

The Temporal Dating and Analysis of the Archaeological Assemblage Recovered from a Portion  
of Prehistoric Site,

“*’Arma ’Ayttakiš Rúmmey-tak*” (Place of the Spirit Woman Spring) CA-SCL-125

A Project Report

Presented to

The Faculty of the Department of Anthropology

San Jose State University

In Partial Fulfillment

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## Abstract

In 1972, the Department of Anthropology at San Jose State University conducted an archaeological salvage recovery project on a portion of prehistoric site CA-SCL-125. This project was initiated by the department after being notified by a concerned citizen regarding the active destruction of the site during construction activities. West Valley College also conducted an independent recovery program at the site in 1973. All materials were later accessioned into the San Jose State University Department of Anthropology Repository.

This project report details the analysis and inventory of the CA-SCL-125 burial population and archaeological assemblage curated at SJSU. As a result of this investigation, three basic research questions were raised about the interpretation of the ancestral Ohlone Indians who resided and interred their dead at this site. Furthermore, in order to understand the various temporal components, AMS dating, XRF sourcing, and obsidian hydration studies were conducted in order to obtain data, which contributed to answering those questions.

## Acknowledgements

I would like to thank my husband and son for their patience, support, and belief in me during the research and writing of this project. I am also greatly indebted to many people who provided suggestions and assistance during this process: Diane DiGuiseppe, David Grant, John Schlagheck, and Gustavo Flores. I would also like to thank my Graduating Committee beginning with my Committee Chair, Dr. Meniketti for his patience and guidance, Dr. Pierce for her advice and the opportunities she has given me to gain confidence in my skills, Mr. Alan Leventhal who introduced me to the prehistoric Muwekma Ohlone site CA-SCL-125, which became my focus of research, and Dr. Darrah for agreeing to join my committee so this project could be completed. This project would have been impossible without their assistance. I also wish to thank the Muwekma Ohlone Tribe of the San Francisco Bay Area for their support in my efforts to learn more about their ancestral heritage site.

The Undersigned Graduate Committee Approves the Project Report Titled

The Temporal Dating and Analysis of the Archaeological Assemblage Recovered from a

Portion of Prehistoric Site,

*"'Arma 'Ayttakiš Rúmmey-tak"* (Place of the Spirit Woman Spring) CA-SCL-125

By

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APPROVED FOR THE DEPARTMENT OF ANTHROPOLOGY

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## Chapter 1

### Introduction and Project Overview

#### Introduction

This study reports upon the previous fieldwork and current analysis of the recovered prehistoric mortuary population and associated archaeological assemblage that was salvaged from a portion of a multi-component archaeological site, CA-SCL-125. Due to its location, it can be deduced that it is an ancestral site of the Ohlone Thámien-speaking tribal groups that occupied this region of Santa Clara County, California. The site is located in south San Jose, adjacent to the Santa Teresa Hills and near a large perennial spring. The prehistoric archaeological assemblage was originally identified, recorded and excavated by West Valley College and San Jose State University during the construction of single-family housing units. During the salvage recovery conducted by West Valley College the site was issued the designation of WVC-18 (meaning the 18th site recorded by West Valley College archaeologists). Later the site was re-designated with the trinomial CA-SCL-57. After receiving this newly designated trinomial, it was discovered that several other sites had also been designated CA-SCL-57, therefore the site was renamed CA-SCL-125 in 1980.

According to the Archaeological Site Survey Records on file with the Northwest Information Center, Sonoma State University, the formal location of the site was plotted on the Santa Teresa 7.5' Quadrangle at the following coordinates: Township 8 South, Range 2 East, 1/4 of 1/4 section with an elevation of approximately 185 feet to 205 feet above sea level. The main recovery area was near the current intersection of Curie Drive and Manila Way, in San Jose. The site was described prehistorically as being on a “finger of land coming off [the] hill into [a]

marsh” (Dietz 1983). The site lies within a transitional zone at the base of the northern edge of the Santa Teresa Hills. CA-SCL-125 also extends to the south to include the Santa Teresa Springs as part of this archaeological locality. In the prehistoric past, this area would have had abundant fresh water and falls within oak woodland and grassland plant communities, with nearby riparian and fresh water marshes which would have supported diversified wildlife as well. The archaeological site survey form further indicates that the surrounding soils consisted of silt, presumably from a nearby stream, and a historic orchard that was being cleared to allow for a new housing development (Dietz 1983).

CA-SCL-125 contains evidence of habitation, tool manufacture and also a cemetery complex. According to Dietz in 1983, the excavations uncovered two house pits, ovens, fire pits, pecked and ground stone artifacts, nearly 40 burials and hundreds of bone fragments. It was also noted that the site was highly disturbed from earthmoving equipment (Jurmain 1980).

### **Project Overview**

Though there are many limitations to this study, this site can provide valuable clues into the ancestral lifeways of the Ohlone tribal groups who occupied this region. Previous to and during excavations, looting of this site was a common occurrence. In the early 1970s the site was brought to the attention of San Jose State University Anthropology Department by a concerned citizen from the area who was concerned by the excessive looting. This was evidenced by the conditions of the site previous to the excavations as well as by members of the public and construction crews showing pictures of and speaking about items they had taken from the site to the archaeologists. Apparently, when the archaeologists asked if these collectors would return the materials, most people refused.

Another complication resulted from the salvage excavation itself. There was construction concurrent to the excavations conducted by San Jose State University and West Valley College. During this time period, multiple site designations were assigned to the materials recovered and the materials were disseminated between both institutions. Furthermore, college, high school and middle school students were the primary volunteer excavators. In many cases, surface finds of human skeletal remains were lumped together as one burial. The collection was eventually consolidated under the CA-SCL-125 designation and curated at San Jose State University, however, many of the artifacts and other materials retained either WVC-18 or SCL-57 designations along with FS catalog numbers that did not match at times the incomplete catalog. In reviewing the catalogs and available notes, a few skeletal elements could not be located in the curation facility, as stated above the old artifact catalog does not match many of the artifacts, and many of the artifacts mentioned in the student notes are no longer with the collection.

Analysis of the CA-SCL-125 mortuary population and archaeological assemblage contribute to the overall body of knowledge of Native peoples of the San Francisco Bay Area. Permission was granted by the Muwekma Ohlone Tribal leadership to submit small samples of human bone for AMS dating, stable isotope and ancient DNA studies. The results from the AMS dating will provide temporal context and placement of the burial population and archaeological assemblage. The anticipated results from the stable isotope studies will provide information about the propensity of their diet during the last ten years of their lives and the results of the ancient mtDNA will help map the various haplogroup lineages of these ancestral Ohlone people (which will be published separately). The ultimate result of this study will also continue to provide a collaborative relationship with the Muwekma Ohlone Tribe as they reclaim their ancestral heritage sites. This collaborative relationship not only entailed obtaining permission

from the Tribal leadership, but tribal members also helped to process some of the artifacts, and members of the Muwekma Ohlone Tribal Language Committee formally renamed the site in their Native Ohlone language.

Since there are no formal publications regarding this burial population and archaeological assemblage, this study will also assist San Jose State University in fulfilling one of the obligations under the Native American Graves Protection and Repatriation Act (NAGPRA) PL-101-601, which is to conduct studies and report on burial populations and associated grave items curated at public institutions that have otherwise been ignored. Also, by following osteological Standards as proposed by Buikstra and Ubelaker, this study will provide comparative data to other osteological populations from other sites.

As the analysis ensued, several research questions emerged as part of the present study:

Research Question 1: What types of activity sets occurred at CA-SCL-125?

Proposed analysis to address this question includes: 1) an archival literature search and review of all available student notes from the excavation; 2) analysis of the ground, flaked, and pecked stone assemblages and other artifacts; 3) overview of shellfish and faunal remains; 4) analysis of exotic materials such as obsidian, and 5) analysis of the human remains.

Research Question 2: What are the sources of the obsidian recovered from the site and what can it potentially tell us about ancestral Ohlone trade networks?

Proposed analysis to address this question includes: 1) submission of obsidian artifacts to Dr. Richard Hughes of Geochemical Research Laboratory for a sourcing study via non-destructive Energy Dispersive X-Ray Fluorescence (EDXRF).

Research Question 3: What are the temporal components represented at this site?

Proposed analysis to address this question includes: 1) dating of human bone using Accelerated Mass Spectrometry (AMS) dating; 2) results of obsidian hydration on several specimens; 3) typology of stone tools; and 4) typology of *Olivella* beads (based on Bennyhoff and Hughes 1987 temporal dating scheme B1).

The overall objectives for this research project include:

- 1) Reassembling the skeletal collection and employing the Department of Anthropology's NAGPRA catalog of elements to help reconsolidate the skeletal collection.
- 2) Using a digital camera to take photos of each burial laid out in anatomical position. Also employing macro photography to take pictures of pathologies. Completing an updated detailed skeletal inventory for each burial. The osteological form will contain a general inventory of elements present and the condition of each element, age determination criteria, sexing determination criteria, measurements, stature, and pathologies (dental and skeletal). Burials that are found to contain multiple individuals will be separated using criteria such as general size, age, and sex; and recognized with an alpha after the burial number (ex. Burial 7a). A separate form will be completed for each comingled individual. In cases where the minimum number of individuals is greater than one, but the skeletal remains cannot be reliably separated, a special note will be added and one form will be completed.
- 3) Sorting faunal remains into basic categories (large mammal, bird, fish), and remove any human remains as isolates.
- 4) Write and submit a grant proposal to the San Jose State University, College of Social Sciences Research Foundation for \$1,370.00 for the purpose of radiometric accelerator mass spectrometry (AMS) dating of human bone from at least two burials.
- 5) With the permission of both the Muwekma Ohlone Tribal leadership and the Department of Anthropology, submit human bone samples from at least two burials to Beta Analytic, Inc. (or another radiocarbon lab), for AMS dating (see Appendix D).
- 6) Submit obsidian samples to Dr. Richard Hughes of Geochemical Research Laboratory, Portola Valley, California, for sourcing via nondestructive Energy Dispersive X-Ray Fluorescence (EDXRF) (see Appendix E).
- 7) Submit obsidian samples to San Jose State University alum, John Schlagheck, to conduct obsidian hydration studies in the SJSU Obsidian Hydration Lab (see Appendix F).

This study presents information derived from the archival literature search conducted by this author at the Northwest Information Center in Chapter 2; the skeletal biology of the mortuary population in Chapter 3; the skeletal pathologies identified on this skeletal population in Chapter 4; the description of the shellfish and faunal assemblage in Chapter 5; the analysis of the bone and shell artifacts in Chapter 6; the analysis and description of the ground and flaked

stone artifacts in Chapter 7; and the results of the AMS dating and chronological placement in Chapter 8.

## **Chapter 2**

### **Background**

#### **Introduction**

In reviewing the available student field notes taken during the SJSU excavation, it was clear that looting had occurred previous to and during excavations. Students noted that local residents and construction workers commonly told them of artifacts and bones that had been taken (often by the very people telling the students about the items), and in a few cases, looters would show the items to the SJSU crew, but would not relinquish the materials.

Based upon limited documentation, the archaeological assemblage was excavated in the early 1970s and the original site designation was assigned in 1974. A portion of the site was excavated by San Jose State University, while the other portion was salvaged by West Valley College. Both institutions employed students and volunteers for their excavations. All of the materials were eventually combined by 1980 at the San Jose State University Anthropological Facility for curation (Cartier et al. 1980).

#### **Overview of the History of Salvage Recovery and Site Location:**

##### **San Jose State University Excavation at CA-SCL-125**

CA-SCL-125 is bordered by Manila Way, Manila Drive, Applegate Court, and Curie Drive (Delgado 1980). The salvage recovery program at the site took place from 1971 to 1973 and was conducted by student volunteers from San Jose State University and local school children (Table 1), under the direction of Dr. Karen Bruhns (Delgado 1980, student notes 1971 to 1973). The initial fieldwork took place from September 23, 1971 to October 10, 1971 in

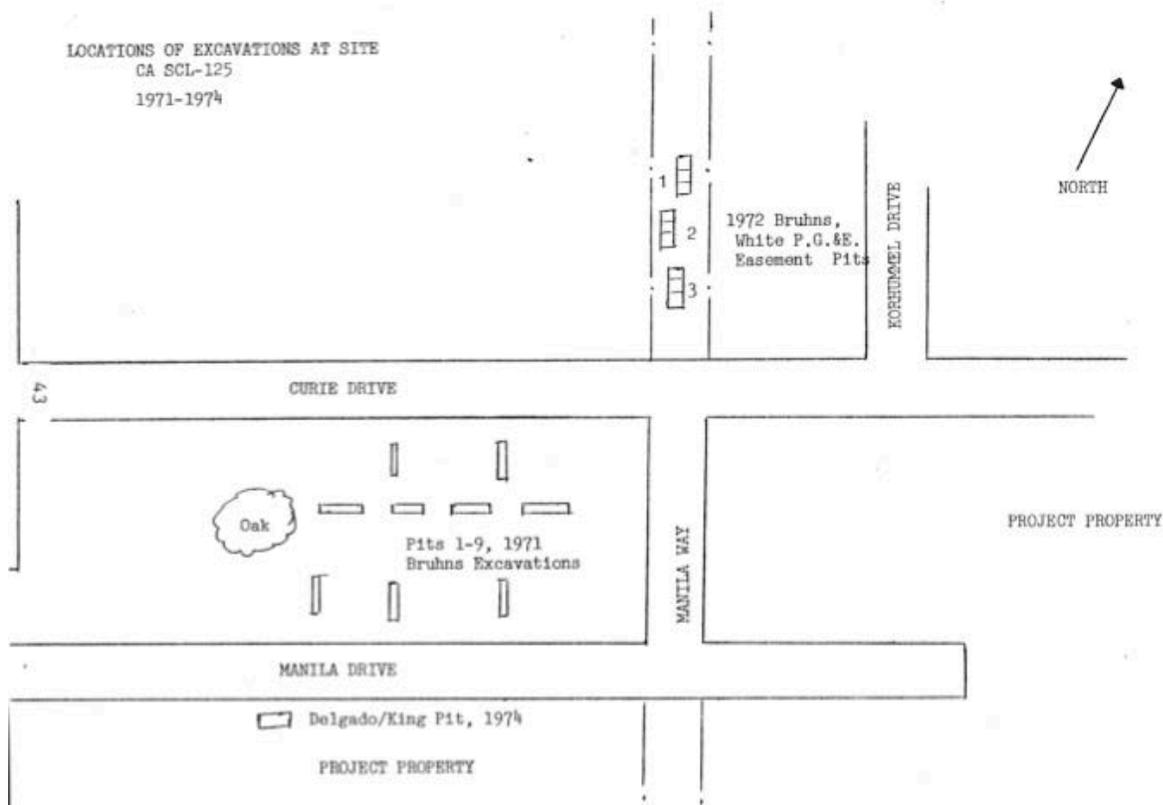
response to construction of a new subdivision (Century Oaks) by PBS Corporation of Los Angeles, California (Delgado 1980). Permission to conduct salvage excavations was granted providing they did not create construction delays. During the excavations, Bruhns noted that residents and construction workers “had fine collections of artifacts” and continued to loot the site even during the archaeological excavation process (Delgado 1980). Table 1 provides the names of all of the recorded people who conducted the fieldwork and laboratory analysis during the early phase of the recovery program and later phases of limited analysis:

**Table 1: Excavation and Analysis Team**

First and Last Name		School Children
Dr. Karen O. Bruhns	Dana Williamson	Bobby Delgado (age 7)
John White	Jan Moisant	Valerie Hamey (7/8 grade)
Nathan Gardner	Greg Jones	Lisa Ramierez (7/8 grade)
Marcus Arguelles	Jim Hesson	Vicki Ruiz (7/8 grade)
Charles Cecil	Mike Stark	Joanie Haines (7/8 grade)
Bill Cecil	Carole Matthews	Deanna Christmas (7/8 grade)
Mary Ann Cecil		Cathy Roberts (7/8 grade)
Daisy Rudnick		Chris Foote (7/8 grade)
Paula Crawford		Cindy Casaburi (7/8 grade)
Doug Whitman		Debbie Phillips (7/8 grade)
Bill Rosenberger		Brian Hughes (7/8 grade)
David Wallace		Charles Perry (7/8 grade)
Greg Tupper		First or Last Name Only
Kathy Tupper	James Delgado (High School)	
Richard Garcia	Mora	
Dennis Crane	Dave J.	
Sue Grant	S. Menkus	Analysis Only
Wendy Owen	Hays	Alan Leventhal
Maura Baumeister	Nick	Lorna Pierce
Ben Chirbez	Randy	Mark Cunningham
Karl Mittelstadt	Maria	M. Sheppard
William Gregg Johnston	Morris	Eric Kauffman
John Freitas	Merlyn	
Debbie Freitas	G. Hubbard	

Near the end of 1971, the excavators received only a three-day notice to evacuate the area due to the earth-grading schedule (Delgado 1980). The construction company stated they would notify San Jose State University when excavations could continue. Excavations resumed in April of 1972 after several students visited the site in March of 1972 and noted the continued destruction from construction equipment. Numerous burials had been unearthed and displaced by the construction (Delgado 1980).

Excavation efforts were then concentrated on a relatively undisturbed area within a PG&E easement (Delgado 1980). Nine test pits were dug between two graded road-beds in 1971 (Figure 1). In 1972, three trenches measuring six meters by two meters were laid out at random (Delgado 1980) (Map 1). Due to a lack of a hold harmless agreement between San Jose



Map 1: Excavation locations for San Jose State University and West Valley College (Cartier et al. 1980)

State University and PG&E, PG&E revoked permission, which was never renewed, during the summer of 1972 (Delgado 1980). By Fall, three San Jose State University students (William Cecil, David Wallace, and Susan Grant) and one high school student (James Delgado) who had worked on the earlier excavations, continued working on Trench 3 under the direction of Instructor John White, without PG&E approval (Delgado 1980). White ordered that the work be abandoned in early 1973, though White occasionally still visited the site to collect surface finds (Delgado 1980).

Also, from May 21, 1972 through December 16, 1972, Nathan Gardner worked under Dr. Joseph Hester to conduct surface surveys (Delgado 1980, Gardner field notes 1972). Gardner systematically surveyed the areas around the trench sites and collected a number of artifacts that were later submitted to Dr. Karen Bruhns (Gardner field notes 1972). Gardner also received skeletal materials that included human and faunal bones and tools from new residents in the housing development (Gardner field notes 1972).

In December of 1972, Gardner conducted infra-red spectrometry testing on the sediment present on many of the artifacts. It was hypothesized that the sediment was calcium carbonate, which testing confirmed (Gardner field notes 1972). After West Valley College issued the designation of WVC-18 for the site, all surface finds from San Jose State University were labeled with the WVC-18 designation (Delgado 1980).

Curation of the skeletal materials and artifacts was established at the San Jose State University Anthropology Laboratory. A catalog for the skeletal elements was created after 1975 according to Dr. Robert Jurmain (Cartier et al. 1980). At that time, burial records from the initial excavations indicated the presence of 15 separate burials with a minimum of 14 individuals (Cartier et al. 1980). There is also an additional eight burial records for materials not formally

recovered due to their fragmentary nature (Cartier et al. 1980). Lastly, there are skeletal elements with no field burial numbers representing a minimum of 12 additional individuals.

### **West Valley College Excavation at WVC-18**

The West Valley College excavation took place at the intersections of Curie Dr. and Manila Way in San Jose, and was centered on a PG&E power line right of way (Map 1). Chester King and Linda King led the West Valley College salvage excavations conducted in 1973 and 1974. After that time, the area was transformed from an orchard field to medium density, single-family homes.

Based on a map discovered at the Northwest Information Center at Sonoma State University, Chester King defined the site boundaries from the central excavation area and he extended to the south to include the Santa Teresa perennial spring. C. King also issued the site its original designation of WVC-18. It was noted that the area had previously been an orchard that had recently been disturbed by surface bulldozing. The impacts to the site were due to the building single-family residential homes (Dietz student report 1983). The last investigation on the site was on June 8, 1974. A three-meter by one-meter test pit was placed near the Santa Teresa Spring by Delgado and Chester King and was excavated by local high school students (Delgado 1980).

There are artifacts within the collection with the site number consistent with the West Valley College (WVC-18) excavation, but no catalog or any records have been located. The recovered burials were also transferred to San Jose State University. The only records regarding these burials are in the SJSU Anthropology Department NAGPRA inventory. According to Alan Leventhal (ex-Anthropology Lab Director) from San Jose State

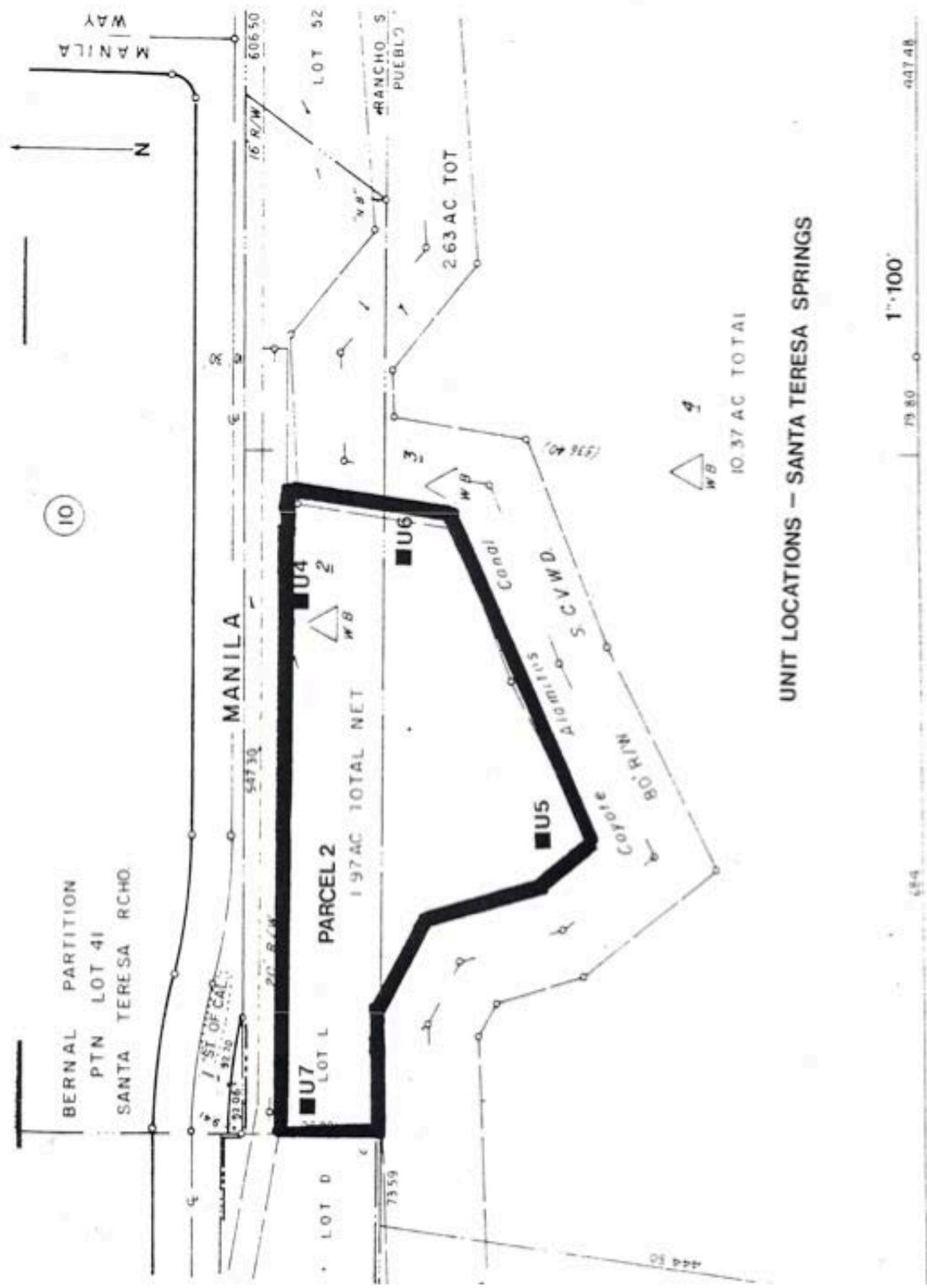
University, the West Valley College collection was transferred to SJSU sometime during the 1980s (correspondence email November 2014).

### **Investigations by Archaeological Resource Management (1980)**

In 1980, Dr. Robert Cartier was the principle investigator for the Curie/Manila Drive Projects under Archaeological Resource Management (ARM). The investigation was conducted in response to continued construction activities. Cartier noted that previous land use included a working ranch and orchard from the 1700s until the 1970s. Proposed development included the building of medium density, single family homes.

The undeveloped portion of the site was divided between three parcels. Parcel 2 is located south of Manila Way and just north of the Coyote Alamitos Canal (Map 2). Parcel 2 is semi-triangular in shape and consisted of 1.97 acres. Four test units were located in this area of the site. Parcel 9 and Parcel 10 are adjacent parcels that extend south from Curie Drive to south of Manila Drive, just north of the Coyote Alamitos Canal (Map 3). These parcels are east of Parcel 2. Parcel 9 and Parcel 10 approximately form a hexagon, with the tip facing south. These parcels had six excavation units and six trenches established on them for subsurface testing. Both parcels are 1.930 acres each (Cartier et al. 1980).

The area evaluated in this present study is located within the larger CA-SCL-125 site catchment as well as a recorded historical site of the Bernal Family Ranch. CA-SCL-125 was speculated to be an ancestral Ohlone multi-component site with deposits potentially from the Early, Middle, and Late Periods (Cartier et al. 1980). Deposits in the various strata appeared to range from approximately 6,000 B.P. through European contact in the 1700s, with historic deposits also present (Cartier et al. 1980).



Map 2: Parcel 2 (Cartier et al. 1980)

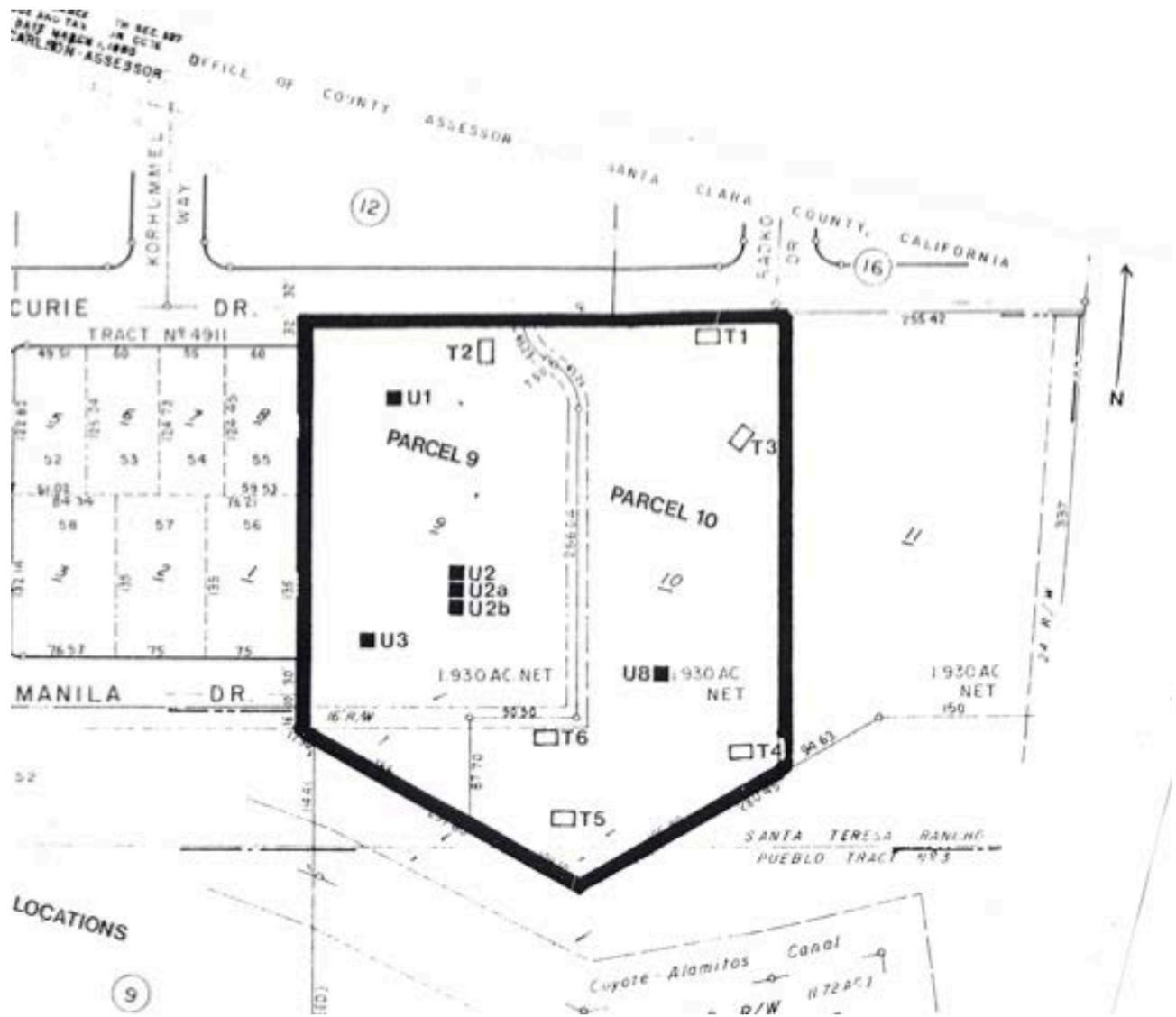
Estimated dating of the site was based on the depth of deposits such as the human remains in comparison to other nearby sites (Cartier et al. 1980:4). The Bernal Ranch is located on the northern base of the Santa Teresa Hills. Just south of this locality is the historically identified Santa Teresa Spring. Coyote Creek flows to the east/northeast of CA-SCL-125. The elevation of the site is approximately 460 (actually is at 200 foot level) feet above mean sea level (Dietz student report 1983).

ARM's evaluation of the site included archival research, surface survey (conducted by Robert Cartier and Charlene Detlefs, Historian), 10 excavation units, six backhoe trenches, bore auger samples (four inch diameter), and probe testing (Cartier et al. 1980). The surface survey revealed archaeological materials predominately on portions of Parcel 9. Excavated units were hand excavated as 1 x 1 meter units up to 210 centimeters deep (Table 2). Human remains were recovered in Parcel 9. The excavation units in Parcel 2 were rich in prehistoric artifacts, especially in Units 5 and 6, which were located northwest of Santa Teresa Spring. Parcel 10 appeared devoid of cultural materials (Cartier et al. 1980). Several artifact collections were also inspected at private residences by Cartier and Detlefs. The collections were said to have been from earlier construction in the 1970s as well as a result of yard work (Cartier et al. 1980).

In attempting to assess the materials curated at San Jose State University, Cartier and Alan Leventhal discovered that some of the collection had already become integrated with the teaching collection (Cartier et al. 1980).

Cartier determined that significant damage to the site had already occurred and that proposed construction activities would cause further damage the site (Cartier et al. 1980).

Cartier's proposed mitigating actions included: 1) no action - completely ignoring any archaeological materials, 2) monitoring - requiring a trained archaeologist be on site and enable the archaeologist to temporarily halt construction to allow for excavation, 3) salvage program - allow excavation of a portion of the land to be impacted, 4) total data recovery - a full scale excavation, or 5) total preservation - no further development to the land (Cartier et al. 1980). Cartier strongly recommended that a trained archaeologist be on site, monitoring activities in an effort to minimize impacts. He also suggests sterile soil be used as fill dirt to cover shallower deposits in order to protect them (Cartier et al. 1980).



Map 3: Parcel 9 and 10 (Cartier et al. 1980)

**Table 2: Unit Depths from the 1980 excavation**

	Unit 1	Unit 1 Column	Unit 3	Unit 4	Unit 5	Unit 5 Auger	Unit 6	Unit 7	Unit 7 auger	Unit 8	Unit 8 auger
0-10 cm											
10-20 cm											
20-30 cm											
30-40 cm											
40-50 cm											
50-60 cm											
60-70 cm											
70-80 cm											
80-90 cm											
90-100 cm											
100-110 cm											
110-120 cm											
120-130 cm											
130-140 cm											
140-150 cm											
150-160 cm											
160-170 cm											
170-180 cm											
180-190 cm											
190-200 cm											
200-210 cm											
210-220 cm											

**Archaeology Resource Management (1985)**

Archaeological Resource Management conducted a resource evaluation for a Mr. Frank Oldham in 1985. Cartier was again the principle investigator. The proposed construction on the site would convert the land from a fallow ranch and previous residence to a church (Cartier 1985). For this project, only archival research and a surface survey were conducted.

The study area is located near the intersection of Curie Drive and San Ignacio Avenue in San Jose on parcel APN 704-11-09 (Map 4). The Universal Transverse Mercator Grid location on the Santa Teresa USGS 7.5' quadrangle is plotted at 607300 mN/4120500mE. Elevation above mean sea level is approximately 200 feet (Cartier 1985). The location is at the northern foot of the Santa Teresa Hills and is located near a perennial spring (Santa Teresa Spring).



Map 4: Location of the 1985 surface survey (Cartier 1985)

Upon review of archival records, it was determined by Cartier that the location was within the boundaries of CA-SCL-125. The surface survey also revealed prehistoric cultural resources (Cartier 1985). These findings, combined with the 1980 findings, led to the recommendation that an archaeologist develop a mitigation plan and to work with project designers in an effort to minimize damage to the site.

#### **Basin Research Associates (1989)**

In 1989, Mr. Bruce D. Bowen of Ainsley Development Inc., authorized Basin Research Associates, Inc. (BRAI) to conduct a cultural resources survey on four parcels (Anastasio et al. 1989). The contiguous parcels are located between Curie Drive, Manila Drive, and San Ignacio Avenue in San Jose. The parcel numbers are APN 704-11-09, -10, -13, and -14 (Anastasio et al.

1989). Outbuildings were to be demolished in favor of a 23 lot single-family subdivision (Anastasio et al. 1989). Basin Research Associates, Inc. conducted a review of then current literature and reports as well as conducted backhoe test trenching in order to assess the extent in which CA-SCL-125 extended into the study area. Based upon the results of their investigation Basin Research issued an informed recommendation regarding the need for either full-time or part-time monitoring.

Robert M. Harmon from Basin Research conducted the field survey on March 28, 1989. During this survey, he did not note any archaeological materials (prehistoric or historic) present (Anastasio 1989:10). Harmon does note however that ground visibility was no more than 20% in any parcel, with the exception being within a horse corral (Anastasio 1989:9). The horse corral was cleared of vegetation, but it is also reasonable to assume that the area was heavily disturbed and may have been raked over for the safety of the horse.

Basin Research Associates, Inc. revised suggested mitigations from Cartier's 1980 study. BRAI advised avoiding the site during future development, stressing that parcel 9 is clearly within the boundaries of CA-SCL-125, while indicating the archaeological resources may extend into parcel 10. They also stated that, though they did not feel CA-SCL-125 extends into Parcel 13, it is possible that outliers still exist in this area. Parcel 14 located on a steeper slope and was considered devoid of any archaeological materials. Also, the plan for parcel 14 was to leave it as open space. BRAI recommended that if avoidance of the site could not be accommodated, then capping the site with sterile soil could protect the subsurface cultural deposits (Anastasio 1989:14). BRAI also suggested as part of their mitigation plan data recovery and archaeological monitoring. They also suggested using systematic backhoe trenching to ascertain the extent of CA-SCL-125 into those parcels (Anastasio 1989).

## **Archaeological Resource Management (2001)**

In 2001, Dr. Robert R. Cartier from Archaeological Resource Management conducted investigations on parcel number APN 704-11-10. This study, which consisted of an archival search as well as a surface survey, was conducted for Louis Engineering of San Jose that had proposed a project to construct a complex of residential units (Cartier 2001:1). Another aspect of this study was to ascertain the eligibility of the site for inclusion on the California Register of Historic Resources (Cartier 2001:1). This parcel had been the site of previous evaluations: Archaeological Resource Management in 1980 and Basin Research Associates, Inc. in 1989. Neither previous study yielded archaeological materials, though the 1980 study did address historic materials. The original application for inclusion on the National Register was prepared by James Delgado and Greta Kleiner, and submitted February 24, 1975 (See appendix B).

Parcel APN 704-11-10 is 1.930 acres located at the base of the north aspect of the Santa Teresa Hills in San Jose. It is bounded between Curie Drive, Manila Drive, and San Ignacio Avenue (Cartier 2001). The area had undergone significant change since the 1970s when development of single-family homes replaced historic structures and ranch lands. Aside from historic resources, no prehistoric resources were identified. Sandstone and Red Franciscan Chert were noted on the site (Cartier 2001:7). This is significant because many of the artifacts in the SJSU CA-SCL-125 assemblage were manufactured from these materials.

Mitigations proposed by Cartier include a historic and architectural inventory for the existing historic home. He also recommended that any construction on the property consider potential impacts to possible prehistoric subsurface deposits (Cartier 2001).

This summarizes the extent of the documented previous archaeological investigations conducted on CA-SCL-125. The following chapter present the skeletal analysis of the burials curated at San Jose Sate University.

