CHAPTER 28

The Many Hats of a Recovery Leader: Perspectives on Planning and Executing Worldwide Forensic Investigations and Recoveries at the JPAC Central Identification Laboratory

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Introduction

Forensic anthropologists and archaeologists, in general, will wear many "hats" to deal with the myriad of tasks outside of typical field and laboratory duties and responsibilities. For example, resource management archaeologists commonly play the roles of payroll officer, administrator, contract negotiator, as well as many other jobs, in addition to digging in the dirt. These additional duties become a critical component of the job

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description of the forensic anthropologists and forensic archaeologists who work for the Joint Prisoners of War, Missing in Action Accounting Command Central Identification Laboratory (JPAC-CIL) investigating cases of missing US military personnel. The JPAC investigations and excavations take place globally, and often in countries that have a high degree of distrust and animosity towards the USA, in general, and the US military specifically. The purpose of this chapter is to provide some insight into the administrative, personal, and logistical hurdles that forensic anthropologists and archaeologists will have to overcome during these international projects. Professionals interested in undertaking large-scale archaeological recoveries of human remains and evidence in a forensic context (whether at JPAC or at other humanitarian and human-rights organizations and projects) may not be able to visualize what awaits them during the transition from an academic environment into a heavily applied environment. To this end, we will present an overview of the political and scientific context of the vast majority of recovery operations conducted by the JPAC-CIL. We also provide "vignettes from the field" in the hopes that students and other professionals can tailor their academic and professional training to gain the types of experiences that are necessary to thrive in an applied, and occasionally, unusual environment.

Overview of JPAC-CIL and Forensic Anthropology

Currently, the JPAC-CIL is the largest employer of full-time forensic anthropologists and archaeologists in the world. The JPAC-CIL is the US Department of Defense's primary tactical and operational arm, involved in the search for, recovery, and identification of US military personnel missing from past US conflicts since World War II, including the Korean War, the Cold War, and the Vietnam War. Occasionally, the JPAC-CIL will recover and identify service members from previous conflicts, such as World War I and the US Civil War. The JPAC-CIL also provides local and international humanitarian assistance during mass disasters and missing person cases with local and federal agencies in the state of Hawaii and throughout the world. Examples include assistance in the identification of victims of the USS *Cole* bombing in Yemen in 2000, assistance in the identification of victims of the September 11, 2001 disaster at the Pentagon and World Trade Center, as well as local assistance to the Honolulu Police Department and the Department of the Medical Examiner, City and County of Honolulu.

JPAC headquarters and the main laboratory of the CIL are located on Joint Base Pearl Harbor-Hickam, near Honolulu, Hawaii, on the island of Oahu. The JPAC organization employs over 400 military and civilian personnel, including members from every branch of the US military service from the Army, Navy, Marine Corps, and Air Force. The CIL currently employs over 30 forensic anthropologists and archaeologists. This number is expected to expand significantly over the next 5 years as mission and identification efforts increase. Additionally, the CIL employs one civilian forensic odontologist (dentist) and two military dentists to assist in the identification and forensic review process. Table 28.1 provides an overview of the JPAC's organizational structure and some of the key functions performed by each section.

Table 28.1 Organization of JPAC and key functions.

JPAC section	*Key functions*
Command	Mission oversight, maintaining relationships with external governmental and nongovernmental agencies as well as keeping family members of the missing informed about JPAC's efforts
Central Identification Laboratory (CIL)	Search and recovery, identification, investigations, and research
J1-Manpower and Personnel	Administrative support, human resources, payroll, and travel coordination
J2-Intelligence Directorate	Historical research, investigation and analysis, data integrity and geographic information systems, records archive, and special security
J3-Directorate of Operations	Coordination, integration, and synchronization of all operations, logistics, and planning
J4-Logistics and Supply	Developing, managing, and overseeing procurement operations, maintaining logistical warehouses, and property accountability
J5-Policy and Negotiations	Facilitates access, strategy, and support of foreign governments and US agencies
J6-Information Technology	Information technology, system administration, system integration, communications and network security
Public Affairs Office (PAO)	Provides consistent, clear messages about JPAC missions, operations, and activities through the use of media engagements, in-house-produced marketing, internal information materials, and face-to-face contact with JPAC experts
Forensic Science Academy (FSA)	A forensic anthropology academic/applied program, taught under the auspices of the Department of Defense by FSA and CIL staff
Detachments (DET)	Detachments 1–3 are permanent support detachments which facilitate operations conducted in or traveling through their respective areas of operations, i.e., Thailand (DET 1), Vietnam (DET 2), and Laos (DET 3). Detachment 4 is located in Hawaii (Joint Base Pearl Harbor-Hickam) and consists of the recovery teams; typically JPAC has 18 standing recovery teams
Medical	Provides health-care support to JPAC before, during, and after missions to maintain force health protection, and preserve mission readiness and operational flexibility
Forensic Imaging Center (FIC)	Provides the CIL with high-quality photographic documentation of worldwide excavation operations as well as providing the PAO with relevant and newsworthy imagery of JPAC personnel accomplishing the mission

A Short History of the CIL

The US Government views the identification and return of US military personnel to their families as an important responsibility to the service members and their families. After each major conflict since the end of the Civil War, the US Government (through the Department of War/Department of Defense) has established temporary Central Identification Units or Central Identification Facilities. These facilities were primarily operated by the US Army via the American Graves Registration Command and Mortuary Affairs operated out of the US Army's Quartermaster Corps. Obviously, these early identification efforts relied on forensic techniques that can best be described as rudimentary when compared to today's technical and methodological advances (Eckert 1983; Wood and Stanley 1989).

During World War II, the American Graves Registration Service (AGRS) was tasked to collect, identify, and inter battlefield casualties (Steere 1951). Many of these techniques are still used in the modern battlefield contexts of the global war on terrorism, with the use of central collection points and temporary cemeteries. At the end of World War II hostilities, primarily in Europe, the AGRS began an extensive program of search and recovery for many servicemen in territories formerly held by enemy forces.

In the aftermath of World War II, the War Department created the American Graves Registration Command. Under this command, military recovery teams search globally to locate, recover, and repatriate service personnel remains to central identification points throughout Europe. The human remains were processed and identified primarily through historical documents and forensic methods. During this time period, the War Department depended heavily on professional physical anthropologists for the scientific identification of remains.

In 1946, the War Department hired Dr Harry L. Shapiro of the American Museum of Natural History in New York, and established the first central identification point in Strasborg, France (Eckert 1983; Wood and Stanley 1989). Shapiro refined the collection and records process for World War II casualties in the European theater. This process was repeated at additional central identification points in Belgium and Italy. For the identification of war dead in the Pacific Theater, a much larger geographic area, a Pacific Zone CIL was established in Hawaii at the US Army's Schofield Barracks. Dr Charles Snow served as the Laboratory Anthropologist from 1947 to 1948 (Snow 1948) and departed when his leave of absence from the University of Kentucky was over. Dr Mildred D. Trotter of Washington University (St. Louis, MO) replaced Snow as the Director of the Pacific Zone CIL. Early during her tenure, Trotter gained permission from military officials to collect data from the remains received by the CIL; Trotter felt that this activity was essential to advance the science of human identification (Conroy et al. 1992). With the help of Dr T. Dale Stewart of the Smithsonian Institution (Washington DC), Trotter collected the data and conducted the analyses that led to milestone studies on stature and age estimation (Trotter and Gleser 1952). At this time, no physical anthropologists or archaeologists were employed during the recovery operations, which were seen exclusively as a military function by the AGRS.

During the Korean War (1950–1953), anthropological methods were used in the identification of battlefield casualties at the CIL in Kokura, Japan, beginning in 1951. However, professional anthropologists were not employed until after the 1953 armistice with the hiring of T. Dale Stewart by the US Army Quartermaster Corps (McKern and Stewart 1957). Stewart worked with several other physical anthropologists (Thomas McKern, Ellis R. Kerley, Charles P. Warren, and Tadao Furue) to study and identify the recovered war dead, including over 4000 sets of remains repatriated during a bilateral operation and exchange of war dead between the Democratic People's Republic of Korea (DPRK; also known as North Korea) and the United

Nations (this was termed Operation Glory). Again, it should be noted that no physical anthropologists or archaeologists were utilized on recovery operations.

