. Convey data specifically describing the excavation, analyses performed, and present relevant physical evidence pertaining to case resolution.
- **Detailed Data:** Any data presented in a report should be reflected in field notebooks and/or analytical notes. As such, all such data presented in a report should be available for review if more detailed information is requested.
- **Report Electronic Storage:** At the present time there is no available mechanism for long-term electronic storage of all types of reports produced by the DPAA in CARIS. Until remedied, the peer-reviewed reports are stored on the DPAA network.
- **Report Photograph Storage:** All negative-based photographs used in a report should be placed in the appropriate folder in the case file. These photographs should be converted into a digital

format and copied onto a compact disc. Negative-based photographs should be placed in protectors, and negatives and labeled photographs turned into Laboratory Administration for inclusion in the case file.
- Final versions of reports are printed on high-quality paper (e.g., Hammermill).

Adhere to the following specific guidance:

4.1 **Voice:** Technical writing style (i.e. passive voice) may be used.

4.2 **Grammar:** Standard American English grammar rules apply to all reports, memoranda, and letters, unless otherwise specified. Common grammatical mistakes include:

- **Essential/Non-Essential Clauses:** Essential clauses typically are not set off by commas, whereas non-essential clauses, which are similar to parenthetical statements, need to be set apart. Essential clauses may be preceded by the word "that;" independent clauses commonly are preceded by the word "which" and are followed by a separating comma. As a general rule, if the clause can be introduced by the expression "by the way" then it is a non-essential clause and may be preceded by the word "which" and set off by a comma—if it cannot, it should be introduced by the word "that" and not set apart with a comma. Examples include:
  - "The F-4 Phantom that was flown by Maj DOAKS crashed in Boo Hoo Province." (The meaning of the sentence is "essential" to the clause "that was flown by Maj DOAKS" and is therefore not set off by a comma.)
  - "The F-4 Phantom, which was designed for the Navy, was a workhorse in the Vietnam War." (The meaning of the sentence is "non-essential" to the clause "which was designed for the Navy" and is therefore set off by a comma.)

- **Use of Lay & Lie:** The verb "lay" is active, whereas the "lie" is inactive. Use "lay" (and its derivative forms) to express action (e.g., "The team laid plastic sheeting over the excavated grid units."); use "lie" (and its derivative forms) to express an inactive state (e.g., "The crash site lies to the north of the river.").
- **Use of Its & It's:** The word "it's" is the contracted form of "it is" and uses an apostrophe. The word "its" is a possessive. It differs from other possessive forms in that it does not employ an apostrophe in order to avoid confusion with the contraction "it's."

4.3 **Spacing & Punctuation:** Standard punctuation and spacing rules apply to all reports, memoranda, and letters, unless otherwise specified. Specifically:

- **Spacing Between Sentences:** Double spaces are used between sentences.
- **Spacing After Colons & Semicolons:** Double spaces are used after colons, while single spaces follow semi-colons. The exception is for citations where page numbers are expressed (e.g., "Bass (1995:92-97) states") or within references, where no spaces are used.
- **Commas in a Series:** The preferred use of commas in series places the final comma after the penultimate item in the series (e.g., "The team recovered teeth, bone fragments, and personal effects at the site).
- **Hyphenation of Measurements:** Hyphens are used to separate two-dimensional measurements. The manner is dictated by whether or not the measurements are used as compound modifiers (e.g., "A 1-x-1-meter unit was excavated…" [hyphen between 1 and meter]; but, "The area excavated was 1-x-1 meters" [no hyphen between 1 and meter]).
- **Hyphenation of Words:** Standard hyphenation rules apply to all reports, memoranda, and letters, unless otherwise specified. Non-human commonly is hyphenated. Some commonly hyphenated words not usually hyphenated in CIL reports include:
  - Postmortem.
  - Antemortem.
  - Perimortem.

- **Hyphenation of Aircraft Models**: Aircraft models and types are presented by a capital letter (or letters) designating the functional class of the aircraft (e.g., F for fighter, B for bomber, etc.) followed by a hyphen, followed by the type number, followed by a capital letter indicating the applicable model number (e.g., "The other F-4A in the flight…; as the UH-1 was attempting to extract the team…").

4.4 **Plurals**: Standard rules for forming plurals are employed in reports. Exceptions are plurals of bones, which may be written either in their English (e.g., tibias), or Latin (e.g., tibiae) forms. Plurals should be used consistently within a given report.