## **Chapter 3**

### **Skeletal Biology**

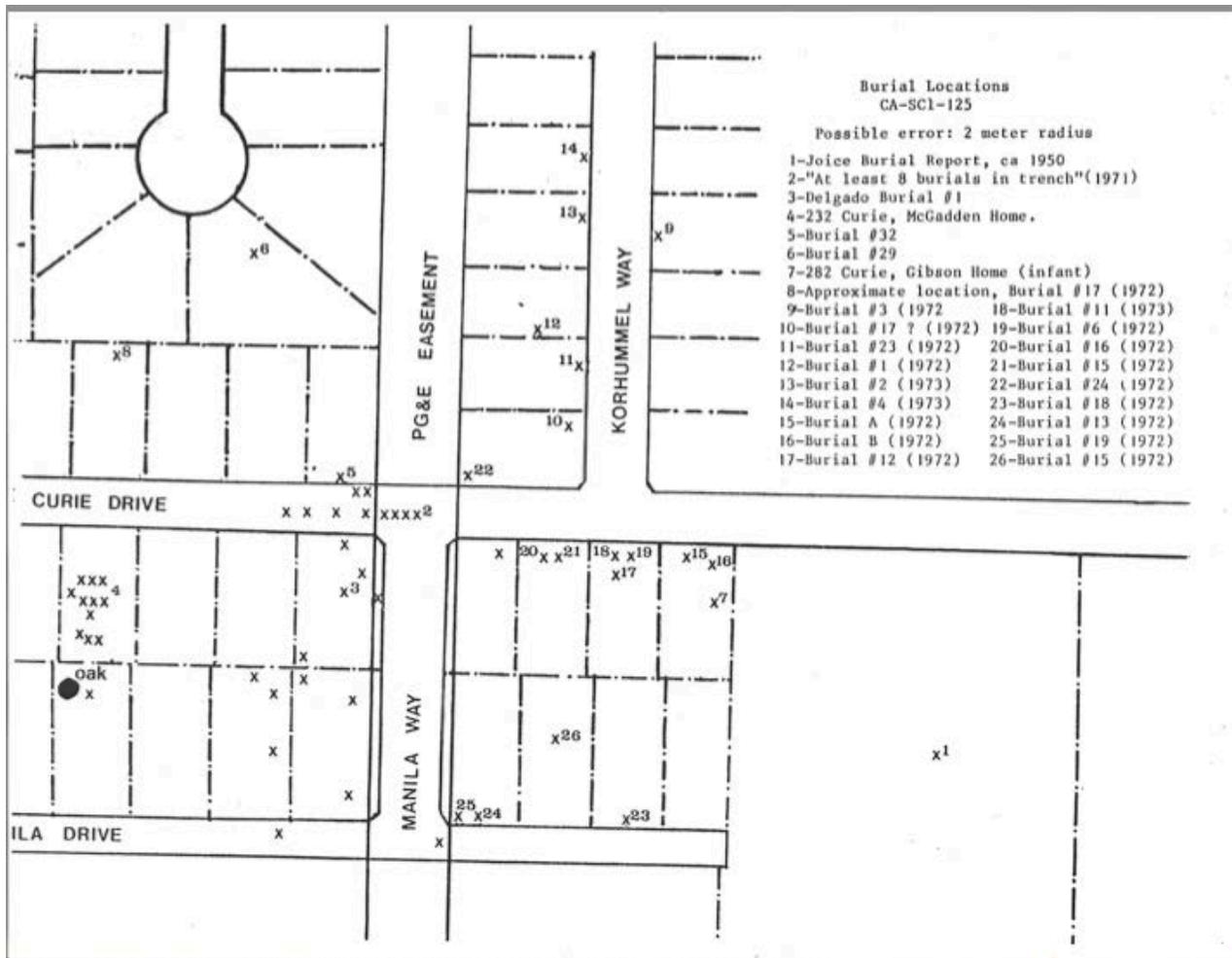
#### **Introduction**

As mentioned previously, excavations as part of the salvage recovery program on site CA-SCL-125 were primarily conducted between 1971 and 1974 by both San Jose State University and West Valley College. Both institutions recovered human remains. Previous to these excavations, at least one burial had been excavated some time during the 1950s, and since that time, skeletal materials had been uncovered, primarily during landscaping activities, as in the case of UK33, a cranium that was collected during the planting of a tree (Delgado 1980).

Cartier created a map of the site in 1980 plotting the burial locations as they had been reported (Map 5). In total, there were reported thirty-three burial loci, with Burial 2 (a surface collection) containing at least eight co-mingled individuals. The burials that were processed in the laboratory underwent several catalog numbering iterations with none of the reference numbers specifically matching the burial number itself. Though Cartier's field map is a representation of where burials and elements were discovered, it cannot be assumed that all of the burial numbers match what was reported in the SJSU Anthropology Department's 1995 NAGPRA report. The map included in the present study represents only a general distribution of the recovered elements.

#### **Methodology**

Each of the reanalyzed burials was compared to the NAGPRA report (1995) in order to reconstruct the individual burials and identify any missing elements. During the course of analysis many elements were not immediately located within the collection drawers, so a search



Map 5: Burial Locations (Cartier et al. 1980)

was conducted through the teaching collection, which included other drawers, boxes containing osteological quiz materials located in cabinets, and boxes labeled CA-SCL-125 in the curation facility. Though most elements were recovered, approximately a dozen elements that were identified in the NAGPRA report were not recovered.

Lastly, the collection had been renumbered and re-cataloged at least twice, which is evidenced by catalog numbers that do not match burial numbers and with multiple burial numbers appearing on some elements. One reason for this confusion is that the West Valley College portion of the collection was accessioned into the San Jose State University Collection in

the early 1980s. In some cases, the West Valley College collection duplicated burial numbers that were already in use by the San Jose State University collection. Also, though elements were cataloged as a burial, not all groups of elements were assigned burial numbers. In the NAGPRA report, several groups of elements were listed with catalog numbers (e.g. 14-1, 14-2, etc.), but the assigned burial number was blank. It is therefore assumed that these burials were collected, but did not receive a field burial number or the assigned number was lost previous to the NAGPRA report.

For the purpose of this study, the burials have retained the number they were assigned in the NAGPRA report. This has resulted in all but one burial receiving a designated burial number. It is not clear as to why the first burial listed was assigned a letter (Burial A), but this designation has been retained in order to avoid further confusion. As mentioned above, it was also discovered that there was occasionally a duplication of burial numbers. This was partially due to the consolidation of the West Valley College collection. When duplicate burial numbers arose, the first burial assigned that number retained that burial number. Those additional burials with the same number were then assigned a numeric designation after a dash to denote a separate burial (e.g., Burial 7-2). If multiple individuals were discovered within one burial, care was taken to attempt to separate them (juvenile/adult, large male/small female and etc.). These individuals then received their own designation by placing an alpha after the burial number (e.g., 2a and 2b). For burials that did not have a previously designated burial number, the catalog number was adopted (e.g., catalog number 19 = Burial 19). Burials with assigned burial numbers had catalog numbers that did not match the burial number.

The assigned burial number from the NAGPRA report was retained to avoid further confusion. Furthermore, there were burial numbers that were not used. It is assumed here that

these may represent the burials that were designated at the excavation site, but were not recovered due to their fragmentary nature. Also, in keeping with the NAGPRA report, several burials were represented by only one element. Under most circumstances these single elements would normally be treated as isolates. The isolates identified in this assemblage during the reanalysis were human remains that were misclassified as either faunal or lithics. Once identified, these isolates were removed, analyzed, re-bagged, and curated with the human remains.

Another issue that arose was the discovery of elements not mentioned in the NAGPRA report. For example, Burial 40 is represented by one element (40-5). There is no 40-1 through 40-4 present or accounted for. Also, in reviewing the field notes, elements were lost between the excavation site and the lab. Furthermore, in the case of Burial 26, the NAGPRA report indicates that the inventory for this burial was never completed.

After reconstructing the burials, each burial was laid out on a table in anatomical position. The elements were inventoried, sexed, aged measured, and assessed for unique traits and pathological conditions. Measurements were taken with a Pittsburg 6" digital caliper and a Ward's osteometric board. Detailed descriptions of the identified pathological conditions will be addressed in the next chapter. Dental attrition, when teeth were available, was assessed and scored using Molnar's scale (1971) and pathological dental changes were also noted. Photographs of the entire burial were taken with a Nikon Coolpix L310 digital camera, as were photographs of unique traits and pathologies. All elements remained with the individual burial and none were returned to the teaching collection.



**Metrics:** No measurements were taken due to a lack of elements.

**Burial: 1**

MNI: 1

Sex: Female

Age: 19-40 years old



Figure 2: Burial 1 (Anatomical Position)

**Condition of Skeleton:** Skeleton is highly fragmented and incomplete. About 25% of the remains are present. Though fragmentary, the bone is of good quality with good cortex. A portion of the right femur has been removed for AMS dating. (see chapter 8 for results)

*Cranium and Mandible:* The cranium is represented by 13 fragments that include frontal, temporal, and parietal. The mandible is also represented by a portion of the right side including the gonial angle and ascending ramus.

*Axial Skeleton:* The axial skeleton is represented by the vertebral column, scapular fragments, eleven rib fragments, and a portion of the right pubis. With the exception of one thoracic vertebra, all axial elements are fragmentary.

*Appendicular Skeleton:* The appendicular skeleton is represented by both humeri, both ulnae, both femora, portions of both tibiae, the left patella, and the right calcaneus. Several of the elements are complete.

**Sex:** Sex was determined by assessing the sub-pubic angle of the pelvis, the supraorbital margin of the cranium, the zygomatic arch, and the transverse diameter of the humerus. The sub-pubic angle was wide and u-shaped (Bass 2005, White 2000, Buikstra and Ubelaker 1994). The supraorbital margin was rounded (Bass 2005, White 2000, Buikstra and Ubelaker 1994) and the zygomatic arch is thin (Griffin 2007). All of these factors were in the female range. The transverse diameter of the humerus was 38.65 mm. Anything less than 42.8 mm is within the range for females according to Bass (2005:158).

**Age:** Age was determined by assessing long bone fusion and the pubic symphysis. Of the epiphyseal unions present, the humeral head starts to fuse the latest at 15 years of age (White 2000:351). The left humeral head is fully fused, indicating an age over 15 years. Using Suchey (1990), the articular surface of the pubic symphysis represented a Phase II. This phase represents individuals from 19-40 years old.

**Unique Non-pathological Traits:** Slight arachnoid fovea noted on interior of frontal bone, just superior/posterior to the frontal crest.

**Metrics:** See Appendix G.

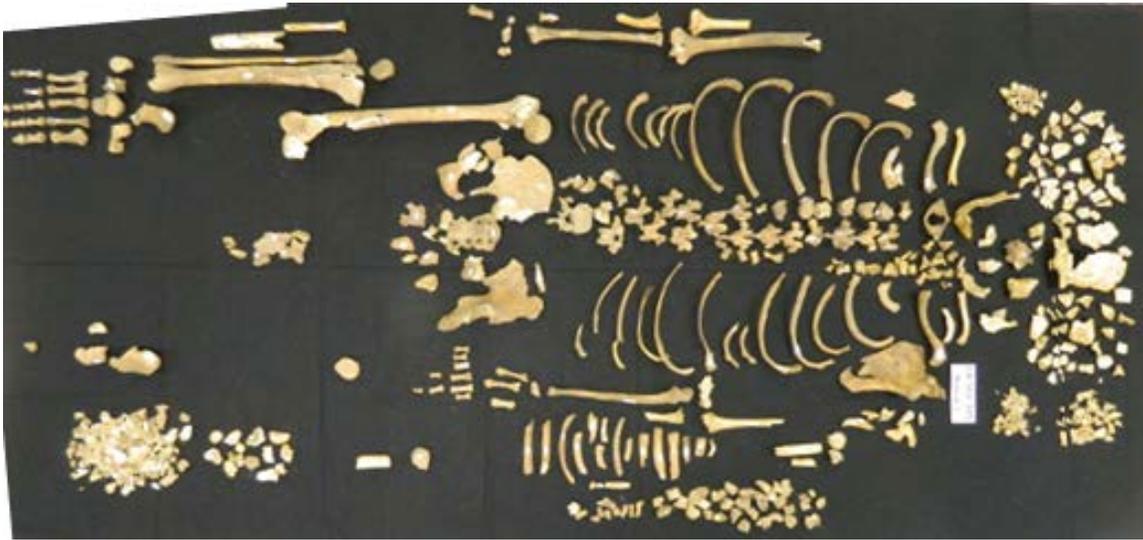


Figure 3: Overview of elements curated as Burial 2

**Condition of skeleton:** During analysis, Burial 2 was determined to be comprised of a minimum of four individuals. While laying out this burial, it was noted that three left clavicles and three mental eminences (mandibles) were present. There are also at least two maxillae, two right tibiae, two right humeri, two left scapulae, two right clavicles, and two left humeri also present. As all of the elements, including the annular rings on some very small vertebrae were fused, it has been determined that all individuals represented were adults. At least one individual was a very large male based on the robusticity and overall size of the elements as well as sexual characteristics such as pelvic traits and metric traits support this determination. The age of these individuals varied as evidenced by billowing on the pubic symphysis and moderate osteoarthritis on the lumbar vertebrae. It is unlikely that one individual contained both traits.

While some elements are relatively complete, the majority of them are highly fragmented with the collection of individuals in this burial being represented by nearly 1,000 fragments.

Care was taken in order to attempt to separate the individuals based on sex, age, and general size, though not all elements could be assigned to a specific individual and will be described below.

*Cranium and Mandible:* There are over 194 small fragments representing the calvarium. Larger fragments include two maxillae and three mandibles. Numerous loose teeth are also present which do not appear to fit into any of the maxillary or mandibular fragments.

*Axial Skeleton:* There were 36 identifiable vertebral bodies (primarily thoracic) with at least a portion of the superior or inferior surface present. There are three transverse processes, one spinous process, one dens process, four facets, and lamina from various vertebrae. At least nine lumbar vertebrae are represented. Fragments of at least one scapula, right and left pubes (divergent in general size), and right and left clavicles (also divergent in size) represent multiple individuals. In addition, there are at least 80 rib fragments.

*Appendicular Skeleton:* The appendicular skeleton is primarily represented by lower limb elements with the exception of three humeri fragments. There are also over 398 small, indeterminate fragments primarily representing long bones, trabecular bone, and irregular bone.

**Sex:** The conglomeration of these elements represent both sexes (White 2000). Those individuals that could be separated from the main group follow below as Burial 2a, 2b, 2c, and 2d.

**Age:** All of the elements in this collection of elements appear to be fused and therefore represent adults (White 2000, Bass 2005, Buikstra and Ubelaker 1994). The varying stages of osteoarthritis and dental attrition characterize a great variance in age (Griffin 2007, Jurmain 1990).

**Metrics:** Due to the fragmentary nature of the elements, no measurements were taken.

**Burial: 2a**

MNI: 1

Sex: Male

Age: 50-59



Figure: 4 Burial 2a in Anatomical Position

**Condition of Skeleton:** This individual was considerably larger and more robust than the other elements. Elements have good cortex and most elements are complete in one piece.

*Axial Skeleton:* The axial skeleton is represented by the majority of the vertebral column, ribs, sternum, clavicles, a scapula, and the majority of the pelvic complex. The ribs, scapula, and clavicles are considered complete, with the presence of articulating surfaces and more than 50% of the element present.

*Appendicular Skeleton:* The appendicular skeleton is partially represented by one humerus, radius, ulna, femur, tibia, and fibula. Hands are primarily represented by phalanges. The feet are represented by a nearly complete right foot and a few left foot fragments.

**Sex:** Sex was determined using pelvic and metric traits. Pelvic traits such as sub-pubic angle, shape of pubis, and size of the greater sciatic notch have been established in assessing sex (Bass 2005, White 2000, Buikstra and Ubelaker 1994). This individual has a narrower, v-shaped sub-

pubic angle, a triangular pubis shape, and a narrow greater sciatic notch. All of these traits fall within the male realm. Also, metric traits can be used to determine sex (Bass 1994). According to Bass (1994), the glenoid fossa, humeral epicondyle, and femoral head measurements can be used to assess sex. A glenoid fossa with a vertical diameter  $>37$  mm is assessed as male. This individual had a measurement of 40.26 mm. A maximum width of the humeral epicondyle exceeding 63.9 mm indicates male, while this individual had a measurement of 67.51 mm. Also, a maximum diameter of a femoral head exceeding 46.5 mm indicates male. This individual has a measurement of 52.86 mm. Based on all of the above criteria, this individual is male.

**Age:** Aging estimation was accomplished utilizing dentition, bone fusion, pubic symphysis, auricular surface, osteoarthritis, and sternal rib ends. All long bones were fused. Pubic symphysis has a face that is porous with some pitting. The rim is eroded on the posterior/superior edge that is consistent with Phase VI. Phase VI is consistent with individuals 49-73 years of age (Suchey et al. 1988). In assessing the auricular surface, it was noted that the surface was irregular with areas of granularity and dense bone. The apical area is slightly irregular however there is no macroporosity present. This is consistent with an individual who is 50-59 years of age. Osteoarthritis in this individual is slight to moderate. The sternal rib end has a U-shaped pit with some deterioration noted on the inside of the pit. This is consistent with an individual in Phase VI or Phase VII. The age range for these phases is 43 to 71 years of age (White 2000, Bass 2005, Buikstra and Ubelaker 1994). Therefore, based on the preponderance of the evidence, the individual is approximately 50-59 years of age.

**Metrics:** See Appendix G.

**Burial: 2b**

MNI: 1

Sex: Female

Age: >15 years old

**Condition of Skeleton:** This burial was separated from the rest of the elements associated with Burial 2 due to the pathological nature of the elements and is represented by a few upper limb fragments.

*Axial Skeleton:* The axial skeleton is only represented by a portion of the left clavicle.

*Appendicular Skeleton:* The appendicular skeleton is poorly represented by a few upper limb fragments.



Figure 5: Overview of Burial 2b

**Sex:** Sex was determined using the measurement of the right humeral epicondyle. According to Bass (1995), a maximum epicondylar breadth of the humerus <56.8 mm indicates a female. The measurement for this individual was 48.57 mm, clearly placing it within the female range.

**Age:** Age was determined to be an adult due to the fusion of the distal humerus. According to Schaefer et al. (2009), the distal humerus fuses by 15 years of age.

**Metrics:** See Appendix G

**Burial: 2c**

MNI: 1

Sex: Female

Age: 25-35 years old

**Condition of Skeleton:** This burial was separated from the rest of Burial 2 and is represented by the cranium. It is possible that this element is related to Burial 2b.

*Cranium and Mandible:* Cranial vault is relatively complete, though fragmentary. Maxillary and mandibular fragments contain a total of five teeth.



Figure 6: Overview of Burial 2c

**Sex:** Sex was determined using cranial traits. The mastoid process is small, supraorbital ridge is sharp, and the supraorbital ridge is small. Also, the gonial angle is shallow. All of these characteristics are indicative of a female (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

**Age:** Age was determined to be adult due to the fusion of the cranial sutures. Also, tooth wear is minimal, with dentin just showing through the crowns. According to attrition rates as outlined by Smith (1984), the individual was 25-35 years of age at the time of death.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 2d**

MNI: 1

Sex: Indeterminate

Age: >18 years old

**Condition of Skeleton:** This is a small individual represented primarily by cervical and thoracic vertebrae. This individual was part of the Burial 2 mixture. It is assumed that this individual is a separate individual, but could be a part of Burial 2b (Figure 7).

*Axial Skeleton:* The axial skeleton only is represented by 28 vertebral fragments.



Figure 7: Size difference of first cervical vertebra between Burial 2a (left) and Burial 2d (right)

**Sex:** Sex could not be determined due to a lack of diagnostic elements.

**Age:** Age was determined to be an adult due to complete fusion of the epiphyseal plates including the annular rings on the body of the vertebrae which occurs by 18 years of age (Schaefer et al. 2009).

**Metrics:** No measurements were taken due to a lack of diagnostic elements

**Burial: 3**

MNI: 1

Sex: Possible Male

Age: >18 years old

**Condition of Skeleton:** Burial is highly fragmented and incomplete.

*Cranium and Mandible:* The cranium and mandible are highly fragmented and represented by over 46 fragments.

*Axial Skeleton:* The axial skeleton is represented by four cervical vertebral fragments.

*Appendicular Skeleton:* The appendicular skeleton was represented by seven indeterminate long bone fragments. In addition to the fragments mentioned, there are over 100 indeterminate fragments.



Figure 8: Overview of Burial 3

**Sex:** Sex is possibly a male due to the roundness of the left supraorbital margin (White 2000, Bass 2005, Buikstra and Ubelaker 1994). There are no other diagnostic elements available.

**Age:** The age for this individual is over 18 based on the fusion of the annular ring on the only cervical vertebra body fragment (Schafer et al. 2009).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 4**                      MNI: 1                      Sex: Indeterminate                      Age: >15 years old

**Condition of Skeleton:** Skeleton is only represented by one fragment.

*Appendicular skeleton:* Right femoral medial epicondyle.

**Sex:** Sex could not be determined due to lack of diagnostic elements.



Figure 9: Burial 4 overview

**Age:** Age was determined by assessing the level of fusion of the right distal femur. The fragment revealed fusion was complete. Fusion of the distal femur typically begins by age 15 years (White 2000, Schafer et al. 2009).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Note:** There is no Burial 5.

**Burial: 6**                      MNI: 1                      Sex: Indeterminate                      Age: 40-45 years old



Figure 10: Burial 6 in Anatomical Position

**Condition of Skeleton.** Skeleton is highly fragmented. Damage is present on the left radius (Figure 11), right fibula and both femora that may have been a result of construction or excavation activities. Right fibula also has evidence of rodent chewing (Figure 12).

*Cranium and Mandible:* Cranium and mandible are poorly represented. Only three indeterminate parietal fragments and one lower left first molar are present.

*Axial Skeleton:* The axial skeleton is represented by lower body fragments only: two lumbar body fragments, sacral fragments, and ilium fragments.



Figure 11: Possible excavation damage.



Figure 12: Rodent gnawing on fibula.

*Appendicular Skeleton:* The appendicular skeleton is represented predominately by the lower body. Fragments of the ulna and radius, both legs, and the left hand are present.

**Sex:** Though a portion of the pelvis was present, it was determined that the greater sciatic notch was of intermediate size, which was indeterminate for sex. Also, though the presence of a preauricular sulcus can be used in helping to determine female, the absence of a preauricular sulcus does not eliminate the possibility of female (Bass 2005, White 2000, Buikstra and Ubelaker 1994). Another trait available on this individual was the femoral head measurement. A measurement  $<43.5$  mm indicates female, while a measurement  $>46.5$  mm indicates a male. As this individual had a femoral head measurement of 46.28 mm, this again placed the individual in the indeterminate range.

**Age:** Age was determined by assessing long bone fusion, the auricular surface, dental wear, and presence of osteoarthritis (Bass 2005, White 2000, Buikstra and Ubelaker 1994). All elements present appear to be fused. The auricular surface was incomplete, so only a cursory assessment could be made. There was no billowing present and only very slight apical changes. The

retroauricular area was missing and could not be assessed. Based on what was present, the auricular surface fit the definitions for phases II-V, which represent individuals 25-45 years old. The dental wear on the lower left first premolar was excessive and extended through the dentin. Enamel is still present. Tooth is worn at an angle. Age estimate from dental wear is 40-45 years of age (Smith 1984). Mild osteoarthritis was only present on the two vertebrae present. There was no osteoarthritis noted on any other joints.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 7**                      MNI: 1                      Sex: Indeterminate                      Age: 20-25 years old



Figure 13: Overview of Burial 7

**Condition of Skeleton:** Skeleton is highly fragmented and poorly represented.

*Axial Skeleton:* The axial skeleton is represented by a sternal rib end and four os coxa fragments.

*Appendicular Skeleton:* The appendicular skeleton is represented by five long bone fragments.

**Sex:** The sex could not be determined due to lack of diagnostic elements.

**Age:** Age was determined due to an indeterminate sternal rib end. The rib end was characterized by a shallow pit with a wavy surface and was determined to be consistent with individuals 20-25 years old (White 2000, Buikstra and Ubelaker 1994, Bass 2005). Also, the distal portion of the right femur was fused, which is consistent with individuals over 15 years of age (White 2000, Buikstra and Ubelaker 1994).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Note:** There is no Burial 8.

**Burial: 9a**    MNI: 1    Sex: Indeterminate    Age: approximately 2 years old



Figure 14: Burial 9a overview

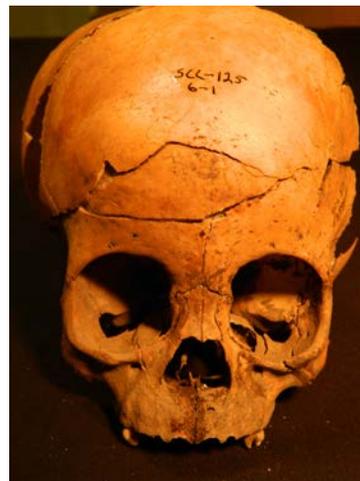


Figure 15: Anterior view of Burial 9a

**Condition of Skeleton:** Skeleton is represented by the cranium only, and was co-mingled with an adult (Burial 9b). Though fragile due to the age of the individual, the cranium is relatively

complete and in good condition. It was observed that the skull had been previously reconstructed.

**Cranium:** The cranium is remarkable complete with all elements present. Reconstruction of the skull had been done some time previous to this study.

**Sex:** Sex was indeterminate due to the individual's age. Individuals must have undergone secondary changes during puberty in order to assess sex skeletally (White 2000, Bass 2005).

**Age:** Age was estimated using dental eruption. None of the molars had yet erupted. Based on studies of dental development conducted by Ubelaker, the individual would have been

approximately 2 years of age (White 2000, Bass 2005, Buikstra and Ubelaker 1994:51, Ubelaker 1989). Though the incisors and canines were lost post mortem, the deciduous first molars appear fully erupted, while the



Figure 16: View of Maxillary Dentition – Burial 9a

deciduous second molars appear to be in the process of erupting and are not in occlusion (Figure 16). The molars posterior to the deciduous second molars are visible in the crypt. There is no noticeable wear on any of the teeth present. Also, none of the cranial sutures are fused, which indicates a younger individual (Buikstra and Ubelaker 1994, Bass 2005).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 9b**

MNI: 1

Sex: Indeterminate

Age: Indeterminate

**Condition of the Skeleton:** This element was curated with Burial 9a and both Burial 9a and Burial 9b were considered one burial. The co-mingled elements were obviously from two different individuals and therefore separated.



Figure 17: Overview of Burial 9b

Though bone cortex is good, the element has been damaged by heavy equipment and is only represented by a portion of long bone.

*Appendicular Skeleton:* The entire burial is represented by the distal portion of the right femoral diaphysis.

**Sex:** Sex could not be determined due to the lack of diagnostic elements.

**Age:** Age could not be determined due to a lack of diagnostic elements including a lack of any clear indication of the epiphyseal surface. It cannot be determined if the distal femur element had undergone fusion.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Note:** There is no Burial 10.

**Burial: 11**

MNI: 1

Sex: Male

Age: 30-34 years of age



Figure 18: Overview of Burial 11

**Condition of Skeleton:** Only the lower portion of the body is present. Elements generally have good cortex. Long bones show evidence of breakage previous to excavation activities. This is evident by the discoloration within the broken area. It is feasible that this breakage occurred historically when the area was utilized for farming and orchard-related activities.

*Axial Skeleton:* The axial skeleton is represented by the lower body elements including lumbar vertebrae, sacrum, and both os coxae.

*Appendicular Skeleton:* The appendicular skeleton is represented by the lower body. Elements present include both legs and feet.

**Sex:** Sex was determined using the greater sciatic notch. The greater sciatic notch on this individual is narrow, indicating male (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

**Age:** Age was determined by examining the auricular surface. The auricular surface exhibited some striae, but a general loss of billowing. Also, there was a coarsening of granularity

indicating that this individual was approximately 30-34 years of age (White 2000:358, Buikstra and Ubelaker 1994).

**Metrics:** See Appendix G.

**Burial: 12**    MNI: 1    Sex: possible Female    Age: 17-25 years of age



Figure 19: Overview of Burial 12

**Condition of Skeleton:** The skeleton is fragmentary and very incomplete. Damage to the left humeral shaft is consistent with construction activities. One medial hand phalange was recovered from the faunal collection. Notes on the bag that contained the phalange indicated that the bone was associated with Burial 12.

*Cranium and Mandible:* The cranium and mandible are highly fragmented into over 60 fragments including a tooth, temporal, frontal, and mandible fragments.

*Axial Skeleton:* The axial skeleton is poorly represented. Elements present include cervical and thoracic fragments, clavicle and scapular fragments.

*Appendicular Skeleton:* The appendicular skeleton is represented by humeral fragments, a few hand and wrist bones, a tibial fragment, a metatarsal, and over 14 indeterminate fragments.

**Sex:** The only two indicators available for sex determination were cranial traits. The sharpness of the supraorbital margin and the shallowness of the ascending ramus both indicated a possible female (Bass 2005, White 2000, Buikstra and Ublaker 1994). The remainder of the skeleton was also gracile, though this factor alone can not be used to determine sex.

**Age:** Aging was determined by assessing fusion of epiphyseal plates and dental wear. All plates that were present were fused, which primarily consisted of one metacarpal, one metatarsal, and hand phalanges. Annular rings on the cervical vertebral bodies are also fused. The upper right first molar has slight wear to the occlusal surface, flattening the cusps. However, the wear has not exceeded the enamel. This is consistent with an individual 17-25 years of age (Brothwell 1965:69).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial 13**                      MNI: 1                      Sex: Indeterminate                      Age: >30 years old

**Condition of Skeleton:** The remains are only represented by a portion of the calvarium.

*Cranium:* The cranium is represented by the left and right parietals and the frontal with a portion of the right orbit.

**Sex:** Sex could not be determined. Both the supraorbital margin and the supraorbital ridge were present, but were ambiguous. Scoring for these elements was done using the standards



Figure 20: Overview of Burial 13

implemented by Buikstra and Ubelaker (1994).

**Age:** Age was determined to be an adult due to fusion of cranial sutures. All sutures appeared fused and were only visible ectocranially (White 2000). No other indicators were present. Though cranial sutures closure can vary greatly, this individual can be estimated at >30 years old (White 2000).



Figure 21: View of Frontal

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 14** MNI: 1 Sex: Male Age: 25-30 years old



Figure 22: Overview of Burial 14

**Condition of Skeleton:** Skeleton is very fragmentary and incomplete, primarily representing the upper body.

*Cranium and Mandible:* The cranium is nearly complete with damage to the right frontal/parietal area and to the facial area. The maxilla and mandible are complete.

*Axial Skeleton:* The axial skeleton is poorly represented by vertebral fragments, os coxa fragments, and a rib fragment.

*Appendicular Skeleton:* The appendicular skeleton is primarily represented by upper body elements. Fragmented elements include the right humerus, left radius, both ulnae, femur, tibia, and fibula fragments. The right radius is complete. The upper limbs are more complete than the lower elements with at least the diaphyses intact.

**Sex:** Sex was determined using the mental eminence and the gonial angle of the mandible and the supraorbital margin of the cranium. The mental eminence was prominent and the gonial angle was steep. The supraorbital margin was rounded, though the supraorbital ridge was moderate (indeterminate). These indicators suggest a male even though the remainder of the skeleton appeared more gracile (White 2000, Bass 2005, Buikstra and Ubelaker 1994).

**Age:** Aging was determined by assessing dentition and epiphyseal fusion. All of the dentition had erupted, including the third molars. This indicates an individual over 17 years of age (White 2000, Bass 2005). Wear on the teeth average a score of three, which indicates an individual approximately 25-30 years of age (Smith 1984). Also, both lower third molars and upper left third molar are erupted and have wear showing they have been in occlusion for some time. Third molars typically erupt near the age of 17 years. Therefore, this individual had to be older than 17 years for teeth to be erupted and worn. Also, all epiphyseal plates appear to be closed, indicating an individual over 18 years of age (White 2000).

**Metrics:** See Appendix G.

**Burial: 15** MNI: 1 Sex: Indeterminate Age: >12 years old

**Condition of Skeleton:** Element that is present is in good condition and complete.

*Appendicular Skeleton:* The burial is represented by one patella.



Figure 23: Burial 15

**Sex:** Sex could not be determined due to a lack of diagnostic elements.

**Age:** Age was determined by the complete fusion of the patella. Fusion of the patella typically occurs by 12 years of age (Schaefer et al. 2009).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Note: No Burial 16**

**Burial: 17**

MNI: 1

Sex: Male

Age: 35-44 years old



Figure 24: Overview of Burial 17

**Condition of Skeleton:** Skeleton is fragmented and incomplete.

*Cranium:* The cranium is poorly represented with only two fragments including a temporal fragment.

*Axial Skeleton:* The axial skeleton is poorly represented and fragmentary. It is represented by four vertebral fragments, once sacral fragment, a clavicular fragment, rib, fragment, and portions of both os coxae.

*Appendicular Skeleton:* The appendicular skeleton is fragmentary, containing humeral fragments, radial fragments, femoral fragments, tibial and fibular fragments. Only a metacarpal, a tarsal, and both patellae are complete.

**Sex:** Sex was determined by assessing the greater sciatic notch, femoral head diameter, and humeral epicondyle. The greater sciatic notch of this individual is very narrow, indicating a male (Bass 2005, White 2000, Buikstra and Ubelaker 1994). The measurement of the femoral

head is 48.99 mm. A measurement greater than 46.5 mm indicates male (Bass 2005, White 2000, Buikstra and Ubelaker 1994). The humeral epicondyle measures 46.82 mm. Measurements greater than 47 mm indicates male while measurements less than 43 mm indicates female (Bass 2005, Buiktra and Ubelaker 1994, White 2000). This individual falls in the higher end of the indeterminate range for that factor. The left mastoid process is also present and is quite large. Therefore, based on the other two indicators and the mastoid process, this individual was most likely male.

**Age:** Age was determined by assessing long bone fusion, auricular surface, and the presence of osteoarthritis. All of the epiphyseal plates appeared to be fused which indicates an individual that is at least 17 years of age (White 2000, Bass 2005). The auricular surface exhibits some apical changes and coarse granularity on the surface. There is macroporosity forming and no striae present which is consistent with phases IV and V. These phases represent ages 35-44 (Bass 2005, Buikstra and Ubelaker 1994). Osteoarthritis was present, though there was strong evidence of a pathology that may have affected its occurrence due to the localization of the occurrence.

**Metrics:** See Appendix G.

**Burial: 18**

MNI: 1

Sex: Indeterminate

Age: 25-29 years old

**Condition of Skeleton:** Burial is represented by one fragment (Figure 43).

*Axial Skeleton:* This burial is represented by a fragment of the right ilium.

**Sex:** Sex could not be determined due to a lack of diagnostic elements.



Figure 25: Overview of Burial 18

**Age:** Age was determined by examining the auricular surface. The auricular exhibited very little coarse granularity and very little other activity. There was no noticeable billowing. This is consistent with phase II, which represent ages 25-29 years of age (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 19**

MNI: 2

Sex: Male/Female\*

Age: 20-35 year of age



Figure 26: Overview of Burial 19

**Condition of Skeleton:** All elements are fragmented with the exception of a few hand and foot bones. In laying out the skeleton, it was evident that there were a minimum of two individuals due to duplication of femora, tibiae, and fibulae. Both individuals are similar in size and age, rendering separation of the individuals correctly as highly doubtful within the realm of this study.

*Cranium:* The cranium is highly fragmented and incomplete. This cranium is represented by four fragments (frontal, parietal, sphenoid, and indeterminate) and one tooth (upper left second molar).

*Axial Skeleton:* The axial skeleton is also fragmentary. Elements include fragments of the clavicle, scapula, ribs, sacrum, and os coxae. There are also duplicate elements that indicate multiple individuals (right scapula).

*Appendicular Skeleton:* The appendicular skeleton is represented by fragments, mostly of the upper and lower limb bones.

**Sex:** The elements represents a minimum of two different individuals. In assessing the cranial traits, the supraorbital margin was very rounded which indicates a possible male (Bass 2005, Buikstra and Ubelaker 1994, White 2000). The pelvis, however, had a very wide greater sciatic notch. The femoral head also measured 40.07 mm. Femoral head measurements less than 43.5 mm typically indicates female (Bass 2005). Therefore, based on the wide sciatic notch and the small femoral head, one of the individuals was most likely female.

**Age:** Age was determined by assessing the auricular surface and the sternal rib ends. The auricular surface was present on the same fragment that contained the greater sciatic notch. The auricular surface was fragmented, though the surface that was present did not express any visible

striae on the demiface, fine granularity, and no apical activity. These markers are consistent with an individual who is approximately 24-35 years of age. The sternal rib ends exhibited a relatively shallow pit that is more u-shaped with slight scalloping on the margins. This is consistent with an individual who is approximately 20-24 years of age. It is unknown to whom the ribs belong.

**Metrics:** See Appendix G.

**Burial: 19-2** MNI: 1 Sex: Possible Male Age: Adult

**Condition of Skeleton:** Burial is highly fragmented and incomplete, with only portions of the skull present.

*Cranium:* The cranium is represented by over 33 fragments. Two identifiable fragments include frontal with a partial eye orbit and left parietal.



Figure 27: Overview of Burial 19-2a

**Sex:** Sex was determined to be male based on a partial reconstruction of the left orbit. The supraorbital margin is rounded and there appears to be a robust supraorbital ridge. Both of these are indicative of a male (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

**Age:** Age was determined by fusion of cranial sutures. Sutures are slightly visible endocranially, but are fused. Fusion of sutures indicates an adult individual (White 2000).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 20**      MNI: 1      Sex: Indeterminate      Age: >25 years old

**Condition of Skeleton:** Skeleton is represented only by cranial fragments.

*Cranium:* The cranium was previously reconstructed and is represented by 22 parietal and frontal fragments.