The US Army Quartermaster Corps maintained the responsibility for the recovery and identification of US service members during the Vietnam War (1966–1973). Rapid recovery of soldiers killed in action (also known as "KIAs") minimized the number of unknown or missing service members seen in previous conflicts. The establishment of the CIL for this conflict, first in Thansenout Airfield in Saigon, then Bangkok (known as the US Army CIL-Thai), and, eventually, on the island of Oahu in Honolulu (the US Army CILHI). Currently the CIL is on Hickam Air Force Base, Hawaii. During this period, physical anthropologists employed by the military basically served as technicians. In fact, the advances made in physical and forensic anthropology during the latter decades of the twentieth century in terms of skeletal biology and identification methods were little used by the US military at this time.

During the mid-1980s, several family members began to question and challenge the scientific veracity of the recoveries and positive identifications provided by the military for servicemen from the battlefields of Southeast Asia. The US Government responded by inviting several outside consultants to examine the operations, including Ellis R. Kerley, William Maples, and Lowell Levine (a forensic odontologist). These consultants found that the CIL was isolated academically and geographically as well as being understaffed, which significantly hampered the laboratory operations (Hoshower 1999). In addition, the lack of outside scientific peer review, the lack of modern scientific equipment, and inadequate training were also identified as significant detrimental issues. The Department of Defense and the US Army Quartermaster responded to these needs by appointing Kerley to serve as the Scientific Director between 1987 and 1991.

Initially, anthropologists were hired strictly for laboratory analysis; however, it quickly was realized that more systematic and scientific field recoveries were critical to the overall success of the identification process. This led to the incorporation of anthropologists on recovery teams. Initially, the anthropologist would serve in an advisory role on field strategies and techniques as well as field assessment of human versus nonhuman bone fragments and teeth. In 1994, Thomas D. Holland became the Scientific Director of the US Army CILHI and the role of the team anthropologist began to transform to a more focused role, including changes in responsibility from advisor to *Recovery Leader*. The Recovery Leader then became the primary expert on the site excavations, field strategies, and leadership on the site area. These responsibilities required that Recovery Leaders possess more than a passing knowledge of archaeology and explicitly required formal archaeological training.

In 2003, the US Army CIL was combined with the Joint Task Force-Full Accounting to become a joint command termed the Joint Prisoners of War, Missing in Action Accounting Command (JPAC). The CIL remained as an independent section directly supervised by the Scientific Director who reported directly to the JPAC Commander. Today, in addition to the CIL's primary mission of recovering and identifying the remains of missing US service personnel, another primary goal is to establish the highest possible level of scientific expertise, competence, and integrity, while maintaining a level of ethical standing that is beyond reproach. The CIL strives to provide leadership within the field of forensic anthropology and forensic archaeology. These disparate goals are maintained through the CIL's accreditation with the American

Society of Crime Laboratory Directors – Laboratory Accreditation Board (ASCLD-LAB) (Holland et al. 2008). In 2003, the CIL became the first Skeletal Identification Laboratory accredited under ASCLD-LAB; in 2008, the CIL advanced that accreditation by becoming the first Skeletal Identification Laboratory to be accredited under the ASCLD-LAB International program. Further detailed discussion of the day-to-day operations within the laboratory portion of CIL can be found in Holland et al. (2008). The focus of the remainder of this chapter is on the field recoveries conducted by JPAC.

Individuals hired for positions within JPAC-CIL as anthropologists and archaeologists must possess the necessary archaeological and interpersonal skills that will allow them to be successful in the field. The following vignettes offer examples of some of the situations in which Recovery Leaders find themselves and the types of knowledge and leadership skills that are necessary when working on a global scale in many different cultural and political environments and settings.

Field Recoveries Conducted by CIL

The primary purpose of the field operations organized by JPAC-CIL is to conduct the most comprehensive recovery of the human remains identified at each site investigation as possible. The task is particularly difficult due to a number of factors, including, but not limited to the following.

1. Time elapsed since the loss incident: the vast majority of military causality losses are from World War II (now almost 70 years ago); others from the Vietnam War are now more than 45 years ago. This time gap can cause many issues, including simply trying to identify local informants or find appropriate eye witnesses to the incident.
2. Type of incident: most of the incidents investigated are aircraft crashes, though some incidents involving ground troop burial are also investigated. Most of the aircraft crashes investigated result in significant fragmentation of human remains. The CIL makes a distinction between slow-moving, propeller-driven aircraft (including rotary aircraft, such as helicopters) and high-speed jet-propelled aircraft. During World War II, most aircraft were propeller-driven, but during later conflicts a mix of different types of aircraft were used, although the majority of the post-World War II conflicts involved jet-propelled aircraft. These sites contrast significantly with battlefield casualty sites which are burial features near the death scene and in many cases contain relatively well-preserved and intact bones.
3. Location of incident: in many cases, military plane crashes left to be investigated are found in remote areas, including jungles. At these recovery sites, the sediment and soils are not conducive to bone preservation. The jungle sediments in Southeast Asia, for example, are highly acidic. In other situations, bone is rather well preserved. For example, the karstic soils of Papua New Guinea occur over a base of limestone and coral, which leads to better bone-preservation conditions.
4. Site disturbance: many recovery sites have been scavenged for metal in the past, or have been modified through farming or other activities, making locating crash sites in these cases particularly difficult. Impact craters may have been filled-in with debris, while cultivation plowing also obscures potential recovery sites. Scavenging

for memorabilia and aircraft parts is particularly common for World War II aircraft in Europe and throughout the former Pacific Theater, including New Guinea.

5. Political situation of host countries: during the course of a war or conflict, territories will change and fluctuate numerous times; attempts will be made to investigate sites and recover remains when areas are controlled by friendly forces. However, in some cases, aircraft crash sites or isolated burials remain in territories controlled by nations that are hostile to, or at least suspicious of, the US government. This requires the investigation and recovery teams to enter territories that may be hostile to US citizens; this is especially the case with the DPRK, where the USA is part of a ceasefire agreement.

Overview of Recovery Operations

Field recoveries for missing soldiers are conducted in a series of steps or phases, not unlike archaeological work that is part of cultural resource management operations, though some modifications of archaeological techniques and methodologies are required. Specific evidence handling and management procedures employed by JPAC archaeologists ensure that material and biological evidence is collected following proper protection and custody. The primary stages involved in field recovery include: (i) research and analysis, (ii) investigation, and (iii) recovery. These steps eventually lead to the recovery and accession of material and biological evidence into the CIL for analysis and identification.

Research and analysis

The J2 section of JPAC conducts an historical review of pertinent historical records, particularly case files [which include Aircraft Accident Cards (Navy), Missing Aircrew Reports (MACRs; World War II, US Army Air Forces), IDPFs (Individual Deceased Personnel Files), Field Search Case files (Korean War), and Reference Number files (REFNO; individual files related to casualties in Southeast Asia)], personnel and combat unit memoirs, military unit histories, and other conflict-related secondary and tertiary historical sources. Lead sheets are created from these and possible cases are selected on their likelihood of success and put forth for field investigation.

Investigation

In an ideal world, a case is selected based on high probability of locating human remains. Attempts are made to locate eye witnesses; however, due to the length of time that has passed since these incidents occurred, most of these individuals are either deceased or cannot recall many details of the incident. Most of the interviews are conducted with informants who know of a crash site or have found evidence and even human remains during cultivation, for example. The investigation team will also attempt to conduct appropriate field observations to specifically correlate a spot on the ground to a specific loss incident. This can include the exclusion of other nearby incidents, finding a data plate or serial number, such as those on a .50 caliber machine gun, that specifically correlates to a type of aircraft or a specific aircraft, life support (aircrew-related gear that may indicate that the aircrew were in an aircraft at the time of the impact), and, of course, identification media, such as an identification tag. Typically, these initial investigation teams comprise military and civilian specialists such as explosive/ordnance disposal technicians, intelligence analysts and/or military historians, medics, and linguists. In the near future, the anthropologists and archaeologists will become more involved in the site survey and evidence handling aspects of the investigations. Nevertheless, the time spent on a site is very limited.