4.5 **Capitalization:** Standard capitalization rules apply to all reports, memoranda, and letters, unless otherwise specified. The following applies:

- **Capitalization of Names:** Names are capitalized as follows:

- Names of individuals being identified typically are written first name, middle initial, and last name in plain text. Last names are written in all capital letters.
- Individuals involved in the same incident (e.g., aircraft crash) but not being identified are written first name, middle initial, and last name—all in plain text, initial capitalization (e.g., "On 2 February 1969 Captain Joseph P. Doaks and Captain Robert A. HEINLEIN were flying an F-4 Phantom…"). Since the identity of the remains often is unknown at the time the SAR and MER reports are written, the preferred use in these reports is to list the last names of all personnel involved in the incident with initial capitalization only.
- For military personnel, the name should be preceded by the individual's rank (e.g., "The remains are identified as those of CPT Robert A. HEINLEIN").
- For civilian personnel Mr., Miss, Mrs., Ms., Dr., etc. should precede the name.

- **Capitalization of Ancestry:** Ancestry categories are capitalized when they reference a region or color (e.g., "Caucasian, Hispanic, Negro, White, Black, etc.") but are not capitalized if they reference a form (e.g., caucasoid, negroid, mongoloid).

4.6 **Italics:** Italics should be used for standard citational Latin phrases and foreign terms (e.g., *post facto*, *in situ*, *a priori*, and *terminus post quem*) but not for common terms such as etc., i.e., and e.g.

4.7 **Acronyms & Abbreviations:** The following guidance applies:

- **First Use:** As a general rule, acronyms and abbreviations used in a report should be written out the first time they appear in a report with the acronym or abbreviation following in parenthesis (e.g., "The Honolulu Police Department (HPD) investigates…").
- **Military Ranks:** Ranks and abbreviations for U.S. military ranks vary by service and conflict. Approved ranks and their abbreviations are listed in a separate guide at J:\ASCLD-LAB\Misc. Guides, Procedures & Instructions\APPENDIX 5.2. Coast Guard ranks follow the USN format. Ranks should be spelled out in their entirety using initial capital letters when beginning a sentence and upon first use. Upon first use, the rank is followed parenthetically by the abbreviation for the rank (e.g., Major General (MG) Halftrack). The abbreviated rank may be used for the rest of the document except at the beginning of a sentence. The exception to the first use rule is when writing memos and other internal documents (e.g., Exhumation Memos) whose audience can reasonably be expected to have an understanding of military ranks and terminology.
- **Start of a Sentence:** Abbreviations should not be used to begin a sentence. Common exceptions to this guidance are the use of the abbreviations for "CIL" (e.g., "CIL 2004-001 consists of two teeth…") or "Dr." (e.g., "Dr. Jones served as a consultant...").
- **Internal Punctuation:** Internal punctuation is used with acronyms only when punctuation is used in the full name (e.g., "The Joint Task Force-Full Accounting"; "JTF-FA."). Periods are not used to separate letters in acronyms and abbreviations (USN, USAF, DPAA). Exceptions include abbreviations for countries (e.g., U.S., P.N.G., and S.R.V.), which always include periods.
- **Common Use:** Acronyms and abbreviations for names and terms that are commonly known (e.g., DPAA, CIL, DPAA-CIL, U.S., FBI, CIA, USAF, etc.) and abbreviations of measurements and military ranks (see below) need not be spelled out. The same applies to those within an internal memorandum, such as a CIL Portion. Any uncommon acronym that would be known to the recipient of the memorandum is not spelled out.
- **One-Time Use:** Abbreviations not used after the initial use need not be supplied.
- **Articles:** As a general rule, articles are used in conjunction with acronyms and abbreviations if an article is commonly used with the unabbreviated form (e.g., "Remains were accessioned at the Defense POW/MIA Accounting Agency …"; "Remains were accessioned at the DPAA…" But, "It is Defense POW/MIA Accounting Agency policy that …"; "It is DPAA policy that …").
- **Use of United States:** The shortened name "United States" is preferred over the full name "United States of America." United States is spelled out whenever it is used as a place name and abbreviated "U.S." when used as a modifier (e.g., "The remains were repatriated to the United States on …"; "The remains were turned over to U.S. officials at Noi Bai Airport.") An exception to this guidance is the use of U.S. in conjunction with a ship's name. United States military ships' names are preceded by the abbreviation "USS" written in capital letters, plain text, with no periods separating the letters. The name of the ship is italicized (e.g., USS *Saratoga*). Note that the abbreviation for "United States Army" is "USA" written with no periods between letters.
- **Measurements:** Certain measurement units may be abbreviated with their first use and are not typically spelled out in full except in cases where

the use of an abbreviation may cause confusion on the part of the reader (e.g., "Six inches in length" rather than "Six in in length"). Measurement abbreviations are one to three letters in length, written in lower case without periods. There is a space between the measurement value and the abbreviation (e.g., 3 g; 5 cm). An exception is in certain military ordnance terms, such as "40mm" referring to 40 millimeter ammunition. Approved abbreviations and exceptions are:

- Inch – in
- Foot (feet) – ft
- Pound – lbs
- Centimeter – cm
- Kilometer – km
- Gram – g
- Kilogram – kg
- Meter(s) – m

Exceptions:

- Mile – mile
- Ton – ton
- Acre – Acre

4.8 **Numbers & Measurements:** The following guidelines apply:

- **CIL Accession Number:** All CIL evidence accession numbers end in either a two- or three-digit identifying number. The number of individual sub-accessions determines the number of digits. For 1-99 sub-accessions, the format is I-xx; for 100-999 sub-accessions, the format is I-xxx (e.g., "The five bone fragments were individually identified as CIL 2004-121-I-01 through CIL 2004-121-I-05…; The 100 fragments of material evidence were redesignated CIL 2004-111-A-001 through CIL 2004-111-A-100…").
- **"CIL"/"CILHI":** The use of "CIL" or "CILHI" in conjunction with case file materials accessioned prior to 1 October 2003 is authorized. Materials accessioned 1 October 2003 or later are designated only with the prefix "CIL."
- **Scientific Usage:** In scientific reports, numbers used to express physical quantities (e.g., distances, lengths, etc.) are written as figures rather than words (e.g., The wreckage was confined to the top 2 meters of soil.").
- **Non-Scientific Usage:** In ordinary text, whole numbers should be spelled out when less than 10; when followed by hundred, thousand, etc., or when beginning a sentence. Numbers equal to or greater than 10 are represented by figures.
- **Numbers in a Series:** Numbers in a series or sentence that apply to the same category should be formatted the same, i.e. either spelled out or in figures (e.g., "The team recovered 5 teeth in Area A and 25 teeth in Area B…; The team recovered two bone fragments in Area A, six bone fragments in Area B, and eleven fragments in Area C…").
- **Dimensions:** Measurements describing dimensions should be presented in a uniform order. The preferred order is length, width, thickness, and mass, where appropriate (e.g., The fragment is 5 cm long, 6 cm wide, 22 cm thick and has a mass of 100 g").
- **Populations & Samples:** When presenting a population use the capital letter "N" followed by an equal sign, followed by the value (e.g., "N = 100"). Samples within a population are represented by a lower-case "n" (e.g., "n = 50"). Note the spaces between the letter and the equal sign and the equal sign and the number.
- **Significant Figures:** Units of measure should be consistent with the precision of the apparatus used (i.e. do not report 25.8 mm for a caliper that can only measure to the nearest half millimeter). Measurement of the same item should be presented with the same number of significant figures (e.g., "The identification tag measures 25 mm wide and 50.1 mm long" is incorrect; "The identification tag measures 24.8 mm wide and 50.1 mm long" is correct). Any additional type of measurement for this object need not be the same number of significant figures (e.g., 250 g), since the measuring device involved do not necessarily have the same precision.
- **Decimals:** Amounts less than one are expressed with a zero before the decimal point (e.g., 0.25 g). The exception to this rule is weapon caliber, normally expressed without the zero (e.g., .50 caliber bullet).
- **Amounts & Units:** Amounts and their units are not separated at the end of lines, but should be grouped together using a non-breaking space (control+shift+space).

4.9 **Use of i.e. & e.g.:** A comma is used after i.e. and e.g. Additionally, both are bounded by parenthesis. For example: "Tooth #8 was mechanically prepared (i.e., drilled by a dentist), suggesting that this tooth was previously restored."

4.10 **Name Suffixes:** There should be no comma between the last name and the suffix. For example: John Smith Junior; John Smith Jr.; John Smith III.

However, when written with the last name first, a comma is used. For example: Smith, John, Junior; Smith, John, Jr.; Smith, John, III.