**Sex:** Sex was indeterminate due to a lack of diagnostic elements.

**Age:** Age was determined by assessing fusion of cranial sutures. The coronal suture was fused and the sagittal suture

was almost completely obliterated. Using Meindi and Lovejoy (1985), the sutures would score 2 and 3 respectively. This indicates a person over 25 years of age (Meindi and Lovejoy 1985).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 21**      MNI: 1      Sex: Male      Age: 17-21 years old

**Condition of skeleton:** Remains are fragmented and are incomplete.

*Axial Skeleton:* The axial skeleton is poorly represented by one rib, a sacral fragment, and an ilium fragment.



Figure 28: Overview of Burial 20

*Appendicular Skeleton:* The appendicular skeleton is also poorly represented. The appendicular skeleton is represented by a portion of a femur, foot phalange, and three indeterminate long bone fragments.



Figure 29: Overview of Burial 21

**Sex:** Sexing of the individual was accomplished using the fragment of the left os coxa, which included the greater sciatic notch. The greater sciatic notch on this individual was narrow and scored a 5 (Buikstra and Ubelaker 1994, White 2000). Based upon this singular criterion it was determined that the individual is most likely a male (Bass 2005, Buikstra and Ubelaker 1994, White 2000).

**Age:** Age was determined primarily by the billowy appearance of the proximal facet on the first foot phalange (Figure 30). This indicates a lack of fusion, which generally occurs by the about 17 years of age (Schaefer et al. 2009). Other factors considered were the lack of osteoarthritis on the surface of the sacral promontory, and also the shallowness of the sternal rib end. The sternal rib end also had relatively smooth margins, which indicated an individual 18-21 years of



Figure 30: Billowing on proximal facet – Burial 21



**Sex:** Sex could not be determined due to the individual is a sub adult and lack of elements.

**Age:** Age is known to be a subadult due to the presence of a deciduous first molar. The molar roots exhibit resorption from exfoliation due to the growth of the permanent tooth in the crypt. Tooth development indicates an individual between 4 to 12 years of age (Schaefer et al. 2009).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 24**                      MNI: 1                      Sex: Indeterminate                      Age: Adult



Figure 33: Overview of Burial 24

**Condition of Skeleton:** Skeleton is highly fragmented and incomplete.

*Cranium and Mandible:* The cranium is poorly represented by six indeterminate calvarium fragments.

*Axial Skeleton:* The axial skeleton is highly fragmented and poorly represented. Identifiable fragments include over 20 vertebral fragments and two ilium fragments.

*Appendicular Skeleton:* The appendicular skeleton is also highly fragmented. Elements represented include fragments from the ulna, radius, hand, femur, patella, fibula, and foot. In addition, there are over 134 indeterminate fragments.

**Sex:** Sex was indeterminate due to a lack of diagnostic elements.

**Age:** Age determination was made using the fusion of the annular rings on the vertebrae and fusion of the distal fibula. The distal fibula fuses at approximately 15 years of age and the annular rings fuse at approximately 17 years of age (Shaefer et al. 2009). Therefore, the individual is an adult. No osteoarthritis was noted on the joint surfaces (Jurmain 1990).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 24-2**                      MNI: 1                      Sex: Indeterminate                      Age: >18 years old

**Condition of Skeleton:** Skeleton is represented by four fragments.

*Axial Skeleton:* Only a small portion of the vertebral column represents the axial skeleton.

*Appendicular Skeleton:* The appendicular skeleton is represented by a proximal hand phalange.

**Sex:** Sex was indeterminate due to a lack of diagnostic elements.



Figure 34: Overview of Burial 24-2

**Age:** Age was determined by the fusion of epiphyseal plates a hand phalange and the fusion of the annular ring on the thoracic vertebral body. No other elements were complete enough to assess. The fusion of the phalange and the annular ring indicates the individual was >18 years old (White 2000, Schafer et al. 2009).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 25** MNI: 1 Sex: Indeterminate Age: >15 years old



Figure 35: Overview of Burial 25

**Condition of Skeleton:** The skeleton is very fragmented and poorly represented.

*Cranium and Mandible:* The cranium and mandible are represented by only six small fragments of the cranial vault and one premolar.

*Axial Skeleton:* The axial skeleton is highly fragmented. It is represented by a portion of the vertebral column, scapular fragments, an ischium fragment, and at least eight rib fragments.

*Appendicular Skeleton:* The appendicular skeleton is represented by fragments from an ulna, tibia, fibula, and feet. There are also 19 indeterminate long bone fragments. Two complete hand phalanges and a metacarpal are complete.

**Sex:** Sex is indeterminate due to a lack of diagnostic elements.

**Age:** Age was deemed adult due to complete fusion of the distal fibula. Fusion of the distal fibula occurs by 15 years of age (White 2000, Bass 2005, Buikstra and Ubelaker 1994, Schaefer et al. 2009). There are no indications of osteoarthritis on any of the joint surfaces.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 25-2a** MNI: 1      Sex: Indeterminate      Age: <15 years old

**Condition of Burial:** This burial is represented by one fragmented element. It was intermingled with Burial 25-2b. Due to the differences in age (based on epiphyseal fusion), it was determined that two individuals were present. Burial 25-2 was then separated into Burial 25-2a and Burial 25-2b.



Figure 36: Overview of Burial 25-2a

*Appendicular Skeleton:* The burial is represented solely by a proximal right femur.

**Sex:** The sex could not be determined due to the lack of diagnostic elements and due to the age of the individual.



Figure 37: Unfused proximal femur

**Age:** Age was determined using the proximal end of the right

femur. The epiphyseal plate was still present and the femoral head was not yet fused. Fusion of the femoral head occurs between the ages of 15 and 19 years (White 2000, Buikstra and Ubelaker 1994, Shaefer et al. 2009). Due to the lack of fusion, it was determined that this individual was less than 15 years of age.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 25-2b**                      MNI: 1                      Sex: Possible Female                      Age: 30-35 years old



Figure 38: Overview of Burial 25-2b

**Condition of Skeleton:** The skeleton is very incomplete despite the completeness of the elements present.

*Cranium and Mandible:* The cranium and mandible are poorly represented with only two occipital fragments and two teeth.

*Axial Skeleton:* The axial skeleton is represented by complete cervical vertebrae and rib fragments.

*Appendicular Skeleton:* The elements representing the appendicular skeleton are mostly complete and with good cortex. The elements present are the radii, ulna, metacarpals, hand phalanges, tibiae, fibulae, and metatarsals.

**Sex:** Though both tibiae were present and measurable, there are no current studies that have examined the sexual dimorphism of the tibiae in Native American populations. This is important as Iscan and Miller-Scaivitz (1984) noted differences in accuracy based on ethnicity. However, using the criteria set forth by Slaus et al. (2013), this individual would have fallen into the female range based on proximal epiphyseal breadth and anterior-posterior measurement at the nutrient foramen. Therefore, it is with caution, that the individual is determined to be female.

**Age:** Aging was determined by fusion of the elements present and wear on the upper third molar. Fusion of the long bones indicated that this individual was most likely over the age of 18 (White 2000, Bass 2005, Buikstra and Ubelaker 1994). This determination corresponds with the fusion of the annular rings on the cervical vertebrae (Cardoso and Rios 2011, Buikstra and Ubelaker 1994). Furthermore, joints which could be assessed for age-related disease showed slight levels, indicating the individual was over 18, but not elderly (Bass 2005, Buikstra and Ubelaker 1994). Eruption of the third molar indicates an age over 17 years (Bass 2005, Buikstra and Ubelaker 1994). Wear on the occlusal surface of the teeth displays slight exposure of the dentine surface. By employing the dental wear scale created by Skeleton (1996), and using published data derived from prehistoric California Central Valley Native Americans, the degree of wear indicates an individual



Figure 39: Wormian bones – Burial 25-2b

25-55 years of age. Smith (1984), created a scale for occlusal attrition using hunter-gather populations. Using Smith's scale, this individual can be aged to approximately 30-35 years old.

**Unique Non-pathological Traits:** Lambdoidal suture is complex and contains wormian bones (Figure 39).

**Metrics:** See Appendix G.

**Burial: 26a**                      MNI: 1                      Sex: Indeterminate                      Age: >15 years old

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Figure 40: Overview of Burial 26a

**Condition of skeleton:** Remains are fragmented and incomplete. Remains were also commingled with a sub-adult.

*Axial Skeleton:* The axial skeleton is poorly represented. Elements present are scapular fragments, an ischium fragment, and a sacral fragment.

*Appendicular Skeleton:* The appendicular skeleton is also poorly represented. Elements present are the ulnae, a radius fragment, metacarpal fragment, femoral fragment, tibial fragments, and a metatarsal.

**Sex:** Sex is indeterminate due to a lack of diagnostic elements.

**Age:** Age is determined to be >15 years of age due to the fusion of the epiphyseal plate in the distal radius (White 2000, Schafer et al. 2009).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 26b**                      MNI: 1                      Sex: Indeterminate                      Age: <17 years old



Figure 41: Overview of Burial 26b

**Condition of skeleton.** Remains were co-mingled with an adult.

*Cranium:* The cranium is fragmented into 14 pieces representing the frontal and parietals.

*Axial Skeleton:* The axial skeleton is poorly represented by a scapular fragment, cervical fragment, and the right ischium.

*Appendicular Skeleton:* The appendicular skeleton is also poorly represented by tibial fragments and a portion of the right foot.

**Sex:** Sex could not be determined due to a lack of diagnostic elements and due to the age of the individual.

**Age:** Age was determined by the lack of fusion of the long bones, specifically the proximal tibia. Fusion of the tibia occurs by 18 years of age (Shaefer et al. 2009). Also, there was a lack of fusion of the talus, proximal and distal epiphyseal plates of the first metatarsal, and billowing on the auricular surface. All of these indicate an individual less than 17 years of age (Shaefer et al. 2009).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 26-2** MNI:1 Sex: Male Age: 40-45 years old



Figure 42: Overview of Burial 26-2

**Condition of Skeleton:** This burial is fragmented, but relatively complete with approximately 60% of the elements present. This individual is also unique in having six lumbar vertebrae. The twelfth thoracic vertebra and sacrum are also present and complete, confirming the presence of six, interlocking lumbar vertebrae.

*Cranium and Mandible:* Approximately half of the cranium is represented. The occipital, left parietal, and left temporal are all fused. Other elements represented include the maxilla and mandible, and teeth.

*Axial Skeleton:* The axial skeleton is represented by scapular fragments, rib fragments, vertebrae, a clavicle fragment, a sternal fragment, the sacrum, and os coxae.

*Appendicular Skeleton:* The appendicular skeleton is represented by both arms, both patellae, carpals, metacarpals, phalanges, tarsals, metatarsals, and both legs.

**Sex:** Sex determination was achieved using a suite of traits derived from the pelvis and skull. The sub-pubic angle is v-shaped and the shape of the pubis is triangular. No ventral arch or dorsal pits are present. The greater sciatic notch is narrow with a score of 4 (Buikstra and Ubelaker 1994). Cranial traits included a larger mastoid process and a projecting mental eminence. The nuchal crest is present, but considered indeterminate for sexing. These traits support a determination that this individual is male (Bass 2005, Buikstra and Ubelaker 1994, White 2000).

Metric measurements were available for the left humeral head and epicondyle, and the right femoral head. The left humeral head measures 42.68 mm, which falls within the female range (<42.8 cm) (Bass 2005:158). Due to the preponderance of the non-metric evidence, this one metric marker was considered close to borderline and therefore, dismissed. The humeral

epicondylar breadth and femoral head diameter measurements fell within the indeterminate range (Bass 2005).

**Age:** Age determination relied upon eruption and wear of dentition, long bone fusion, assessing the pubic symphysis and auricular surface, and the presence of osteoarthritis (Bass 2005). All the dentition was erupted, including the third molars. Third molar eruption indicates an age over 18 years. Wear patterns on the teeth, including the third molars displayed large sections of the dentine on the occlusal surface. According to Smith's (1984) scale, this individual is aged to approximately 40-45 years based upon Stage 6 wear. Using Skeleton's (1996) scale, the individual is >40.

All long bones appear to be fused with no visible separation at the epiphyseal line. The sacrum, which is one of the last bones to fuse at about 25 years of age, is fused (White 2000). The pubic symphysis has a fine grained face with minimal lipping. This makes it consistent with a Phase IV, which indicates 26-45 years of age (Buikstra and Ubelaker 1994, White 2000, Bass 2005). The auricular surface had slight irregularities on the apical surface and the margins. The characteristics of the auricular are consistent with Phases V-VII, with an age range of 40-59 years of age (Bass 2005, Buikstra and Ubelaker 1994, White 2000).

**Unique Non-pathological Traits.** Shovel shaped incisors (43), Inca bone (Figure 44), six lumbar.



Figure 43: Shovelled Incisors – Burial 26-2



Figure 44: Inca Bone – Burial 26-2

**Metrics:** See Appendix G.

**Burial: 27**

MNI: 2

Sex: Indeterminate

Age: >17 years old



Figure 45: Overview of Burial 27

**Condition of skeleton:** Due to the presence of two left fibulae, it has been determined that there is a minimum of two individuals. Due to the general size and age of the individuals, it is not reasonable to separate them.

*Cranium and Mandible:* The cranium and mandible are poorly represented. Elements present include a nasal spine fragment, occipital fragments, and a maxillary fragment.

*Axial Skeleton:* The axial skeleton is represented by two vertebral fragments, one rib fragment, and one os coxa fragment.

*Appendicular Skeleton:* The appendicular skeleton, though fragmented, is represented by the upper limbs (a humeral fragment, ulnar fragment, radial fragments, a metacarpal and a hand phalange) and the lower limbs (a femoral fragment, tibial fragments, and a calcaneus).

**Sex:** There are no diagnostic features on any of the elements in which to ascertain sex.

**Age:** The long bones that have their epiphyseal plates all appear fused including both left fibulae. The distal fibula fuses by age 17 (Schafer 2009). Therefore, this individual is >17 years of age.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 27-2** MNI: 1 Sex: Indeterminate Age: 16-18 years old

**Condition of Skeleton:** Skeleton is represented by four small fragments.

*Cranium and Mandible:* The only elements present are an occipital fragment and a lower third molar.

*Axial Skeleton:* The axial skeleton is represented only by two rib fragments, including a sternal rib end.



Figure 46: Overview of Burial 27-2

**Sex:** Sex was indeterminate due to a lack of diagnostic elements.

**Age:** Age was determined by examining an indeterminate sternal rib end. The rib end exhibited slight billowing which is consistent with phase 0-1 (White 2000, Buikstra and Ubelaker 1994). Phase 0-1 was found to be consistent with ages 16-18 years. One third molar fragment was also present. The fragment exhibited no wear on the occlusal surface. Due to the development of the tooth, it is estimated that the individual was >15 (Bass 2005, White 2000, Buikstra and Ubelaker

1994). It cannot be determined if the tooth had erupted or was still in the crypt at the time of death.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 28** MNI: 1 Sex: Indeterminate Age: >15 years old

**Condition of Skeleton:** Elements are highly fragmented and the burial is incomplete.

*Cranium and Mandible:* The cranium is represented by seven small fragments including frontal, zygomatic, temporal, and indeterminate fragments.



Figure 47: Overview of Burial 28

*Axial Skeleton:* The axial skeleton is represented by three thoracic vertebrae fragments, 23 rib fragments, three sternum, and two indeterminate scapular fragments.

*Appendicular Skeleton:* The appendicular skeleton is represented by one right ulna fragment, one incomplete hand phalange and 23 indeterminate fragments.

**Sex:** Sex was indeterminate due to a lack of diagnostic elements.

**Age:** Aging could only be determined by the fusion of one phalange. Fusion of the phalange occurs at approximately 15 years of age (Shaefer et al. 2009). Since this element was fused, it was determined that this individual was >15 years old.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 29**                      MNI: 1                      Sex: Male                      Age: 40-45 years old

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**Condition of skeleton:** The skeleton is represented by the cranium only. Portions of cranium and maxilla were previously reconstructed and glued with an unknown adhesive.



Figure 48: Burial 29

*Cranium and Mandible:* The cranium and mandible are represented by 100+ indeterminate cranial fragments, occipital, left and right parietals, left and right temporals, right superior orbital fragment, maxilla, right portion of mandible, and teeth.

**Sex:** Sex for this individual was determined by a large mastoid process, very robust nuchal area, rounded supraorbital margin, large mental eminence, and a sharp gonial angle (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

**Age:** Age was determined by tooth wear. The tooth wear on the molars is worn down near the cervicoenamel junction. This is consistent with an individual who was approximately 40-45 years of age (Griffin 2007, Smith 1984). The cranial sutures on this individual are not fused and are wide open. Lack of closure cannot be conclusively used as an indicator of age as cranial fusion can happen at drastically different rates (White 2000).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 30**

MNI: 1

Sex: Indeterminate

Age: >17 years old

**Condition of Skeleton:** This individual is represented by one element.

*Appendicular Skeleton:* The element present, a left radius, is complete in one piece and is in relatively excellent condition.



Figure 49: Overview of Burial 30

**Sex:** Sex cannot be determined due to lack of diagnostic elements.

**Age:** Age is determined to be an adult due to long bone fusion. The left radius is completely fused. The distal epiphyseal plate fuses later than the proximal plate. Typically, the plate begins fusing by 17 years of age (White 2000, Bass 2005, Buikstra and Ubelaker 1994).

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Note:** There is no Burial 31.

**Burial: 32**

MNI: 1

Sex: Female

Age: 16-23 years old

**Condition of Skeleton:** The burial is fragmented and is primarily represented by the lower limbs.

*Axial Skeleton:* The axial skeleton is poorly represented by three vertebral fragments, seven rib fragments, two sternal fragments, ischial fragments, and sacral fragments.

*Appendicular Skeleton:* The appendicular skeleton is represented by fragments of the radius, ulnae, hands, femur, tibiae, and fibulae. It is also represented by complete elements in the feet.



Figure 50: Overview of Burial 32

**Sex:** Sex was determined by the diameter of the femoral head which was 40.22 mm. According to Bass (2005) measurements under 42.5 mm indicates that this individual is female.

**Age:** Age was determined by the sternal rib ends. The rib ends have a shallow pit with slight scalloping around the margins. The floor of the pit has been eroded from taphonomic conditions, though no projections or irregularities appear in what is left of the pit or on the margins. This is consistent with phases 1 and 2 that correspond to an individual who is 16-23 years of age (Iskan 1984, Bass 2005, Buikstra and Ubelaker 1994).

**Metrics:** See Appendix G.

**Note:** There is no Burial 33, 34, or 35.

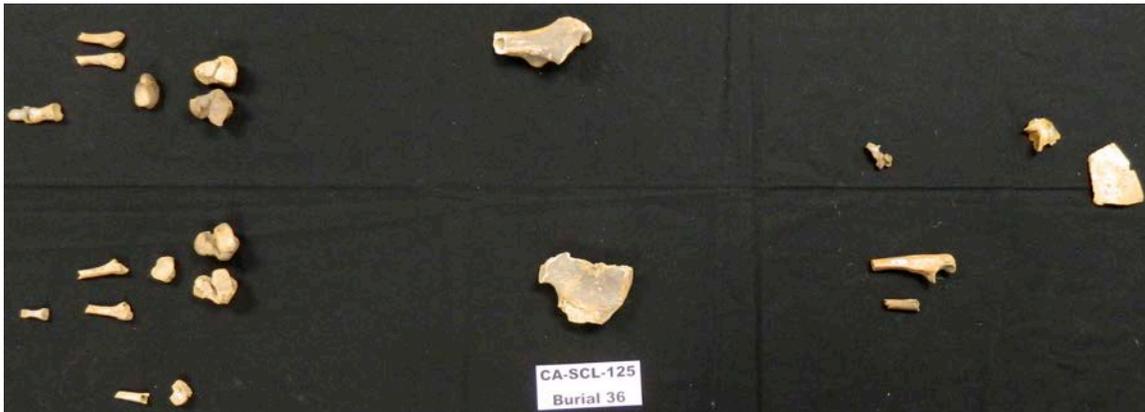


Figure 51: Overview of Burial 36

**Condition of skeleton.** These individuals were excavated by West Valley College. Due to the duplication of tali elements in the foot, multiple individuals are represented (Figure 52).

*Cranium:* The cranium is poorly represented by only two fragments, occipital and frontal.

*Axial Skeleton:* The axial skeleton is also poorly represented with only a vertebral neural arch and ilium fragment present.

*Appendicular Skeleton:* The majority of the burial is represented by the appendicular skeleton. Elements present are an ulna fragment, radial fragment, femur fragment, and feet. The foot elements contain four tali (2 right and 2 left).



Figure 52:  
Multiple Tali –  
Burial 36

**Sex:** Sex was determined on one element to be a possible male. The supraorbital ridge is pronounced which is indicative of a male (Bass 2005, White 2000, Buikstra and Ubelaker 1994). The os coxa fragment appears to have a larger sciatic notch, which would indicate female (Bass

2005, White 2000, Buikstra and Ubelaker 1994). Due to the number of tali, it was already apparent that there are multiple individuals represented.

**Age:** Age was indeterminate on most of the elements. All elements appear fused, therefore all individuals represented were adults. All tali were fused, which indicates an individual over 15 years of age. The exception is the incomplete fusion of the iliac crest on the left os coxa fragment. The iliac crest typically fuses between the ages of 14 and 21 (Schaefer et al. 2009). Fusion of this element is nearly complete, therefore placing the age between 16 and 21 years of age.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

**Burial: 37** MNI: 1 Sex: Indeterminate Age: >17 years old

**Condition of Skeleton:** Skeleton is poorly represented by four fragments.

*Axial Skeleton:* The axial skeleton is represented by one acetabulum fragment and two sacral fragments.

*Appendicular Skeleton:* The appendicular skeleton is only represented by a proximal fibula fragment.



Figure 53: Overview of Burial 37

**Sex:** Sex could not be determined due to a lack of diagnostic elements.



**Burial: UK 33**

MNI: 1

Sex: Probable Male

Age: Adult

**Condition of skeleton:** Burial is represented by cranium only. Cranium was recovered by a resident in the area who discovered the burial during an irrigation project.

Remainder of the individual was not recovered. Also, this burial is not included in the NAGPRA report which was published after acquisition of this piece.

*Cranium:* The skeleton is represented by the majority of the cranial vault (occipital, portion of left parietal, right parietal, and right temporal).



Figure 55: Burial UK 33

**Sex:** The sex of the individual is tentatively determined by the large mastoid process and the robust nuchal crest. Both are consistent with a male individual (Bass 2005, White 2000, Buikstra and Ubelaker 1994). Due to a lack of other elements to assess, assignment is probable.

**Age:** Age of the individual is determined to be an adult due to the fusion of the sagittal and lambdoidal sutures. The sagittal suture is completely obliterated endocranially and is partially obliterated ectocranially (White 2000).

**Unique Non-pathological Traits:** Very complicated cranial sutures with wormian bones along the lambdoidal suture.

**Metrics:** No measurements were taken due to a lack of diagnostic elements.

## **Isolates**

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In addition to the burials identified within the NAGPRA report, a number of human isolates were recovered from the faunal and lithic assemblage from this site. These fragments have no known provenience nor are they connected with any particular burial. All have been issued a designation with the upper case letter I for Isolate.

### **I-001      Age: >11 years old**

**Skeletal Element:** Distal portion of the right first metatarsal

**Age:** Due to the fusion of the element, age is estimated to be >11 years of age (Schafer et al. 2009).

### **I-002      Age: Indeterminate**

**Skeletal Element:** Long bone fragment (possible tibia)

### **I-003      Age: Indeterminate**

**Skeletal Element:** Cranial fragment

### **I-004      Age: Indeterminate**

**Skeletal Element:** Left ulna diaphysis fragment (fits together with I-005).

### **I-005      Age: Indeterminate**

**Skeletal Element:** Left ulna diaphysis fragment (fits together with I-004).

**I-006      Age: Indeterminate**

**Skeletal Element:** Occipital fragment

**I-007      Age: Indeterminate**

**Skeletal Element:** Parietal Fragment

**I-008      Age: Indeterminate**

**Skeletal Element:** Parietal Fragment

**I-009      Age: Indeterminate**

**Skeletal Element:** Frontal fragment

**I-010      Age: Indeterminate**

**Skeletal Element:** Occipital fragment along the lambdoidal suture

**I-011      Age: Indeterminate**

**Skeletal Element:** Occipital condyle

**I-012      Age: Indeterminate**

**Skeletal Element:** temporal fragment

**I-013      Age: Indeterminate**

**Skeletal Element:** Right orbit (frontal and zygomatic fragments)

**I-014      Age: Indeterminate**

**Skeletal Element:** Right proximal ulna

**I-015      Age: Indeterminate**

**Skeletal Element:** Five small ilium fragments

**I-016      Age: Indeterminate**

**Skeletal Element:** Two cranial fragments

**I-017      Age: Indeterminate**

**Skeletal Element:** Humeral diaphysis fragment

**I-018      Age: Indeterminate**

**Skeletal Element:** Femoral diaphysis fragment

**I-019      Age: Indeterminate**

**Skeletal Element:** Neural arch fragment

**I-020      Age: <12 years old**

**Skeletal Element:** Right fibula

**Age:** Only the proximal portion is present. A lack of any fusion of the proximal epiphysis indicates an age of less than 12 years of age (Schafer et al. 2009).

**I-021      Age: Indeterminate**

**Skeletal Element:** Left ulna fragment

**Pathology:** Diaphysis is offset by approximately 19.13 mm.

**I-022      Age: Indeterminate**

**Skeletal Element:** Long bone fragment (most likely the anterior portion of the shaft at the deltoid tuberosity).

**I-023      Age: Indeterminate**

**Skeletal Element:** Left ilium fragment

**I-024      Age: Indeterminate**

**Skeletal Element:** Radius fragment

**I-025      Age: Indeterminate**

**Skeletal Element:** Left radius fragment

**I-026      Age: Indeterminate**

**Skeletal Element:** Glenoid fossa fragment of scapula

**I-027**      **Age: 40-50 years old**

**Skeletal Element:** Left upper second molar

**Age:** The wear pattern on the tooth is extensive and has exposed the dentin on the occlusal surface. This wear pattern is consistent with an individual 40-50 years old (Griffin 2007, Smith 1984).

**71-49**      **Age: Prenatal – 36 to 40 weeks**

**Skeletal Element:** Left ulna

**Age:** The element is very small and is not fused. Maximum length of the unfused diaphysis is 55.54 mm. According to Schafer et al. (2009), this individual would have been prenatal – 36 to 40 weeks.

**79-5**      **Age: Indeterminate**

**Skeletal Element:** Right second cuneiform

**80-2a**      **Age: <20 years old**

**Skeletal Element:** Sacrum (S2/S3 area) fragment

**Age:** There does not appear to be any fusion to the adjoining sacral fragments. Fusion of these elements typically occurs by about 20 years of age (Schafer et al. 2009).

**80-2b            Age: >20 years old**

**Skeletal Element:** Sacrum (right side)

**Age:** The element appears to be fused. Fusion of these elements typically occurs by about 20 years of age (Schafer et al. 2009).

**80-3            Age: <17 years old**

**Skeletal Element:** Proximal left humerus

**Age:** Element is not fused. Fusion of the proximal ephiphyseal union typically occurs around 17 years of age (Schafer et al. 2009)

**89-2a            Age: >18 years old**

**Skeletal Element:** Three tibial fragments

**Age:** The proximal tibia fuses by approximately 18 years of age (Schafer et al. 2009). The tibial elements present appear to be fused.

**95            Sex: Possible Male            Age: Adult**

**Skeletal Element:** Right temporal/mastoid process

**Sex:** This individual had a larger mastoid process. Males have larger mastoid processes than females (White 2000, Bass 2005, Buikstra and Ubelaker 1994).

**Age:** Due to the size and development of the mastoid process, it is probably that this individual was an adult.

**119**            **Age: Indeterminate**

**Skeletal Element:** Lumbar vertebra neural arch fragment

**133**            **Age: Indeterminate**

**Skeletal Element:** Left ilium fragment

**159**            **Age: Indeterminate**

**Skeletal Element:** Tibial plateau

**590**            **Age: >12 years old**

**Skeletal Element:** Left first metacarpal

**Age:** The metacarpal is fused. Metacarpals fuse by approximately 12 years of age (Schafer et al. 2009).

**603**            **Age: Indeterminate**

**Skeletal Element:** Occipital fragment

### **Number of Individuals**

The minimum number of individuals (MNI) was determined by analyzing the CA-SCL-125 skeletal collection curated at San Jose State University in the Anthropology Department Laboratory. These curated remains were compared to the NAGPRA report completed in 1995 by the Anthropology Department. Each burial was assumed to be a discreet individual unless

otherwise indicated by repetitive elements, gross differences in size, gross differences in age, or obvious differences in sex. Based on these criteria, a total of 58 individuals were identified.

In assessing the available field notes, the site was heavily disturbed and many elements were collected from the surface or from the back dirt. It is possible that several burials were struck by heavy equipment and elements scattered, causing one individual to be labeled under more than one burial number. It is also likely that multiple individuals were collected and curated under one burial number, but due to the fragmented nature they had not been identified as multiple individuals. Also, the field notes indicated at least eight burials that were identified in the field, but were considered too fragmented to collect. Lastly, there is one burial (29-2), which is missing all of the elements and Burial 40 that is not mentioned in the NAGPRA report at all.

### **Sex and Age Determination**

Sexing determination for the adult burials was based on the morphological characteristics of the pelvis, cranium, and metric measurements of post-cranial elements when available. Sex determination can only be determined on skeletal remains that have developed secondary sexual characteristics. As pre-pubescent children have not undergone the physical changes necessary, sub-adult sex is indeterminate. The pelvis (*os coxae*) is the primary element used in sexual determination as it is the most sexually dimorphic characteristic in the human skeleton. Of the three bones that fuse to create the os coxae (ilium, ischium, and pubis), the pubis is the most diagnostic for sexing skeletal remains. In analyzing the pubis, the shape, subpubic concavity, and presence or absence of a ventral arch or dorsal pits are assessed. In addition to the pubis, the size of the greater sciatic notch is also assessed (Buikstra and Ubelaker 1994, Bass 2000).

Sexually dimorphic elements of the cranium include the nuchal crest, mastoid process, supraorbital ridge, and the supraorbital margin (Buikstra and Ubelaker 1994, Bass 2000, Griffin 2007). Additionally, the gonial angle and mental eminence of the mandible were also used. Post-cranial metric measurements that assist in sex determination include the glenoid fossa, humeral head diameter, width of the humeral epicondyle, and the diameter of the femoral head (Bass 2000, Dittrick and Suchey 1986).

In this population, there were twelve males and seven females. Five individuals were juveniles that could not be sexed due to their age. The remainder of the individuals lacked diagnostic elements making sex determination impossible within the scope of this study. In two cases, the burial also lacked diagnostic elements for age determination.

Age estimation included changes to the pubic symphysis, auricular surface, sternal rib ends, dental development and attrition, degree of osteoarthritis, and epiphyseal fusion (Bass 2005, Schaefer et al. 2009, Griffin 2007, Iscan et al. 1984, 1985, Jurmain 1990, Lovejoy et al. 1985, White 2000, Suchey et al. 1988). The pubic symphysis, located at the anterior of the os coxae, undergoes predictable changes as a person ages due to the ossification of cartilage. Over time, there is a reduction in the billowy appearance on the surface and a change in texture from fine grained to a denser rough surface that accompany specific age ranges (Griffin 2007, Suchey et al. 1988).

At the posterior of the os coxae is the auricular surface. The auricular surface also reveals age-related morphology due to predictable changes to the sacroiliac joint. Changes that occur due to age include topography, marginal lipping, density, reduction of billowing, and porosity (Lovejoy et al. 1985, Griffin 2007, White 2000, Bass 2005). Similarly, sternal rib ends undergo changes in pit depth and shape, margin shape, and development of bony spicules that

provide a specific age range (Iskan et al. 1984, 1985). Osteoarthritis of the vertebral column and degenerative joint disease of the long bones was examined and scored (Jurmain 1990).

In assessing dentition, both dental development and attrition were useful in assessing age. According to A.E.W. Miles (1962), development of dental biology occurs at a predictable rate. Deciduous erupt prior to permanent teeth. By examining which teeth have or have not erupted, it is possible to determine an age range, especially for juveniles. For adults, dental attrition patterns may be more useful as all permanent teeth have erupted, with the last permanent teeth to erupt being the third molar, which occurs at approximately 18 to 25 years of age (Miles 1962). Miles also states that since the first molar erupts before the second (approximately six years of age), the second molar erupts before the third (approximately twelve years of age), and the third molar erupts last, the wear pattern should be the heaviest on the first molar, followed by the second molar, followed by the third molar. Assuming a consistent diet, the attrition should exhibit a gradient pattern. Aggregate assessments of dental morphology provides a more accurate age range in burial populations (Griffin 2007).

Epiphyseal fusion occurs at a predictable rate, allowing it to be used for age assessment. Bones often develop from multiple growth centers and fuse together as the individual grows. A human is born with approximately 450 ossification centers, while at adulthood an individual has approximately 206 elements (White 29:2000). In juveniles, metrics such as long bone length can also be used to calculate approximate age (Maresh 1970, Schaefer et al. 2009). When possible a conglomeration of multiple aging methods was employed in order to obtain the most accurate age range.

The age range for this population was estimated to be prenatal 36 to 40 weeks (isolate 71-49) to 59 years of age. There are six sub-adults present within the burials with ages ranging from

prenatal 36 to 40 weeks to less than 15 years old. Young adults (17 to 25 years of age) were represented by five individuals. Adults age 25 to 30 were represented by five individuals, while 30 to 40 year olds were represented by three individuals. Two burials contained individuals from 40 to 50 years old, and one burial was an individual 50 to 60 years old. Two burials lacked any diagnostic elements to determine sub-adult or adult. The remaining burials lacked determining age characteristics beyond those indicating an adult. Often this involved individuals that only had elements that were fused.

### **Measurements**

Buikstra and Ubelaker (1994) recommend recording the measurements of skeletal elements such as the long bones when possible. Though measurement of most elements in the collection was hindered by their fragmentary nature, those elements that fulfilled the necessary criteria were measured. Measurements were taken using an electronic digital caliper. Available measurements are included with the skeletal inventories in Appendix G.

### **Stature Estimation**

Stature estimation can be calculated using the metric measurement of maximum long bone lengths. Though a more accurate stature can be calculated using the maximum length of all the long bones, formulas are available for stature estimation derived from one long bone. In the case of this collection, there were no individuals, which allowed for calculations using all of the long bones. All calculations are from one bone measurement using Genoves's (1967) formula. In total, stature estimates were calculated for four burials.

**Table 3: Individual Stature**

Burial No.	Sex	Age	Elements	Centimeters	Feet
1	Female	19-40	left humerus	166.5	5'5"
2a	Male	50-59	right tibia	173.3	5'8"
25-2b	Female	30-35	left tibia	154.9	5'1"
26-2	Male	40-45	right femur	173.3	5'8"

Though only two males and two females produced stature results, comparing them to other San Francisco Bay Area sites reveals that these individuals were relatively tall.

**Table 4: Comparison of Stature to Other San Francisco Bay Area Sites**

<u>Sex</u>	<u>Sample Size</u>	<u>Site No.</u>	<u>Average Centimeters</u>	<u>Average in Feet</u>	<u>AMS Date</u>
Female	2	CA-SCL-125	160.7	5'3"	
Male	2	CA-SCL-125	173.3	5'8"	
		Regional			
Male	1	Medical Center	163	5'4"	Historic
Male	1	CA-SCL-30H	161.0 to 170.5	5'3" to 5'7"	AD 1781
Male	4	CA-SCL-287	149.8 to 164.0	4'11" to 5'5"	AD 150 to 234
Male	1	CA-SMA-267	164.4 to 164.5	5'5"	2084 BC
Male		CA-ALA-307		5'3" to 5'5"	
Male	1	CA-ALA-312	167.5 to 170.5	5'6" to 5'7"	2040 BC

(DiGiuseppe and Grant 2011, 2013; Kansa and Strotter; Leventhal et al. 2009, 2010, 2011; Wallace and Lathrap 1975)

The other available stature estimates are only from males, with the tallest individuals from CA-ALA-312 and CA-SCL-287 at 5'7". Wallace and Lathrap (1975) reported the male individuals at CA-ALA-307 of a shorter stature, 5 feet 3 inches to 5 feet five inches while females were shorter. Therefore, with an average male stature of 5 feet 8 inches and an average female stature of 5 feet 3 inches, indications are that these individuals from CA-SCL-125 may have been of taller than average stature for the Bay Area.

## **Discussion**

Prior to this study, the osteological remains had been reviewed by anthropology student Mark Cunningham working under Dr. Robert Jurmain. The review was completed in the 1980s and was adopted in 1995 for compliance to the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA). The NAGPRA report presented an inventory of skeletal elements, minimum number of individuals (MNI), sex, age, and pathologies.

The purpose of this present study was to independently verify the presence of the elements in the report and also to conduct a comprehensive analysis of the burial population that included MNI, sex, age, stature, and pathologies, measuring the elements according to the Standards as defined by Buikstra and Ubelaker (1994) and assess possible interobserver error. It was discovered that several elements listed in the NAGPRA report could not be located. This may be due to the masking tape that was used to cover the catalog number on the bone for quizzes and tests upon removal the catalog number was also removed. Also, general handling the bones may have had resulted in the catalog numbers fading as well. It is therefore possible that the missing elements can still be located within the teaching collection however the missing or faded catalog numbers make it impossible to reunite them with the collection.

During the course of analysis, the available but limited student notes were reviewed for more information regarding possible provenience. However, those notes often did not coincide with what was present in the collection. As mentioned previously, this is possibly due to multiple numbering methods used and the duplication of numbers when the West Valley College collection was moved to San Jose State University. By formally reporting on the completed analysis of the skeletal remains, the skeletal biological data generated from this study will be

readily available for comparison to other sites and thus contribute the to body of knowledge of the prehistory of the indigenous ancestral Ohlone people of the San Francisco Bay Area.