If a site has been investigated, but a Recovery Leader needs more specific information on the recovery site (such as the distribution of different types of aircraft parts), then a Phase 2 Team (P2T) may be called to gather more information. A P2T is a small, functionally specific team lead by a Recovery Leader with extensive archaeological experience. Other members include a communication specialist, explosive/ordnance disposal (EOD) technician, forensic photographer, and a military team leader. This team typically spends several days on a potential site to conduct both surface and subsurface testing of a recovery site. Thus, more specific information can be gathered by these types of survey and attempts will be made to narrow down a site location which will maximize subsequent recovery efforts and make the operation more efficient. For example, the P2T may, through subsurface testing of a particular area on a site, identify the cockpit or other crew station of an aircraft, allowing the recovery team to focus on those specific areas at a later date.

Recovery operations

Recovery operations include the excavation and recovery of both material and biological evidence from a field setting. This takes place after the investigative process has concluded and all the data are reviewed by the command. In consultation with the historical section, and the CIL, the J3 Operations section creates a decision matrix that objectively assigns a score to a site which relates to the probability of locating remains. From this score, recovery sites are chosen.

Based on the information collected during the investigative effort, the Recovery Leader begins to make important planning decisions concerning the team management and size in conjunction with the JPAC J3 Operations and Planning Section. Is the site of sufficient size to accommodate the normal complement of team members, usually about 10–12 individuals, or is a so-called "plussed-up" or double team needed? These types of decision are related to factors such as site size, limited access by the host government, and imminent danger of site destruction through development. The planning phase also requires estimates of the amount of work that can be completed during the mission time frame, including the number of square meters that can be excavated and whether or not the site will need follow-up missions or deployments to complete excavations. The Recovery Leader also devises an efficient excavation strategy including excavation method (hand versus mechanical), screening type (does the site area support a wet-screening operation?), and determining whether any other specialized equipment or training is needed. This latter concern is especially important for remote or mountainous base camps. Experience in camping and other outdoor activities can supplement any academic experience that an archaeologist or anthropologist may have.

A typical field recovery team consists of about 10–12 members including a Recovery Leader (anthropologist or archaeologist), Team Leader (usually a military logistics officer), Assistant Team Leader (a senior noncommisioned officer who acts as the site foreman), an interpreter or linguist, a forensic photographer, an explosive ordnance disposal technician, a medic, a communications technician, a Life Support Analyst (a military or civilian technician who can identify parts of aircraft or materials that would be associated with the an aircrew's body), and two to three additional military service members who conduct general duties at the recovery scene, including excavation, sediment screening, construction, and other logistical support for the excavation of the site.

Once anthropologists or archaeologists arrive on a recovery scene, they begin to conduct the necessary business of documenting the site prior to excavation with the initial site survey. After initial documentation, a recovery operation begins with an on-site pedestrian survey of the scene that is conducted by the Recovery Leader and key team members. The EOD technician conducts a surface survey with a metal detector, which allows the Recovery Leader to understand the subsurface distribution of metal fragments (particularly important in understanding the distribution of aircraft wreckage) as well as indicating possible unexploded ordnance. Previously collected information from the investigative process is reconciled with the current site condition and distribution of evidence. Additionally, the Recovery Leader may choose to re-interview possible eye witnesses and informants.

As the Recovery Leader begins to understand the structure and distribution of a site, logistical requirements and recovery operation planning will be finalized. Logistical requirements include the location of various aspects of site "furniture." These include a screening station consisting of 10 to 20 screens that are used to process the large amounts of sediment that must be examined for evidence, the location of local worker and US personnel break areas, equipment storage, and latrines. All of these must be located in an area that is close enough to maintain an efficient operation, but not within the site boundaries to effect the excavation. If a base camp is required for the operation, it needs to be located within the shortest distance possible from the recovery scene to ensure that an inordinate amount of time is not spent traveling to and from the recovery scene as well as not impacting the site area. However, sometimes logistical concerns, such as a flat area with sufficient area for a base camp or the location of a helicopter landing zone, will take precedence over travel time and a base camp might be located within a 60- to 90-min hike from a recovery scene.

The first step of the excavation involves the clearing of vegetation in order to increase the archaeological visibility of evidence and identify scene topography. Occasionally, mechanical excavation may be required to identify buried archaeological features, such as formal and expedient burials and crash craters. Standard archaeological procedures for recording provenience (three-dimensional coordinate information for the location of evidence) require the use of a standard archaeological excavation grid. Primarily, the excavation units are marked off with stakes and twine/string that conform to a standard 4 m×4 m square. This configuration allows the Recovery Leader to subdivide the excavation grid into smaller subunits (a 2 m×2 m unit or even a 1 m×1 m unit) if finer and more detailed excavation is required. The establishment of an excavation grid often will require the adaptation of more traditional archaeological methods. Many aircraft impact sites are located in extreme topography and establishing a traditional excavation grid can be challenging and requires flexibility by a Recovery Leader: "And if it is too dangerous to measure in the grid using tapes, why are you excavating there anyway?" (Roskams 2001: 98). Obviously, in order to recover human remains from these sites, a grid may have to be constructed in extreme environments!

The excavation units are then dug to incident sterile sediments, which are defined as sediments that contain no evidence related to the incident, or, in this case, no evidence of disturbance from burial or metal intrusion from an aircraft impact. Sediments removed from the excavation unit are transported to screening stations where they are processed through 6 mm hardware cloth or wire mesh. Sediments are moved to these processing areas using bucket lines (buckets passed in a line of local workers from the recovery scene to the screening station), zip lines (buckets passed using a rope-and-pulley system), primitive chutes, and wheel barrows.

Organizing the Field Recovery

Fieldwork at the JPAC, as with any other large-scale forensic archaeological project, involves dealing with common issues such as balancing limited resources while efficiently and effectively capturing the data and preserving the evidence that will ultimately lead to case resolution. Recovery Leaders must contend with finite resources (time, labor, and money), logistical impediments, and sociopolitical realities such as host-nation restrictions and cultural differences. Thus, Recovery Leaders need to be flexible and creative while working within the boundaries of a detailed, standard operating procedure. The key for successful recovery work is to develop strategies that maximize evidence retrieval, while fully documenting the context and spatial relations of the evidence, as well as maintaining chain of custody from the field to the laboratory. In addition to being the forensic and archaeological subject-matter experts, the Recovery Leaders are responsible for carrying out nonscientific roles, including as primary scientific interpreters to various local, national, and international government officials. Other roles include briefing high-ranking military and government officials, serving as an "ambassador" or representative of the USA in other nations (often characterized as *not* acting like the so-called Ugly American), media representative, and safety officer. All of these responsibilities require that the Recovery Leader must be well organized, manage time well, and be a creative problem solver.

Since every recovery site requires its own evaluation and unique excavation strategy and since JPAC is typically operating in several countries simultaneously around the world, it is somewhat difficult to describe a "typical mission" at JPAC. While many forensic field recoveries in the Southeast Asian and World War II contexts involve military aircraft crashes, each scene is unique in terms of spatial distribution of evidence. Topography, the remoteness of the site, and the preservation potential of a given region often result in a wide variety of recovery strategies developed by individual Recovery Leaders to process the site. While initial site formation processes may have been straightforward (e.g., a fast-moving jet hitting the side of a mountain), the sites continue to be modified and obscured by various taphonomic processes, such as secondary burial by humans, gnawing by carnivores, scavengers, and rodents, and fluvial transport of materials, among others.