JOSEPH E. DOAKS
LTC, DE [*var.* Lieutenant Colonel, U.S. Army Dental Corps]
Odontologist

JOSEPH E. DOAKS
BG, USA [*var.* Brigadier General, United States Army]
Commanding

OFFICIAL MEMORANDA	MILITARY CORRESPONDENCE	CIVILIAN CORRESPONDENCE
Mark S. Spindler Brigadier General, U.S. Army Deputy Director Defense POW/MIA Accounting Agency	Mark S. Spindler Brigadier General, U.S. Army Deputy Director Defense POW/MIA Accounting Agency	Mark S. Spindler Brigadier General, U.S. Army Deputy Director Defense POW/MIA Accounting Agency
Edward A. Reedy, Ph.D., M.D., D-ABP Captain, Medical Corps, U.S. Navy Science Director Defense POW/MIA Accounting Agency	Edward A. Reedy, Ph.D., M.D., D-ABP Captain, Medical Corps, U.S. Navy Science Director Defense POW/MIA Accounting Agency	

5.0 FORMATS: Scientific reports use standardized formats (see below), with templates available on the DPAA network. Regardless of the type of correspondence, the following guidelines apply to maintain internal consistency within each type.

5.1 **Letterhead:** Unless directed otherwise, the first page of any letter or memorandum submitted to an individual or agency external to the DPAA is on official letterhead. Conversely, internal memoranda should not be printed on letterhead.

5.2 **Signature Blocks:** See examples above.

- **Military:** Military signature blocks are either two or three lines. The first line is the author's name written in all capital letters. Line two is rank and branch written either in abbreviated form or in initial capital letters and separated by commas. The third line is the author's position. Letters or memoranda prepared for the Commander's signature use the term "Commanding" on line three. Odontologists may also use the civilian signature block. See examples above.
- **Civilian:** Civilian signature blocks are two lines (unless the length of the title forces the use of a third line). The first line is the author's name written in all capital letters. Line two is the author's title or position. The author's terminal academic degree is included following the name and should be abbreviated without periods. Anthropologists should list the title "Anthropologist" on the second line (without reference to sub-specialty). Senior anthropologists may use their full titles, written with initial capital letters. When an anthropologist is authoring a report for which they filled a functional role, the functional title should precede the title. The two should be separated by a slash. Examples include:
- **Agency Director & Science Director:** The signature blocks and correct spellings and titles of the Deputy Agency Director and Science Director are shown above:

  JOSEPH E. DOAKS, PhD
  Anthropologist

  JOSEPH E. DOAKS, MA
  Recovery Leader

  JOSEPH E. DOAKS, DDS
  Odontologist

5.3 **Date:** Dates are formatted "day month year" with no internal punctuation. The month is written in its entirety with initial letter capitalization. The day is written as either one or two digits with no leading zero. The year is written in its entirety (e.g., "1 January 2001; 10 February 2001; but not 02 January 2001, 2 Jan 2001, 2 January 01").

5.4 **Reference (Citation):** The following applies:

- **Published References Cited in Report Text:** References cited in report text should be listed by author's last name followed by the publication date and is set off by parentheses. Specifically:
  - Two or more references within the same set of parentheses should be separated by a semicolon, e.g., (Bass 1999; Trout 2000)," and listed in alphabetical order.
  - If the author's name is used in the text, only the publication date is set off in parentheses (e.g., "Work by Bass (1999) showed that…").

Bass, W. M.
1995 *Human Osteology: A Laboratory and Field Manual.* 4th ed. Special Publication No. 2 of the Missouri Archaeological Society, Columbia, MO.

Byrd, J. E. and B. J. Adams
2000 An alternative approach to the use of stature and long bone measurements in the identification process. Paper presented at the 52nd Annual Meeting of the American Academy of Forensic Sciences, Reno, NV.

Lovejoy, C. O., R. S. Meindl, T. R. Pryzbeck, and R. P. Mensforth
1985 Chronological metamorphosis of the auricular surface of the ilium: A new method for determination of adult skeletal age at death. *American Journal of Physical Anthropology* 68:15-28.

Moorrees, C. F. A., E. A. Fanning, and E. E. Hunt, Jr.
1963 Age variation of formation stages for ten permanent teeth. *Journal of Dental Research* 42:1490-1502.

Ousley, S. and R. Jantz
1996 *FORDISC 2.0.* University of Tennessee, Knoxville, TN.

Rhine, S.
1990 Non-metric skull racing. In *Skeletal Attributions of Race: Methods for Forensic Anthropology*, edited by G.W. Gill and S. Rhine, pp. 9-20. Maxwell Museum Anthropological Papers No. 4, Albuquerque, NM.

Steele, D. G. and C. A. Bramblett
1988 *The Anatomy and Biology of the Human Skeleton.* Texas A&M University Press, College Station, TX.

Vogel, R. A.
2008 The taphonomy of garbage disposals as seen through the eyes of a teenage psychopath. *Proceedings of the Sixty-Second Annual Meeting of the American Academy of Forensic Sciences* 16:338-339.