## **Chapter 4**

### **Skeletal Pathologies**

#### **Introduction**

This chapter reports on the pathologies associated with the human remains recovered during the excavation of CA-SCL-125. The minimum number of individuals for this population was fifty-eight. Pathologies were identified on sixteen burials. The fragmented condition of the remains and the incompleteness of many of the burials impeded analysis.

#### **Methods**

While each burial was laid out for inventory, each of the elements was examined for pathologies that included age related conditions, dental disease and attrition, evidence of trauma, pathological lesions, or any other anomalous condition.

#### **Dental Pathology**

The study of dental pathology provides a window into the lives of prehistoric peoples. Due to the durability of teeth, they can often be the last remaining remnant of the individual. Also, because teeth do not remodel during life, they provide a record of the individual's life events such as extended illness, diet, processing activities, or poor nutrition (Kieser 1990). These events express themselves through enamel defects such as hypoplasias, carious lesions, abscesses, alveolar resorption, attrition, and differential wear patterns. There were eight burials with observable dental pathologies (Grady et al. 2001). None of the dentition were complete, however observed pathologies included caries, abscesses, tooth loss, periodontal disease,

calculus, attrition, and malocclusion (Table 5). Due to the level of attrition, which in most cases was severe, reaching near the cervico-enamel junction, enamel defects were not observable.

**Table 5: Summary of Dental Pathologies**

Burial #	Infectious			Degenerative			Genetic
	Caries	Abscess	Tooth loss	Periodontal Disease	Calculus	Attrition	Malocclusion
1				X			
*2		X	X	X		X	X
6					X		
12	X			X	X		
14	X						
25-2b	X				X		
26-2		X		X	X		
29	X	X			X		X

\*Burial 2 MNI = 4

For the purpose of this study, dental diseases can be divided into three main categories: infectious, degenerative, and genetic. Infectious disease includes caries, abscesses, periodontal disease, and ante mortem tooth loss. Degenerative disease includes calculus, periodontal disease, and attrition. The genetic condition observed in this population was malocclusion. The processes that cause these conditions are varied.

*Caries*

Caries are caused by an overproduction of organic acids produced by bacteria (Larsen 1997) (Figure 56). The acids break down the tooth enamel causing carious lesions or pits. Continued destruction by the acids can lead to tooth



Figure 56: Dental caries – Burial 25-2b

loss. Also according to Larsen (1997), in prehistoric populations, females are more often afflicted by caries than males. Caries were present in Burial 12, 14, 25-2b (Figure 56), and 29.

### *Abscesses*

Abscesses begin with exposure of the pulp chamber, commonly due to caries, extreme attrition, or trauma (Grady et al. 2001). Opportunistic pathogens enter the exposed pulp chamber and cause infection, which can manifest as inflammation and pus production to bone destruction and tooth loss (Hillson 1996). Abscesses were noted in Burial 2, 26-2, and 29. The location of the abscesses was primarily in the maxilla (Figure 57), with only Burial 2 expressing an abscess in the mandible (Figure 58). Though maxillary abscesses are more common (Grady et al. 2001), it must also be noted that this collection is lacking in observable mandibular elements.



Figure 57: Abscess at the base of the lingual root of the upper right first molar – Burial 29



Figure 58: Abscess at base of left canine – Burial 2

### *Periodontal Disease*

Periodontal disease is an inflammation of the periodontal tissues caused by bacteria (Grady et al. 2001). The inflammation initially creates lesions on the gums and results in destroying the periodontal ligaments (Hillson 1996). As the disease progresses, it can cause bone loss and tooth loss. It must also be noted that periodontal disease can be caused by

degenerative factors. Due to the nearly identical expression between the infectious and degenerative forms, it is nearly impossible to differentiate between the two in the archaeological record (Hildebolt and Molnar 1991).

### *Calculus*

Calculus is a degenerative disease. Calculus is the mineralized plaque adhering to the tooth surface and accumulating over time. In extreme conditions and often in conjunction with infectious disease, calculus can also build on the tooth root.

### *Attrition*

Mechanical processes cause attrition over time. The two forces that act on the teeth during mastication are abrasion and attrition. Abrasion refers to outside particles that rub against the teeth, slowly wearing them down. Attrition refers to the tooth-to-tooth contact (Hillson 1996, Grady et al. 2001). Attrition rates have also been calculated for different populations, allowing dental attrition to be an indicator of age.



Figure 59: Right second molar with open root canals – Burial 2

### *Malocclusion*

Malocclusion is a genetic dysfunction. In this assemblage, rotations and impactions were present. Burial 2 has a maxillary canine that has grown laterally. It is fully



Figure 60: Maloccluded canine – Burial 2

developed and shows no sign of wear, indicating it was never in occlusion (Figure 60). Burial 29 has both medial incisors fully formed and impacted (Figure 61).



Figure 61: Impacted central incisors – Burial 29

**Skeletal Pathology**

The main goal of this section is to provide a detailed summary of the pathological conditions associated with this burial population. The pathological conditions for this population were divided into seven categories: osteoarthritis (OA) and degenerative joint disease (DJD), enthesopathy, trauma, infections, metabolic, stress indicators, and other. There were thirteen burials that exhibited at least one of the aforementioned indicators. A summary of the affected burials is as follows (Table 6):

**Table 6: Summary of Skeletal Pathologies**

Burial #	OA/DJD	Enthesopathy	Trauma	Periostitis	Metabolic	Stress Indicators	Other
A	X				X		
1	X					X	
*2	X						
2a	X		X	X			
2b	X		X	X			tumor
6	X	X					
11	X						
14			X				
17	X	X	X				unilateral spondylolysis
19			X				
26-2	X						bilateral spondylolysis
**27				X			
29							increased vascularization

\* Burial 2 MNI = 4, \*\*Burial 27 MNI = 2

### *Osteoarthritis and Degenerative Joint Disease*

Joint disease includes osteoarthritis and degenerative joint disease. Expression of the disease includes osteophyte formation (Figure 62) and formation of subchondral defects such as eburnation and sclerosis (Grady et al. 2001). Sclerosis, which is a hardening of tissues, is better viewed with radiographic equipment, which was not available for

this study. Eburnation is a result of the breaking down and hardening of the tissues into “an ivory-like mass” (Dorland 1932:410). The surface gains a polished appearance as the bone rubs against bone.



Figure 62: Lipping on indeterminate lumbar – Burial 2

### *Enthesopathy*

Enthesopathies are associated with the general wear and tear on joints from tendons and ligaments. Though commonly associated with aging (degenerative), enthesopathies can be caused by inflammatory, traumatic, or metabolic conditions (Resnick and Niwayama 1983). They are characterized by bony alterations such as spicules at the insertion sites of tendons and ligaments. These spicules are formed as a reaction to the pulling stresses between the bone and the ligaments or tendons (Grady et al. 2001).



Figure 63: Spicules on superior surface of patella – Burial 17

## Trauma

Trauma is often recorded in the archaeological record as fractures. These fractures can be in any state of healing and may or may not be offset or fused. Types of fractures include transverse, oblique, spiral, depression, compression, traction, and avulsion. In the case of this assemblage, there were no unfused fractures or avulsions.



Figure 64: Proximal foot phalange with healed break – Burial 2a

Burial 2a contains an angulation to the distal portion of a proximal foot phalange with an associated bone callous (Figure 64).

There is also some remodeling on the distal end. Burial 2b has bulbous appearance to the midshaft of the left clavicle at the conoid tubercle (Figure 65). This is combined with associated



Figure 65: Inferior view of left clavicle with healed break – Burial 2b

porosity. Burial 14 contained a slight depression on the left parietal just posterior to the coronal suture. The inner table has a very slight bulge in the same area that is not bilateral, indicating a possible healed depression fracture. The distal articular surface of the right first metacarpal of Burial 19 exhibits extensive remodeling, however the proximal facet is



Figure 66: Remodeling on head of first metacarpal – Burial 19

unremarkable (Figure 66). Some type of traumatic force is indicated due to the divergence in remodeling on the same element.

### *Periostitis*

Periostitis is an inflammatory reaction on the surface of the bone and does not involve the marrow cavity. The inflammation can be a result of trauma or infection (White 2000), though often it is associated with infection (Grady et al. 2001). The ability to assess periosteal infection on multiple elements can assist in the



Figure 67: Periosteal reaction on the left ulna – Burial 27

designation between trauma and infection as trauma would be more localized, however trauma can also lead to infection.

In this assemblage, one burial exhibited periosteal reaction. The mid-diaphysis of the left ulna associated with Burial 27 shows roughness and porosity consistent with periosteal reaction (Figure 67). This burial was a minimum of two individuals and the burials were poorly represented. Though there were dental pathologies, no other pathologies were noted in this burial. Due to the condition and incompleteness of the skeleton and that there are multiple individuals present, a determination can not be made as to whether the reaction was more likely infection or trauma.



Figure 68: Anterior view of C2 and C3



Figure 69: Inferior view of C3 showing porosity and enlargement of left facet

### *Metabolic*

Osteoporosis is a metabolic disorder characterized by a loss in total bone mass as a consequence of an imbalance between bone resorption and formation (Krane and Holick 1991:1921, White 2000). It is often associated with aging, with women being affected more often than men (White 2000, Grady et al. 2001). The vertebrae are one of the most common areas associated with osteoporotic changes. In this assemblage, one burial (Burial A), expressed metabolic changes (Figure 68, 69, 70, 71, 72). Note the excessive porosity visible. This is accompanied with collapsed vertebral bodies.



Figure 70: Superior view of C4



Figure 71: Superior view of C5



Figure 72: Superior view of C6

*Stress Indicators*

Stress indicators can express episodes of malnutrition or chronic infection (Grady et al. 2001, Lewis and Roberts 1997). The indicator associated with this population is criba orbitalia. Criba orbitalia is expressed as lesions on the roof of the eye orbits, often associated with anemia due to environmental stress/malnutrition (White 2000, Grady et al. 2001). Though associated with anemia, traumatic injury can also create porosity mimicking criba orbitalia (Walker et al. 2009, Wolter 1979, Griffeth et al. 1997, Woo and Kim 1997, Sabet et al. 2001). In the CA-SCL-125 assemblage, frontal bone elements containing orbitals, were scarce. Burial 1 did contain a



Figure 73: Porosity on the superior surface of the left orbit – Burial 1



Figure 74: Porosity on the left supraorbital ridge – Burial 1

portion of the left orbit that also exhibited porosity on the roof of the orbit and extending to the supraorbital ridge (Figure 73 and 74). Criba orbitalia typically expresses bilaterally. Regretably, only one orbit is present, making the diagnosis tentative.

*Other –*

### *Tumor*

Tumors are masses of tissue which persist and grow independent of their surrounding structures and have no physiological use (Dorland 1932). Tumors can be benign or malignant.

Benign tumors are often encapsulated and push other tissues aside, while malignant tumors tend to



Figure 75: Soft tissue tumor depression – Burial 2b

infiltrate surrounding tissues (Dorland 1932). The lesion on the postero-lateral surface of the left humerus of Burial 2b is consistent with damage caused by a benign tumor (Figure 75).

Causes of these tumors ranges greatly and includes genetics and environmental origins.

### *Spondylolysis*

The remaining pathology represented in this assemblage is spondylolysis, which is a separation of the neural arch from the vertebral body at the pedicle (Dorland 1932: 1204, Cyron et al. 1976). In the lumbar vertebrae, this defect occurs most commonly in L5 (Harvey et al. 1998). This particular defect may or may not have caused associated pain (Standaert and Herring 2000). It is unclear if the defect is part of a congenital weakness, an indicator of stresses, or both (Harvey et al. 1998, Ortner and Putchar 1985:358).

Two burials in this assemblage exhibited spondylolysis. Burial 17 exhibits a unilateral separation occurring on the left side at the pedicle of the third or fourth lumbar vertebra. Only two lumbar fragments are present, making it impossible to assess the involvement of any lower vertebrae. Burial 26-2 was a unique individual in that there were a total of six interlocking vertebrae. The sixth lumbar vertebrae has bilateral separation of the neural arch from the body at the pedicle (Figure 76). All lumbar vertebrae are present and no other lumbar vertebrae exhibit separation.



Figure 76: Spondylolysis of the 6<sup>th</sup> lumbar – Burial 26-2

## **Discussion**

Previously, the osteological remains had been reviewed by Mark Cunningham under Dr. Robert Jurmain. Brief descriptions for the pathologies and diagnoses were included in the notes adopted as the NAGPRA report. Though I agreed with most of the possible diagnoses, I disagreed with the assessment for Burial A.

Although I agree with the diagnosis of degenerative arthritis, also known as degenerative joint disease or osteoarthritis (White 2000), I do not agree with the diagnosis of congenital block vertebrae. The diagnosis of the block vertebrae was based on the partial fusion of C2 and C3. Block vertebrae are when two or more vertebrae fail to bilaterally segment. This is a developmental field defect that means a mistake is made in the coding shortly after conception (Giampietro et al. 2009, Martinez-Frias et al. 1998, Martinez-Frias 2004).

Blastogenesis occurs from the time of conception to about 28 days. During this time, the midline is defined, which later becomes the foundation for the vertebrae. Segmentation is also

ordered at this time. Developmental field defects such as block vertebrae begin here. Also during this time, vital organs are beginning to form. Mothers who have infants with blastogenetic defects have a higher proportion of spontaneous abortion. In modern times, developmental field defects occur in about 4 out of 10,000 births (Giampietro et al. 2009, Optiz et al 2002, Martinez-Frias et al. 1998, Martinez-Frias 2004).

Organogenesis marks the segmentation of the vertebrae as well as chondrification and the beginning of ossification. Chondrification (when the tissues become cartilaginous) begins 6-7 weeks post conception (Martinez-Frias et al. 1998, Martinez-Frias 2004). At this point, the vertebrae should be forming distinct units. This is followed by the formation of ossification centers by the eighth week. The mistakes made earlier will soon ossify into bone. At birth, the vertebrae are still in three pieces (White 2000, Giampietro et al. 2009, Martinez 2004, Gray 1974). By the age of 1, the arches have fused together. By 3-6 years of age, the arches fuse to the body (Giampietro et al. 2009, White 2000, Wilkinson 1960, Usher 2000).

Blastogenetic defects are polytopic, meaning there are multiple defects. During my research, I discovered Klippel-Feil syndrome consistently exhibits cervical block vertebrae. The constellation of conditions that can occur with this syndrome include scoliosis, deafness, heart and renal abnormalities (Hensinger et al. 1974). Blastogenetic disorders are usually genetic, though there is evidence of environmental causes such as untreated insulin dependent diabetes in the mother (Castori et al. 2008). Cervical block vertebrae occur in less than 0.7% of the world population and there are no other reported cases found in the archaeological record of California (Murphy and McKenzie 2010). Only a few cases were recorded in Canadian Inuit populations (Merbs 2004).

Although block vertebrae are most commonly seen at the second and third vertebrae, which is the area in question with this individual, block vertebrae result in the lack a fissure to form (Barnes 1994). In the case of these vertebrae, the area of the fissure is visible and fusion can also occur due to degenerative osteological changes and therefore should not be ruled out (Merbs 2004, Barnes 1994, Brickley 2002). In fact, this is also the most common area for degenerative cervical spinal disease to express itself (Weber et al. 2003). The degenerative condition of the vertebrae can also account for the collapse of several of the vertebral bodies (Brickley 2002). There are other possible, though less likely diagnoses for the pathologies notes. For example, another possibility is myeloma, which in 20% of the cases produced changes to the spinal column including collapsed vertebra and osteoporosis (Tosi 2013), or chronic infection.

Also, the vertebral column was reassembled and glued. The elements were then x-rayed and an angle of kyphosis was measured using the Cobb method (Harrison et al. 2000) and found to be 37 degrees (Cunningham 1994) (Figure 77). In examining the elements before the glue was removed, it was found that not all of the facets and articulating points were properly aligned. A certain degree of kyphosis can be assumed when the anterior portion of the vertebral body has collapsed causing a triangular or wedge-shape (Brickley 2002). Though these vertebrae were relatively complete and several vertebral bodies are collapsed in this individual, it would be difficult without the non-skeletal elements present to accurately measure the specific angle. Kyphosis is also measured with the individual typically in a standing position so as all of the appropriate forces are acting against the joint surfaces (Weber et al. 2003, Harrison et al. 2000). Though given the condition of the vertebrae it is likely that the individual did have an abnormal curvature, the exact degree of the curvature is in question.

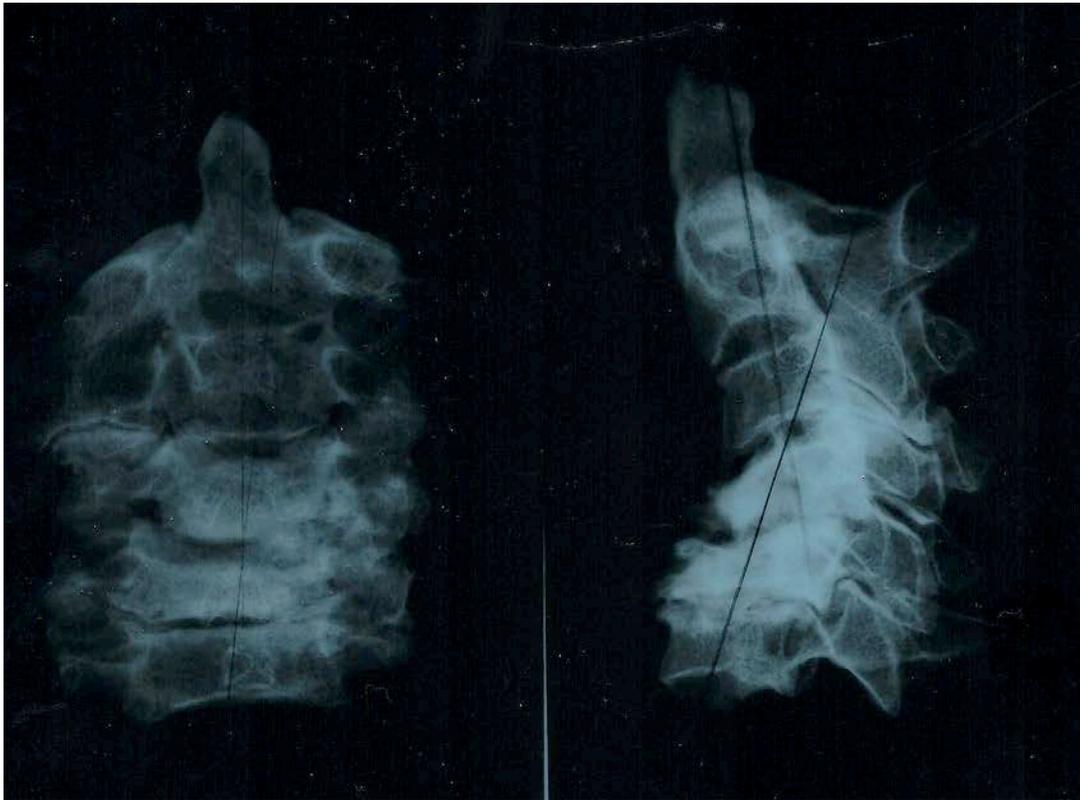


Figure 77: X-ray taken of Burial A showing the measurement of kyphosis.

## Chapter 5

### Analysis of Shellfish and Faunal Remains

#### Introduction

This chapter provides an overview of the shellfish and faunal remains recovered by San Jose State University and West Valley College at the CA-SCL-125 site. The assemblage consisted of over 303 shellfish remains, 66 antler fragments, and 658 faunal bone fragments. A comprehensive analysis of the shellfish and faunal remains is outside the scope of this present study. This preliminary review and sort of these ecofactual materials was undertaken in order to 1) provide an accounting for these remains, 2) generate an updated catalog for the curation of these remains, 3) preparation of these materials for future research and analysis.

#### Methods

The shellfish and faunal elements were removed from their bags and sorted into respective categories. General information about provenience, general faunal bone (e.g., large or small mammal, antler, bird bone, or if previously identified animal species) or shell type was recorded. Human remains were removed from the faunal collection and curated with the other human elements as isolates. After sorting and recording, the shellfish and faunal elements were placed in new plastic bags with the site number, reference number, provenience, and brief description on the bag. Elements that did not have a reference number were assigned a new number.

*Shellfish Remains*

Portions of the shellfish remains were identified by species in collaboration with Alan Leventhal. These identified species are listed below with their provenience (Table 7).

**Table 7: Shellfish Distribution, Identification and Number**

Ref #	Provenience / CM	Common Name	Species Name	# of fragments
66-B-3	Trench 1C	Shell		2
FS 800-1	Unknown	Black Abalone	<i>Haliotis cracherodii</i>	2
500	Unknown	Muscle Shell	<i>Mytilus edilus</i>	100+
F-050	Pit 2B	Muscle Shell	<i>Mytilus edilus</i>	2
F-051	Unknown	Shell		5
76-5	Pit 3	Muscle Shell	<i>Mytilus edilus</i>	100+
76-3	Pit 3	Small Crab		1
89-5a	Trench 1B	Shell		13
89-5b	Pit 6	Scallop	<i>Pecten circularis</i>	1
88-1	Surface	Shell		19
88-1a	Surface	Shell		1
88-1b	Unknown	Muscle Shell	<i>Mytilus edilus</i>	23
88-1c	Pit 1	Shell		5
88-1d	Pit 6	California horn snail	<i>Cerithidea californica</i>	2
88-1e	Pit 8	California horn snail	<i>Cerithidea californica</i>	1
88-1f	Pit 3	California horn snail	<i>Cerithidea californica</i>	2
75	Pit 2	Shell		23
F-052	Unknown	Oyster	<i>Ostrea sp.</i>	1

A total of five shellfish species were identified. By far the most commonly represented shell in the collection was *Mytilus edilus*, or the blue mussel (97%). This is followed by *Cerithidea californica*, or the California horn snail (1.6%), *Ostrea lurida*, or the bay oyster (0.3%), *Pecten circularis*, or the scallop (0.3%), and *Haliotis cracherodii*, or black abalone

(0.3%). The prevalence of *Mytilus edilus*, *Cerithidea californica*, and *Ostrea lurida* is repeated at other sites and indicates their importance as a food resource (Leventhal et al. 2014, Gerow and Force 1968, Cartier et al. 1993:168-171)

*Mytilus edilus*, the blue muscle, is an intertidal species found in both the Atlantic and Pacific Oceans (Figure 78).

These muscles prefer to live in large colonies, attaching itself to rocks. They can vary greatly in size from approximately a few centimeters up to approximately 20 centimeters. *Mytilus*



Figure 78: *Mytilus edilus*

*edilus* is an edible shellfish that can be prepared in a variety of

ways (Jacknis 2004, Kroeber 1925, Heizer and Elsasser 1980). Father Juan Crespi noted large numbers of muscle shells were in Ohlone villages during his 1774 expedition (Bean 1994:19).

They were collected using a sharpened stick. Care must be taken during red tides as this shellfish can absorb a high enough level of toxins to produce a paralysis (Suchanek 1981). This poisoning appears to have been known to Native Peoples though is not well recorded (Jacknis 2004).

*Cerithidea californica*, the California horn snail, is a salt marsh species found from central California to Baja California (Figure 79).

*Cerithidea* was a common food item during the Middle Period in other Santa Clara Valley habitation sites, with an increasing prevalence into the Early Late Period suggesting an increasing reliance on the horn snail and resource intensification (Bryne and Byrd 2009:85).



Figure 79: *Cerithidea californica*

*Ostrea lurida*, the Olympic oyster, is found in bays and estuaries, attaching them to the undersides of rocks (Figure 80). It can also survive in areas where fresh water interacts with salt water, creating fluctuations in salinity. A valuable food source, the Olympic oyster was almost extirpated from the San Francisco Bay in the 1800s due to overharvesting (Bulseco 2010). The native peoples collected this resource by gathering by hand or with the use of a digging stick (Jacknis 2004).



Figure 80: *Ostrea lurida*

*Pecten circularis*, the scallop, is unique among bivalves due to its ability to swim away from predators (Figure 81). A salt-water animal, the scallop prefers shallower water. The scallops can be collected by wading through the shallow waters at low tide and simply picked up (Gosling 2003:50).



Figure 81: *Pecten circularis*

*Haliotis cracherodii*, the black abalone, is a large member of the snail family that lives in rocky tidal and sub-tidal habitats along the Pacific coast (Figure 82). During low tides, they wedge themselves into rock crevices, while when immersed, especially at night, they may be found moving over the rocks (NOAA 2013). A sharpened hard wood stick would be used to dislodge the abalone from the rocks. The abalone was used as food as well as the shell being used for jewelry and trade (Jacknis 2004, Bean 1994).



Figure 82: *Haliotis cracherodii*

*Faunal Remains: Large or Small Mammal*

All of the faunal remains were preliminarily sorted. In total there were 658 faunal bones contained in this assemblage. Based on the site numbers on the artifacts, this portion of the collection includes contributions from both San Jose State University and West Valley College. Distribution of the faunal remains is as follows (Table 8).

**Table 8: Faunal Bone Distribution**

Location	Depth	Category	# of Fragments
Trench 2B Pit 7	20-30 cm	Bird Bone	1
Pit 3		Bird Bone	4
Pit 7		Bird Bone	1
	Surface	Bird Bone	5
Unknown		Bird Bone	4
Unknown		Fish Bone	1
Pit 1C		Large Mammal	1
Pit 1		Large Mammal	5
Pit 2		Large Mammal	46
Pit 3		Large Mammal	4
Pit 5		Large Mammal	10
Pit 7		Large Mammal	5
Pit 8		Large Mammal	30
Pit 9		Large Mammal	26
Pit A	60 cm	Large Mammal	7
Trench 3A	20-30 cm	Large Mammal	9
Trench 3A	60-70 cm	Large Mammal	7
Trench 1B	20-30 cm	Large	16

		Mammal	
Trench 1B	30-40 cm	Large Mammal	1
Trench 1B	50-60 cm	Large Mammal	1
Trench 1B		Large Mammal	2
Trench 1C		Large Mammal	11
	Surface	Large Mammal	169
Unknown		Large Mammal	74
Pit 1		Medium Mammal	4
Unknown		Medium Mammal	2
Pit 1		Small Mammal	2
Pit 3		Small Mammal	13
Pit 5		Small Mammal	1
Pit 7		Small Mammal	2
Pit 8		Small Mammal	28
Pit A	60 cm	Small Mammal	1
Pit A		Small Mammal	1
Trench 1B		Small Mammal	1
Unknown		Small Mammal	10
Pit 1		Misc. Faunal	10
Pit 1B	50-60 cm	Misc. Faunal	1
Trench 2B Pit 7	20-30 cm	Misc. Faunal	4
Pit 2		Misc. Faunal	3
Pit 8		Misc. Faunal	64
Pit 9		Misc. Faunal	1
	Surface	Misc. Faunal	47
Unknown		Misc. Faunal	32

The distribution of faunal remains appeared to be from large animal such as artiodactyl (deer) with 423 specimens or 64.3%. Small mammals only represented by 59 fragments or 9% of the assemblage. Birds, fish, and medium sized mammals represented only 3% of the assemblage. There were 162 fragments that were unclassified, but were most likely mammalian.

### *Antler*

The assemblage also contained antler material from cervids (Table 9). Though antler can be an important tool for manufacturing lithics, there was no distinct evident of use on these specimens.

**Table 9: Distribution of Antler Material**

Ref #	Provenience / CM	# of fragments
95-2	Pit 8 70-80 cm	7
95-1	Pit 8 70-80 cm	1
95-3	Pit 8 70-80 cm	2
98-1	Burial 11	1
83-1	Unknown	19
98-1a	Unknown	1
83-1a	Unknown	27
93-1	Unknown	1
166	Unknown	1
167	Unknown	1
F-053	Unknown	5

## **Discussion**

Previous to this study, only several cursory reviews had been conducted on some of the faunal and shellfish remains. Many of the specimens were still conglomerated in the original soil contained in the unit level brown paper bags with minimal information (e.g., “Bag B”) and without any additional associated notes or provenience. For this study, only a preliminary sorting of all specimens was conducted.

Though the provenience within the site may be questionable or absent, potentially due to disturbance from construction activities, answers to questions pertaining to dietary remains can contribute to paleoenvironmental reconstruction. For example, the blue muscle would have been collected as a food source from the San Francisco Bay as well as the California horn snail, which would have been harvested from the Bay salt marsh. It would be expected that there would be a larger quantity of food animals present especially if the recovery area was within the confines of a village, however, based upon limitations in the field recovery program, as well as recovery area, the amount of faunal remains recovered from this site is rather limited in quantity.

It was also not surprising that the majority of the faunal bone was from large animals. This could be due to the ability of the larger animal bone to be recognized during excavation, during screening or that a higher prevalence of large mammal material over other bone. It is unlikely that taphonomy alone would have been the main cause as small bones were present and in good condition. Larger animals would have produced more food for less energy than hunting smaller game and therefore would have been preferred. Further study of these elements is recommended to identify the species of as many of the specimens as possible and to compare these faunal data to other sites.

## Chapter 6

### Analysis of Bone and Shell Artifacts

#### Introduction

This chapter reports on the bone and shell artifacts that were recovered from the salvage excavations at CA-SCL-125. A total of three bone awls were recovered as well as twelve completed shell beads and one bead blank. The beads are made out of *Olivella* shells. The bead type is consistent with A1 series beads (Bennyhoff and Hughes 1987). Though there are more beads and shell pendants mentioned in the student notes recorded during the excavation, none of these artifacts were located in the collection during the duration of the study.

#### Methods

All of the bone and shell artifacts were removed from their bags and organized on trays. Awls were examined for evidence of striations, polishing, burning, or other signs of manufacture or use. The shell beads were examined for perforation type. The bone and shell artifacts were then compared to the existing catalog and none of them matched. They were then placed in new bags, which were labeled with the site number, reference number, brief description, and provenience (when available). Reference numbers were assigned to artifacts lacking them.

#### Bone Artifacts

##### **Bone Awls**

Bone awls are a specialized tool made of bone that has a pointed tip for tasks such as puncturing hides and for basket manufacture. It may or may not have a groove or small hole (eye) for cord attachment. Large animal bones such as long bones and floating ribs (lower ribs

with no sternal attachment) were commonly used (Gifford 1940). This made them useful in a variety of tasks such as basket making, mat weaving, netting, woven traps, and as punches for perforating animal hides.

**Specimen # FS 024** is a bone awl (Figure 83). The modified bone was from a large animal (possibly deer). The base is missing therefore it is impossible to classify using Gifford's 1940 typology. There is no provenience for this specimen. Max. length = 12.9 mm x 2.7 mm.



Figure 83 – Bone Awl

**Specimen # FS 022** is a bone awl crafted from a large animal long bone (Figure 84). The bone appears to be the cannon bone of a deer (Adams and Crabtree 2012).

Typologically it is close in appearance to Gifford's type A1bI awl (Gifford 1940:200). There is no provenience for this specimen.



Figure 84: Bone Awl from long bone

**Specimen # FS 023** is a bone awl with a broken tip (Figure 85). The awl was crafted from a large animal long bone. There is no provenience for this specimen.



Figure 85: Possible Bone Awl

## Shell Artifacts

### *Olivella* Shell Beads

The beads represented in the assemblage are Class A1 Simple Spire-lopped beads (Figure 86). As defined by Bennyhoff (1987), these beads are characterized by their nearly complete shells and the spire is removed perpendicular to the axis. These beads have a long history in the western United States, being used for nearly 9,000 years (Fitzgerald et al. 2005).

These beads were common during the Early Period through the beginning of the Late Period (Milliken and Schwitalla 2012). Later beads were often more complex.

**Specimen # 88-1a** are ten Class A1 Simple Spire-lopped beads (Figure 87). Based up the measurements provided by Bennyhoff and Hughes (1987:117), one bead is sub-classified as A1a small spire lopped (6.11 mm diameter), seven are sub-classified as A1b medium spire lopped (7.34 mm, 7.46 mm, 7.47 mm, 7.52 mm, 7.56 mm, 7.98 mm, and 8.66 mm diameters), and two are sub-classified as A1c large spire lopped (9.63 mm and 10.58 mm diameters). There is no provenience associated with these specimens.

**Specimen # 88-1b** are two *Olivella* shells (Figure 88). One shell appears to be spire-lopped, while the other appears relatively whole. Both of these shells were recovered from Pit 8 at an unknown depth.



Figure 86:  
Close up of  
spire – Ref #  
88-1a



Figure 87:  
*Olivella* shell  
beads – Ref #  
88-1a



Figure 88: *Olivella*  
beads – Ref # 88-1b

Based on Bennyhoff and Hughes, these beads are both sub-classified as A1b medium spire lopped (7.32 mm and 7.22 mm diameter) (Bennyhoff and Hughes 1987:117)

**Specimen # 88-1c** is an intact *Olivella* shell (Figure 89). The shell is consistent in size and shape with the other shell beads. This shell was recovered from Pit 2 at an unknown depth.



Figure 89: *Olivella* shell – Ref # 88-1c

## Discussion

The loss of the other shell artifacts from the collection such as shell pendants that are mentioned in the student field notes limits any temporal and cultural interpretation for the present study relative to the classification of the Mission artifacts. However, the artifacts that are present represent activities such as the bone awls for puncturing materials in a manufacturing process. The awls also represent a particular material type as all of them were manufactured from the remains of large animals.

Shell beads were often strung or sewn to other objects such as clothing (Bennyhoff and Hughes 1987). The beads in this assemblage were A1 spire lopped beads that were often strung together (Bennyhoff and Hughes 1987:117). Though beads often have a temporal component, these beads have an extended context. This particular style of bead had a long history, extending from the Late Early Period into the Early Late Period. The A1a small spire lopped

was more common during the Early Period (3000 BC through approximately 500 BC) and Phase I of the Late Period (approximately AD 900 to AD 1500), while the A1c large spire lopped was dominant in the Protohistoric and Middle Period (approximately 200 BC to AD 700) (Bennyhoff and Hughes 1987:118). The A1b medium spire lopped was common throughout the different time periods and thus has no temporal significance (Bennyhoff and Hughes 1987:118).

## Chapter 7

### Analysis of Flaked, Ground, Pecked, and Battered Stone

#### Introduction

This chapter reports on the analysis of the flaked, ground, pecked, and battered stone tool assemblages that were recovered from CA-SCL-125 by San Jose State University and West Valley College in 1971 to approximately 1974. The assemblage was recovered from several contexts: 1) surface finds, 2) hand excavated trench units, 3) hand excavated test units, 4) in construction excavations, 5) and materials collected and donated by local residents. Over 2,132 lithic elements were recovered.

#### Methods

All of the lithic materials were removed from their bags and placed onto sorting trays in the San Jose State University Department Anthropology Laboratory. These materials were examined and sorted by material type, stage and probable mode of reduction and modification, and overall condition and form. The stone tools were then closely examined for any provenience as less than half of the bags containing the lithics identified any provenience. All of the final material classifications were independently verified by Anthropology instructor, Mr. Alan Leventhal. All flaked and ground stone tools were compared against the existing catalog, then counted, measured, and weighed. Only approximately five percent of the artifacts matched the older catalog. This may be due to the collection undergoing several numbering schemes as well as not all of the artifacts being catalogued after arriving at the laboratory. After the lithics were recorded, they were placed in new bags marked with the current site number, reference number,

provenience (if available), material type, classification, number of pieces (if more than one), and weight. In the case of multiple reference numbers on an artifact, preference was given to the CA-SCL-125 associated specimen number. In the case of no associated reference number, one was then assigned. The tools and equipment used in the analysis included:

- Bausch & Lomb AS24 10.5x – 45x variable stereoscopic microscope
- Ohaus Series 700 2610g triple beam balance scale
- Mitutoyo Model CD-6 electronic digital caliper

The following attributes were employed for classifying formed tools, informal tools and waste flake / debitage (after Leventhal et al. 2009):

1. Material type
2. Type of flake (flaking debris) based on the following criteria:
  - (a) Probable mode of production (e.g., bipolar, freehand hard hammer, soft hammer, or pressure flaking)
  - (b) Condition of flake (e.g., complete, fragmented, shattered, thermally spalled etc.)
  - (c) Size and shape (e.g., orientation of the platform and bulb of percussion, expanding)
  - (d) Overall thickness of the flake
  - (e) Presence, absence and percentage of cortex present on the dorsal and /or platform
3. Informal tools (e.g., utilized flakes, modified flakes), based on:
  - (a) Degree of edge modification
  - (b) Observed type of use/wear patterns and edge damage
4. Formed (formally flaked) tools, based on:
  - (a) Overall morphology and degree of modification
  - (b) Presence of use/wear patterns or edge damage (e.g., polish, nibbling, impact fractures)
  - (c) Evidence of reworking and reuse

Based on the above attributes, a total of nine formed (formal) and informal tools as well as eleven debitage / waste flake categories were identified and are listed below:

### **Formed (Formal) and Informal Tools**

1. Cores, Core Fragments, Assayed Cobbles and Assayed Pebbles (112 specimens)
2. Utilized Flakes (53 specimens)
3. Modified Flakes (48 specimens)

4. Projectile Points / Biface (16 specimens)
5. Backed Knives (3 specimens)
6. Scrapers (1 specimens)
7. Choppers (1 specimens)
8. Borers (1 specimens)
9. Groundstone (69 specimens)

### **Debitage / Waste Flakes**

1. Cortical Flakes (177 specimens)
2. Primary Flakes (1,173 specimens)
3. Thinning Flakes (190 specimens)
4. Pressure Flakes (2 specimens)
5. Bipolar Cortical Flakes (11 specimens)
6. Shatter (174 specimens)
7. Thermal Spalls (7 specimens)
8. Bipolar Wedge (2 specimens)
9. Bipolar Flakes (42 specimens)
10. Core Rejuvenation Flakes (4 specimens)
11. Cortical Shatter (24 specimens)

These formed (formal) and informal tools along with twenty flaked stone debitage classes fall into fifteen identified material types that are:

- |                                  |                        |
|----------------------------------|------------------------|
| 1. Red Franciscan Chert (RFC)    | 9. Siltstone (Slt)     |
| 2. Green Franciscan Chert (GFC)  | 10. Sandstone (Sa)     |
| 3. Yellow Franciscan Chert (YFC) | 11. Quartzite (Qtzite) |
| 4. Monterey Chert (MC)           | 12. Quartz (Qtz)       |
| 5. White Franciscan Chert (WFC)  | 13. Chalcedony (Chal)  |
| 6. Obsidian (Obs)                | 14. Basalt (Ba)        |
| 7. Steatite (St)                 | 15. Rhyolite (Rhy)     |
| 8. Chert/other (Co)              |                        |

### **Flaked Stone Artifact Descriptions**

#### **Cores, Core Fragments, Assayed Cobbles and Assayed Pebbles**

Cores are made on pebbles, cobbles, and other knappable stone materials to produce lithic elements: 1.) products (cores, bifaces, primary flakes, and etc.) and 2.) by-products (flakes, blades, and debitage). Cores from this collection fall into six types:

Type 1 - Cobble cores	(10 specimens)
Type 2 - Pebble cores	(14 specimens)
Type 3 - Exhausted cores	(40 specimens)
Type 4 - Bipolar pebble / cobble cores	(5 specimens)
Type 5 - Core Fragments	(9 specimens)
Type 6 - Assayed pebble /cobbles	(34 specimens)

A total of one hundred and twelve specimens were classified as cores or assayed pebbles from this assemblage (see Table 10: Distribution of Core Types). I will employ definitions proposed by Leventhal et al. 2009 (Pp. 11-7 – 11-11) will be presented below to define the different core and assayed types of tools.