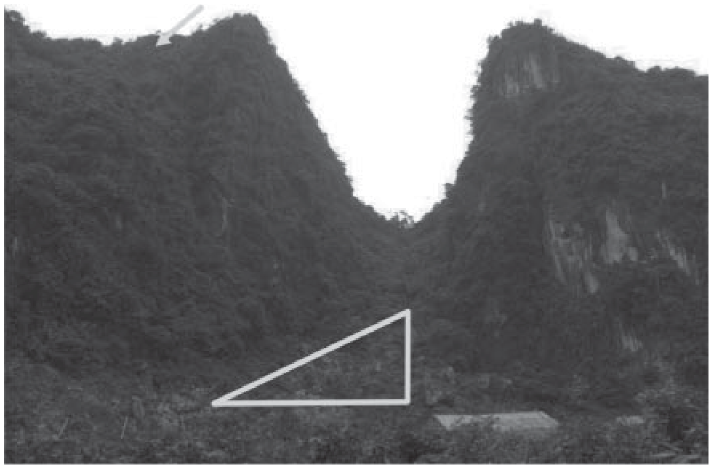

Figure 28.1 Overview of the A-4F recovery scene showing lower (triangle) and upper project areas (arrow).

Although the standard site-recovery standard operating procedures are followed, considering the variety of sites excavated by the CIL there are numerous unique obstacles faced by the recovery teams due to post-crash time interval, modification of the scenes, and environmental and topographic conditions, as discussed above. The following case studies present some of these unique obstacles faced by the field operations and Recovery Leader in terms of both excavation and interpretation of the archaeological context. Hopefully these discussions will give the reader a better understanding of what is expected of a JPAC Recovery Leader, and their roles and duties, in this unique nonacademic setting.

Case study 1: an A-4F Vietnam-era aircraft crash

This case involves the crash of an A-4F aircraft over northern Vietnam in 1972. The lone airman in the plane was conducting a nighttime armed-reconnaissance mission. Search of the area of the crash had been conducted on numerous occasions and eventually lead to an aircraft wreckage site presumed to be that of an A-4F aircraft. The area is in karstic topography and includes steep limestone talus slopes bounded by vertical limestone cliffs (Figure 28.1). Plane wreckage was observed both near the summit as well as on the lower talus slopes at the base of the cliff.

Due to the difficulty of the terrain and the steepness of the slopes around the wreckage, the site was initially not recommended for excavation. Eventually, an investigative team accompanied by professional mountaineers and climbers resurveyed the incident location. The team found no life support or pilot-related equipment on either the upper or lower sections of the crash site. Presence of such evidence usually allows the Recovery Leader to plan where to begin excavations. The mountaineers recommended that based on safety and logistical considerations, excavations should begin in the lower section of the site at the base of the cliff. Following consideration of what evidence was being retrieved during this phase of the recovery, the Recovery Leader could reevaluate whether to continue excavation of the crash site at the top of the karst cliff.

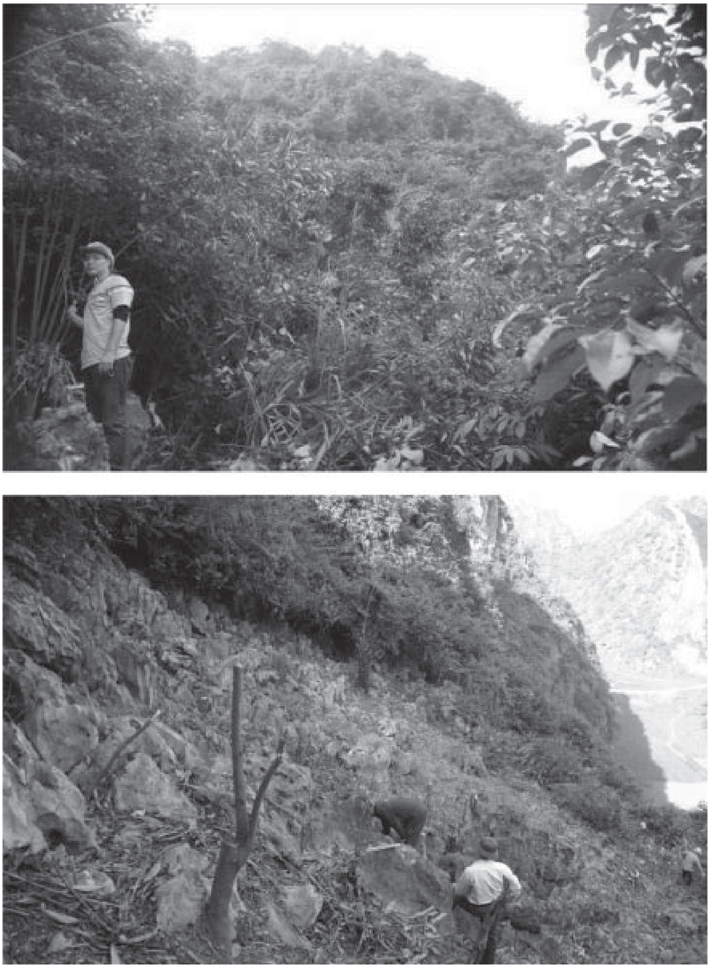

Figure 28.2 Photograph of the A-4F recovery area showing upper portion prior to clearing (top) and after clearing (bottom).

Full-scale recovery operations began at the lower locus. While this operation commenced, a small team located a suitable approach to the upper area. The team ascended to the top of the cliff and conducted a pedestrian survey of this locus. Significant quantities of life-support materials were located here. A series of boulders and drops occurred between the upper and lower loci, which would have prevented any of the upper material evidence from moving downslope and being deposited downhill on the lower main recovery area. As expected, excavation of the lower locus produced nothing of significance. Obviously, the upper locus had a much higher potential for yielding significant evidence that included aircraft remains, personal effects and, importantly, human biological remains. Due to budgetary and safety concerns, permission was needed from the governments of both the USA and Vietnam to proceed with full-scale excavation of the upper locus. Permissions were finally granted, and while a portion of the team continued to process the lower locus, other recovery team members fixed lines and ladders to vertical sections of the cliff face, built bridges,