Vogel, R. A.
2006 The taphonomy of garbage disposals. Paper presented at the 58th Annual Meeting of the American Academy of Forensic Sciences, Seattle, WA.

Vogel, R. A.
2006 The taphonomy of spousal murder using common household products. Poster presented at the 58th Annual Meeting of the American Academy of Forensic Sciences, Seattle, WA.

- References consisting of two authors or less should be listed in their entirety while references of three or more authors should be listed by the lead author followed by "*et al.*" For example: "The skull shows male traits (Bass and Walleye 1999) while the pelvis exhibits female traits (Bass *et al.* 2000)."
- Page numbers should be included in text references when citations are used or when referring to specific items (text, photographs, tables, etc.) within the text (e.g., Bass 1999:13).
- When citing to the level of page number, the year and page number are separated by a colon. Sequential multiple pages are cited as (1999:133-145); non-sequential pages are cited as (1999:323, 335).

- **Published References in a Bibliography or References Cited**: Bibliographical citations, which approximate the format found in *American Antiquity,* should be listed alphabetically by the author's last name. See above examples.
- **Meeting Papers & Posters:** For meeting papers and posters, there are two styles of citations related to peer-review and publication. If the poster abstract/text or abstract/paper was peer reviewed and published in an official proceedings volume (e.g., AAFS), it is cited in this context. If there was no, or limited, peer review of an abstract and the abstract is published in a meeting booklet (e.g., AAPA, SAA), then the citation is in the context of a meeting presentation. In other words, two different citation styles exist, published proceedings and non-proceeding abstracts. For both, the citations should follow the above formats.

James, K.
2002 The Watch Guy: Vintage wrist watch and pocket watch information. Electronic document, http://www.thewatchguy.com, accessed 15 March 2003.

Gerhard Beutler
2002 Electronic document, http://www.beutler-muenzen.de, accessed 31 May 2003. *[Note that Gerhard Beutler is the title of this website – in this case for foreign coins – and therefore appears alphabetically under G and not B.]*

The Rosary Shop
2002 Electronic document, http://www.rosaryshop.com, accessed 12 December 2002.

Seung, H.
2002 Hyunsuk's Military Watch Gallery. Electronic document, http://www.mochanni.com/~hseung/album/mwr/, accessed 30 November 2002.

- **Internet Sites:** When formatting website sources for a references section, follow the examples and guidance listed above.
  - The initial date is the most recent copyright date for the website.
  - Since information changes frequently, include the access date at the end of each reference.
  - Computer programs accessed via the internet (such as *OdontoSearch*) follow the rules for paper documents, listed above, since their content is not as fluid.
  - If an author is clearly listed, cite that person in the references section and in the body of the text when referring to that publication. If the website provides no author, cite the title of the website itself (i.e., "The Rosary Shop 2002" instead of "Anonymous 2002"). Do not cite the webmaster, as this person may or may not be responsible for content. When in doubt, cite the title of the website.
  - Do not imbed a hyperlink in the report document. Leave the text in normal formatting (displaying black text, not blue).
  - Website names may be split at single slashes in order to continue text from one line to another.

5.5 **In-Text Citations:** The following types of citations are in-text only: the information is contained in the citation itself, and citations do not appear in the references section of the report.

- Personal Communications: This is verbal information from a relevant expert or informed witness, for example if Mr. Brian Bennett informed you about the scavenging history of a site in P.N.G. They are cited as in the following example:

  "As cinema changed during the 1970s, the prevalence of snuff films dropped off to next to nothing in the wake of new outlets for creative aggression (Ms. Amanda Stauffenberg, Curator, Chicago Film Institute, pers. comm.)."

  - If the person involved has a relevant title, include it, as in the above example. Luther Hanson would be cited as (Mr. Luther Hanson, Curator, USA Quartermaster Museum, pers. comm.). Include the appropriate honorific (Mr., Ms., Reverend Father, etc.), since in the case of many foreign names this is not readily apparent.
  - Witness statements, delineated as such in reports, do not need added citations (i.e., "Mr. Wang Chung, pers. comm.), since this has already been covered by your description of it as a witness statement.
  - Personal communication citations are ordered alphabetically (as with all citations cited in a row, separated by semicolons) by the last name of the cited source: "...but that restaurant was inadequate (Mr. Michael T. Bojack, Restaurant Critic, *Chicago Times*, pers. comm.; Ms. Ella O'Shaugnessy, Cuisine Editor, *Windy City Magazine*, pers. comm.; Stauffenberg 2003)."