**Type 1: Cobble cores** generally consist of fist sized rounded cobbles (originally larger than 3 inches) of various lithic materials which display a limited amount of flake detachment along one edge. They retain much of their original cortex and size, thus distinguishing them from the smaller pebble cores.

**Type 2: Pebble cores** share the same basic characteristics as cobble cores, except that they tend to be less than 3 inches in original overall maximum length.

**Type 3: Exhausted cores** tend to be too small or difficult for further reduction, hence the usefulness has become exhausted.

**Type 4: Bipolar cores** are made on either cobble or pebble-sized lithic material and display distinctive bulbar expressions that are characteristic of hard hammer and anvil reduction techniques.

**Type 5: Core fragments** are cores that still retain a portion of their original flake scar detachment and striking platforms, but were either shattered or fragmented during the reduction process.

**Type 6: Assayed pebbles /cobbles** are different from cores in that they exhibit only one or possibly, at most, two flake scars. Although the raw materials may be of knappable quality, they tend to have been struck once, evaluated or “assayed,” and then discarded for some unknown reason.

**Table 10: Distribution of Core Types**

Specimen #	Type	Provenience / Depth	# of Pieces	Material Type	Weight
Ref 8b	Type 1 Cobble Core	Burial 12 15 cm	1	RFC	204.6 g
51a	Type 1 Cobble Core	Surface	1	RFC	199.5 g
42	Type 1 Cobble Core	Unknown	1	Chal	169.8 g
090-2	Type 1 Cobble Core	Surface	1	GFC	185.2 g
37	Type 1 Cobble Core	Unknown	1	GFC	328.4 g
39	Type 1 Cobble Core	Surface	1	GFC	172.7 g
40	Type 1 Cobble Core	Unknown	1	RFC	162.9 g
41	Type 1 Cobble Core	Surface	1	RFC	200.6 g
018-2a	Type 1 Cobble Core	Surface	1	Chal	158.7 g
71	Type 1 Cobble Core	Surface	1	RFC	124.3 g
FS 067-2	Type 2 Pebble Core	Burial 1	1	Co	100.3 g
072-4	Type 2 Pebble Core	Pit 1B 20-30	1	RFC	57.9 g
072-1a	Type 2 Pebble Core	Surface	1	RFC	73.5 g
072-2	Type 2 Pebble Core	Surface	1	RFC	52.0 g
081-1b	Type 2 Pebble Core	Unknown	1	Chal	127.2 g
081-1c	Type 2 Pebble Core	Unknown	1	GFC	79.6 g
081-1d	Type 2 Pebble Core	Unknown	1	GFC	79.5 g
081-1e	Type 2 Pebble Core	Unknown	1	GFC	45.5 g
081-4	Type 2 Pebble Core	Unit 3B 0-10	1	GFC	70.2 g
081-2a	Type 2 Pebble Core	Surface	1	GFC	49.5 g
070-1	Type 2 Pebble Core	Pit 3	1	RFC	30.5 g
38	Type 2 Pebble Core	Unknown	1	RFC	131.3 g
05-1	Type 2 Pebble Core	Unknown	1	RFC	74.6 g
05-1a	Type 2 Pebble Core	Surface	1	RFC	44.5 g
69	Type 3 Exhausted Core	Surface	1	RFC	17.3 g
F-002	Type 3 Exhausted Core	Burial 2 10 cm	1	GFC	92.3 g
F-003	Type 3 Exhausted Core	Burial 2 10 cm	1	GFC	47.7 g
Ref 8c	Type 3 Exhausted Core	Burial 12 15 cm	1	RFC	53.4 g
073-4a	Type 3 Exhausted Core	Unit 2C 10-20 cm	1	GFC	16.3 g
072-1	Type 3 Exhausted Core	Unknown	1	RFC	100.4 g
072-3	Type 3 Exhausted Core	Pit 2B	1	RFC	17.7 g
090-2a	Type 3 Exhausted Core	Unknown	1	GFC	31.5 g
090-2b	Type 3 Exhausted Core	Surface	1	GFC	96.8 g
090-2c	Type 3 Exhausted Core	Surface	1	GFC	69.1 g
090-2d	Type 3 Exhausted Core	Unknown	1	GFC	84.4 g
090-2e	Type 3 Exhausted Core	Surface	1	GFC	26.8 g
080-1	Type 3 Exhausted Core	Surface	1	GFC	60.3 g
074-2a	Type 3 Exhausted Core	Surface	1	GFC	13.1 g
090-1	Type 3 Exhausted Core	Unknown	1	RFC	37.5 g
081-1a	Type 3 Exhausted Core	Unknown	1	RFC	46.4 g

081-2	Type 3 Exhausted Core	Surface	1	GFC	19.7 g
081-2b	Type 3 Exhausted Core	Surface	1	GFC	31.7 g
077-4	Type 3 Exhausted Core	Pit 1B 0-10 cm	1	GFC	22.8 g
05-1b	Type 3 Exhausted Core	Unknown	1	RFC	17.7 g
05-1c	Type 3 Exhausted Core	Unknown	1	RFC	21.6 g
05-1d	Type 3 Exhausted Core	Unknown	1	RFC	32.8 g
05-1e	Type 3 Exhausted Core	Unknown	1	RFC	50.8 g
05-1f	Type 3 Exhausted Core	Unknown	1	RFC	37.1 g
05-1g	Type 3 Exhausted Core	Unknown	1	RFC	36.7 g
05-1h	Type 3 Exhausted Core	Unknown	1	RFC	22.0 g
05-1i	Type 3 Exhausted Core	Unknown	1	RFC	9.8 g
05-1j	Type 3 Exhausted Core	Unknown	1	RFC	16.7 g
098-2	Type 3 Exhausted Core	Unknown	1	RFC	30.7 g
F-006	Type 3 Exhausted Core	Pit 3B 20-30 cm	1	GFC	21.6 g
052-2	Type 3 Exhausted Core	Surface	1	RFC	14.2 g
052-2a	Type 3 Exhausted Core	Unknown	1	RFC	37.2 g
F-007	Type 3 Exhausted Core	Trench 3C 30-40 cm	1	RFC	33.0 g
F-008	Type 3 Exhausted Core	Pit 2C 20-30 cm	1	RFC	28.6 g
F-009	Type 3 Exhausted Core	Pit 5	1	RFC	37.1 g
F-010	Type 3 Exhausted Core	Pit 2C 10-20 cm	1	RFC	30.9 g
F-011	Type 3 Exhausted Core	Unknown	1	RFC	51.4 g
F-012	Type 3 Exhausted Core	Unknown	1	GFC	47.0 g
F-013	Type 3 Exhausted Core	Unknown	1	GFC	56.5 g
7	Type 3 Exhausted Core	Curie Rd	1	RFC	22.7 g
F-001	Type 4 Bipolar Core	Burial 2 10 cm	1	GFC	17.4 g
Ref 8d	Type 4 Bipolar Core	Burial 12 15 cm	1	RFC	27.8 g
073-1a	Type 4 Bipolar Core	Unknown	1	GFC	13.9 g
043-1	Type 4 Bipolar Core	Unknown	1	MC	29.1 g
018-2	Type 4 Bipolar Core	Surface	1	GFC	25.3 g
F-004	Type 5 Core Fragment	Unit 2B 10-20 cm	1	RFC	21.3 g
F-005	Type 5 Core Fragment	Trench 1 Pit 2 40-50 cm	1	RFC	8.4 g
91	Type 5 Core Fragment	Unknown	1	Chal	32.1 g
080-4	Type 5 Core Fragment	Unit 2A 10-20 cm	1	GFC	40.0 g
96	Type 5 Core Fragment	Surface	1	RFC	102.5 g
54	Type 5 Core Fragment	Pit 3A 70-80 cm	1	RFC	29.5 g
F-014	Type 5 Core Fragment	Pit 1B 20-30	1	RFC	28.0 g
19	Type 5 Core Fragment	Unknown	1	MC	23.6 g
19a	Type 5 Core Fragment	Unknown	1	MC	45.3 g
78-1	Type 6 Assayed Pebble	Unknown	1	GFC	130.9 g
78-2	Type 6 Assayed Pebble	Unknown	1	RFC	18.3 g
78-3	Type 6 Assayed Pebble	Unknown	1	RFC	91.6 g
78-4	Type 6 Assayed Pebble	Unknown	1	RFC	20.6 g
78-5	Type 6 Assayed Pebble	Unknown	1	RFC	58.4 g
78-6	Type 6 Assayed Pebble	Unknown	1	RFC	40.3 g

51b	Type 6 Assayed Pebble	Surface	9	RFC	357.6 g
051-1	Type 6 Assayed Pebble	Unknown	3	RFC	200.2 g
057-3	Type 6 Assayed Pebble	Surface	1	RFC	52.2 g
067-1	Type 6 Assayed Pebble	Unknown	1	J	69.0 g
096-3	Type 6 Assayed Pebble	Unit 1B 20-30 cm	1	RFC	16.5 g
096-2	Type 6 Assayed Pebble	Surface	1	RFC	40.9 g
081-1f	Type 6 Assayed Pebble	Unknown	2	GFC	80.4 g
53	Type 6 Assayed Pebble	Unit 1B 0-10 cm	1	RFC	25.7 g
018-2b	Type 6 Assayed Pebble	Surface	1	YFC	17.8 g
070-2	Type 6 Assayed Pebble	Trench 1C 40-50 cm	1	RFC	12.6 g
078-4	Type 6 Assayed Pebble	Pit 1B 0-10 cm	1	GFC	19.8 g
05-1k	Type 6 Assayed Pebble	Unknown	1	RFC	59.5 g
63	Type 6 Assayed Pebble	Pit 1B 0-10 cm	1	RFC	58.9 g
F-015	Type 6 Assayed Pebble	Unknown	1	Ba	468.2 g
F-016	Type 6 Assayed Pebble	Pit 3	1	RFC	22.0 g
F-017	Type 6 Assayed Pebble	Trench 3C 0-10 cm	1	RFC	23.8 g
F-018	Type 6 Assayed Pebble	Surface	1	Ba	56.1 g

### **Utilized Flakes**

Utilized flakes are informal or generalized tools that are characterized by edge-damage caused by use. These tools are often used for cutting, scraping, and shaving before being discarded. These flakes show little to no purposeful detachment modification. According to Shen (1999), the flake must have one or more edges or Edge Units (E.U.s) that exhibit evidence of use/wear patterns.

A total of fifty-three flake stone elements have been classified as “Utilized Flakes” from this assemblage. The distribution and context from which these utilized flakes were recovered as follows (Table 11):

**Table 11: Distribution of Utilized Flakes**

Provenience / CM	# of Pieces	Material Type
Burial 5	1	RFC
Pit 3	1	YFC
Pit 3A 20-30 cm	2	RFC
Pit 3A 70-80 cm	1	RFC
Pit 3B 0-10 cm	1	RFC
Pit 3B 30-40 cm	1	RFC
Pit 6	1	RFC
Surface	3	GFC
Surface	8	RFC
Trench 1 Pit 2 40-50 cm	1	RFC
Unit 1B 0-10 cm	2	RFC
Unit 3A 0-10 cm	1	GFC
Unknown	14	RFC
Unknown	2	MC
Unknown	12	GFC
Unknown	1	Qtzite
Unknown	1	YFC

### **Modified Flakes**

According to Hylkema (1985) and Shen (1999), modified flakes are informal tools that represent incomplete stages of manufacture. The artifact underwent some initial reduction and then was later abandoned. Leventhal et al. (2009) also states that modified flakes can also represent resharpened tools that were discarded after modification.

A total of forty-eight elements were classified as “Modified Flakes” from the assemblage. Table 12 presents the distribution and context from which these modified flakes were recovered is as follows:

**Table 12: Distribution of Modified Flakes**

Provenience / CM	# of Pieces	Material Type
Curie Rd	1	RFC
Pit 1B	1	RFC
Pit 1B 20-30 cm	2	GFC
Pit 1C 10-20 cm	1	RFC
Pit 2B 40-50 cm	1	GFC
Pit 2C 10-20 cm	1	RFC
Pit 3B 30-40 cm	1	GFC
Pit 5	1	Chal
Pit 9	1	RFC
Surface	17	RFC
Trench 3C 10-20 cm	1	GFC
Trench 3C 20-30 cm	1	RFC
Trench 3C 60-70 cm	1	GFC
Unit 3A 40-50 cm	1	RFC
Unknown	17	RFC

**Projectile Points/Bifaces**

Projectile points are typically bifacially flaked tools with piercing tips. They are attached to the ends of lances, spears, darts or arrows for purposes of hunting game and warfare. A total of sixteen projectile points/bifaces were identified in the assemblage. The distribution and context from which these projectile points/bifaces were recovered is as follows (see Table 13). The attributes of the projectile points/bifaces specimens are described below.

**Table 13: Distribution of Projectile Points**

Specimen #	Provenience / CM	Description	Material Type	Weight
FS 010	Burial 1 40 cm	Leaf-shaped dart point base	MC	3.5 g
71-46	Burial 25 Surface	Biface fragment	RFC	2.2 g
FS 008	Burial A	Distal portion of dart point	RFC	8.6 g
3	Curie Rd	Leaf-shaped dart point	MC	7.7 g
2	Curie Rd	Large contracting stem dart point	GFC	24.9 g
5	Curie Rd	Dart base	WFC	3.6 g
6	Curie Rd	Dart base	Obs	2.8 g
45-2	Curie Rd	Projectile point tip	Obs	3.1 g
9	Unknown	Leaf-shaped dart fragment	GFC	6.7 g
20	Unknown	Dart base	MC	0.9 g
002a	Unknown	Dart base	90Ba	6.9 g
17	Unknown	Projectile point base	MC	8.3 g
18	Unknown	Projectile point tip	MC	5.2 g
068-1	Unknown	Biface fragment	RFC	7.6 g
7	Unknown	Biface fragment	GFC	9.9 g
F-021	Unknown	Biface fragment	Obs	1.1 g

**Specimen # FS 018** is a resharpened projectile point tip of Monterey chert (Figure 90). It is broken diagonally across the mid-section. Max. length = 32.09 mm x 21.84 mm x 10.10 mm. Wt. 5.2 g.

**Specimen # FS 020** is a small dart point base of Monterey chert (Figure 91). Max. length = 16.31 mm x 15.82 mm x 3.96 mm. Wt. 0.9 g.



Figure 90: Projectile point – Ref# FS 018



Figure 91: Dart point base  
– Ref # FS 020



Figure 92: Biface  
fragment – Ref # 007

**Specimen # 007** is a biface fragment of green Franciscan chert (Figure 92). Max. length = 46.07 mm x 23.64 mm x 10.41 mm. Wt. 9.9 g.

**Specimen # 5** is a dart point base of white Franciscan chert (Figure 93). Max. length = 18.78 mm x 21.22 mm x 6.59 mm. Wt. 3.6 g.



Figure 93: Projectile point  
base – Ref # 005

**Specimen # 003** is a resharpened leaf-shaped dart point of Monterey chert (Figure 94). Max. length = 35.40 mm x 18.75 mm x 12.52 mm. Wt. 7.7 g.



Figure 94: Dart Point  
– Ref # 003



Figure 95: Stanford  
Man II projectile point  
base – Ref # FS 017



Figure 96: Leaf-shaped  
dart point – Ref # FS 009

**Specimen # FS 017** is a Stanford Mann II projectile point base of Monterey Chert (Figure 95). Max. length = 42.20 mm x 19.81 mm x 9.91 mm. Wt. 8.3 g.

**Specimen # FS 009** is a leaf-shaped dart point of Monterey chert (Figure 96). Max. length = 41.38 mm x 19.84 mm x 8.46 mm. Wt. 6.7 g.



Figure 97: Dart point  
base – Ref # FS 002

**Specimen # FS 002** is a dart base of basalt (Figure 97). Max. length = 32.93 mm x 26.57 mm x 8.35 mm. Wt. 6.9 g.

**Specimen # 068-1** is a biface fragment of red Franciscan chert that split along the vertical surface due to a weakness in the rock (Figure 98). Max. length – 38.14 mm x 16.44 mm x 9.03 mm. Wt. 7.6 g.



Figure 98: Biface  
fragment – Ref # 068-1

**Backed Knives / Utilized Flakes (3 specimens)**

There were three backed knives identified in the assemblage. Backed knives are tools that appear to have been manufactured on relatively large cortical or primary flakes can be either unifacially or bifacially modified, or it may have been used without further modification (Leventhal et al. 2009). As the name implies, they are often employed in cutting or scraping activities. The opposite edge is a flattened surface, is where the tool was most likely grasped.

**Specimen # 089** is a backed knife of beige Franciscan chert (Figure 99). The specimen was recovered from the surface. Max. length = 5.0 mm x 4.2 mm x 2.6 mm. Wt. 44.0 g.

**Specimen # 075-2** is a backed knife of green Franciscan chert (Figure 100). The specimen was recovered from the surface.

Max. length = 67.07 mm x 45.34 mm x 22.52 mm. Wt. 77.8 g

**Specimen # 073-4** is a backed knife of green Franciscan chert. The specimen was recovered from Pit 1B at a depth of 0-10 cm. Max. length = 45.51 mm x 42.13 mm x 25.52 mm. Wt. 55.8 g.



Figure 99: Backed knife – Ref # 089



Figure 100: Backed Knife – Ref # 075-2

### **Scrapers (1 specimen)**

Scrapers are typically unifacially modified cortical or primary flakes, though in some cases, modification may be bifacial (Shen 1999). The wear patterns tend to be perpendicular to the worked edges, indicating the tool was used in a scraping-like fashion.

**Specimen # 76** is a unifacially modified flake with evidence of soft hammer percussion on the left lateral edge (dorsal view). Max. length = 37.6 mm x 26.3 mm x 10.8 mm. Wt. 13.2 g.

### **Choppers (1 specimen)**

Generally wedge-shaped in cross section, choppers are cobbles that have undergone hard hammer percussion to create an edge for chopping or splitting material (Hylkema 1991). The prepared edges often exhibit polish and crushing from use (Hylkema 1991).

**Specimen # F-022** is a thick cortical flake of basalt with slight edge damage on the distal edge suggesting that it may have been used as a chopper. This specimen was recovered from Pit 1C on the surface. Wt. 301.7 g.

### **Borers (1 specimen)**

According to Cartier (1993), borers were used to bore holes into wood, bone, shell, or stone. The bit end tends to exhibit wear patterns in the form of crushing, rounding, nicking, or polish.

**Specimen # 096-2** is a borer of red Franciscan chert that was recovered from the surface. Max. length = 42.03 mm x 13.49 mm x 21.30 mm. Wt. 12.4 g.

### **Debitage / Waste Flakes**

A total of 1,806 flaked stone elements were classified as “Debitage/Waste Flakes” from the assemblage. These flakes were produced during the manufacture of stone tools. The debitage and waste flakes from this assemblage were classified based on the probable mode of production. A total of thirteen categories as proposed by Leventhal et al. (2009) were used to categorize this collection. The definition proposed by Leventhal et al. 2009 (Pp. 11-14 and 11-15) were employed for this study.

1. Cortical Flakes (177 specimens) – These are broken down by the following material types: RFC: 105, GFC: 68, MC: 1, Qtzite: 1, Chal: 1, Ba: 1. Cortical Flakes are usually produced by freehand hard and/or soft hammer percussion techniques. Cortical flakes represent the first of a series of flake detachment processes and these flakes retain at least 50% or more of their cortex.
2. Primary Flakes (1,173 specimens) – These are broken down by the following material types: RFC: 759, GFC: 371, MC: 26, Chal: 7, Co: 7, WFC: 3. Primary flakes were removed from a core or quarry blank by either hard hammer percussion, or if from a primary blank, by both hard hammer and/or soft hammer percussion techniques. Primary flakes as opposed to cortical flakes, retain less than 50% of the cortex. However, cortex may still be present on the striking platform. If the primary flakes were derived from a primary flake blank, neither cortex or previous flake scars would necessarily be present on the dorsal face.
3. Thinning Flakes (190 specimens) – These are broken down by the following material types: RFC: 120, GFC: 60, MC: 6, Chal: 1, Co: 1, Obs: 2. Thinning Flakes are usually produced by soft hammer or antler baton percussion. These flakes tend to be much thinner than primary flakes with smaller striking platforms and less pronounced bulbs of percussion. They usually retain two or more previously detached flake scars on their dorsal surfaces. These flakes often appear to be byproducts of the production of formed tools, such as bifaces and /or projectile points, rather than the result of initial core reduction. Some thinning flakes are typically longer than they are wide (sometimes referred to as bladelets). These thinning flakes are distinctive and are the result of the last stages of perform/bifacial tool production.

4. Pressure Flakes (2 specimens – Obs: 2) are usually derived from pressing an antler tine, a resharpened bone, or a hafted tooth against the edge of a flake or stone tool, resulting in this distinctively tiny flake. These flakes are usually representative of the very last stages of tool manufacture. The process is also referred to as final edge treatment. Pressure flakes may also be produced as a result of resharpening the edge of a worn tool.
5. Bipolar Cortical Flakes (11 specimens – RFC: 10, GFC: 1) are produced by an anvil and hard hammer reduction technique rather than by freehand hard hammer. These flakes are distinguished by three bulbar types: a) flat or sheared, b) salient, and c) diffused. They retain cortex on their dorsal surface.
6. Shatter (174 specimens – RFC: 131, GFC: 33, MC: 5, Qtzite: 1, Ba: 4) refers to usually angular, irregular shaped detritus that are most probably flake fragments and / or failed “shattered” material derived from assayed cobbles, cores and / or tools. Since these specimens have lost almost all of their flake attributes and characteristics they cannot reliably be placed in any of the other lithic classes.
7. Thermal Spalls (7 specimens – MC: 1, Ba: 1, San: 5) fall into a separate category because they are unintentional byproducts due to exposure to intense heat.
8. Bipolar Wedges (2 specimens – GFC: 2) have cortex running from proximal to distal end along one dorsal margin. Bipolar wedge shaped flakes are usually produced on small rounded cobble and pebble cores. In some cases, however, some wedges do not have cortex present on the dorsal margins.
9. Bipolar Flakes (42 specimens – RFC: 21, GFC: 19, MC: 2) are produced by hammer and anvil technique and have the same distinguishing traits as bipolar cortical flakes, but retain less than 50% cortex.
10. Core Rejuvenation Flakes (4 specimens – RFC: 2, GFC: 2) are really a rare form of primary flakes. These flakes were deliberately removed as a large flake that usually retains part of the original crushed or damaged striking platform area of the core, thus classifying these large flakes as neither a core or a fragment.
11. Cortical Shatter (24 specimens – RFC: 18, GFC: 5, Qtzite: 1) is the same as the “Shatter” class of debitage, except these fragments retain 50% or more cortex.

### **Ground, Pecked, and Battered Stone**

Tools that fall under this category include 1) manos (handstones), 2) mutates (grinding slabs), 3) mortars, 4) pestles, 5) pecked cobbles, and 6) battered stones/hammerstones (Leventhal et al. 2009).

## Manos and Metates

A total of twenty specimens were classified as manos or metates. Manos or handstones were used with grinding slabs that were often called metates. These were used to pound and grind seeds into flour meal. The distribution and context from which these manos and metates were recovered is as follows (Table 14). The attributes of the manos and metates are described below.

**Table 14: Distribution and Context of Manos and Metates**

Specimen #	Material Type	Provenience	Description	Weight
200-10	Sa	Surface	Bifacial Mano Fragment	412.1 g
200-13	Sa	Surface	Bifacial Mano Fragment	990.0 g
200-21	Sa	Surface	Bifacial Mano Fragment	1303.3 g
200-23	Sa	Surface	Unifacial Mano Fragment	262.9 g
200-36	Sa	Surface	Unifacial Mano Fragment	382.8 g
200-37	Sa	Unknown	Bifacial Mano Fragment	192.1 g
200-38	Sa	Unknown	Unifacial Mano Fragment	390.4 g
200-42	Sa	Trench 1C Surface	Bifacial Metate Fragment	393.3 g
200-43	Sa	Unknown	Bifacial Mano Fragment	339.0 g
200-50	Sa	Unknown	Metate Fragment	396.7 g
200-51	Sa	Unknown	Unifacial Mano Fragment	44.1 g
200-55	Sa	Unknown	Bifacial Mano Fragment	550.7 g
200-8	Sa	Surface	Unifacial Mano Fragment	951.8 g
300-26	Sa	Surface	Metate	12.7 kg
300-27	Sa	Unknown	Metate	6.58 kg
300-28	Sa	Unknown	Metate	4.54 kg
300-29	Sa	Unknown	Metate Fragment	2.95 kg
300-30	Sa	Unknown	Metate Fragment	676.6 g
300-31	Sa	Surface	Metate Fragment	4.99 kg
300-64	Sa	Surface	Metate Fragment	281.4 g

**Specimen # 200-10** is a bifacial unshaped mano fragment produced on a round cobble. One area appears to have been exposed to fire. The fragment also exhibits plow scar damage. Max. length = 80 mm, max width = 75 mm

**Specimen # 200-13** is an unshaped bifacial mano made on an intact cobble of fine-grained sandstone. It is rectanguloid in shape and both ends display evidence of slight battering and rounding. Two faces show evidence of grinding. Small grooves on the body displays evidence of heavy equipment damage during construction. Max. length = 133 mm, max. width = 80 mm

**Specimen # 200-21** is an unshaped bifacial mano on a large cobble of sandstone with evidence of battering on one end. Two sides are flattened due to grinding. Specimen exhibits plow scars. Max. length = 149 mm, max. width = 92 mm

**Specimen # 200-23** is a unifacial mano produced on sandstone. The specimen is split perpendicular to the long axis. The broken face may also have been used as an abrader as the high facets are worn flat. Max. length = 89 mm, max. width = 47 mm

**Specimen # 200-36** is a possible unshaped unifacial mano made on a flattened oval shaped cobble of reddish sandstone. One face exhibits slight polish with central pecking and part of this face is partially covered with caliche. A portion of this face exhibits a spall due to end battering. The opposite face does not appear to exhibit any wear patterns, however there is an end battered spall ambifacially located opposite the other spall. Max. length = 93 mm x 84 mm.

**Specimen # 200-37** is an unshaped bifacial mano fragment produced from a ovoid shaped cobble of sandstone. The specimen exhibits rounding along one of the broken surfaces. It appears that the surface was also exposed to fire. After breakage, the specimen had been redeployed as an abrader on a broken end. The high facets on that face exhibit wear and polish. Max length = 86 x 45 mm.

**Specimen # 200-38** is a unifacial mano fragment produced on a roundish cobble of red sandstone. Max. length = 85 mm x 53 mm. Wt. 390.4 g.

**Specimen # 200-42** is a bifacial metate fragment of sandstone. One face is slightly worn and polished, while the other face is flat and polished. After breakage, it was exposed to fire. Max. length = 88 mm x 71 mm. Wt. 393.3 g.

**Specimen # 200-43** is an unshaped bifacial mano fragment of indurated sandstone. Some of the surfaces also show evidence of slight pecking. Max. length = 100 mm x 82 mm. Wt. 339.0 g.

**Specimen # 200-50** is a remnant of a bifacial metate of sandstone. One face has been worn flat which may be the base and the other face retains a worked concave surface. Max. length = 67 mm x 68 mm. Wt. 396.7 g.

**Specimen # 200-51** is a remnant of a unifacial mano of red sandstone. Max. length = 36 mm x 48 mm. Wt. 44.1 g.

**Specimen # 200-55** is an intact shaped bifacial mano of indurated sandstone. Both faces exhibit polish on the entire surfaces and both faces exhibit a centrally placed dimple. Both edges perpendicular to the long axis exhibit pecking as part of the shaping of the tool. One end exhibits pecking and slight battering. Caliche is present on one face and a plow scar is present on the opposite face. Max. length = 96 mm x 75 mm x 46 mm. Wt. 550.7 g.

**Specimen # 200-8** is an intact unifacial mano of sandstone. The cobble has a flattened surface on the bottom, which is consistent with grinding. Slight evidence of battering on the edges with a small spall. One face of the round cobble is heavily ground and slightly beveled. The face is ground polished with some slight parallel striations and two of the edges exhibit rounding and battering and some spalling. It may have been used in conjunction with a basin metate. Max. length = 108 mm x 57 mm. Wt. 951.8 g.

**Specimen # 300-26** is an unshaped bifacial boulder metate of sandstone. The worked surface is pitted and beveled. There is caliche on all aspects. The main working surface has been ground smooth and exhibits evidence of pecked rejuvenation. The opposite face has a ground surface near the wider end with a possible pecked dimpled area near the central portion of the boulder. This is consistent with the Middle Early Period. Max length = 387 mm x 219 mm x 101 mm. Wt. 28 lbs.

**Specimen # 300-27** is an unshaped bifacial boulder metate of sandstone. The worked surface has a few pits and one face exhibits rejuvenation pecking. A portion is heavily ground, while the

opposite face is heavily ground as well. There is minor damage from heavy equipment during construction activities. Max. length = 332 mm x 188 mm x 83 mm. Wt. 14.5 lbs.

**Specimen # 300-28** is an unshaped bifacial boulder metate of sandstone. The worked surfaces show little wear. One face shows grinding on the wider end and is sloped. The other face appears to have general grinding but is obscured by caliche. Max. length = 266 mm x 169 mm x 65 mm. Wt. 10 lbs.

**Specimen # 300-29** is a rectanguloid worked sandstone metate fragment. The flattened surface exhibits pitting on one side and a pecked surface on the other side. The edges are rounded. It is broken perpendicular to the long axis. Max. length = 228 mm x 162 mm x 42 mm. Wt. 6.5 lbs.

**Specimen # 300-30** is a unifacial metate fragment of indurated sandstone. Two edges exhibit flake scar detachment. One face appears ground flat. Max. length = 123 mm x 105 mm x 47 mm. Wt. 676.6 g.

**Specimen # 300-31** is an unshaped basin metate of red sandstone. The face exhibits evidence of heavy striations from grinding. The opposite face appears to have been a boulder mortar with a sloped, worked surface. There is caliche on all surfaces and evidence of damage from heavy equipment during construction activities. Max. length = 199 mm x 227 mm x 107 mm. Wt. 11 lbs.

**Specimen # 300-64** is a remnant of a bifacial metate fragment of indurated sandstone. Both faces exhibit wear patterns. Max. length = 105 mm x 36 mm. Wt. 281.4 g.

### **Mortars and Pestles**

A total of forty-nine specimens were classified as mortars or pestles. Pestles were commonly used in conjunction with mortars or stone bowls (Leventhal et al. 2009). Mortars and pestles were commonly used to pulp or mash foods including acorns, seeds, nuts, berries, fruit, corns, fish and meats (Leventhal et al. 2009). The distribution and context from which these mortars and pestles were recovered is as follows (Table 15). The attributes of the mortars and pestles are described below.

**Table 15: Distribution and Context of Mortars and Pestles**

Specimen #	Material Type	Provenience	Description	Weight
6	Sa	Unknown	Pestle End Fragment	280.6 g
200-1	Sa	Unknown	Mortar Fragment	1079.4 g
200-11	Sa	Unknown	Shaped Pestle Fragment	306.0 g
200-12	Sa	Surface	Unshaped Pestle Fragment	252.6 g
200-2	Sa	Unknown	Unshaped Pestle Fragment	741.5 g
200-20	Sa	Unknown	Unshaped Pestle Fragment	271.6 g
200-22	Sa	Surface	Unshaped Pestle Fragment	339.5 g
200-31	Sa	Unknown	Shaped Pestle Fragment	219.6 g
200-32	Sa	Unknown	Pestle End Fragment	162.8 g
200-39	Sa	Unknown	Unshaped Pestle Fragment	322.5 g
200-4	Sa	Unknown	Shaped Pestle Fragment	377.4 g
200-49	Sa	Surface	Shaped Pestle Fragment	72.1 g
200-5	Sa	Unknown	Shaped Pestle Fragment	306.6 g
200-54	Sa	Unknown	Shaped Pestle Fragment	178.2 g
200-6	Sa	Unknown	Unshaped Pestle Fragment	403.1 g
200-61	Sa	Surface	Unshaped Pestle Fragment	177.1 g
200-62	Sa	Unknown	Unshaped Pestle Fragment	173.2 g
200-65	Sa	Trench 1B10-20 cm	Pestle End Fragment	125.1 g

200-68	Sa	Unknown	Shaped Pestle Fragment	342.1 g
200-69	Sa	Surface	Shaped Pestle Fragment	449.7 g
200-70	Sa	Unknown	Pestle End Fragment	459.5 g
200-71	Sa	Unknown	Shaped Pestle Fragment	492.7 g
200-72	Sa	Surface	Shaped Pestle Fragment	1025.6 g
200-73	Sa	Surface	Shaped Pestle Fragment	606.3 g
200-74	Sa	Surface	Shaped Pestle Fragment	599.5 g
200-75	Sa	Surface	Shaped Pestle Fragment	1249.3 g
200-76	Sa	Unknown	Intact Unshaped Pestle	1662.6 g
200-77	Sa	Unknown	Pestle End Fragment	836.6 g
200-78	Sa	Surface	Shaped Pestle Fragment	1278.3 g
200-79	Sa	Unknown	Shaped Pestle Fragment	1141.7 g
200-80	Sa	Surface	Shaped Pestle Fragment	886.1 g
200-82	Sa	Surface	Shaped Pestle Fragment	511.8 g
200-83	Sa	Unknown	Shaped Pestle Fragment	974.3 g
200-84	Sa	Surface	Shaped Pestle Fragment	525.6 g
200-85	Sa	Unknown	Shaped Pestle	460.7 g
200-86	Sa	Unknown	Shaped Pestle Fragment	753.9 g
200-87	Sa	Surface	Shaped Pestle Fragment	372.0 g
200-90	Sa	Surface	Unshaped Pestle Fragment	484.5 g
300-1	Sa	Surface	Mortar Fragment	414.8 g
300-2	Sa	Surface	Mortar Fragment	593.1 g
300-3	Sa	Surface	Mortar Fragment	708.4 g
300-4	Sa	Surface	Mortar Fragment	290.6 g
300-5	Sa	Surface	Mortar Fragment	967.6 g
300-7	Sa	Unknown	Mortar Fragment	1243.9 g
300-8	Sa	Surface	Mortar Fragment	1697.6 g
300-9	Sa	Unknown	Mortar Fragment	218.9 g
300-10	Sa	Surface	Mortar Fragment	427.2 g
300-11	Sa	Unknown	Mortar Fragment	7 lbs.
300-12	Sa	Unknown	Mortar Fragment	11 lbs.

**Specimen # 6** is the proximal end of a shaped pestle made of indurated sandstone. The proximal tip exhibits battering and spalling from limited use. The distal end is broken at an oblique 45 degree angle. The entire body has been heavily etched and polished as part of the shaping process. This style of pestle is consistent with Phase 1 of the Late Period (1100-1600 AD).

Max. length = 118.45 mm x 41.1 mm x 38.9 mm. Wt. 280.6 g.

**Specimen # 200-1** is a rectanguloid, sub-rounded, intact partially shaped pestle of greywacke indurated sandstone. The lateral margins and part of both faces in areas is not pecked and the original cortex of the cobble is still present. The distal end exhibits slight pecking, rounded polish and slight striations from use. The proximal end exhibits pecking as part of the shaping process with possible slight spall due to processing or battering. Max. length = 177 mm x 72 mm x 60 mm. Wt. 1079.4 g.

**Specimen # 200-11** is an irregular shaped pestle fragment of sandstone. The body is highly polished and remnant manufacture pecking is obliterated by polish. The proximal end, which is tapered, shows evidence of battering and spalling. It was exposed to fire. Max. length = 123 mm x 52 mm. Wt. 306.0 g.