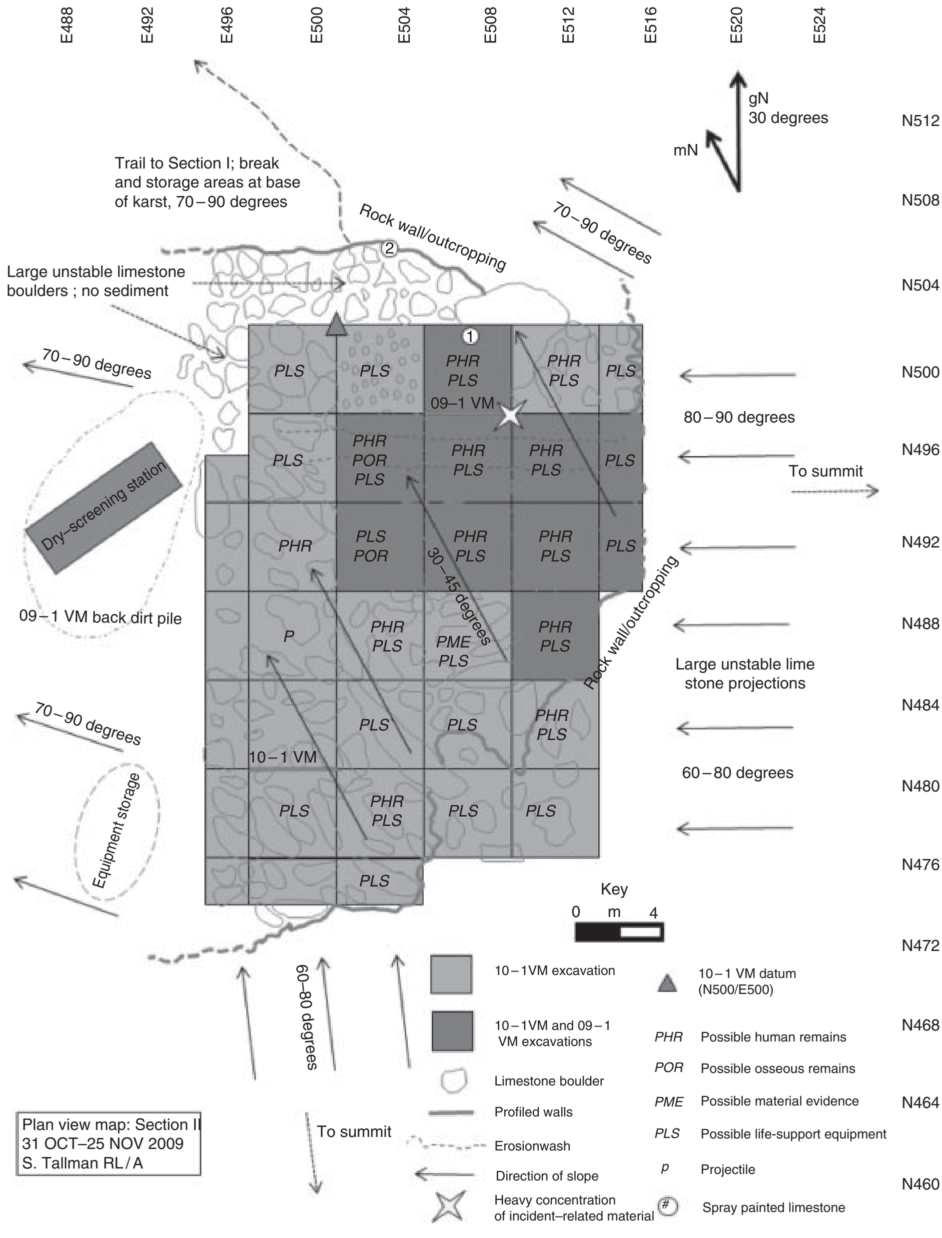

Figure 28.3 Plan-view map at close of excavations of case study 1.

and made the approach to the upper locus safer and more easily traversed, especially in the event of a medical emergency that would require the evacuation of an injured individual.

The upper locus was considerably more defined spatially than the lower locus; however, the upper locus required considerably more safety-related and logistical hurdles, especially in terms of movement of equipment and workers (Figure 28.2). Within the limited space, the screening station needed to be placed in such a location as to ensure that processed sediment would not be screened over incident-related materials and sediments, or that the screened sediments would not fall on personnel in the lower locus!

Significant amounts of life support-related equipment and biological evidence were located in the upper locus (Figure 28.3). However, due to time constraints, the excavation of the entire upper crash site could not be completed, and the site activity was suspended. Although some human remains were recovered, JPAC policy requires a return to a site when feasible until all reasonable and prudent measures have been exhausted and the probability of subsequent recovery is minimal. A subsequent recovery team returned to the upper locus the following year.

Case study 2: a World War II-era P-51D aircraft crash

Case study 2 involves a World War II-era P-51D (Mustang) aircraft that crashed into a cultivated field in Germany. This case illustrates the parallels between skills required and techniques used for processing small-scale (e.g., an isolated burial) and large-scale (e.g., mass graves, crash craters) features. This situation is common with military aircraft crash sites investigated by the CIL; often a body or bodies have been removed from an impact crater and buried in a shallow grave. The impact crater represents a large archaeological feature, while the burial represents a small-scale archaeological feature; both of these require different approaches and techniques to process due to the difference in scale and origin.

Historical and records-based research by the JPAC J2 section identified a potential aircraft crash site location in a German farm field. An investigative team was sent to survey the farm field, interview the landowner, and identify and interview potential eye witnesses and informants in a final assessment of recovery potential. The preliminary investigation of the site included metal detector and pedestrian surveys, which yielded a number of metal concentrations; however, no distinct crash crater or large pieces of wreckage were found in this actively cultivated field. The metal concentrations seemed to provide enough evidence to warrant a full-scale recovery operation in a relatively circumscribed area. Based on the historical information, witness and informant testimony, as well as this physical evidence, a recovery team was deployed to the scene.

Scene processing consisted of two primary phases: (i) discovery phase and an (ii) excavation phase. The discovery phase began with another pedestrian and metal detector survey of the cultivated field, which allowed the team to relocate the metal concentrations previously identified by the investigative team (see Figure 28.4). This strategy allowed the recovery team to establish the boundaries and perimeter of the aircraft debris field. Aircraft wreckage was recorded in a roughly rectangular area, approximately 75 m×35 m in size, adjacent to an unpaved road running along the edge of the field. After this initial search and identification of a potential excavation area, a backhoe with a toothless bucket (to eliminate gouging of the earth) was used to systematically remove parallel rows of the upper topsoil layer. Each row excavated by the backhoe was inspected systematically for the presence of a possible aircraft impact feature.

At other similar crash sites, a large portion of the aircraft will penetrate the ground upon impact and create an “impact crater” with an associated blast berm. The larger, heavier portions of the aircraft that impact first (the front fuselage or engine for a World War II-type fighter or pursuit aircraft) will be forced below the floor of the impact crater. Subsequent fire and explosions will burn and scatter aircraft components and biological evidence. Over time, the crash crater is filled in through natural processes, as well as through human intervention. Many impact craters were filled with village or town debris or trash to level a field used for farming. The craters also provided a place to deposit debris from houses destroyed during the conflict. *In situ* aluminum aircraft skin and frames embedded into the ground, particularly if they are thermally altered, typically will oxidize and become friable and chalky white/blue in appearance. If inexperienced, a Recovery Leader might overlook this modified metal or mistake it for other materials. In fact, when these substances adhere to other items, they are often mistaken for bone. Ferrous components of the plane oxidize and produce red-brown stains in the soil.

In this case, the P-51D Mustang, a small single-seat pursuit/fighter aircraft, crashed into the field, creating an impact crater with larger components of the plane exposed and present on the ground surface at the time of the incident. Local inhabitants salvaged the more accessible wreckage. Human remains also were likely encountered at the time; however, no witness recalled the removal or burial of human remains to a secondary burial in a local cemetery or churchyard. Over the next 65 years, the crater had been filled during the normal course of farming activities. Fortunately, normal farming activities generally only disturb the plow zone, thus incident-related materials and the crash crater would remain largely undisturbed below the plow zone.

During the backhoe operations, the impact feature was first identified as an area of darker sediment interlaced with small fragments of decomposing and oxidized metals (Figure 28.4, right). Once this potential feature was identified, the plow zone was cleared in the surrounding area. The team then excavated an area approximately 10 m×10 m in size, and roughly centered in the middle of the crash crater feature.

Figure 28.4 Discovery phase and completed excavation of case study 2. Top left: trenching operations using heavy machinery to strip off the plow-zone level. Right: the first appearance of the crash crater feature in the floor of a test trench. Bottom left: completed excavation.

During excavation, two small exploratory trenches – one approximately 2.0 m × 0.5 m in dimension and 40 cm in depth, and the other approximately 3.0 m × 0.4 m and 50 cm in depth – and running through the impact feature, were hand-excavated to assess the depth and stratigraphic profile of the feature. Initially, the impact site appeared as four separate features due to the uneven subsurface topography; however, as excavation progressed, these individual features coalesced into one primary aircraft impact feature.

The impact feature was then fully excavated by removing only the modified soil from within the feature as defined by the stratigraphic interface between the feature fill and the original, pre-impact matrix. This allowed the Recovery Leader to preserve the original shape of the impact crater. However, while the feature fill provided the focus of the excavation, some areas of the feature were excavated beyond its borders (i.e., beyond the stratigraphic interface) to allow for a more complete stratigraphic assessment and ensure that the area beyond the feature was devoid of material evidence. All sediments from the feature were screened through 6 mm wire mesh. Concurrently, additional test trenches were mechanically excavated with backhoes in areas beyond the crash feature to ensure that no additional features related to the crash incident were located in the vicinity.