- Written Correspondence: These may appear in multiple formats, such as personal letters and official memoranda. They are all cited in roughly the same manner and include the type of written correspondence, originator (person and office or just office if that is all there is), recipient, and date. The standard abbreviation for "dated" is "dtd" and does not have to be defined within the body of your report. Note also that the date format follows that used in the item of correspondence. If the date is unknown, say "undtd." Citations of these types are the most fluid, since varying amounts of information are included, and different formats are used. Fill in missing information with brief descriptions, where necessary/possible: "...but the informant claimed to have recovered the bone while excavating a foundation for the first

Vietnamese Starbuck's (REF: letter from unknown Vietnamese remains trader to staff, U.S. Embassy, Hanoi, undtd, received 15 March 2001)." Other examples of citations or this type include:

- "...but some concerns were expressed regarding the creation of yet another committee (REF: letter from Senator Claudia Dellucci, Illinois State Senate, to OASD/IDA [DPMO], dtd March 14, 2005)."

  "...was agreed at that time that another excavation in this location primarily would serve to boost the Vietnamese bamboo resale market (REF: memorandum from Dr. James Pokines, DPAA-CIL, to Ms. Carolina Fuentes, Hawaii Department of Corrections, dtd 31 May 2015)."

  "...but this site was such a blatant fake that it made usual KPA site tampering efforts look like the Gettysburg Battlefield by comparison (REF: memorandum for record from Dr. William Belcher, DPAA-CIL, dtd 3 October 2015).

- Electronic Correspondence: These follow the same broad pattern as written correspondence. Use relevant titles and organizations. Use the standard military date formula, since this prints in a format determined by your e-mail system. For example:

  "...which is consistent with both the M1 and M1A1 flamethrower (REF: electronic correspondence from Mr. Luther Hanson, Curator, USA Quartermaster Museum, to Dr. Ian MacLeod, DPAA-CIL, dtd 12 December 2015)."

- DPAA/JPAC/CILHI/CIL Reports are cited as follows:

  "...but excavation of this area of the site was suspended during the 68th JFA due to the presence of poison monkeys (*Macaca pokinensis*) in the forest canopy (see Interim Search and Recovery Report: 2002/CIL/007, p. 13)."

  "...and the third mandibular molars (see Forensic Odontology Report: CIL 2002-007-I-01)."

  "...recovered during a site survey of the reported crash location (see Site Survey Form for MACR 16254, Site GM-00708, Dr. Joshua J. Peck, dtd 18 June 2014)."

  "...the taphonomic signature indicated that the remains CIL 2002-007-I-01 had undergone severe weathering (Forensic Anthropology Report: CIL 2002-007-I-01)."

  "...the material evidence is also consistent with the trauma pattern detected on the skeletal remains (see Material Evidence Report: CIL 2002-007-A-01 Through 68, pp. 23-44)." [Note that "Through" is capitalized, since it is part of the title.]

- Multiple Reports: Cite reports as a condensed group:

  "...the remains were stained green in multiple locations, which probably occurred postmortem (see Forensic Anthropology Reports: CIL 2002-007-I-01 through I-07 and CIL 2002-007-G-01; Forensic Odontology Reports: CIL 2002-007-I-01 through I-04 and I-07)." [Note that "through" is not capitalized, since it is not part of a title.]

- Message Traffic: Their format consists of the originating organization, the date/time group, and the title. The title gets title capitalization: every important word. They are cited as in the following examples:

  "...but previous efforts to locate the crash site were thwarted by poor weather (REF: MSG CDR JTF-FA, 180007Z DEC 02, SUBJ: Detailed Report of Investigation of Case 1007 Conducted During the 68th Joint Field Activity in the Lao People's Democratic Republic)."

- Multiple Messages: If you have multiple messages to cite at once, separate them by semicolons and place them in chronological order:

  "...'rainy' season being a relative term on that mountainside (REF: MSG CDR JTF-FA, 120007Z DEC 02, SUBJ: Detailed Report of Investigation of Case 1007 Conducted During the 68th Joint Field Activity in the Lao People's Democratic Republic; MSG CDR JTF-FA, 302218Z NOV 04, SUBJ: Detailed Report of Investigation of Case 1007 Conducted During the 75th Joint Field Activity in the Lao People's Democratic Republic)."