**Specimen # 200-12** is an unshaped pestle on an oblong sandstone fragment. It is slightly cylindrical in shape. The proximal end is tapered and shows some evidence of battering and spalling and crushing. There is also some fire blackening on the surface. Max. length = 99 mm x 49 mm. Wt. 252.6 g.

**Specimen # 200-2** is an unshaped pestle on an oblong fragment of sandstone. There is evidence of pecking down the length of one aspect of the body. The superior surface is slightly tapered and rounded. The distal surface is rounded and shows evidence of battering and a large spall. Max. length = 153 mm x 63 mm. Wt. 741.5 g.

**Specimen # 200-20** is an unshaped pestle of sandstone. The rounded end shows evidence of pecking. It was initially broken horizontally at the midshaft, then broken diagonally at the midshaft. The broken end has been used for battering as the high facets are rounded with slight spalling. The specimen has also been exposed to heat. Max. length = 96 mm x 45 mm. Wt. 271.6 g.

**Specimen # 200-22** is an unshaped pestle fragment of sandstone. The distal end was broken diagonally at the midshaft. The end appears to be rounded and flattened. Caliche is present as well as plow scars on the body of the artifact. Max. length = 112 mm x 58 mm. Wt. 339.5 g.

**Specimen # 200-31** is a midsection fragment of a shaped pestle of sandstone. The midsection exhibits polish. Caliche is present. Max. length = 63 mm x 46 mm. Wt. 219.6 g.

**Specimen # 200-32** is a possibly shaped pestle end fragment of sandstone. The edges are rounded and the distal end appears to have been pecked. Max. length = 61mm x 49 mm. Wt. 162.8 g.

**Specimen # 200-39** is a midsection fragment of an unshaped pestle of sandstone. The distal end has a chisel-like prominence that is rounded and spalled and appears to have been used in an adze-like fashion. It is slightly polished meaning it may have been used against wood or rawhide during processing. There is also evidence of plow scar and damage from heavy equipment during construction. Max. length = 121 mm x 49 mm. Wt. 322.5 g.

**Specimen # 200-4** is a shaped pestle fragment of sandstone. The surface is polished, distal end rounded and flattened, and there is a spall along the margin. Max. length = 100 mm x 55 mm. Wt. 377.4 g.

**Specimen # 200-49** is a midsection fragment of a shaped pestle of sandstone. The specimen shows evidence of shaping by pecking. Max. length = 56 mm x 44 mm. Wt. 72.1 g.

**Specimen # 200-5** is a midsection fragment of a shaped pestle of sandstone. The entire body has been pecked and polished as part of the shaping process. Caliche covers much of the remnant body. The distal truncated end has slightly rounded edges and a rough distal face on the higher facets indicate that it might have been used as an abrader. The proximal end is also broken. Max. length = 62 mm x 59 mm. Wt. 306.6 g.

**Specimen # 200-54** is the proximal end of a shaped pestle fragment of sandstone. The end shows pecking and rounding. It is broken perpendicular to the main axis. The body exhibits plow scars. Max. length = 55 mm x 48 mm. Wt. 178.2 g.

**Specimen # 200-6** is an unshaped pestle fragment of sandstone. The distal end shows evidence of wear from grinding. The edges are rounded and battered. It is broken horizontally at the midsection. The specimen also exhibits slight plow scar damage. Max. length = 88 mm x 61 mm. Wt. 403.1 g.

**Specimen # 200-61** is a possible midsection fragment of an unshaped pestle. Specimen is covered in caliche. Max. length = 52 mm x 51 mm. Wt. 177.1 g.

**Specimen #200-62** is an unshaped pestle fragment of sandstone. The distal end exhibits rounding. Specimen is broken at the midshaft. Max. length = 86 mm x 49 mm. Wt. 173.2 g.

**Specimen # 200-65** is the distal end of a pestle of sandstone. The end is flattened and rounded. Max. length = 67 mm x 20 mm. Wt. 125.1 g.

**Specimen # 200-68** is a shaped pestle fragment of indurated sandstone. The entire body has been pecked and polished as part of the shaping process. The distal end has rounding and polish from contact with a mortar. It is broken at the midsection perpendicular to the long axis. Max. length = 81 mm x 54 mm. Wt. 342.1 g.

**Specimen # 200-69** is a shaped pestle of sandstone. It is cylindrical in shape. The entire body has been pecked as part of the manufacturing process. Both ends show rounding due to contact with mortar. The distal end shows some polish as well as pecking to rejuvenate surface. The proximal end is smoother. The body is heavily damaged from plow scars due to agricultural activity. This pestle was made on the proximal end of a larger shaped pestle. The distal end was made on the perpendicular break of the pestle and the distal end exhibits rounding, spalling, flattening, and slight polish. The proximal end exhibits slight rounding. Max. length = 113 mm x 52 mm. Wt. 449.7 g.

**Specimen # 200-70** is the midsection of a highly polished shaped pestle of indurated sandstone.

The distal end exhibits evidence of use and reshaping. The end has possible been repacked along the distal edge and then rounded and polished through limited use. The opposite end exhibits a perpendicular break along the long axis. There is also a little caliche present. Max. length = 81 mm x 56 mm. Wt. 459.5 g.

**Specimen # 200-71** is a shaped pestle fragment of indurated sandstone. The distal end exhibits rounding and polish through contact with a mortar. The entire body exhibits pecking and manufacturing polish. The distal third is broken relatively perpendicular to the long axis. The distal end has been pecked which was part of a rejuvenation process. Max. length = 107 mm x 51 mm. Wt. 492.7 g.

**Specimen # 200-72** is a shaped pestle fragment of sandstone. The entire body has been pecked as a part of the shaping process. The distal end is rounded with a spall at the rounded body margin. It is broken at the midsection perpendicular to the long axis. The existing end displays no use wear patterns. Max. length = 136 mm x 67 mm. Wt. 1025.6 g.

**Specimen # 200-73** is a cylindrical, shaped pestle fragment of sandstone. The entire body has been pecked as part of the shaping process. The proximal surface is also pecked in the central portion and the proximal end is slightly rounded from use. Caliche covers most of the surfaces. It is broken at the midsection perpendicular to the long axis. Some grooves indicate possible plow scars from agricultural activities. Max. length = 108 mm x 64 mm. Wt. 606.3 g.

**Specimen #200-74** is a cylindrical, shaped pestle fragment of sandstone. Pecking and some polish is present from the manufacturing process. The proximal end contained spalls at the midsection break possibly due to a rejuvenation effort. Spall on the proximal portion of the body is most likely from heavy equipment during construction. It is also broken at the midsection, perpendicular to the long axis. Max. length = 109 mm x 63 mm. Wt. 599.5 g.

**Specimen # 200-75** is a shaped pestle fragment of indurated sandstone. The intact distal end exhibits rounding and polish through contact with a mortar. The entire body of the artifact exhibits pecking and manufacturing polish thus giving it its cylindrical appearance. The midsection exhibits a perpendicular break. A portion of the body is covered in caliche. Near the distal end along the lower body of the pestle exhibits an impact spall most likely from heavy equipment during construction. Similar looking intact cylindrical pestles have been recovered from late phase mortuary contexts at CA-ALA-329 (Leventhal 1993) and CA-SCL-38 (Bellifemine 1997). This artifact collaborates the Late period radiocarbon date. Max. length = 225 mm x 54 mm. Wt. 1249.3 g.

**Specimen # 200-76** is an intact unshaped pestle of indurated sandstone. The wider distal end exhibited polish, rounding, and spalling through use. The proximal end is slightly rounded and polish. Max. length = 202 mm x 55 mm. Wt. 1662.6 g.

**Specimen # 200-78** is a shaped pestle fragment of indurated sandstone. The distal end has some rounding. There is spalling from heavy use or breakage. The midsection is broken at the

perpendicular angle to the long axis. Caliche covers one surface. Max. length = 190 mm x 65 mm. Wt. 1343.6 g.

**Specimen #200-79** is a shaped pestle fragment of indurated sandstone. The entire body has been pecked and polished as part of the shaping process. The distal end has rounding and polish and striations in a localized area. The midsection has been split perpendicular to the long axis. Max. length = 187 mm x 58 mm. Wt. 1141.7 g.

**Specimen # 200-80** is a slightly tapered ovoid shaped pestle fragment of indurated sandstone. It was broken diagonally at the midsection. Two grooves exhibits damage most likely from heavy equipment during construction. The entire body is heavily polished as a result of manufacturing. The proximal end exhibits spalling and bettering which was employed for a particular kind of processing but does not have the wear patters of the others. Max. length = 203 mm x 62 mm. Wt. 866.1 g.

**Specimen # 200-82** is a shaped pestle fragment of indurated sandstone. The distal portion has rounding and spalling. The body has caliche on one surface. Thermal spalling on the distal portion of the body due to exposure to fire. The specimen was also broken at the midsection perpendicularly to the long axis. Max. length = 81 mm x 61 mm. Wt. 511.8 g.

**Specimen # 200-83** is a shaped pestle fragment of sandstone. The body is covered with caliche and possibly charcoal. The distal end is flattened and slightly rounded. The body has been

broken perpendicular to the long axis at the midsection. The body is pecked and polished during the manufacturing process. Max. length = 113 mm x 72 mm. Wt. 974.3 g.

**Specimen # 200-84** is a shaped pestle fragment of sandstone. The specimen is covered in caliche. The distal end exhibits flattening, slight rounding, and spalling. The opposite end has a break perpendicular to the long axis. Max. length = 85 mm x 66 mm. Wt. 525.6 g.

**Specimen # 200-85** is a shaped pestle of indurated sandstone. The entire body has been pecked and polished as a part of the shaping process. Both ends show rounding and polishing through contact with a mortar. Both ends have retained organic staining. Max. length = 106 mm x 49 mm. Wt. 460.7 g.

**Specimen # 200-86** is a partially shaped pestle fragment of indurated sandstone. The specimen is covered in caliche. The proximal end is broken perpendicular to the long axis at the midsection. Grooves on the body exhibit damage most likely from heavy equipment during construction. Max. length = 149 mm x 62 mm. Wt. 753.9 g.

**Specimen # 200-87** is a shaped pestle fragment of indurated sandstone. The entire body has pecking and polish as a part of the shaping process. Caliche covers one surface. The proximal end is tapered. It is also broken perpendicular to the long axis at the midsection. Max. length = 96 mm x 40 mm. Wt. 372.0 g.

**Specimen # 200-90** is an unshaped pestle fragment of sandstone. The proximal end is broken at the midsection perpendicular to the long axis. The proximal end is tapered and exhibits slight rounding. Caliche covers the specimen. Max. length = 119 mm x 56 mm. Wt. 484.5 g.

**Specimen # 300-1** is an unshaped mortar well fragment of sandstone. The patina of the broken edges indicates prehistoric breakage. Max. length = 51 mm x 83 mm x 82 mm. Well depth = 41 mm. Wt. 414.8 g.

**Specimen # 300-2** is a mortar well fragment of sandstone. The patina of the broken edges indicates prehistoric breakage. Part of the exterior appears to have been partially pecked and ground. Caliche is present in the well interior. Max. length = 60 mm x 122 mm x 79 mm. Well depth = 56 mm. Wt. 593.1 g.

**Specimen # 300-3** is a mortar rim fragment from a partially shaped boulder mortar of light colored banded sandstone. The edge is rounded and slightly beveled from use. Max. length = 108 mm x 66 mm x 143 mm. Well depth = 56 mm. Wt. 708.4 g.

**Specimen # 300-4** is a partially shaped mortar well fragment of sandstone. The patina of the broken edges indicates prehistoric breakage. The exterior exhibits pecking, while the interior displays remnant pecking and polish from use. Max. length = 44 mm x 88 mm x 81 mm. Wt. 290.6 g.

**Specimen # 300-5** is a boulder mortar rim fragment of sandstone. The edge is slightly rounded with no beveling present on the well side. There is caliche on the interior surface. Max. length = 124 mm x 71 mm x 102 mm. Well depth = 99 mm. Wt. 967.6 g.

**Specimen # 300-7** is a boulder mortar rim fragment of sandstone. The edge is slightly rounded with no beveling present on the well side. Evidence that the mortar was broken by heavy equipment. Max. length = 162 mm x 72 mm x 109 mm. Well depth = 115 mm. Wt. 1243.9 g.

**Specimen # 300-8** is a small boulder mortar rim fragment of sandstone. The edge is rounded though there is no beveling. The exterior surface has evidence of pecking. The mortar was destroyed by heavy equipment. Max. length = 94 mm x 169 mm x 116 mm. Well depth = 48 mm. Wt. 1697.6 g.

**Specimen # 300-9** is a boulder mortar well fragment of sandstone. There is a red pigment (possible mercury sulfide/cinnabar) staining in the well. The exterior exhibits some slight pecking. Max. length = 166 mm x 174 mm x 114 mm. Well depth = 102 mm. Wt. 1473.1 g.

**Specimen # 300-10** is a mortar well fragment of sandstone. The broken edges are covered in caliche indicating prehistoric breakage. Part of one break is also blackened from fire. Max. length = 45 mm x 104 mm x 69 mm. Wt. 427.2 g.

**Specimen # 300-11** is a shaped boulder mortar of sandstone. The partial side has a rounded rim that exhibits slight beveling from use. The exterior displays full pecking. Max. length = 130 mm x 108 mm x 224 mm. Well depth = 103 mm. Wt. 7 lbs.

**Specimen # 300-12** is a hopper mortar well fragment of very fine grained sandstone. The patina of the broken edges indicates prehistoric breakage. The well exhibits a high degree of polish. Other damage to the mortar indicates that it was impacted by heavy equipment. Max length = 116 mm x 193 mm 182 mm. Well depth = 53 mm. Wt. 11 lbs.

### **Pecked and Battered Stone Tools**

According to Cartier (2003), pecked stone cobbles are informal tools that exhibit a vary degree of pecking on the cobble's surface. These cobbles were commonly used to process nuts, seeds, grains and other materials (Fogelson and Sturtevant 2004). Hammer stones or battered stones were cobbles that were used in a hammer-like fashion. The distribution and context from which these pecked and battered stone tools were recovered is as follows (see Table 16).

**Table 16: Distribution of Pecked and Battered Stone Tools**

Specimen #	Provenience / CM	Description	Material Type	Weight
94	Pit 9	End battered cobble	San	260.2 g
200-3	Surface	End battered cobble	San	792.9 g
200-18	Surface	End battered cobble	San	164.6 g
200-19	Surface	End battered cobble	San	248.8 g
200-24	Surface	End battered cobble	San	82.5 g
200-26	Surface	End battered cobble	San	169.8 g
200-27	Surface	End battered cobble	San	186.4 g
200-33	Surface	End battered cobble	San	177.3 g
200-35	Surface	End battered cobble	San	157.7 g

200-44	Surface	End battered cobble	San	151.4 g
200-52	Surface	End battered cobble	San	73.3 g
200-57	Surface	End battered cobble	San	301.2 g
200-59	Surface	End battered cobble	San	90.6 g
200-81	Surface	End battered cobble	San	726.7 g
200-89	Surface	End battered cobble	San	220.6 g
700-104	Surface	End battered cobble	San	414.4 g
200-34	Unknown	End battered cobble	Rhy	88.5 g
200-58	Unknown	End battered cobble	San	226.7 g
200-88	Unknown	End battered cobble	San	340.6 g
200-91	Unknown	End battered cobble	San	214.6 g
084-1	Unknown	End battered cobble	Co	67.1 g
1	Curie Rd.	Hammer stone	RFC	87.0 g
49	Trench 3C 0-10 cm	Hammer stone	Qtz	257.5 g
92	Unknown	Hammer stone	GFC	105.1 g

### Ornamental and Other Stone

**Specimen # 200-48** is a spherical shaped cobble of rhyolite. The surface has been rounded and pecked. The provenience is unknown. Max. length 68 mm x 62 mm. 305.9 g.

**Specimen # 200-66** is a rounded, walnut-sized pebble of sandstone that has slight polish on one face and dark organic staining. The specimen was recovered from the surface. Max. length = 42 mm x 41 mm. Wt. 54.9 g.

**Specimen # 200-67** is a ball of granite. The small, walnut-sized rock has been rounded and polished. The specimen was recovered from the surface. Max. length = 27 mm x 29 mm. Wt. 29.9 g.

**Specimen # 003** is a pendant made of a fine-grained siltstone or possibly volcanic tuff (Figure 101). The flattened face exhibits polish and striations parallel to the long axis. The opposite, rounded face also exhibits polish, striations, and rounding. The pendant hole appears to be biconically drilled with the larger bore hole on the rounded face. Both the proximal and distal end also exhibit rounding, polish, and striations from manufacture. The provenience is unknown. Max. length = 53.31 mm x 37.21 mm x 14.56 mm. Wt. 26.6 g.



Figure 101: Pendant – Ref # FS 003

**Specimen # 005** is a net weight of sandstone (Figure 102). It is a rounded cobble with a groove around the circumference. The provenience is unknown. Max. length = 59.35 mm x 50.94 mm x 42.82 mm. Wt. 174.5 g



Figure 102: Net weight – Ref # FS 005

**Specimen # F-023** is a rod fragment of asbestos. The specimen was recovered from Unit 1B at a depth of 0-10 cm. Wt. 0.8 g.

**Specimen # 004** is a pendant of steatite (Figure 103). The hole is drilled from both sides on the proximal end. The provenience is unknown. Max. length 22.72 mm x 9.56 mm x 6.17 mm. Wt. 2.1 g.



Figure 103: Pendant –  
Ref # FS 004



Figure 104: Atlatl weight –  
Ref # FS 001

**Specimen # FS 001** is an atlatl weight of sandstone (Figure 104). The provenience is unknown.

Max. length = 114.27 mm x 38.75 mm x 24.15 mm. Wt. 174.7 g.

### Miscellaneous Manuports

Manuports are unmodified materials that have been transported onto the site (Sutton and Arkush 2009). These specimens do not fit any particular category, though their presence on the site is culturally significant. The distribution and context of the manuports is as follows (Table 17):

**Table 17: Distribution of Manuports**

Specimen #	Material Type	Provenience	Description	Weight
200-17	Ba	Surface	Small boulder	6.5 lbs.
200-28	San	Unknown	Elongated cobble fragment	169.1 g
200-30	San	Surface	Fire scarred fragment	160.4 g
200-41	San	Unknown	Cobble	329.9 g
200-45	San	Unknown	Cobble	233.7 g
200-47	San	Surface	Boulder	1525.1 g
200-60	San	Unknown	Cobble	123.5 g
200-63	San	Surface	Cobble	28.0 g

700-78	San	Unknown	Elongated cobble	218.9
700-84	San	Surface	Elongated cobble fragment	74.5 g
88-1	Co	Surface	Serpentine fragment	43.7 g
51-2	RFC	Surface	9 fragments	563.1 g
61	Qtz	Surface	Quartz bearing pebble	27.4 g
F-024	Ba	Unknown	Split cobble	84.9 g
F-025	Qtz	Unknown	Quartz bearing pebble	26.8 g

### **Obsidian Sourcing**

According to Dr. Richard Hughes, obsidian is a silica-rich volcanic glass that is produced when magma from a deep source is expelled and then cooled rapidly. Obsidian eruptions are highly uniform in chemical composition, making it possible to trace pieces of obsidian back to their source. Through the use of energy dispersive x-ray fluorescence (edxf), the by analyzing the x-ray spectra of each element contained in the specimen, the results can be compared to the available data for the different obsidian sources (Hughes 2015). The full report can be found in Appendix E. The process is also non-destructive.

There were six samples submitted to Dr. Richard Hughes of Geochemical Research Laboratory (GRL) in March 2015. The results of the samples revealed the majority of the obsidian came from Napa Valley, with only two samples from elsewhere (Mt. Hicks and Annadel) (Table 18). Ten specimens were also submitted to the San Jose State University Obsidian Laboratory (SJSUOL) and independently reviewed by the Origer Obsidian Laboratory for obsidian hydration. The full report can be found in Appendix F. In part of the process, they conducted visual sourcing. Through visual sourcing, all of those specimens revealed a Napa Valley origin.

**Table 18: Obsidian Sourcing Results**

Specimen #	Description	Weight	Source
004	Thinning Flake	0.2 g	Mt. Hicks
006	Dart Base	2.8 g	Napa Valley
1000	Projectile Point Fragment	3.1 g	Annadel
8a	Thinning Flake	0.4 g	Napa Valley
10	Pressure Flake	0.4 g	Napa Valley
1001	Pressure Flake	0.2 g	Napa Valley
FS-014	Biface Fragment	3.1 g	Napa Valley
FS-033	Unmodified Pebble	4.7 g	Napa Valley
FS-032	Percussion Flake	2.1 g	Napa Valley
FS-031-1	Shatter	2.8 g	Napa Valley
FS-031-2	Shatter	0.4 g	Napa Valley
FS-031-3	Thinning Flake	0.4 g	Napa Valley
FS-012	Point Fragment	3.6 g	Napa Valley
FS-011	Point Fragment	4.7 g	Napa Valley
FS-013	Biface Fragment	1.8 g	Napa Valley
FS-015	Biface Fragment	1.7 g	Napa Valley

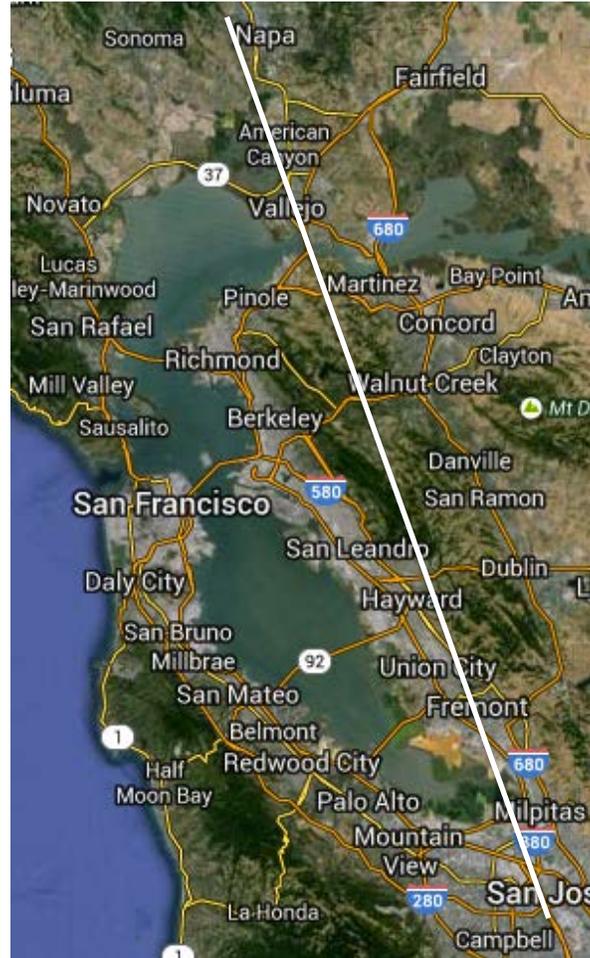
## **Discussion**

The analysis of the flaked, ground, pecked, and battered stone artifacts recovered from CA-SCL-125 provides some interpretive aspects about the activity sets that occurred over a 2000 year period of time. Clearly the importation of raw material for flaked stone tool and the types of formal, informal and lithic waste products recovered demonstrate that the following activities have been identified: 1) within the geographical catchment of the site local materials such as the Franciscan Cherts and Sandstone boulders and cobbles were acquired and brought back to the CA-SCL-125 locality; 2) Trade is inferred by the presence of several exotic materials such as obsidian from the Napa and Annadel sources to the north and from the Mt. Hicks sources to the east near Mono Lake (Map 6). Monterey Chert had to also been traded in from the Pacific Coast

to the west of the site along with *Olivella* and *Haliotis* shells; 3) Hunting was another important activity as evidenced by the presence of projectile points and the bannerstone/atlatl weight along with the remains of various game animals; 4) The presence of the utilized flakes suggest that plants were processed for netting and baskets and other similar fiber products. This is further supported by the presence of bone awls; 5) Various plant foods were harvested and processed using manos and metates and perhaps concurrently (or later in time) mortars and pestles; 6) The presence of a net weight suggests that these ancestral Ohlone people were either netting animals such as rabbits or antelope on land, harvesting water fowl in the nearby fresh water lakes/marshes, or for fishing in the local creeks; for tool manufacture (debitage) as well as habitation (larger grinding stones). Also, the most common materials used, such as Franciscan chert, are naturally found in abundance within the immediate area.

The prevalence of obsidian indicates trade routes to the north. A preponderance of the obsidian was sourced to Napa Valley (Map 6), indicating the strongest trade between CA-SCL-125 and Napa Valley peoples at least for obsidian. The distance between these two locations is approximately eighty-five miles.

**Map 6: Distance between Napa Valley and San Jose**



## Chapter 8

### The Dating and Chronological Placement of Prehistoric Site CA-SCL-125

#### Introduction

On September 5, 2011, I received a letter of support from the Muwekma Ohlone Tribal leadership (see Appendix A) allowing for the submittal of three small samples of human bone to Beta Analytic for Accelerator Mass Spectrometry (AMS) dating. In addition, I was granted permission to conduct obsidian hydration studies on all obsidian specimens that had been recovered from the site. These studies were instrumental in obtaining chronological information. Previous to this study, no radiocarbon dating or obsidian hydration had been performed for this site. Based on general aspects of the stone tool assemblage, it was predicted that this was a Middle Period site with possible extension into the Late Period (after Bennyhoff and Hughes 1987). Per the terms of the College of Social Sciences research grant which was awarded in 2011, the bone samples were submitted to Beta Analytic, Inc. for AMS dating (see Appendix D for AMS dating results).

#### AMS Dating: Burial 1 (Femur)

In accordance with my research questions, I desired to conduct AMS dating of the burial features in order to develop a temporal context in which to place the site. Given the fact that there was no charcoal retained from the previous salvage excavations and the only identifiable datable features were the burials themselves, after permission was issued and the osteological analysis conducted suitable samples were then selected. These samples were chosen based on several factors: 1) available elements for AMS sampling, 2) MNI of one individual, and 3)

probable provenience based upon limited information contained in the field notes and previous studies. Burial 1 met these criteria. Provenience information stated that the burial was recovered approximately 48 cm from grade and the burial included a pierced shell pendant (unable to locate this artifact) (field notes by Karen Bruhns 1972).

In 2011, a 15.4 g. sample from the diaphysis of the right femur was submitted to Beta Analytic, Inc. for AMS dating. The results from Beta Analytic were obtained on November 28, 2011. Burial 1 yielded a corrected dated range of 430 B.P. to 520 B.P. (A.D. 1520 to A.D. 1430) with a midrange date of A.D. 1475. Based on the Dating Scheme B proposed by Bennyhoff and Hughes (1987) this person passed away sometime in the Late Phase 1C of the Late Period (A.D. 1300 – 1500). Placing this median date in the Dating Scheme D proposed by Groza in 2002 and Hughes and Milliken (2007), this burial falls within the L1 Late Period (A.D. 1250-1550).

#### **AMS Dating: Burial 6 (Tibia)**

Burial 6 was chosen because it had the deepest possible provenience. In 2011, an 18.8 g. sample of the distal portion of the left tibia was submitted to Beta Analytic, Inc. for AMS dating. The results from Beta Analytic were obtained on November 28, 2011. Burial 6 yielded a corrected range of 2060 BP to 2160 BP (210 B.C. to 110 B.C.) with a midrange date of 160 B.C. Based on the Dating Scheme B proposed by Bennyhoff and Hughes (1987) this person was buried sometime in the Early Phase of the Middle Period. Placing this median date in the Dating Scheme D proposed by Groza in 2002 and Hughes and Milliken (2007), this burial falls within the lower reaches of M1 Bead Horizon of the Middle Period (200 B.C. – A.D. 450).

A third sample from Burial 12 was submitted later to International Chemical Analysis, Inc. in collaboration with Alan Leventhal. The result of this dated burial was obtained in April

2015. This person dated with a corrected range of 410 – 350 B.C. with a midrange date of 380 B.C. which places this burial within the Early/Middle Transition Period (500 – 200 B.C.) of the proposed Dating Scheme B by Bennyhoff and Hughes (1987). Employing the proposed Dating Scheme D by Groza (2002) and Hughes and Milliken (2007) this ancestral Ohlone person also falls within the Early/Middle Transition Period (500 – 200 B.C.).

### **Obsidian Hydration Study**

A total of ten obsidian specimens were submitted to John Schlagheck of the San Jose State University Obsidian Laboratory (SJSUOL) for hydration studies. The results were verified by Tom Origer at the Origer Obsidian Laboratory (OOL) in Santa Rosa, California. Values were successfully calculated for eight of the specimens (Table 19). Negative results for two of the specimens were a result of one not being culturally modified and the other having diffuse (unreadable) bands.

Conversion formulas for corrected dating values of the obsidian have been proposed for several obsidian sources (see Wilson 2004) for results from central California coastal sites. The conversion formula for Napa Valley sources is  $y=153.4 x^2$ . The  $y$  = years ago, while  $x$  = the mean hydration value squared. For example, for Specimen FS-014, the date is calculated in the following way:  $153.4 x 3.0^2$ . The converted date is estimated to be 1,380.6 years ago (or roughly A.D. 635). Taking the year of the study and subtracting the calculated date gives the approximate year the artifact was modified within the sampled hydration region.

**Table 19: Conversion Rates of the Mean Hydration Values**

Specimen #	Description	Weight	XRF Source	Mean Hydration Value	Years Before Present	Corrected Years Ago	Date
FS-014	Biface Fragment	3.1 g	Napa Valley	3.0	1290	1380	AD 635
FS-033	Unmodified Pebble	4.7 g	Napa Valley	NA	NA		
FS-032	Primary Flake	2.1 g	Napa Valley	4.5	2970	3106	1091 BC
FS-031-1	Shatter	2.8 g	Napa Valley	2.3	811	812	AD 1203
FS-031-2	Shatter	0.4 g	Napa Valley	3.1	1380	1474	AD 541
FS-031-3	Thinning Flake	0.4 g	Napa Valley	5.1	3835	3990	1975 BC
FS-012	Point Fragment	3.6 g	Napa Valley	4.8	3389	3534	1519 BC
FS-011	Point Fragment	4.7 g	Napa Valley	5.0	3683	3835	1820 BC
FS-013	Biface Fragment	1.8 g	Napa Valley	NA	NA		
FS-015	Biface Fragment	1.7 g	Napa Valley	6	4984	5522	3507 BC

### **Projectile Points**

The assemblage included several projectile points that were temporally diagnostic by comparing these points to others in the area. The assemblage included a medium sized, projectile point base of Monterey chert (Specimen #FS 017) that is morphologically similar to points recovered at the Stanford Man II site as well as CA-SCL-178. The points at the Stanford Man II site were directly related to a burial that yielded dates of approximately 2450 B.C. to 2400 B.C. (Hildebrandt et al. 1983).

The collection also included three leaf-shaped dart point fragments (Specimen #FS 009, FS 010, FS 003) of Monterey chert. These points are very similar to Specimen 2686 (recovered

from CA-SCL-163) and Specimen 1414 (recovered from CA-SCL-178). These specimens are thought to predate 1000 B.C. (Hildebrandt 1983:8-47). The dates for the Stanford Man II projectile point and the leaf-shaped dart points indicate the Early Period (3000 B.C. to 500 B.C.) according to Bennyhoff and Hughes (1987).

## **Discussion**

One of the original research questions was: *What are the temporal components represented at this site?* In this chapter, the results of both the AMS dating and Obsidian Hydration study have been able to address this question by using absolute dating methods of 1) Accelerated Mass Spectrometer dating of three human bone samples, 2) relative obsidian hydration dating, and 3) the relative dating method using the *Olivella* bead typology. In considering the AMS dating, the range of the site is approximately 380 B.C. to A.D. 1500. That is a 1,880 year span. This span covers the Early/Middle Transition Period well into the Late Phase 1C of the Late Period.

In considering the results from the obsidian hydration study, these dates span even farther in both directions to include the Lower Archaic Period (3507 BC Bennyhoff and Hughes 1987). The *Olivella* beads that are present in this assemblage were relatively common for a long period of time, from the Late Early Period into the Early Late Period (Bennyhoff and Hughes 1987).

As a result the intuitive temporal/typological prediction of a Middle Period component as well as the presence of a Late Period component is verified through these AMS dates. There is also a chance that due to the site's proximity to the perennial Santa Teresa Spring as well as other nearby fresh water sources, some of the burials may even dated to the Early Period, however, this can only be tested through additional AMS dating. An Early Period component is

supported by the temporal significance of the Stanford Man II projectile point and the leaf-shaped dart points.

## **Chapter 9**

### **Conclusion**

The primary goals for this research project on ancestral Ohlone heritage site CA-SCL-125 were to: 1) create a comprehensive analysis of the skeletal population, 2) provide a temporal placement of the site, 3) to review and summarize the artifactual and ecofactual archaeological assemblages, 4) to summarize what types of activity sets that may have occurred and inferred at the site so that these materials may be available for future analyses, 5) to generate an updated catalog for the curation of the collection, and 6) to have this comprehensive research project serve as an updated compendium to the Department of Anthropology's NAGPRA report and responsibility. By using established osteological standards, both the archaeological assemblage and the skeletal population can more readily be compared to other Central California sites. With the assemblages being sorted, analyzed, and inventoried, this report will contribute to the knowledge base of the ancestral Muwekma Ohlone people of the San Francisco Bay Area.

As presented in the introduction of this study, the analysis of the CA-SCL-125 skeletal population and associated archaeological assemblage included raising a few basic research questions:

- 1) What types of activity sets occurred at CA-SCL-125?
- 2) What are the sources of obsidian and what can they tell us about possible trade networks?
- 3) What are the temporal components represented at this site?

With the analysis for this project complete, the above questions can be addressed. Regarding types of activity sets that can be inferred, the presence of lithic debitage lends evidence for raw material acquisition and flaked tool manufacture and trade by the recovery of obsidian and Monterey Chert. The presence of mortars and pestles as well as manos and metates

identified in the recovered assemblage and recorded in the student field notes regarding possible house features presents possible evidence of habitation and residential-related activities that include the processing of various foods such as plants and meat. The faunal and shellfish remains provide evidence of hunting and shellfish harvesting and trade especially noted from Pacific Ocean species of shellfish. Lastly, the presence of burials adds to the multicomponent site with a mortuary complex.

Regarding evidence of long distance trade from the north of the San Francisco Bay and east to the Sierra Nevada, the recovery of obsidian flaked tool tools and debitage provides strong evidence. Since obsidian is not found naturally occurring in the Santa Clara Valley area, the obsidian XRF sourcing revealed aspects of suggested trade inter-relationships. The obsidian sourcing completed by Dr. Richard Hughes and in conjunction with the obsidian hydration study conducted by John Schlagheck revealed a heavy prevalence of Napa Valley obsidian with only two of the sixteen specimens from other sources (Mt. Hicks and Annadel). These results provide a strong argument for trade from the Napa region through either the East Bay or through the Central Valley and then to this region in the south Bay.

Lastly, there was the question of defining the temporal components at CA-SCL-125. The AMS dating of human remains, obsidian hydration, artifact typology, and shell beads yielded an opportunity for absolute and relative dating of the site. The results from these studies revealed a long span of at least intermittent occupation and use of the site for multi-activities. The AMS dating of the bone provides evidence of mortuary-related activities during the Middle and Late Periods. Obsidian hydration possibly extended activities into the Lower Archaic Period (circa. 3000 B.C.), while the shell beads correlated with the burials.

## **Implications of the Study**

The results contained within this research project represents a major contribution to the San Jose State University Department of Anthropology by providing a permanent record of the CA-SCL-125 assemblage and human skeletal population. A copy of this report will also be submitted to the Northwest Information Center at Sonoma State University in Rohnert Park, California where it can be viewed by the archaeological community and other interested researchers.

The Native American Graves and Repatriation Act (NAGPRA; U.S. Public Law 101-601) enacted in 1990 mandated that all U.S. government agencies and institutions receiving federal funding must inventory any Native American human remains and mortuary artifacts, assess potential ancestral affiliation, and communicate with the federally recognized descendant tribes to ascertain the disposition of the collection (Larsen 1997). This report includes a detailed analysis of the skeletal remains that may represent over 58 individuals. Therefore, this report not only contributes to an increased understanding of the Native populations, it also assists the San Jose State University Department of Anthropology to comply with the Native American Graves and Repatriation Act (NAGPRA).

## **Naming of the Site**

In commencing this project, I received a letter of support from the Muwekma Ohlone Tribal leadership for the AMS dating of their ancestral remains. As a result of the current collaboration, the Muwekma Ohlone Language Committee decided to rename the site in their Native dialect. On March 26, 2015, the Muwekma Ohlone Language Committee chose to rename this site '*Arma 'Ayttakiš Rúmmey-tak*, which translates into English as **Place of Spirit**

**Woman Spring Site** as an alternative to the colonial Santa Teresa Springs Site. The linguistic breakdown and sources for this name are as follows:

- *'Arma* = Spirit, Spirits (*JP Harrington Chochenyo*)
- *'Ayttakiš* = Woman (*JP Harrington Chochenyo*)
- *Rúmme*y = Rivulet; river, small river; stream, small stream; creek; *pond*; *spring* (*JP Harrington Chochenyo*)
- Site = -tka after vowels; -tak after a consonant (*JP Harrington Chochenyo*)  
Note: The locative definition of the –tak and –tka suffix endings also includes ‘At, Place, Place of, Location, Area, Site, By The, Into The...’