The impact feature was mapped via a baseline running parallel to both the adjacent two-track road and the longitudinal orientation of the crash feature (roughly northeast to southwest). Thus, the mapping baseline was oriented relative to the topography of the site area and orientation of the archaeological feature, and not to true or magnetic north. The northeast stake of the baseline was designated the site datum (the primary reference point) and all measurements were obtained from this line. A 1 m × 1 m grid system was established off of this baseline to facilitate the mapping of the crater outline and to systematically record the interface of the impact feature below surface. A transit-and-tape system was used to measure (triangulate) the position of the site datum to semipermanent points on the landscape (in this case, two electrical poles), in the immediate vicinity of the site. While not the best situation for archaeological recovery, these semipermanent points would allow a subsequent team, if necessary, to relocate the site and reestablish the excavation grid system. The transit was then used to map the overall boundaries of the test trenches and the other aspects of the site in reference to the site datum point.

Within the impact crater feature, significant amounts of small aircraft debris were encountered. Some of this debris yielded serialized part numbers that correlated to a P-51D aircraft. Browning M2 .50 caliber aircraft machine guns were found along the perimeter of the impact crater, a position that would be consistent with the wing-mounted aircraft machine guns of a P-51D. A small quantity of osseous material was recovered during the excavation from the deepest (i.e., "punched in") areas of the impact crater, about a meter below the surface. These remains were highly fragmented and degraded after nearly 70 years in the ground; however, the materials still yielded mitochondrial DNA sequences that could be compared to family blood samples.

This case study illustrates the various strategies used to discover a highly modified and transformed site as well as the employment of a site-specific excavation strategy. In addition, there was another component of this job that deserves special mention. In many areas of the world where JPAC Recovery Leaders operate there are cultural resource management or historical preservation laws that require a robust archaeological scope of work to be submitted and approved by various state and, in some cases, federal agencies. In addition, environmental concerns also must be addressed through a permitting process. All of these permits must be finalized and approved prior to the excavation. Finally, the removal of any material evidence (artifacts) and biological materials must be approved by archaeological or historical preservation agencies and, possibly, medicolegal officials. These activities require the JPAC Recovery Leader to be proficient in the historical preservation laws and permitting requirements of a variety of nations throughout the world.

A related topic is that of "wreck hunting" or "plane spotting" activities. Well-meaning historical and World War II enthusiasts locate crash sites and turn over the information to various local and US government officials. Eventually this information will make it back to JPAC's J2 section for investigation into whether it correlates to a known US loss incident. However, many enthusiasts are more interested in the collection of World War II aircraft parts for personal collections as well as for selling in a very lucrative artifact market, and have had access to these easily seen crash sites for over 65 years! Although many of these activities are illegal and unethical, they remain quite common.

The JPAC-CIL teams may also be asked to conduct clean-up activities at disturbed sites to determine whether any biological materials are present. The JPAC teams, particularly in Europe and North America, will receive numerous requests by local enthusiasts to participate in their excavations of these scenes. In these cases the Recovery Leader and others in team leadership must act as public relations managers, site security, safety officers, and ambassadors. When working in a small community, the Recovery Leader attempts to satisfy the local inhabitants' curiosity about the process, promote best practices, discourage looters, and build relations. The goal is to not insult the locals, particularly since they may have reported the site to JPAC originally and their enthusiasm may lead to additional discoveries in the area. Often these local enthusiasts and amateur historians have specialized knowledge of aircraft parts or military history. However, the team leadership needs to understand that, in many cases, there are multiple groups of local enthusiasts who are competing for JPAC's recognition. Problems and difficulties may ensue if the team leadership focuses on one or another of these groups and individuals and it is here that the ambassador role of the Recovery Leader is important.

Case study 3: a naturally disturbed Korean War burial

This case involves a recovery of the remains of several US servicemen in the DPRK. As background, the Korean War was fought during 1951 through 1953 in an attempt to halt the territorial expansion of Socialism throughout the entire Korean Peninsula (Mossman 1990). Over 8100 US servicemen are currently considered missing from this conflict with approximately 5000 in the DPRK, a regime which is openly hostile to the USA and its allies. Between 1996 and 2003, the US Army CILHI (the precursor of the JPAC-CIL) conducted an active program of joint investigation and excavation in the DPRK under the guidance and supervision of the Korean People's Army. In 2003, the USA suspended operations in the DPRK due to safety and communications concerns. Negotiations are ongoing to once again allow the USA access to the DPRK.

Most of the American casualties missing from the Korean War and investigated by JPAC-CIL were ground forces killed on the battlefield. Many of these individuals were hastily buried in fighting positions (so-called foxholes) by both friendly and hostile forces. Other situations encountered include burials in former prisoner-of-war (POW) camps or POW holding areas.

In addition to attempting to work in a relatively hostile political environment, the search for missing soldiers is complicated by the not uncommon practice of secondary reburial in which servicemen graves are excavated and the bones reassembled in a new grave by the Koreans in preparation for American investigations (Holland et al. 1997). The political rationale behind these "faux graves" is unclear or unknown, although the Korean People's Army officials often speak of the recovery of remains as an indicator of the political success of a given recovery mission and to the extraordinary level of cooperation provided by the Korean government to the American government in these affairs.

In many instances, when led to a potential burial location, the Recovery Leader must carefully consider a number of factors, including the location and context of the burial features, and the orientation and positioning of the body, in order to interpret the legitimacy of the grave itself. For example, when excavations reveal a set of remains haphazardly arranged, and not in anatomical position, disturbance and reburial are indicated. This is further corroborated by the location of the grave, the attributes of the grave feature itself, and other factors. Faux burials can range from a burial feature that has been disturbed by the Korean People's Army prior to excavation by a US team (indications of these activities can include a transposed tibia, fresh grass fragments, or even a newspaper fragment from the previous year) to completely manufactured graves in which remains are removed from the original grave and reburied in a new grave elsewhere. This latter type of grave include evidence of attempts to place skeletal elements in an approximate articulated pattern, although the legs and arms are often switched and the vertebral elements piled in the center of the torso area. The key to proper interpretation of these features resides in training and experience in archaeology, geology, and taphonomy to separate natural from artificial configurations. The following case study is offered to provide an example of why a comprehensive understanding of forensic taphonomy, including fluvial transport issues and depositional processes, are key in the interpretation of these scenes.

Investigative research and witness statements led a US Army CILHI investigative team to consider a location, approximately 25 m^2 in size, on the eastern side of a small valley, below a ridge, as a likely spot for a burial site of several US service members. This area was near a known POW holding area that was used after the Battle of Ch'ongh'chon in late 1950 (Mossman 1990: 61–83). The investigation team identified a small depression (approximately 2.70 m in diameter) adjacent to bedrock outcrops as a likely location for a burial pit. A small test pit was excavated into this depression. Indeed, human remains were encountered along with various material evidence, including most notably a US-manufactured pocketknife in poor condition, and was labeled as Feature 1. At this point, the investigation team ceased operation and the recovery team was brought in to conduct a more rigorous excavation.

Topographically, the site is located in the path of a small, seasonal stream channel, which coursed downward adjacent to this bedrock-bound depression from above (and from the area where the POW holding area was located). Standard archaeological techniques were used to process the possible burial feature and recover additional human remains (Figure 28.5). Feature 1 appeared pit-like in profile and extended 85 cm below the ground surface in its center and feathered upward to only 10–15 cm below the surface along its lateral perimeters. The feature was bounded by coarse granitic bedrock to the north, west, and east.