- Military Records: These include dental records, physical exam records, and MACRs. The FORs typically present all of them in one list, with filled-in information indicated by italics and dates following the format used on each form:

  (1) OQMG FORM 371 (DATA ON REMAINS NOT YET RECOVERED OR IDENTIFIED) labeled *SMITH, Sam C.* with a dental charting date of *12 Dec 04*. The form is unsigned.
  (2) WD AGO FORM 8-116 (REPORT OF DENTAL SURVEY) labeled *Smith, Sam C.* with treatment dates of *18 April 04* and *18 April 05*. The form is signed by a dental officer.

Subj: CIL 2004-007-D-01; RECOMMENDATION FOR ADMINISTRATIVE FIAT

Forensic Odontology Report: CIL 2004-117-I-01

Forensic Anthropology Report: CIL 2004-117-I-01

Forensic Anthropology Report (Addendum): CIL 2004-117-I-01

Material Evidence Report: CIL 2004-117-A

Search and Recovery Report: CIL 2004-039-R

- MACRs are uniquely-numbered documents and require the least reference information: "...but it was suspected that the bomber ran out of fuel and crashed (REF: Missing Air Crew Report [MACR] 1007, dtd 15 March 1944)."
- Comparison tables in FAR Addenda may cite the source of information below the table, in 10 pt font:

  REF: OQMG FORM 371 (DATA ON REMAINS NOT YET RECOVERED OR IDENTIFIED) labeled *SMITH, Sam C.*, dtd 07 DEC 41.

- In text, this citation would read: "...but this individual was reported as Missing in Action (REF: OQMG FORM 371 [DATA ON REMAINS NOT YET RECOVERED OR IDENTIFIED] labeled *SMITH, Sam C.*, dtd 07 DEC 41).
- Chain of Custody documents are cited as:

  DA Form 4137 (EVIDENCE/PROPERTY CUSTODY DOCUMENT) listing Reason Obtained as *Excavation of Aircraft Crash Site MACR 1007* with accession date of *9 July 2002*.

5.6 **Word Processing:** Documents are set up as follows:

- **Font:** Times New Roman (regular) is the preferred font for use in reports, official letters, and memoranda. Informal memoranda may use any font.
- **Type Size:** The preferred type size for the body of reports and official letters and memoranda is 12 pt. Tables may reduce to 10 pt where necessary.
- **Margins and Borders:** Preferred margins and borders for reports and official letters and memoranda are one inch (top, bottom, left and right). Headers and footers typically are placed 0.5 in from the top and bottom, respectively.
- **Indentation Space:** The preferred paragraph indention for reports is 0.25 in. A hanging indent should be used. For internal memoranda, paragraphs are indented using five spaces.
- **Line Spacing:** Recommended line spacing is shown in the example below. A 12 pt space is left between paragraphs. As with font size and margins, spacing may be adjusted as needed to correct formatting problems such as widows and isolated signature blocks.
- **Headers:** Headers are not shown on the first page of a report, official memorandum, or letters.
  - Report headers should consist of the report type and case number, written in italics with initial capitalization of primary words. The header is right justified, and typically begins 0.5 in from the top and bottom of the page. Examples appear above.
  - Headers for official memoranda and letters should repeat the subject line from the first page. The word "Subject" is abbreviated "Subj," with the subject information written in all capitals. The subject information should match that of the subject line on the first page of the document. The header line is written in plain text. A memorandum header example is shown above.
- **Footers (Pagination):** Footers consist of pagination and include the following guidance:
  - Pagination consists of Arabic numbers throughout.
  - The first text page of any report should not display the page number.
  - All other pages should list the page and total number of pages (X of Y) starting on Page 2 centered at the bottom of the page and beginning 0.5 in from the bottom of the page.

FORENSIC ODONTOLOGY REPORT:
CIL 2004 -235-I-16

2 **12 pt Space**
3 **12 pt Space**
4 **DPAA CENTRAL IDENTIFICATION LABORATORY** *[centered]*
5 **12 pt Space**
6 **10 May 2004** *[centered]*
7 **12 pt Space**
8 **12 pt Space**
9 **DENTAL REMAINS** *[centered]*
10 **12 pt Space**
11 The dental remains consist of a fragment of maxilla containing teeth #2, #3, and
12 #4 as well as a root fragment…
13 **12 pt Space**
14 **12 pt Space**
15 **OPINION** *[centered]*
16 **12 pt Space**
17 The dental remains designated CIL 2004-235-I-06 were compared with…For
18 this reason, I recommend the dental remains be identified as:
19 **12 pt Space**
20 *Lieutenant Colonel Joseph Luther Smith, 333-22-1111, US Army*
21 **12 pt Space**
22 **12 pt Space**
23 **12 pt Space**
24 **12 pt Space**
25 JOSEPH P. DOAKS, DDS
26 Odontologist

- Special instructions for the introductory sections of Search and Recovery and Material Evidence reports are found below.
- Footers used with official memoranda/ letters should follow SECNAVINST 5216.5D CH-1.