The recovered human remains consisted of nonarticulated and randomly scattered long bones and six concentrations of cranial elements. The mapping procedure included piece-plotting (and individual numbering) of the human remains and significant pieces of material evidence onto grid paper. During excavation, two arbitrary stratigraphic levels, upper and lower (Figure 28.6) were designated, although they did not represent individual depositional units. Cranial elements appeared to be concentrated along the perimeter of the feature while the long bones were scattered in the center. There was a conspicuous absence of vertebrae, ribs, tarsals, metatarsals, carpals, and metacarpals. Almost all of the long bones lacked the proximal and distal ends and appeared to have been eroded away. The infusion and penetration of roots and rootlets into the cortical bone tissue, as well as root-etching of the bone surfaces,

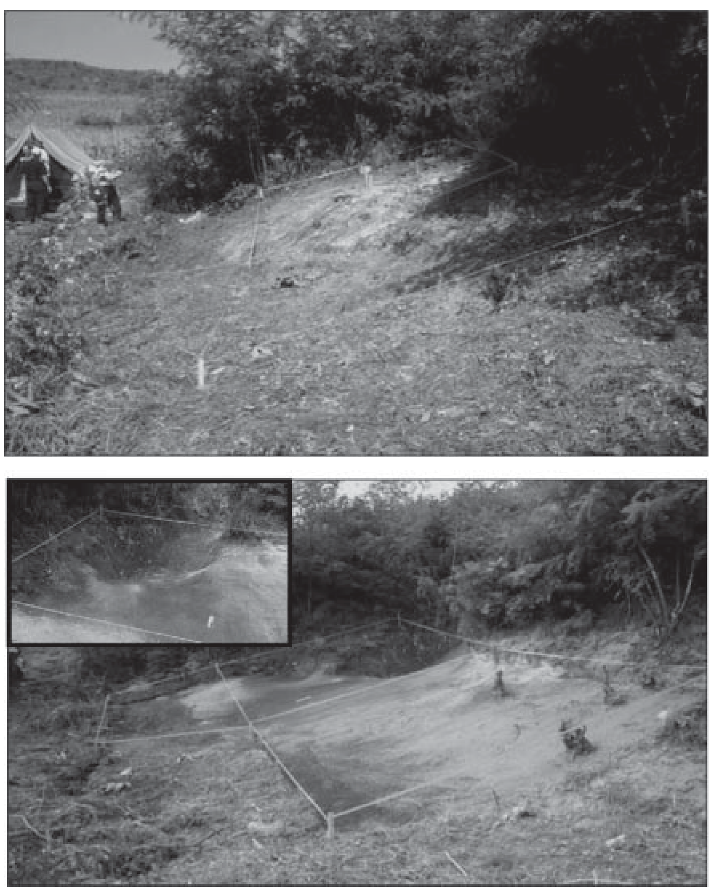

Figure 28.5 Before (top) and after (bottom) excavation of case study 3. Inset in the bottom panel is another view of Feature 1.

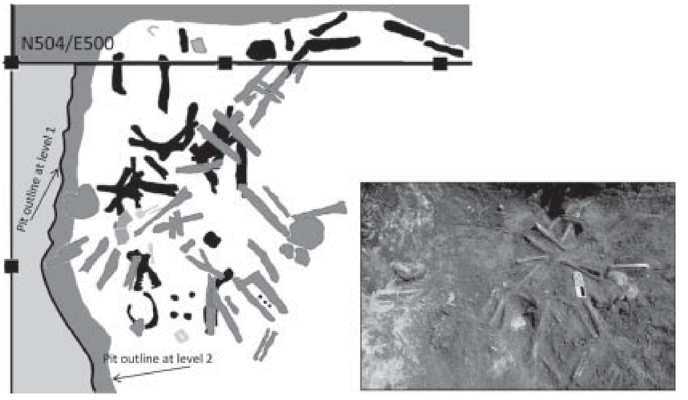

Figure 28.6 Modified sketch map and photo illustrating the commingled human remains and material evidence found within Feature 1 (case study 3). The pattern of deposition and preservation of materials is consistent with fluvial depositional processes.

suggested that the remains had been in this location undisturbed for a substantial period of time (Lyman 1994: 375–377).

After exposure, mapping, and removal of the human remains, excavation continued an additional 20 cm until bedrock was encountered. The deposits within the feature consisted of coarse, granitic sediment that included large decomposed granite pieces infused with crystals of feldspar and quartz. Removal of the remainder of the feature matrix revealed a natural bowl-like depression formed in the granitic bedrock, which explained the surface depression (see Figure 28.6). The "burial" feature lies on a level break in slope, again within the path of the seasonal stream.

This type of bone accumulation has been described in the paleontologic and zooarchaeological literature as an "active accumulation" which R. Lee Lyman (1994: 162) defines as "…processes which, via transport or movement of skeletal parts (whether or not as complete carcasses/skeletons) significant distances from the location of animal death, result in relatively dense concentrations of bones and teeth in a spatially limited area." Active accumulations are most often associated with physical agencies, such as hydraulic or fluvial activities (Gifford 1981; Hanson 1980; Micozzi 1991; Voorhies 1969; Wood and Johnson 1978).

In addition, the composition of the deposits in the area of the human remains and feature corresponds, in general, to Voorhies' (1969: 69) observations on fluvial transport, redeposition of remains, and, in particular, removal of skeletal elements. The absence of Group I elements (ribs, vertebrae, sacrum, and sternum) seems to represent a winnowed deposit, as described by Behrensmeyer (1975: 471). The human remains assemblage matches many of the indicators of fluvial transport cited in Nawrocki et al. (1997), particularly partial or complete destruction of the facial skeleton, perforation of the thin plates of bone, and abrasion or breakage of exposed edges or processes, among others. The apparent random orientation of the long bones suggests that the fluvial process was not linear, but instead somewhat circular, like a fluvial eddy (a circular swirling water offshoot off the main stream) in a bedrock depression (Voorhies 1969; Shipman 1981; Nawrocki et al. 1997). As discussed above, the angular sediment of the decomposed granite that comprised the matrix of Feature 1 may have been responsible for the extreme abrasion and lack of long-bone epiphyseal regions (Binford and Bertram 1977; Shipman and Rose 1988; Nawrocki et al. 1997).

Given the configuration of the bones within the feature, the eroded nature of the bone ends, and the geological context, the most parsimonious explanation for the concentration of bones is that they were washed out of the original grave feature located somewhere upslope near the POW camp. Through fluvial transport they ended up in an eddy created by the depression in the bedrock. The stream energy was diminished when it entered this depression and the long bones and cranial elements sank to the bottom of the feature (Nawrocki et al. 1997). The remainder of the smaller bones likely continued downstream. Apparently there was still sufficient energy to create a swirling-type effect which resulted in the bones abrading against each other and the granitic sediment and bedrock (see Voorhies 1969; Shipman 1981; Nawrocki et al. 1997), thus explaining the eroded long-bone ends.

Only limited investigation was permitted at the scene and the search for the original burial pit associated with the POW camp was unsuccessful in revealing the location of the mass grave. However, mitochondrial DNA testing of the remains recovered was successful in identifying a number of individuals from this secondary accumulation of human remains (Christensen et al. 2007). Through an understanding of forensic taphonomic processes it was possible to identify likely depositional processes and dismiss others which might have been misinterpreted as a faux burial created by the Korean People's Army (i.e., Holland et al. 1997).

Discussion

The three case studies discussed above serve to illustrate some of the very different operational models and situations that a Recovery Leader can expect to operate under in various cultural and political contexts. In some areas of the world, JPAC recovery teams are left to conduct operations with relative autonomy and little interaction with the host nation's governmental officials. In other investigations, prior governmental approval is necessary, historical preservation issues need to be resolved, land access permits must be obtained, and embassies notified. All of this activity takes place during the pre-excavation and planning phases of the operation. Some countries, such as the DPRK, work only within a framework of military-to-military operations, while others require the team to interface with their civilian counterparts. In still other countries, the freedom of movement, even outside of hotels, is severely restricted and curfews may be enforced.

Preparation for employment with JPAC-CIL: physical, mental, academic

What then are some of the important education skills, work experience, and interpersonal skills necessary to become a JPAC Recovery Leader? Since recoveries are conducted throughout the world and under very different conditions, adaptability, self-reliance, self-confidence, and critical thinking are key. Add to that mix advanced skills in both osteology and archaeology, and the ingredients for a successful application to JPAC-CIL are beginning to emerge. Some of the specific skill sets or background include the following.