5.7 **Report Formats:** Informal, in-house memoranda (including Memoranda For Record) may be written in any format provided they include the following information in the heading: Date, Subject, Author, and Addressee. The following guidance pertains to CIL scientific reports. Refer to the accompanying template.

- **Report Title:** FAR, FOR and MER titles are written in 16 pt bold type, all capital letters, and centered on the page. SAR titles are the same font size but are first letter uppercase and the rest of the word lowercase. The CIL name written in 14 pt bold type is centered two lines below the title. The date, written in 14 pt bold type, is centered one line below the CIL name (see above). The report title, lab name, and date are replicated in the same font size and spacing on the first page of the report text.
- **Section Titles:** All section titles are written in bold type and centered on the page.
  - Primary Section Title: 14 pt all capitalization bold.
  - Secondary Section Title: 14 pt bold first letter capitalization.
  - Tertiary Section Title: 14 pt first letter capitalization, all italicized.
- **Figures/Photographs:** Figures include any graphic representation including photographs, line drawings, maps, etc. and are subject to the following rules:
  - Photographs may be digital or negative based, scanned and inserted in text. Inclusion of printed, hard copy photographs in reports is discouraged.

Table 1. Sample inventory table for CIL 2004-083-A-01 Through 03.			
Accession Number	**Consolidated Accession Number**	**Description**	**n =**
CILHI 1999-029-A	CIL 2004-083-A-01	Canteen cup	1
CIL 2004-084-A-01	CIL 2004-083-A-03	Pull-the-dot snaps	13

- All maps, line drawings, or other graphic insertions should be inserted into the text following their initial citation in the text.
- If sufficient room on a page is not available, figures need not be on the same page as the citation, but may be on the next page following the first citation.
- Figures may be paired on the page.
- Figures should be inserted into the text and then centered on the margins.
- All figures should be labeled sequentially as Figure 1, Figure 2, Figure 3, etc. Figure captions use a sentence style and are written in bold typeface (e.g., **Figure 1. Plan view of cotton handkerchief**. **Scale is in cm.**). One line should be inserted between the photograph and the figure caption. Two lines should be inserted before the figure and two lines between the figure caption and any subsequent text or figure. Captions should be centered under the figure if one line or left justified if more than one line
- Publishable figures should be scanned and saved at 300 dpi for photographs and 600 dpi for line drawings. Preferred formats for saving digital images are TIFF, PCX, or GIF files.
- The FALCONVIEW program is available for country maps and may be downloaded. If FALCONVIEW maps are downloaded, be certain to include a north arrow and map scale in the figure. Map name(s), and datum (if any), and other pertinent information can be included in the figure caption.
- All maps (including country maps) in notes and reports have a directional arrow (preferably a north arrow) and a scale indicated on them. The scale can be in words rather than a bar and may occur in the caption.

- **Tables:** Tables typically are enclosed in single fine-line grids and are used to present or list information not shown. Refer to the accompanying example. The following procedures apply:
  - If tables are small horizontally the table should be centered on the page.
  - Cells in the table should be sufficiently large so that word/number strings are not broken (e.g., CIL 2004-199-A-01 should be on one line of the table).
  - Table headings occupy the interior top row and have the above format, left justified.
  - The second line of a table consists of column headers.
  - All column headers are bold and centered with the bottom line of the header being a double line.
  - All headers should appear on every page the table appears.
  - Text should be left justified and only the first letter of any phrase or description capitalized unless the word is a proper noun.
  - Numbers in columns are centered in the column and right justified (use the decimal tab).

- **Lists:** Lists of items should be indented 0.25 in from the margin, subsections within a list should be indented a further 0.25 in. Both indentations should be made using a hanging indent.
- **Appendices:** Appendices are used to present material that assist in interpreting or understanding a report but whose inclusion in the body of the report would prove cumbersome or confusing. Material commonly presented in appendix form includes large format maps, R&A summaries, lists of project personnel, etc. Appendices, if necessary, are numbered numerically and sequentially. Appendices should be labeled in 12 pt bold type, left justified. For example:

  APPENDIX 1: List of recovered life support evidence retained by DPAA LSI.

5.8 **Special Instructions for SARs & MERs:** Use of title pages and tables of contents have been discontinued for SARs and MERs.