1. Forensic osteological skills: while the focus of this chapter has been the Recovery Leader roles and responsibilities, most Recovery Leaders are also proficient in osteological analysis of the human skeleton (Recovery Leaders with a more traditional background in archaeology tend to focus on the analysis of artifacts, or material evidence). Human osteological skills come into play when determining forensic significance of the osteology remains and whether they represent human or animal, and even assessment of biological profile. For example, in the DPRK, Recovery Leaders will frequently be led to burial sites that yield native Korean remains and not missing US service members. Skills in the analysis of forensic taphonomy bone modification are also critical.
2. Archaeological skills: an individual trained in archaeology brings a unique set of skills to forensic anthropological investigation of missing military service personnel, and relate to looking at sites within a geomorphic and cultural landscape, conducting search and survey operations and strategies, and obviously field excavation and site and context interpretations. More traditional site-oriented tasks include excavation grid construction, orienteering skills (topographic map reading, the use of a variety of styles of compasses, the use of a global positioning system receiver), and the use of survey equipment (transits, electronic distance-measuring devices, total stations), as well as an understanding of geology, taphonomy, and stratigraphy. These latter skills allow the Recovery Leader to more properly interpret the site modifications since the time of the incident. In addition, Recovery Leaders require a certain amount of flexibility in the construction of recovery strategies, particularly in terms of being able to adapt excavation methodologies to the specific sites and their topographic/landscape settings. For an archaeologist wishing to become a Recovery Leader, the authors would recommend gaining supervisory experience and developing core leadership and organizational skills in addition to basic archaeological tasks. One may also want to gain experience on a large variety of archaeological surveys as well as different types of archaeological site.
3. Outdoor skills: because the JPAC Recovery Leaders often live and work in austere environments, a background in basic outdoor activity skills is a necessity. Again, knowing how to use a compass and read a topographic map is a useful outdoor as well as archaeological skill to possess. Knowledge of hiking, backpacking, and camping are essential as is training in first aid and cardiopulmonary resuscitation (CPR). Additionally, skills of rock climbing and rope/knot work also are beneficial.
4. Interpersonal skills: the Recovery Leader needs to develop good interpersonal skills. In dealings with military personnel, foreign dignitaries, and foreign nationals from the entire spectrum of socioeconomic status, as well as local and international media, the Recovery Leader needs to display respect and a temperate personality. Public speaking skills and even negotiation skills may be necessary.
5. Writing skills: because a large part of the Recovery Leader's job is spent writing reports, a potential Recovery Leader must have adequate skills, both in note-taking as well as the preparation of final excavation reports. These skills can be gained by the student writing essays and term papers in school, as well as attending writing center workshops at universities or colleges. Another important venue to demonstrate these skills is through academic writing, like a dissertation or Master's thesis as well as publications in peer-reviewed journals or other publications.

According to Sledzik et al. (2007), forensic anthropology has entered the "Fourth Era" where forensic anthropology is recognized as a unique discipline.[1] As such, training in forensic anthropology must include physical anthropology and closely related fields such as human biology and archaeology. Dirkmaat et al. (2008) have suggested that a "paradigm" shift has occurred in the field, as forensic archaeological methods and protocols for acquiring a contextual setting for the skeletons analyzed are interdigitated with forensic osteological methods and techniques. However, many academic programs are stuck in "third gear" in terms of implementing opportunities to acquire rigorous archaeological skills into forensic anthropology-oriented programs; skills that are heavily in demand in applied contexts. As the nature of forensic anthropology transitions from a purely laboratory-based realm into a more fully functional integration of laboratory and field activities (see Chapter 1 in this volume), many academic departments have been slow to integrate requirements for a truly holistic melding of the laboratory-based and field-based expertise that a modern forensic anthropologist needs in order to be successful and contribute in a meaningful way to the changing field.

Many programs do allow for a flexible approach to curriculum building and often put the onus on the student to seek out the proper training, academic work, and field experience. While seemingly ideal, this approach can actually limit one's experience given the significant time demands and economic realities that obtaining practical archaeological experience requires. If one's only experience comes from archaeological course work and a single 6-week field school (as typically required for non-archaeology-focused students) then the depth and breadth of one's knowledge is usually insufficient for employment by the CIL. Additionally, a typical field school curriculum can only present a partial picture of the types of practical skills that are necessary to successfully work for a cultural resource management company, a government agency, or in the international forensic community.

Anthropologists come to JPAC-CIL from a wide variety of life paths. However, some of the most successful are those who have worked on large-scale archaeological projects as part of the field crew and, ultimately, as crew chiefs or principal investigators. These types of position allow the student/employee to gain the appropriate organizational and leadership skills needed to manage large-scale recovery projects. Skills learned for the practical side of archaeology are far different from those used to manage a group of military service members and indigenous field crew. One of the authors (WRB) grew up in a military family and worked on large-scale excavation projects in Pakistan, and so these skills sets were already developed. For others, exposure to leadership roles and responsibilities can come from a variety of sources; professionals and students need to seek out these opportunities and exploit them. For instance, in addition to employment on small- and large-scale cultural resource management projects, there are opportunities such as working on medicolegal recoveries, historic cemetery burial excavations, and international human-rights work. Often, local law-enforcement agencies request assistance when dealing with a clandestine burials or surface scatters of human remains and evidence. Due to the increased visibility of forensic anthropology in the mainstream, many of these agencies may seek expertise from anthropologists and archaeologists at local universities. Become a team member, volunteer for search-and-rescue operations (e.g., skills from archaeology as simple as reading a map and compass and walking transects are applicable to a large number of scenarios). Seek out colleagues with ongoing research-based excavations and volunteer your time as well as gaining employment with local or regional cultural resource management projects. Attendance at regional and national anthropological and archaeological meetings (especially those for the American Association of Physical Anthropology, the Society for American Archaeology, and the American Academy of Forensic Sciences) is particularly useful for networking with other professionals and students.

Concluding Remarks

The primary goal of JPAC-CIL recovery projects is to recover human remains of missing servicemen that subsequently can be identified through the scientific practices of forensic anthropology. The success of the identification process is dependent on the scientific integrity and success of the excavation and recovery operations. However, to be a successful Recovery Leader, a forensic anthropologist/archaeologist must be able to move freely between scientific, diplomatic and interpersonal responsibilities.

Based on detailed historical research, recovery crews are sent out into foreign locales to corroborate basic information such as the precise location and composition of the debris field and verification of a specific aircraft from debris. This information ultimately will lead to the recovery of the biological remains of missing US service members. These locales often have limited access, over treacherous terrain that may require a 5-hour hike along leech-filled, shallow streams and through triple-canopy jungle. Once at the locale, excavation activities usually encompass standard archaeological techniques, including pedestrian surveys (often with metal detectors), clearing vegetation in the vicinity of the site, setting up excavation grid systems, excavating with various hand and mechanical tools, screening of excavated matrix, and interpreting stratigraphy and archaeological features. Of course, the Recovery Leaders must be comfortable with these skills and adapt these standard techniques to unusual circumstances, such as extremely steep slopes! The primary means of understanding the difficulties is to realize that many of the sites are unique and pose problems whose solutions cannot be found in an archaeological textbook.

Other skills learned from recreational activities, such as hiking, rock climbing, and photography, can be converted into skills that are required by Recovery Leaders. Outdoor skills such as map reading, orienteering, and camping are also essential. The authors recommend gaining these skills by joining a local hiking or trail-maintenance club, a rock climbing gym, or a climbing club, as well as practicing camping and backpacking skills.

The authors hope that this overview of field operations at JPAC-CIL as well as the case studies convey some of the exciting and challenging aspects of forensic anthropology. A strong background in archaeological recovery techniques and interpretation is needed to adapt standard excavation techniques. Like fieldwork anywhere in the world, the work is often miserable and grimy, but worthwhile in recovering the remains of missing US service members. We should reemphasize here that within all of the vignettes presented the responsibility of maintaining strict timetables, directing workforces, and ensuring scientific integrity of the process is incredibly demanding.

NOTE

1 T. Dale Stewart (1979) and Thompson (1982) both recognized three eras of growth of forensic anthropology as a scientific discipline. The first era occurred before World War II where there was no formal instruction and little work within the medicolegal communities; the second era occurred from the 1940s to the 1970s where forensic anthropology had more interest by the military (and other government agencies) and medicolegal investigative services; and, the third era was characterized by field professionalism with the creation of the Physical Anthropology section of the American Academy of Forensic Sciences and the American Board of Forensic Anthropology.

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