Collaborative efforts between the indigenous Muwekma Ohlone Tribe of the San Francisco Bay Area and the San Jose State University Anthropology Department maintains a vital link that was established during the early 1980s . The Muwekma Ohlone Tribe has supported many faculty, staff and student research projects relative to their ancestral heritage sites and human remains. In keeping with its long established tradition of renaming their ancestral heritage sites in their language the Tribe continues a process of reclaiming their history and identity that was almost completely eradicated from this geographic region. Furthermore, the naming of this site in the native language helps support the Tribe’s cultural and linguistic revitalization, which also helps to enforce meaningful bonds between the Tribe and our institution. It is my hope that this report will prove to be a contribution to the Muwekma Ohlone Indian Community.

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## Appendix A

Letter of Support from the Muwekma Ohlone Tribal Leadership



# MUWEKMA OHLONE INDIAN TRIBE

OF THE San Francisco BAY AREA REGION

'Innu Huššištak Makiš Mak-Muwekma *"The Road To The Future For Our People"*

September 5, 2011

**TRIBAL CHAIRPERSON**  
ROSEMARY CAMBRA

Dr. Charles Darrah, Chairman Anthropology Department

**TRIBAL VICE CHAIRPERSON**  
MONICA V. ARELLANO

**TRIBAL COUNCIL**  
HENRY ALVAREZ  
JOANN BROSE  
GLORIA E. GOMEZ  
ROBERT MARTINEZ, JR.  
RICHARD MASSIATT  
SHEILA SCHMIDT  
CAROL SULLIVAN  
KARL THOMPSON (TRES)  
FAYE THOMPSON-FREI

Dear Dr. Darrah,

I am writing this letter on behalf of the Muwekma Tribal Council's support for the AMS dating of our ancestral remains from site CA-SCL-125. It is our understanding that anthropology graduate student Ms. Elizabeth Mabie who has been working closely with Alan Leventhal is in the process of analyzing the burial population and associated artifacts from this site and she would like to obtain radiocarbon dates for her graduate-level project.

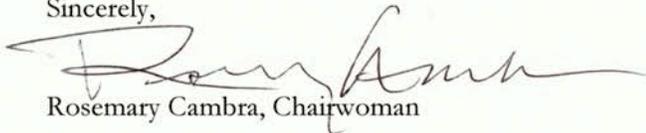
It also has been brought to our attention that this site was initially "salvaged" back in 1974 by volunteers from West Valley College and San Jose State University and the human remains and artifacts were ultimately placed under the care of the Anthropology Department. Furthermore, we also understand that to date no comprehensive analysis has been undertaken on the cultural materials from this site.

As you may already know that the Muwekma Tribal leadership has supported many faculty, graduate and undergraduate student studies in the past, and at times we have worked hand-in-hand with these same faculty and students on our ancestral burials and burial regalia.

Therefore, please allow this letter serve as a statement of full support in Ms. Mabie's research and desire to conduct radiocarbon dating, stable isotope and ancient DNA studies under the supervision of Mr. Alan Leventhal or the department's archaeologists on our ancestral remains from site CA-SCL-125 located in the Santa Teresa Hills area of south San Jose. .

Should you have any questions, please feel free to contact me or Tribal Administrator Ms. Norma Sanchez at [rcambra@muwekma.org](mailto:rcambra@muwekma.org) or [nsanchez@muwekma.org](mailto:nsanchez@muwekma.org).

Sincerely,



Rosemary Cambra, Chairwoman

Cc: Muwekma Tribal Council  
Cultural Resources file CA-SCL-125

P.O. Box 360791, Milpitas, California 95036

## Appendix B

National Register of Historic Places Nomination Form

NATIONAL REGISTER OF HISTORIC PLACES  
INVENTORY - NOMINATION FORM

(Type all entries - complete applicable sections)

STATE: California	
COUNTY: Santa Clara	
FOR NPS USE ONLY	
ENTRY NUMBER	DATE

1. NAME

COMMON:  
Rancho Santa Teresa, Santa Teresa Spring, Joice Ranch

AND/OR HISTORIC:  
Rancho de Santa Teresa, Bernal Rancho

2. LOCATION

STREET AND NUMBER:  
455 Bernal Road

CITY OR TOWN:  
San Jose

STATE: California      CODE:      COUNTY: Santa Clara      CODE: 95119

3. CLASSIFICATION

CATEGORY (Check One)	OWNERSHIP	STATUS	ACCESSIBLE TO THE PUBLIC
<input type="checkbox"/> District <input checked="" type="checkbox"/> Site <input type="checkbox"/> Object	<input type="checkbox"/> Public <input checked="" type="checkbox"/> Private <input type="checkbox"/> Both	<input checked="" type="checkbox"/> Occupied <input type="checkbox"/> Unoccupied <input type="checkbox"/> Preservation work in progress	Yes: <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Unrestricted <input type="checkbox"/> No
PRESENT USE (Check One or More as Appropriate)			
<input checked="" type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Educational <input type="checkbox"/> Entertainment	<input type="checkbox"/> Government <input type="checkbox"/> Industrial <input type="checkbox"/> Military <input type="checkbox"/> Museum	<input type="checkbox"/> Park <input checked="" type="checkbox"/> Private Residence <input type="checkbox"/> Religious <input type="checkbox"/> Scientific	<input type="checkbox"/> Transportation <input checked="" type="checkbox"/> Other (Specify) Spring/water source is stables

4. OWNER OF PROPERTY

OWNER'S NAME:  
Mrs. Edna McEntire

STREET AND NUMBER:  
455 Bernal Road

CITY OR TOWN: San Jose      STATE: California      CODE:

5. LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC.:  
County Records Book 704, pages 9 and 11

STREET AND NUMBER:  
70 West Hedding Street

CITY OR TOWN: San Jose      STATE: California      CODE:

6. REPRESENTATION IN EXISTING SURVEYS

TITLE OF SURVEY:  
Historic Inventory of San Jose

DATE OF SURVEY: 1973       Federal       State       County       Local

DEPOSITORY FOR SURVEY RECORDS:  
Main Library

STREET AND NUMBER:  
180 West San Carlos Street

CITY OR TOWN: San Jose      STATE: California      CODE:

SEE INSTRUCTIONS

STATE: CALIFORNIA  
COUNTY: SANTA CLARA  
ENTRY NUMBER:  
DATE:

FOR NPS USE ONLY

See Continuation Sheet

## 7. DESCRIPTION

CONDITION	(Check One)					
	<input type="checkbox"/> Excellent	<input type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Deteriorated	<input type="checkbox"/> Ruins	<input type="checkbox"/> Unexposed
	(Check One)			(Check One)		
	<input type="checkbox"/> Altered	<input type="checkbox"/> Unaltered	<input type="checkbox"/> Moved	<input type="checkbox"/> Original Site		
DESCRIBE THE PRESENT AND ORIGINAL (if known) PHYSICAL APPEARANCE						
<p>A spring freely flowing from grey rock, a stream meandering westward through tall grass and native oaks must have been the surroundings for an Indian village circa 3000 B.C. Steep hills rise abruptly behind the spring and afford a clear view of the entire valley and eastern hills. Through this valley passed Juan Bautista de Anza in 1775 and in 1826 a retired soldier (invalido), Don Jose Joaquin Bernal brought his family to San Jose and took up residence near the site of the spring. Bernal built four adobes, several wooden structures and by 1834 had, as testified to by a neighbor, Jose Juan Hernandez, planted a vineyard, an orchard and had cultivated the land "to a great extent". During this early time, cattle were branded with the mark . El Camino Real (the Royal Road) cut east-west through the rancho.</p> <p>On May 19, 1834 Don Joaquin petitioned Governor Jose Figueroa for title to "a league or less" (see attached map). On July 11th Figueroa responded granting 9,647.13 acres or more than a square league.</p> <p>Records of Mission Santa Clara show that Bernal died on June 11, 1837 and was buried the next day in the mission cemetery. His family remained at the rancho and it prospered under the direction of his sons. Newspapers and books of the day refer to the Bernals as "outstanding citizens".</p> <p>During the year 1840 a French saddle maker by the name of Changara set up a tannery below the spring where he caught the overflow in a stone vat and there tanned his hides. His small wooden house stood near the vat and when he had made forty to fifty saddles, Changara would set off through the state to sell them. He met his death on one of his trips and his profits reportedly lie buried to this day somewhere on the rancho.</p> <p>November 29, 1844 was a proud day for the Bernals. Here the then Governor Manuel Micheltorena and former Governor Juan Bautista Alvarado signed the Treaty of Santa Teresa (see attached treaty). By the terms of the treaty Micheltorena promised to send his cholos, "an unpopular band of ex-convicts", out of California within three months. Unfortunately Governor Micheltorena did not abide by the agreement and in February 1845 the "battle" of Cahuenga Pass took place, resulting in his unseating as Governor.</p> <p>After the Bear Flag Revolt (1846) and the Mexican War (1846-1848) the Spanish land grants were declared invalid until certified by U.S. courts. Land commissions were created to investigate claims and on January 3, 1853 Don Agostin Bernal petitioned for Rancho Santa Teresa. The petition was reviewed in December of 1853, was confirmed by the land commission on September 15, 1854 and the U.S. District Court confirmed a grant of 4,460.03 acres on August 11, 1856.</p> <p>See continuation sheet attached.</p>						

SEE INSTRUCTIONS

7. DESCRIPTION - Continuation Sheet

By April of 1868 the land commission had partitioned the acreage among forty-five families. The Bernals retained lots 33, 36 and 41 totaling 800 acres. The Thompson West Historical Atlas of Santa Clara Valley shows the lots as belonging to Francisco Bernal, grandson of Don Joaquin.

After 1868 further partitioning left 400 acres of lot 36 to one of the best loved citizens of San Jose, Ygnacio Bernal. He planted extensive orchards, constructed an earth fill reservoir below the spring and was mentioned in Santa Clara County's agricultural "who's who", Sunshine, Fruit and Flowers. During the ownership by Ygnacio the brand for the cattle changed to the mark of .

On April 22, 1906 Ygnacio died and ownership of the rancho passed to Pedro who in 1910 started a most lucrative business, the Santa Teresa Springs Water Company (see attached). As recently as 1970 offers were made to purchase Santa Teresa water.

A quicksilver mine proved unprofitable but the discovery of huge deposits of marl, a natural limestone fertilizer, resulted in the establishment of a marl mine which flourished until Pedro's death. The 17th report of the State Mineralogist cites Bernal marl as top grade which makes Santa Teresa only the third known source of marl in sufficient quantity to mine along with England and South America.

October 14th of 1925 was Saint Teresa's day and a cause for celebration on the rancho. Father Seraphina and Father Ricarti of Holy Family Church brought to the celebration that year a statue of the saint brought from Rome. The statue was placed at the spring (the site of a supposed manifestation) and a medallion given by the Carmelite sisters (St. Teresa's order) adorned her robes.

Pedro Bernal built a second home on the rancho in 1934, dying there on September 5, 1935. The mark Pedro used  is intact on a rock near a shrine built in 1928 to hold the statue of Santa Teresa. The property passed to his sister Jacoba Bernal Fisher and to his cousins the Patrick Joice family, who bought Ygnacio's home in 1948. The brand  and were used during this period and to the present day by the Joice ranch.

The property remained in orchards and fields dotted with giant oaks until 1968 when a developer built homes on all but the remaining 16.86 acres.

Within this 16 acres is contained a microcosm of California history. Indian, Spanish, Mexican and Anglo periods are represented in this historic site. Indian remains from prehistoric times lie only a few feet below the surface of the rich adobe earth which proved so serviceable as a building material and planting soil. The tanner's house remains near the main house where it was moved when the reservoir was constructed. The spring still flows at a reliable year-around rate of 800 gallons per hour and the vat used for tanning hides still is in place. The hills are still green in early spring and the oaks still shade the informal gardens but sub-division press close around representing a new generation of California occupation. (See attached map)

SEE INSTRUCTIONS

8. SIGNIFICANCE			
PERIOD (Check One or More as Appropriate)			
<input checked="" type="checkbox"/> Pre-Columbian	<input type="checkbox"/> 16th Century	<input type="checkbox"/> 18th Century	<input checked="" type="checkbox"/> 20th Century
<input type="checkbox"/> 15th Century	<input type="checkbox"/> 17th Century	<input checked="" type="checkbox"/> 19th Century	
SPECIFIC DATE(S) (If Applicable and Known)			
AREAS OF SIGNIFICANCE (Check One or More as Appropriate)			
<input type="checkbox"/> Aboriginal	<input type="checkbox"/> Education	<input type="checkbox"/> Political	<input type="checkbox"/> Urban Planning
<input checked="" type="checkbox"/> Prehistoric	<input type="checkbox"/> Engineering	<input checked="" type="checkbox"/> Religion/Philosophy	<input type="checkbox"/> Other (Specify)
<input checked="" type="checkbox"/> Historic	<input type="checkbox"/> Industry	<input type="checkbox"/> Science	_____
<input checked="" type="checkbox"/> Agriculture	<input type="checkbox"/> Invention	<input type="checkbox"/> Sculpture	_____
<input type="checkbox"/> Architecture	<input type="checkbox"/> Landscape Architecture	<input type="checkbox"/> Social/Humanitarian	_____
<input type="checkbox"/> Art	<input type="checkbox"/> Literature	<input type="checkbox"/> Theater	_____
<input type="checkbox"/> Commerce	<input type="checkbox"/> Military	<input type="checkbox"/> Transportation	_____
<input type="checkbox"/> Communications	<input type="checkbox"/> Music		_____
<input type="checkbox"/> Conservation			_____
STATEMENT OF SIGNIFICANCE			
<p>The significance of Rancho Santa Teresa in a national inventory of historic places is best measured by the contribution this site would make to future generations seeking their heritage in a valley sadly lacking in the preservation of a proud history. Development has raced across the Santa Clara Valley heedless of the destruction of open space, clean air and profitable agriculture. Only in small spots on the edges of the valley does a small part of history remain intact.</p> <p>If this site is not preserved more will be lost than an opportunity for another park. Archaeologically this site is rich in the opportunity to fill in large gaps in the pre-history of this country. Rancho Santa Teresa is listed with San Jose State University as archaeological site SCL-57. It is also listed with West Valley College as archaeological site WVC-18. (See attached) Primarily an occupation site with inter-lying human burials, the site is roughly dated a late middle to early late horizon time periods in central Californian chronology, or about 2000 b.p.</p> <p>Historically the preservation of some part of an original land grant dating from 1834 would be unique in Santa Clara County. No where else in this valley are so many periods represented in a site of continuous occupation.</p> <p>Religion was of such importance to the early settlers of California that the significance of Santa Teresa spring should be perpetuated. As recently as 1950, the farm workers made an annual pilgrimage to the spring. The spirit of the religion of Father Junipero Serra remains strong at this site.</p> <p>The environmental aspect is of great significance because the land remains in nearly its original condition and would improve the quality of life in the local neighborhood by providing sorely needed open space. The proximity of the subject site to an extensive county and/or regional park would facilitate public access and could provide ready made facilities for visitors. Santa Clara County badly needs such a site of history so that our young people can more clearly visualize what life entailed before this age of automation.</p>			

9. MAJOR BIBLIOGRAPHICAL REFERENCES - Continuation Sheet

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Unpublished Sources:

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Rev. A.D. Spearman, S.J.  
Rev. A. Duggin, S.J.  
Mrs. Alora Joice Rice  
Brother Herman of the Cross, Carmelite Order  
Patrick James Joice
- Records: Mission Santa Clara  
Bancroft Library, Berkeley  
Saint Joseph's Church, San Jose  
San Jose State University  
San Jose Public Library, California Room  
San Jose Mercury News  
West Valley College  
San Jose Historical Museum

9. MAJOR BIBLIOGRAPHICAL REFERENCES

Published Sources:

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 Bancroft, Hubert Howe; History of California Vols. I-V inclusive University of California Press, Berkeley 1966.  
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 (See continuation Sheet)

10. GEOGRAPHICAL DATA

LATITUDE AND LONGITUDE COORDINATES DEFINING A RECTANGLE LOCATING THE PROPERTY			O R	LATITUDE AND LONGITUDE COORDINATES DEFINING THE CENTER POINT OF A PROPERTY OF LESS THAN TEN ACRES		
CORNER	LATITUDE	LONGITUDE		LATITUDE	LONGITUDE	
	Degrees Minutes Seconds	Degrees Minutes Seconds		Degrees Minutes Seconds	Degrees Minutes Seconds	
NW	121° 47' 40"	37° 13' 55"		° ' "	° ' "	
NE	121° 47' 15"	37° 13' 55"		° ' "	° ' "	
SE	121° 47' 15"	37° 13' 40"		° ' "	° ' "	
SW	121° 47' 40"	37° 13' 40"		° ' "	° ' "	

APPROXIMATE ACREAGE OF NOMINATED PROPERTY: 16.5 acres

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE:	CODE	COUNTY:	CODE

11. FORM PREPARED BY

NAME AND TITLE:  
 James Delgado; and Mrs. Greta Kleiner,  
 ORGANIZATION: Concerned citizens  
 DATE: February 24, 1975  
 STREET AND NUMBER:  
 234 Castillon Way.  
 CITY OR TOWN: San Jose  
 STATE: California  
 CODE: 95119

12. STATE LIAISON OFFICER CERTIFICATION

NATIONAL REGISTER VERIFICATION

As the designated State Liaison Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service. The recommended level of significance of this nomination is:

National  State  Local

Name \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

I hereby certify that this property is included in the National Register.

\_\_\_\_\_  
 Chief, Office of Archeology and Historic Preservation

Date \_\_\_\_\_

ATTEST: \_\_\_\_\_

\_\_\_\_\_  
 Keeper of The National Register

Date \_\_\_\_\_

SEE INSTRUCTIONS

## Appendix C

Letter in Support of Preserving the Archaeological Site

from West Valley College



14000 FRUITVALE AVENUE ■ SARATOGA, CALIFORNIA 95070 ■ (408) 867-2200  
SARATOGA CAMPUS



Jan 3, 1974

To Whom it May Concern:

The purpose of this letter is to indicate that the land around the Santa Theresa Springs is an archaeological site designated WVC-18 in West Valley College's archaeological records. This archaeological site comprises an important resource of knowledge about San Jose's prehistory. The site is irreplaceable and has value both to science and to future generations of citizens who value and want to know about the past.

Although the part of the archaeological site which lies north of Heaton Moor Ave. has been very heavily damaged by housing tract development, the part of the site remaining to the south of the street appears to be relatively intact.

Open space use of this land is highly recommended for the purpose of preserving this irreplaceable archaeological site.

Sincerely,  
*Linda King*  
Linda King  
Archaeology Dept.

JAMES P. HARDY, *Superintendent/President*  
GOVERNING BOARD

MILDRED WHARTON, *Chairman*

FOSTER S. LOPES, *Vice Chairman* ■ ROBERT W. BRYDON, *Clerk* ■ WILLIAM H. CILKER ■ WILLIAM H "Ben" GOULD ■ DONALD E. LINDSTROM ■ ROBERT A. SORENSEN

## Appendix D

Results of AMS Dating from Beta Analytics, Inc



*Consistent Accuracy . . .  
. . . Delivered On-time*

Beta Analytic Inc.  
4985 SW 74 Court  
Miami, Florida 33155 USA  
Tel: 305 667 5167  
Fax: 305 663 0964  
Beta@radiocarbon.com  
www.radiocarbon.com

Darden Hood  
President

Ronald Hatfield  
Christopher Patrick  
Deputy Directors

November 28, 2011

Mr. Alan Leventhal  
San Jose State University  
College of Social Sciences  
Office of the Dean  
San Jose, CA 95192  
USA

RE: Radiocarbon Dating Results For Samples CASCL125-1, CASCL125-6

Dear Mr. Leventhal:

Enclosed are the radiocarbon dating results for two samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses proceeded normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

Our invoice has been sent separately. Thank you for your prior efforts in arranging payment. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

  
Digital signature on file



**BETA ANALYTIC INC.**

DR. M.A. TAMERS and MR. D.G. HOOD

4985 S.W. 74 COURT  
MIAMI, FLORIDA, USA 33155  
PH: 305-667-5167 FAX:305-663-0964  
beta@radiocarbon.com

## REPORT OF RADIOCARBON DATING ANALYSES

Mr. Alan Leventhal

Report Date: 11/28/2011

San Jose State University

Material Received: 11/9/2011

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 309497 SAMPLE : CASCL125-1 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (bone collagen): collagen extraction: with alkali 2 SIGMA CALIBRATION : Cal AD 1330 to 1340 (Cal BP 620 to 610) AND Cal AD 1400 to 1440 (Cal BP 550 to 510)	430 +/- 30 BP	-19.5 o/oo	520 +/- 30 BP
Beta - 309498 SAMPLE : CASCL125-6 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (bone collagen): collagen extraction: with alkali 2 SIGMA CALIBRATION : Cal BC 350 to 290 (Cal BP 2300 to 2240) AND Cal BC 230 to 160 (Cal BP 2180 to 2110) Cal BC 130 to 110 (Cal BP 2080 to 2060)	2060 +/- 30 BP	-19.1 o/oo	2160 +/- 30 BP

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "\*\*\*\*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

# CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-19.5:lab. mult=1)

Laboratory number: **Beta-309497**

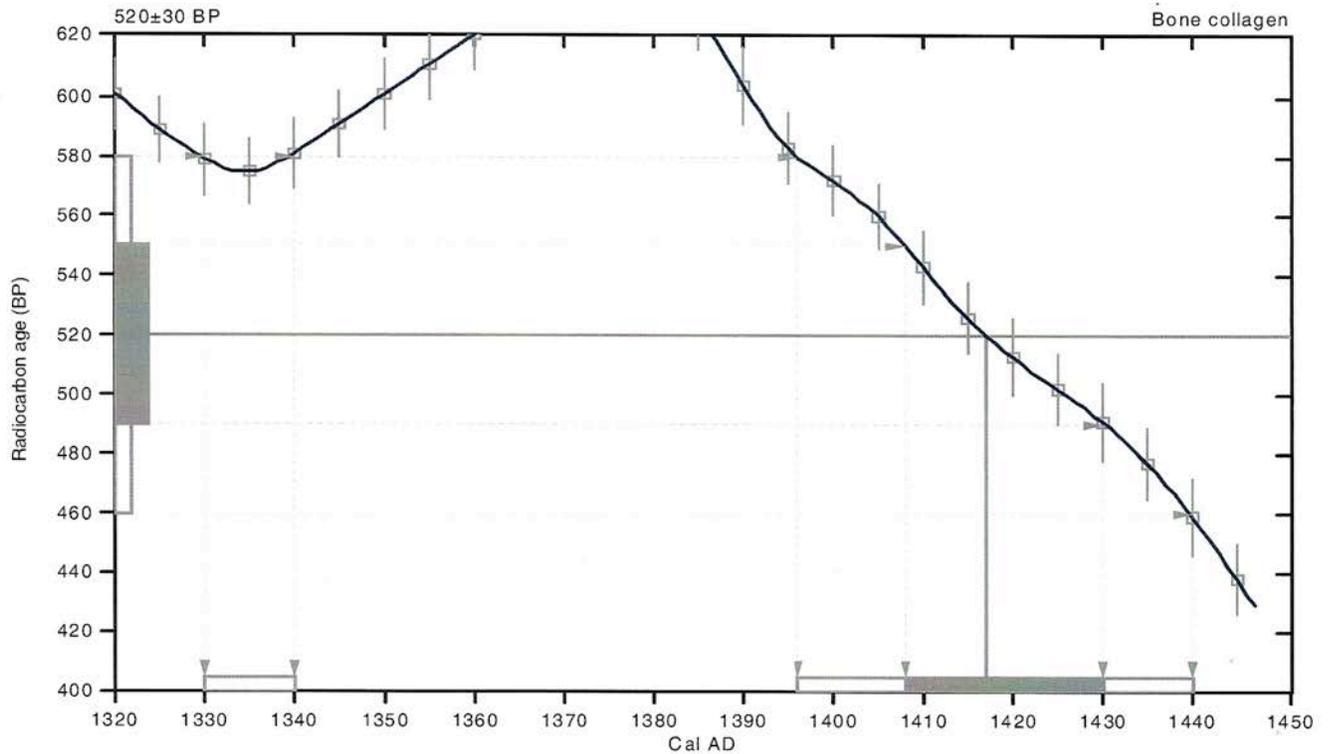
Conventional radiocarbon age: **520±30 BP**

2 Sigma calibrated results: **Cal AD 1330 to 1340 (Cal BP 620 to 610) and  
(95% probability) Cal AD 1400 to 1440 (Cal BP 550 to 510)**

Intercept data

Intercept of radiocarbon age  
with calibration curve: **Cal AD 1420 (Cal BP 530)**

1 Sigma calibrated result: **Cal AD 1410 to 1430 (Cal BP 540 to 520)**  
(68% probability)



## References:

*Database used*

*INTCAL09*

*References to INTCAL09 database*

*Heaton, et al., 2009, Radiocarbon 51(4):1151-1164, Reimer, et al., 2009, Radiocarbon 51(4):1111-1150,*

*Stuiver, et al., 1993, Radiocarbon 35(1):137-189, Oeschger, et al., 1975, Tellus 27:168-192*

*Mathematics used for calibration scenario*

*A Simplified Approach to Calibrating C14 Dates*

*Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322*

## Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-Mail: [beta@radiocarbon.com](mailto:beta@radiocarbon.com)

## Appendix E

### Obsidian Results from Geochemical Research Laboratory

Geochemical Research Laboratory Letter Report 2015-19

*Energy Dispersive X-ray Fluorescence Analysis of Obsidian Artifacts from CA-SCI-125,  
Located in the Santa Teresa Hills in South San Jose, California*

March 18, 2015

Mr. Alan Leventhal  
Senior Staff Archaeologist & Tribal Ethnohistorian  
Muwekma Ohlone Tribe of the San Francisco Bay Area  
Office of the Dean, College of Social Sciences  
San Jose State University  
San Jose, CA 95192

Dear Alan:

This letter reports the results of energy dispersive x-ray fluorescence (edxf) analysis of six obsidian artifacts from archaeological site CA-SCI-125, located in the Santa Teresa Hills of south San Jose, Santa Clara County, California. This analysis was conducted pursuant to your letter request of March 6, 2015. Laboratory equipment and instrumentation, artifact-to-source (geochemical type) attribution procedures, measurement resolution limits for each element, and literature references are the same as I reported previously for artifacts from CA-SCI-30/H (Hughes 2007).

**Table 1**

Quantitative Composition Estimates for Obsidian Artifacts from CA-SCI-125

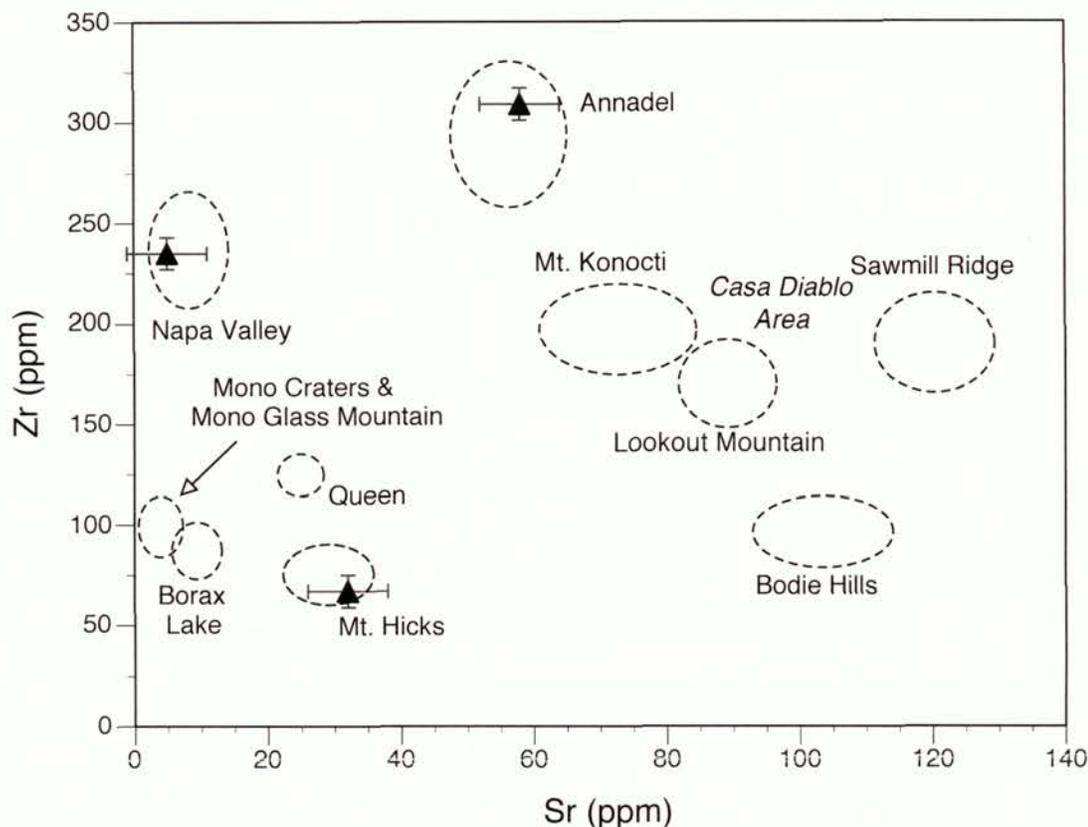
Cat. Number	Trace Element Concentrations											Ratio	Obsidian Source (Chemical Type)
	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	Fe <sub>2</sub> O <sub>3</sub> <sup>T</sup>	Fe/Mn	
004	nm	nm	153 ±4	32 ±3	11 ±2	67 ±4	19 ±2	30 ±27	nm	nm	nm	17	Mt. Hicks
006	nm	nm	189 ±4	5 ±2	48 ±3	235 ±4	8 ±3	433 ±30	nm	nm	nm	88	Napa Valley
1000	nm	nm	156 ±4	58 ±3	56 ±3	309 ±5	13 ±2	606 ±36	nm	nm	nm	60	Annadel
<i>U.S. Geological Survey Reference Standard</i>													
RGM-1 (measured)	nm	nm	147 ±4	110 ±3	27 ±3	216 ±4	8 ±3	847 ±30	nm	nm	nm	63	Glass Mtn., CA
RGM-1 (recommended)	32	15	149	108	25	219	9	807	1600	279	1.86	nr	Glass Mtn., CA

Values in parts per million (ppm) except total iron [in weight %] and Fe/Mn intensity ratios; ± = 2 σ expression of x-ray counting uncertainty and regression fitting error at 120-360 seconds livetime. nm= not measured.

Three of the artifacts you sent were large enough to generate reliable quantitative composition estimates (see Table 1). Edxf data in Table 1 and Figure 1 indicate that one artifact each was manufactured from obsidian of the Mt. Hicks, Napa Valley, and Annadel chemical types.

**Figure 1**

Zr vs. Sr Composition of Obsidian Artifacts from CA-SCI-125



Dashed lines represent the range of variation measured in geological obsidian source samples. Filled triangles plot samples from Table 1. Error bars are two-sigma (95% confidence interval) composition estimates for each specimen.

The other three flakes you submitted was too small and thin to generate x-ray counting statistics adequate for proper conversion from background-corrected intensities to quantitative concentration estimates (i.e., ppm) so I analyzed them to generate integrated net count (intensity) data for the elements Rb, Sr, Y, Zr, Nb, Mn and Fe (see Hughes 2010 for further description of analysis protocol). Ternary plots for these small artifacts (see Figure 2) show that three of them fall within the Rb/Sr/Zr ratio range for Napa Valley obsidians.

**Table 2**

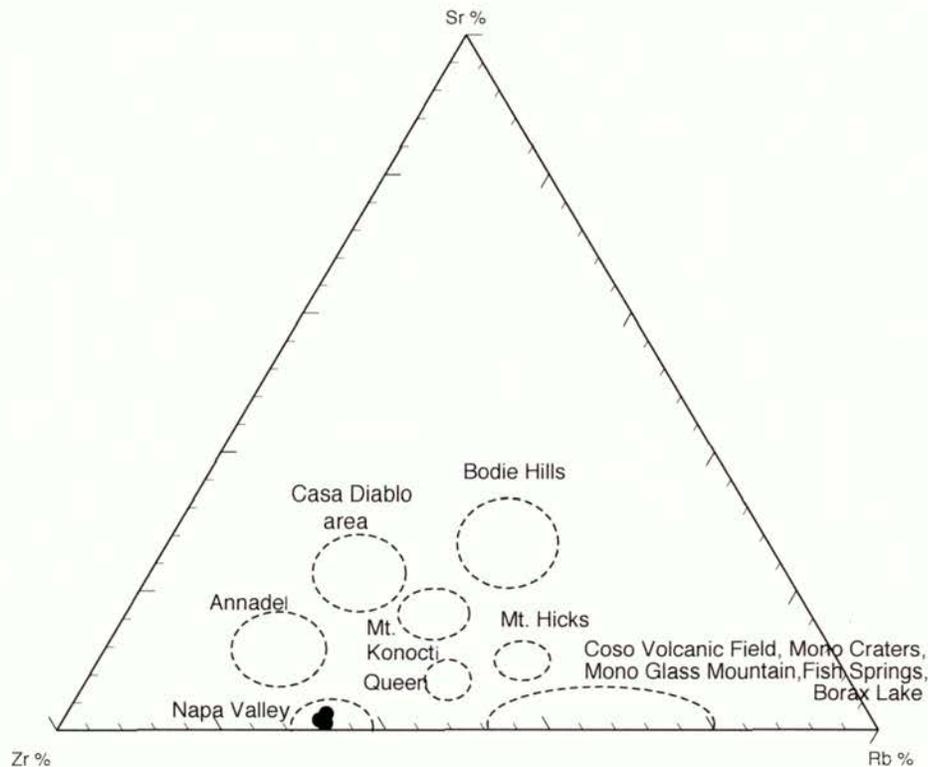
Integrated Net Intensity Element Data for Small Obsidian Flakes from CA-SCI-125

Cat. no.	Element Intensities				Intensity Ratios									Obsidian Source (Chemical Type)
	Rb	Sr	Zr	$\Sigma$ Rb,Sr,Zr	Rb%	Sr%	Zr%	Fe/Mn	Rb/Sr	Zr/Y	Y/Nb	Zr/Nb	Sr/Y	
8a	385	29	806	1220	.316	.024	.661	72.4	13.3	6.2	3.5	21.8	.2	Napa Valley
10	357	11	742	1110	.322	.010	.669	76.4	32.5	6.2	3.8	23.2	.1	Napa Valley
1001	359	17	775	1151	.312	.015	.673	77.0	21.1	6.4	3.1	19.4	.1	Napa Valley

Elemental intensities (peak counts/second above background) generated at 30 seconds livetime.

**Figure 2**

Ternary Diagram Plots for Small Obsidian Artifacts from CA-SCI-125



Dashed lines represent range of variation in geological obsidian source samples. Black dots plot the artifacts reported in Table 2.

Combining quantitative analysis results (Table 1) with integrated net peak intensity data (Table 2) this research documents that four of the six artifacts you submitted from SCI-125 were made from obsidian of the Napa Valley chemical type, with single artifacts manufactured from Mt. Hicks and from Annadel volcanic glass.

I hope this information will help in your analysis and interpretation of the significance of these artifacts. Please contact me at my laboratory (phone: [650] 851-1410; e-mail: rehughes@silcon.com; lab web site: www.geochemicalresearch.com) if I can provide any further assistance or information.

Sincerely,

*Richard E. Hughes*

Richard E. Hughes, Ph.D., RPA  
Director, Geochemical Research Laboratory

### References

Hughes, Richard E.

- 2007 Energy Dispersive X-ray Fluorescence Analysis of Obsidian Artifacts from the Cahalan Avenue Site (CA-SCI-869) Located in South San Jose, Santa Clara County, California. Geochemical Research Laboratory Letter Report 2007-47 submitted to Alan Leventhal, San Jose State University, July 6, 2007.
- 2010 Determining the Geologic Provenance of Tiny Obsidian Flakes in Archaeology Using Nondestructive EDXRF. *American Laboratory* 42 (7): 27-31.

# CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-19.1;lab. mult=1)

Laboratory number: **Beta-309498**

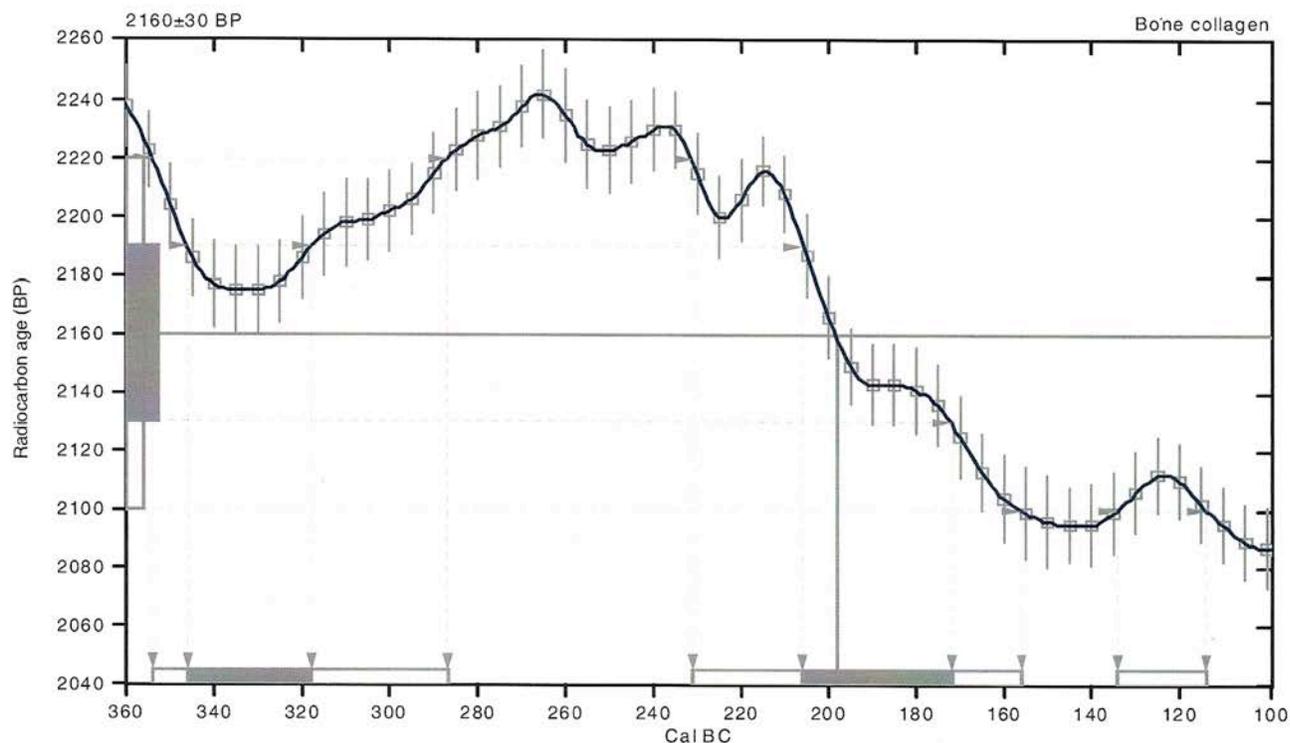
Conventional radiocarbon age: **2160±30 BP**

**2 Sigma calibrated results:** Cal BC 350 to 290 (Cal BP 2300 to 2240) and  
(95% probability) Cal BC 230 to 160 (Cal BP 2180 to 2110) and  
Cal BC 130 to 110 (Cal BP 2080 to 2060)

Intercept data

Intercept of radiocarbon age  
with calibration curve: Cal BC 200 (Cal BP 2150)

**1 Sigma calibrated results:** Cal BC 350 to 320 (Cal BP 2300 to 2270) and  
(68% probability) Cal BC 210 to 170 (Cal BP 2160 to 2120)



## References:

*Database used*

*INTCAL09*

*References to INTCAL09 database*

*Heaton, et al., 2009, Radiocarbon 51(4):1151-1164, Reimer, et al., 2009, Radiocarbon 51(4):1111-1150, Stuiver, et al., 1993, Radiocarbon 35(1):137-189, Oeschger, et al., 1975, Tellus 27:168-192*

*Mathematics used for calibration scenario*

*A Simplified Approach to Calibrating C14 Dates*

*Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322*

## Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-Mail: beta@radiocarbon.com

## Appendix F

Obsidian Hydration Results from San Jose State University

Obsidian Laboratory

April 23, 2012

Beth Mabie  
Graduate Student  
Department of Anthropology  
San Jose State University

**RE: Obsidian Hydration Results: (Job Number: SJSUOL-11-012)**

Dear Beth:

Thank you for trusting your obsidian samples to the San Jose State University Obsidian Laboratory (SJSUOL). This letter summarizes laboratory analysis for ten (10) specimens from site CA-SCL-125 in the City of San Jose, CA.

Laboratory technicians visually survey each specimen to identify two or more surfaces that will likely yield readable margins. Generally, two parallel cuts are required to remove a thin section from the selected location on each specimen with a four-inch diameter circular saw blade mounted on a lapidary trim saw. The raw thin sections are about one millimeter thick when removed and are mounted on a standard microscope slide with Lakeside Cement.

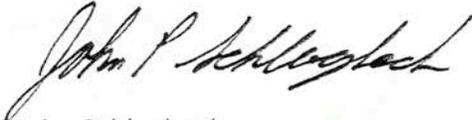
The mounted sections are then manually ground in two stages using #600 silicon carbide abrasive on plate glass. Grinding is complete when the sample is about 0.003 inches thick, or when light passes readily through the thin section. A glass slide cover is then mounted on top of the thin section permanently.

Technicians measure the hydration band using a 40X objective and a 12.5X eyepiece mounted on an Olympus BH-2 polarizing microscope. Ideally, six measurements are obtained from various locations along the cross-sectional margin of each sample. The measurements are averaged to yield the mean values reported on the attached data sheet. Due to normal limitation of the equipment, an error of +/-0.2 microns is acknowledged for the reported data. The measurements reported here were done at SJSUOL and verified by Tom Origer at the Origer Obsidian Laboratory (OOL) in Santa Rosa, CA.

Of the ten pieces of obsidian examined, eight yielded hydration readings. See the "comments" area of the data sheet for specific information on individual specimens including the results of visual sourcing and the conversion of the mean hydration value to an estimated Years Before Present (YBP). The date calculation is the result of using the equation  $YBP = kx^2$  (Friedman & Smith, 1960), where the constant (k) is 153.4 for Napa obsidian (Origer, 1987), and the

hydration measurement (x) is corrected for Effective Hydration Temperature (EHT) (Basgall, 1990) in the San Jose area. These further results have also been reviewed by Tom Origer at the OOL.

Sincerely,



John Schlagheck  
Hydration Technician  
SJSUOL

### Works Cited

- Basgall, M. E. (1990). Hydration Dating of Coso Obsidian: Problems and Prospects. *Presented at the 1990 SCA Annual Meeting*. Foster City.
- Friedman, I., & Smith, R. L. (1960). A New Dating Method Using Obsidian: Part I-The Development of the Method. *American Antiquity*, 25(4), 476-493.
- Origer, T. M. (1987). Temporal Control in the Southern North Coast Ranges of California: The Application of Obsidian Hydration Analysis. *Papers in Northern California Anthropology*, 1.

## San Jose State University Obsidian Laboratory (SJSUOL) Data Sheet

Client ID Number	Catalogue Number (SJSUOL-)	Description; Morphology	Mass (g)	Drawing/Photo	Hydration Measurements	Mean	Comments
FS-014	11-012-1	Possible bi-face fragment	3.1		2.9 3.0	3.0	A portion of the surface area appears to have new margins and may have been damaged during recovery. Visual Sourcing: <b>Napa YBP: 1290</b>
FS-033	11-012-2	Unmodified pebble	4.7		NA	NA	Smooth dull surface is result of water erosion. Not culturally modified. Hydration analysis not applicable (NA). Visual Sourcing: <b>Napa</b>
FS-032	11-012-3	Percussion flake	2.1		4.4 4.5 4.5 4.7 4.5 4.5	4.5	One edge shows signs of ware  Visual Sourcing: <b>Napa YBP: 2970</b>
FS-031-1	11-012-4	Possible shatter or small core	2.8		2.0 2.1 2.4 2.4	2.3	Specimen has many flake scars for such a small mass  Visual Sourcing: <b>Napa (root beer Napa) YBP: 811</b>

Client Name: Mabie, Beth  
 SJSUOL Job Number: S-11-012

Client ID Number	Catalogue Number (SJSUOL-)	Description; Morphology	Mass (g)	Drawing/Photo	Hydration Measurements	Mean	Comments
FS-031-2	11-012-5	Shatter	0.4		3.0 3.2	3.1	Good bands
FS-031-3	11-012-6	Thinning flake	0.4		5.0 5.1 5.0 5.1 5.1 5.1	5.1	Visual Sourcing: Napa YBP: 1380  Very clear glass
FS-012	11-012-7	Point fragment	3.6		4.7 4.8 4.8 4.9	4.8	Visual Sourcing: Napa YBP: 3835
FS-011	11-012-8	Point fragment-base with notches	4.7		5.0 5.0 5.0 5.0 5.0	5.0	Visual Sourcing: Napa YBP: 3389  Visual Sourcing: Napa YBP: 3683

Client Name: Mabie, Beth  
 SJSUOL Job Number: S-11-012

Client ID Number	Catalogue Number (SJSUOL-)	Description; Morphology	Mass (g)	Drawing/Photo	Hydration Measurements	Mean	Comments
FS-013	11-012-9	Bi-face fragment	1.8		DB	DB	Diffuse bands (DB)-no measurement possible  Visual Sourcing: Napa
FS-015	11-012-10	Bi-face fragment	1.7		5.8 6.0	6.0	Visual Sourcing: Napa YBP: 4984

## **Appendix G**

### **Skeletal Inventories**

**Burial: A**                      MNI: 1                      Sex: Indeterminate                      Age: >18 year old

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### **Condition of Skeleton.**

Skeleton is very incomplete and only represented by six cervical vertebrae. The elements that are present are complete, with good cortex. At some point in the past, the vertebrae had been glued together. Great care was taken to use water in order to dissolve the glue and tease apart the pieces that were not fused together. Elements were also stored in a small cardboard box stuffed with cotton.

#### *Axial Skeleton:*

Cervical vertebrae – C2 through C6

### **Sex and Age.**

#### *Sex:*

Sex is indeterminate due to a lack of diagnostic elements.

#### *Age:*

Age is >18 due to complete fusion of epiphyseal plates in the vertebrae, specifically the annular rings on the body of the vertebrae which fuse last (Schaefer et al. 2009).

### **Pathologies.**

#### *Age-related.*

- All six cervical vertebrae exhibit excessive porosity, exaggerated facets, and collapsed bodies with extensive lipping. All bones feel very light weight.
- The C2 and C3 vertebrae are fused almost completely at the body with only small portions unfused on the anterior surface and a very small portion of the posterior surface. Fusion is also present at the left articular facets and on the left portion of the neural arch. The right facet is not fused. The transverse foramina of C2 and C3 appear normal. Left inferior facet of C3 is enlarged and porotic. Also, porosity is

- present on the vertebral body of C3 (unable to determine porosity of C2 due to fusion).
- The C4 vertebra has a collapsed body with extensive lipping on the inferior surface. Superior surface of the body contains numerous bony plaques. Also on the superior surface are two small areas of eburnation at the posterior edge of the body. The inferior body surface is extremely porous. Both superior facets are enlarged with the left facet being nearly three times larger than the right. Extensive lipping on the left facet extends over approximately one-third of the left transverse foramen. The left transverse foramen is also larger than the right. Small areas of eburnation are present on both superior facets with the left facet exhibiting slightly more than the right. Inferior facets are slightly enlarged, but relatively equal. Some lipping on both facets, though no eburnation noted.
  - The C5 vertebral body exhibits excessive porosity on both the superior and inferior surfaces. The vertebral body is collapsed, with excessive lipping on both the superior and inferior surfaces. Lipping from the body almost completely covers the transverse foramen on the right side. Both superior facets are slightly enlarged and exhibit some lipping. Inferior facets are also slightly enlarged, exhibit lipping, and also exhibit micro-porosity.
  - The C6 vertebra exhibits slight collapse, with lipping primarily on the superior surface. The superior surface also exhibits a great deal of porosity, while the inferior surface only shows slight porosity. The inferior surface also exhibits bony plaques. The lipping on the superior surface extends over the right transverse foramen. The right transverse foramen is not normal and actually contains a double foramen. Both superior facets are slightly enlarged, contain micro-porosity, and also have slight lipping. Inferior facets are also slightly enlarged with the left being slightly larger than the right, both have micro-porosity, and both have slight lipping.

**Burial: 1**

MNI: 1

Sex: Female

Age: 19-40

**Condition of Skeleton.** Skeleton is highly fragmented and incomplete. About 25% of the remains are present. Though fragmentary, the bone is of good quality with good cortex. A portion of the right femur has been removed for AMS analysis.

*Cranium:*

One frontal fragment with upper left orbit

Right zygomatic arch fragment

One right temporal fragment

Two right parietal fragments

One left temporal fragment

One left parietal fragment

Six miscellaneous small fragments

Right mandibular fragment containing gonial angle and ascending ramus

*Axial Skeleton:*

One cervical neural arch

Thoracic vertebrae: one complete lower thoracic vertebra, broken at the neural arch, one incomplete 12<sup>th</sup> thoracic vertebra missing left facets and spinous process, one body fragment, four small fragments (one upper spinous process, 2 small body fragments, one inferior right facet)

Lumbar vertebrae: one incomplete vertebra with body and left portion of neural arch, one complete vertebra only missing right superior facet, 3 inferior facet fragments

Four indeterminate scapular fragments.

Five left rib fragments

Four right rib fragments

Two indeterminate rib fragments

Right pubis

*Appendicular Skeleton:*

Four indeterminate long bone fragments

Complete left humerus

Incomplete right humerus – missing the proximal portion

Incomplete right and left ulnae – both missing superior portion of the olecranon process and distal portion of the element.

Distal portions of the right and left femur

Distal portion of the left tibia

Fragments of the right tibial plateau and distal portion of the right tibia

Complete left patella

Complete right calcaneus

### **Sex and Age.**

#### *Sex:*

Sex was determined by assessing the sub-pubic angle of the pelvis, the supraorbital margin of the cranium, the zygomatic arch, and the transverse diameter of the humerus. The sub-pubic angle was wide and u-shaped (Bass 2005, White 2000, Buikstra and Ubelaker 1994). The supraorbital margin was rounded (Bass 2005, White 2000, Buikstra and Ubelaker 1994) and the zygomatic arch is thin (Griffin 2007). All of these factors were in the female range. The transverse diameter of the humerus was 38.65 mm. Anything less than 42.8 mm is within the range for females according to Bass (2005:158).

#### *Age:*

Age was determined by assessing long bone fusion and the pubic symphysis. Of the epiphyseal unions present, the humeral head starts to fuse the latest at 15 years of age (White 2000:351). The left humeral head is fully fused, indicating an age over 15 years. Using Suchey (1990), the articular surface of the pubic symphysis represented a phase II. This phase represents individuals from 19-40 years old.

## **Pathologies.**

### *Age-Related:*

- Slight lipping on the anterior surface of one thoracic vertebral body.
- Lumbar vertebrae bodies exhibit lipping on the superior and inferior margins. Also slight porosity is visible on the superior and inferior body surfaces. No marked changes on the articular facets.
- No changes noted on any other articular surfaces.

### *Dental Disease:*

- Porosity noted on the posterior aspect of a molar socket on mandibular fragment. Tooth is not present. Based on location, it can be assumed the socket was for the left lower second molar and that the third molar is not present. It cannot be determined if the third molar ever erupted or if it was lost ante-mortem and had healed.

### *Pathology Location and Description:*

- Porosity noted on the surface of the left eye orbit. Also, porosity noted superior to the left eye orbit, on the supraorbital ridge

**Unique Non-pathological Traits.** Slight arachnoid fovea noted on interior of frontal bone, just superior/posterior to the frontal crest.

**Stature.** A maximum length measurement was taken on the left humerus. Using the chart established by Genoves (1967) using a Mesoamerican population, the individual would have been approximately 166.5 cm (5'5 ½") in height.

## **Postcranial Measurements:**

	Left	Right
Humerus: maximum length	331	
Humerus: epicondylar breadth	58.03	
Humerus: vertical diameter of head	44.2	
Humerus: anterior-posterior diameter at midshaft	16.33	
Humerus: medial-lateral diameter at midshaft	21.35	

**Burial: 2**      MNI: 4

**Condition of skeleton.** During analysis, Burial 2 was determined to be a minimum of four individuals. While laying out the burial, it was noted that three left clavicles and three mental eminences (mandibles) were present. There are also at least two maxillae, two right tibiae, two right humeri, two left scapulae, two right clavicles, and two left humeri. As all of the elements, including the annular rings on some very small vertebrae, were fused, it has been determined that all individuals represented were adults. At least one individual was a very large male based on the robusticity and over all size of the elements as well as sexual characteristics such as pelvic traits and metric traits. The age of the individuals varied as evidenced by billowing on the pubic symphysis and moderate osteoarthritis on the lumbar vertebrae. It is unlikely that one individual contained both traits.

While some elements are relatively complete, the majority of them are highly fragmented with the collection being represented by nearly 1,000 fragments. Care was taken in order to attempt to separate the individuals based on sex, age, and general size, though not all elements could be assigned to a specific individual and will be described below.

There are over 398 small, indeterminate fragments primarily representing long bones, trabecular bone, and irregular bone.

*Cranium:*

There are over 194 small fragments representing the calvarium. Suture lines appeared to be primarily the sagittal and lambdoidal. All sutures were fused and only visible ectocranially.

Maxillary fragment – medial incisors were lost ante mortem and sockets are healed, lateral incisors are peg shaped. Left canine has grown laterally, is fully developed, and has no wear.

There is a large abscess in the roof of the palette near the canine. The foramen incisivum is also

enlarged. There is no evidence of the remainder of the teeth on the left side. Right canine socket is present and porotic. There is evidence of an abscess on the labial side near the right first premolar. Teeth are worn nearly through to the cervicoenamel juncture.

Maxillary fragment – anterior portion of the left side including the infraorbital foramen. Socket for first molar is present. Sockets for second and third molars appear healed and porotic. This is not a portion of the above maxilla due to the duplication of area.

Mandibular fragment including the right portion of the mental eminence – too fragmented to assess for sex

Mandibular fragment including the mental eminence (complete, so not a part of above fragment) – scoring for the mental eminence is a 4 which is consistent with a male (White 2000, Buikstra and Ubelaker 1994). Medial incisors were lost ante mortem and the sockets are completely healed. Sockets are present for lateral incisors, left canine, left first and second premolars. First molar is present in situ. Wear is completely through the dentinoenamel junction.

Incomplete mandible – (reconstructed 3 fragments) strong mental eminence and sharper gonial angle indicating male (White 2000, Buikstra and Ubelaker 1994), left first incisor, left second incisor, left canine, and right second molar are in situ. All are worn almost to the cervicoenamel junction, with the worst wear on the second molar that has both root canals open. There is also an abscess on the labial side at the base of the left canine. Sockets for the left canine and first premolar, and left third premolar are present.

Loose teeth – all loose teeth were examined for possible inclusion with maxillary or mandibular fragments

- right first upper molar (heavy angled wear through the dentin to the cervicoenamel junction)
- right first upper molar (heavy angled wear through the dentin into the cervicoenamel junction – large cavity on lingual side with one root missing)

- three left second premolars (one worn to the cervicoenamel junction, one worn through the dentioenamel junction and cavity on the mesial surface, one starting to wear through the dentioenamel junction)
- two lower canines – indeterminate sides (both worn to the cervicoenamel junction)
- two upper canines – indeterminate sides (both worn to the cervicoenamel junction)
- left lower third molar (heavy angled wear to the cervicoenamel junction, caries on the mesial surface)
- left upper third molar (minimal wear on surface has not broken through the dentioenamel junction)
- left lower third molar (heavy wear through the dentioenamel junction)
- right upper third molar (very minimal wear, caries on the occlusal surface)
- indeterminate lower molar (buccal to lingual wear pattern into the cervicoenamel junction)
- two indeterminate lower molars (one worn through the cervicoenamel junction, one worn superior to the cervicoenamel junction)
- left lower medial and lateral incisors (both exhibit shoveling, both are worn just through the dentinoenamel junction – probable that these two teeth are from the same individual)
- lower left canine (slight wear, occlusal enamel intact).

#### *Axial Skeleton:*

Vertebral bodies: There were 36 identifiable vertebral bodies with at least a portion of the superior or inferior surface present. Of those 36, six did not contain enough undamaged margin to assess for osteoarthritis and did not exhibit any other pathology. Seventeen of the fragments contained clear margins, exhibiting no osteoarthritis. Five fragments exhibited mild osteoarthritis with slight lipping around the margins. The remaining eight fragments exhibited moderate lipping on the margins.

Vertebral arch, facet, and processes: There are three transverse processes, one spinous process, one dens process, four facets, and lamina. The three transverse processes and one spinous process are unremarkable. The dens process has moderate lipping on the margins of the articular surface. Incidentally, this dens process does not articulate with either C1 vertebrae present. Two of the articular facets (one inferior and one superior) have mild to moderate lipping. The other two facets (both inferior) are unremarkable. Lamina is also unremarkable.

Lumbar vertebrae – There are seven neural arches, two body fragments, and one complete lumbar. Two of the neural arches are unremarkable, with clear margins on the articulating facets. The remaining five neural arches exhibit spicule formation as well as bony plaques on several of the facets. The two body fragments also have lipping at the margins. The complete vertebra has more excessive spicule formation on the left lateral/superior surface, though lipping occurs the entire superior margin. The right superior facet shows marginal changes, while the other three facets are unremarkable. A small Schmorl's node is on the inferior body surface.

Scapula – There is one indeterminate spine fragment, one indeterminate border fragment, one left glenoid cavity fragment, one left acromion process fragment, one coracoid process fragment, and one indeterminate coracoid process fragment. All are unremarkable and glenoid cavity fragment exhibits clear margins.

Left pubis symphysis – This element differs greatly in size and age from the right pubic symphysis that is present. Slight billowing is visible on surface. Margins are smooth.

Ribs – eight left rib fragments, six right rib fragments, four sternal rib ends, and 61 indeterminate rib fragments. The sternal rib ends are similar to burial 3A. All exhibit a U-shaped pit, slight porosity, and fairly regular margins. The phase for these rib ends is approximately four or five.

Age would be approximately 26 years of age to 42 years of age. It is possible that these rib ends belong to Burial 3A. However, the sheer number of ribs and the size of some of the other vertebral rib ends indicates at least one other individual.

Right first rib fragment from a more gracile individual – missing both ends

Right and left clavicles – both missing proximal ends – due to differences in length and general size, most likely from two separate individuals and not consistent with Burial 2A or 2B

*Appendicular Skeleton:*

Femoral diaphysis fragment

Right tibia mid-shaft fragment is unremarkable and is also clearly the most weathered element with a bleached color and poor cortex compared with the rest of the elements.

Proximal diaphysis of the right fibula is unremarkable

Indeterminate humerus fragments: One diaphysis fragment and two head fragments are unremarkable. The head fragments represent two different humeri, and most likely represent two different individuals due to the difference in size.

**Burial: 2a**                      MNI: 1                      Sex: Male                      Age: 50-59

This individual was considerably larger and more robust than the other individuals as evidenced by the size of the skeletal elements.

**Condition of Skeleton.** The individual is approximately 40% complete. Elements have good cortex and most elements are complete in one.

*Axial Skeleton:*

Complete left scapula (5 pieces) - small depression in the center of the glenoid fossa.

Right scapular fragment – fragment of the subscapular fossa – does not fit into missing portion of left scapula.

Complete C1 vertebra – right facet is enlarged, with lipping. Also the dens process facet has lipping on the right superior margin.

Both clavicles are complete (R-1, L-2) with the right only missing a portion of the medial articular surface. Slight porosity noted on both clavicles at the juncture with the acromion process.

Thoracic Vertebrae - T11 and T12 neural arches, there are six body fragments, nine indeterminate neural arches, two spinous processes, and three transverse processes. Two of the body fragments exhibit mild to moderate lipping, while the other four have none. Seven of the indeterminate neural arch fragments are unremarkable. T5 neural arch fragment exhibits an enlarged right inferior facet with associated porosity. This matches the T6 neural arch with corresponding enlargement and porosity of the superior right facet. The inferior facets on T11 are enlarged and rounded with moderate lipping, giving it the appearance of a T12. The enlarged facets of T11 fit into the enlarged, lipped superior facets of T12.

Left os coxa – ilium and ischium are complete (2). acetabulum – 58.49 mm

Right os coxa – ilium, ischium, and pubis are present (complete in 5 pieces)

Both first ribs (right in 2 pieces, left in 1 piece) are incomplete, missing the articular surfaces.

Five complete right ribs (3 are missing sternal end) – one rib has a bony callous close to the sternal end (possible healed break – not associated with age as evidenced by articular surface)

Sternal ends are phase IV-V with a u-shaped pit exhibiting slight porosity, but otherwise good bone quality. Edges are fairly uniform with no scalloping present. Walls still have a relatively good weight. (age 26-42 – Bass 2005:137).

Eight left rib fragments (missing most of articular surfaces) and one incomplete left rib (missing sternal end)

Manubrium (incomplete in 8 pieces)

Sacrum (incomplete in 9 pieces)

*Appendicular Skeleton:*

Both patellae are complete

Left tarsals – complete calcaneous and talus, navicular fragment

Foot phalanges – four distal, one intermediate, four proximal, right proximal and distal phalanges

Left humerus is represented by the distal epicondyle only

Left femoral head fragment

Complete right femur - distal diaphysis too damaged to allow for any measurements (previously reconstructed) (14 fragments) lipping noted lateral to lesser trochanter, strong linea aspera, no osteoarthritis

Complete right tibia (reconstructed and glued previously)(11 fragments)

Complete left fibula

Left humerus is missing the proximal end (5 fragments) (previously reconstructed)

Complete left radius (2 fragments)

Right carpals – complete scaphoid, complete greater multangular, complete pisiform

Right metacarpals – complete first metacarpal

Complete left ulna (2 pieces) bony plaque in the center of the trochlear notch.

Left carpals – complete scaphoid

Left metacarpals – complete first metacarpal, complete second metacarpal, complete third metacarpal

Hand phalanges – five complete proximal phalanges, one incomplete proximal phalange, four intermediate phalanx, one distal phalanx

Right tarsals – Incomplete calcaneous, complete talus, complete navicular, complete cuboid, complete first cuneiform (2 pieces), complete second cuneiform

All right metatarsals are complete – first metatarsal has a deep depression in the proximal articular surface which exhibits porosity and descends into the trabecular bone. Under magnification, edges appear smooth (active infection?)

## **Sex and Age.**

### *Sex:*

Sex was determined using pelvic and metric traits. Pelvic traits such as sub-pubic angle, shape of pubis, and size of the greater sciatic notch have been established in assessing sex (Bass 2005, White 2000, Buikstra and Ubelaker 1994). This individual had a narrower, v-shaped sub-pubic angle, a triangular pubis shape, and a narrow greater sciatic notch. All of these traits fall within the male realm. Also, metric traits can be used to determine sex (Bass 1994). According to Bass (1994), the glenoid fossa, humeral epicondyle, and femoral head measurements can be used to assess sex. A glenoid fossa with a vertical diameter  $>37$  mm is assessed as male. This individual had a measurement of 40.26 mm. A maximum width of the humeral epicondyle exceeding 63.9 mm indicates male, while this individual had a measurement of 67.51 mm. Also, a maximum diameter of a femoral head exceeding 46.5 mm indicates male. This individual has a measurement of 52.86 mm. Based on all of the above criteria, this individual is male.

### *Age:*

Aging determination was accomplished utilizing dentition, bone fusion, pubic symphysis, auricular surface, osteoarthritis, and sternal rib ends. All long bones were fused. Pubic symphysis has a face that is porous with some pitting. The rim is eroded on the posterior/superior edge that is consistent with phase VI. Phase VI is consistent with individuals 49-73 years of age. In assessing the auricular surface, it was noted that the surface was irregular with areas of granularity and dense bone. The apical area is slightly irregular, however there is no macroporosity present. This is consistent with an individual who is 50-59 years of age. Osteoarthritis in this individual is slight to moderate. The sternal rib end has a U-shaped pit

with some deterioration noted on the inside of the pit. This is consistent with an individual in phase VI or phase VII. The age range for these phases is 43 to 71 years of age (White 2000, Bass 2005, Buikstra and Ubelaker 1994). Therefore, based on the preponderance of the evidence, the individual is approximately 50-59 years of age.

## **Pathologies.**

### *Age-Related Disease:*

- Mild to moderate degenerative joint disease is present in the left shoulder, both elbows, right wrist, and both hands. It is also present in both hips, the right knee, both ankles, and the left foot.
- The spinal column exhibits mild to severe osteoarthritis. The atlas has moderate OA.

### *Pathology Location and Description:*

- The right first metatarsal has a large depression with porosity and pitting on the proximal facet.
- The distal end of the right clavicle is porotic on the superior surface.
- One proximal foot phalange has an offset distal end indicating a healed break.

**Stature:** The maximum tibial length of 406 mm was used to estimate stature. Utilizing the formula as proposed by Genoves (1967), the individual was approximately 170.51 cm to 176.14 cm (5' 7" to 5' 9"). According to Auerbach's (2010) formula, the individual would be 174.27 cm (5' 8 ½").

## **Post Cranial Measurements:**

	Left	Right
Clavicle: maximum length	150.42	
Clavicle: anterior-posterior diameter at mid-shaft	10.82	
Clavicle: superior-inferior diameter at mid-shaft	11.19	
Humerus: epicondylar breadth		66.89
Radius: maximum length		265
Radius: anterior-posterior diameter at mid-shaft		12.01
Radius: medial-lateral diameter at mid-shaft		16.62
Ulna: maximum length	286	
Ulna: anterior-posterior diameter at mid-shaft	14.64	

Ulna: medial-lateral diameter at mid-shaft	14.55	
Femur: maximum head diameter		52.86
Femur: epicondylar breadth		85.79
Tibia: maximum length		406
Tibia: maximum distal epiphyseal breadth		52.09
Fibula: maximum length		392
Fibula: maximum diameter at midshaft		14.64
Calcaneus: maximum length		48.36
Calcaneus: middle breadth		29.14

**Burial: 2b**                      MNI: 1                      Sex: Female                      Age: >15 years old

**Condition of Skeleton.** This burial is represented by a few upper limb fragments. It is only about 5% complete.

*Axial skeleton:*

Lateral half of the left clavicle.

*Appendicular skeleton:*

Left radial diaphysis fragment

Incomplete right humerus (missing proximal end) (3)

Proximal right ulna fragment

Proximal right radius fragment

Incomplete left humerus (missing proximal half) (2) -

Proximal left ulna fragment

Small left radius fragment

## **Sex and Age.**

### *Sex:*

Sex was determined using the measurement of the right humeral epicondyle. According to Bass (1995), a maximum epicondylar breadth of the humerus <56.8 mm indicates a female. The measurement for this individual was 48.57 mm, clearly placing it within the female range.

### *Age:*

Age was determined to be an adult due to the fusion of the distal humerus. According to Schaefer et al. (2009), the distal humerus fuses by 15 years of age.

## **Pathologies.**

### *Pathologies Location and Description:*

- Lateral half of the left clavicle – bone is slightly bulbous appearance at the conoid tubercle with associated porosity indicating a possible healed break.
- A possible soft tissue infection has created a large, porotic depression at the distal portion of the left humerus. This is coupled with the superior facet of the left ulna being misshapen. The edge appears wavy at the anterior margin. Also, the proximal left radius is evidenced with eburnation.

**Stature.** Stature is indeterminate due to a lack of diagnostic elements.

## **Post Cranial Measurements.**

	Left	Right
Humerus: epicondylar breadth		48.57

**Burial: 2c**                      MNI: 1                      Sex: Female                      Age: 25-35 years old

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**Condition of Skeleton.** This burial is represented by the cranium.

*Cranium:*

Four frontal fragments including supraorbital margins and supraorbital ridge.

Five left parietal fragments

Left temporal fragment including the mastoid process

Right parietal fragment

Right temporal fragment including the external auditory meatus

Left ascending ramus of the mandible (2)

One maxillary fragment with left canine, first and second premolars in situ

One mandibular fragment with left canine and first premolar in situ

**Sex and Age.**

*Sex:*

Sex was determined using cranial traits. The mastoid process is small, supraorbital ridge is sharp, and the supraorbital ridge is small. Also, the gonial angle is shallow. All of these characteristics are indicative of a female (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

*Age:*

Age was determined to be adult due to the fusion of the cranial sutures. Also, tooth wear is minimal, with dentin just showing through the crowns. According to attrition rates as outlined by Smith (1984), the individual was 25-35 years of age at the time of death.

## **Pathologies.**

### *Dental Disease:*

- Slight calculi present on all teeth.

**Stature.** Stature was indeterminate due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to a lack of elements.

**Burial: 2d**                      MNI: 1                      Sex: Indeterminate                      Age: >18 years old

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**Condition of Skeleton.** This is a small individual represented primarily by cervical and thoracic vertebrae. This individual was part of the Burial 2 mixture. It is assumed that this individual is a separate individual, but could be a part of Burial 2b.

### *Axial Skeleton:*

Indeterminate vertebrae – Nine fragments including two body fragments and two facet fragments.

Cervical vertebrae – C1 is complete (in 3), C2 is a body fragment, four indeterminate body fragments, and four neural arch fragments.

Thoracic vertebrae – One body fragment, one spinous process, and five neural arch fragments

## **Sex and Age.**

### *Sex:*

Sex could not be determined due to a lack of diagnostic elements.

*Age:*

Age was determined to be an adult due to complete fusion of the epiphyseal plates including the annular rings on the body of the vertebrae which occurs by 18 years of age (Schaefer et al. 2009).

**Pathologies:** None were noted.

**Stature:** Indeterminate due to lack of diagnostic elements.

**Measurements:** None taken due to a lack of elements.

**Burial: 3**                      MNI: 1                      Sex: Possible Male                      Age: Possible Adult

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**Condition of Skeleton.** Burial is highly fragmented and incomplete.

100+ indeterminate fragments

*Cranium:*

One frontal fragment (left supraorbital margin)

One left temporal fragment

One occipital condyle

11 right temporal fragments

One left mandibular condyle fragment

31 small, indeterminate fragments

*Axial Skeleton:*

One cervical spinous process

One cervical body fragment

Two cervical facet fragments

*Appendicular Skeleton:*

Seven indeterminate long bone fragments

**Sex and Age.**

*Sex:*

Sex is possibly a male due to the roundness of the left supraorbital margin (White 2000, Bass 2005, Buikstra and Ubelaker 1994). There are no other diagnostic elements available.

*Age:*

The age for this individual is over 18 based on the fusion of the annular ring on the only cervical vertebra body fragment (Schafer et al. 2009).

**Pathologies.** No pathologies were noted on the fragments.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to the fragmentary nature of the elements.

**Burial: 4**                      **MNI: 1**                      **Sex: Indeterminate**                      **Age: >15 years old**

**Condition of Skeleton.** Skeleton is only represented by one fragment.

*Appendicular skeleton:*

Right femoral medial epicondyle

**Sex and Age.**

*Sex:*

Sex could not be determined due to lack of diagnostic elements.

*Age:*

Age was determined by assessing the level of fusion of the right distal femur. The fragment revealed fusion was complete. Fusion of the distal femur typically begins by age 15 years (White 2000).

**Pathologies.** No pathologies were noted.

**Stature.** Stature was indeterminate due to lack of diagnostic elements.

**Measurements.** Measurements were not taken due to the fragmentary nature of the only element present and the lack of all other elements.

**Burial: 5**

Burial 5 was not collected due to a lack of human bones (Nathan Gardener student notes March 19, 1972).

**Burial: 6**                      MNI: 1                      Sex: Indeterminate                      Age: 40-45 years old

**Condition of Skeleton.** Skeleton is highly fragmented. Damage is present on the left radius, right fibula and both femora that may have been a result of construction or excavation activities. Right fibula also has evidence of rodent chewing. Distal portion of the diaphysis of the left tibia was removed for AMS dating.

*Cranium:*

Three indeterminate parietal fragments

Lower left first premolar

*Axial Skeleton:*

Two lumbar bodies

Three sacral fragments

Left ilium

Right ilium

*Appendicular Skeleton:*

Left ulna diaphysis fragment

Distal portion of the left radius

Carpals – left hamate, left greater multangular, left lesser multangular

Metacarpals – left MC1, MC2, MC3, MC4, and MC5

Three complete proximal hand phalanges

Four complete intermediate hand phalanges

One complete distal hand phalange

Distal portion of the right radius

Left femur is incomplete in 11 fragments

Right femur is complete in five fragments

Both patellae are complete

Proximal diaphysis of left tibia

Diaphysis of left fibula

Incomplete right tibia

Diaphysis of right fibula

Proximal facet of the first right metatarsal

Distal foot phalanx

### **Sex and Age.**

#### *Sex:*

Though a portion of the pelvis was present, it was determined that the greater sciatic notch was of intermediate size, which was indeterminate for sex. Also, though the presence of a preauricular sulcus can be used in helping to determine female, the absence of a preauricular sulcus does not eliminate the possibility of female (Bass 2005, White 2000, Buikstra and Ubelaker 1994). Another trait available on this individual was the femoral head measurement. A measurement  $<43.5$  mm indicates female, while a measurement  $>46.5$  mm indicates a male. As this individual had a femoral head measurement of 46.28 mm, this again placed the individual in the indeterminate range.

#### *Age:*

Age was determined by assessing long bone fusion, the auricular surface, dental wear, and presence of osteoarthritis (Bass 2005, White 2000, Buikstra and Ubelaker 1994). All elements present appear to be fused. The auricular surface was incomplete, so only a cursory assessment could be made. There was no billowing present and only very slight apical changes. The retroauricular area was missing and could not be assessed. Based on what was present, the auricular surface fit the definitions for phases II-V, which represent individuals 25-45 years old. The dental wear on the lower left first premolar was excessive and extended through the dentin. Enamel is still present. Tooth is worn at an angle. Age estimate from dental wear is 40-45 years

of age (Smith 1984). Mild osteoarthritis was only present on the two vertebrae present. There was no osteoarthritis noted on any other joints.

### **Pathologies.**

#### *Age-Related:*

- Indeterminate lumbar body has noticeable lipping on the inferior margin.
- Slight lipping on the inferior margin of the right patella.
- Both patellae have slight spicule formation on the superior surface at the (ligament) attachment.

#### *Dental Disease:*

- The lower left first premolar has a build up of calculi into the cementum.

#### *Pathology Location and Description:*

- On the right femoral head, the fovea capita has an enlarged and raised margin. There is no corresponding activity seen in the acetabulum. This may be an indicator of potential ligament stress.

**Stature.** Stature was not determined due to lack of complete diagnostic elements.

### **Post Cranial Measurements.**

	Left	right
Os Coxae: iliac breadth		132.84
Femur: maximum head diameter		46.28
Tibia: anterior-posterior diameter at the nutrient foramen	36.77	
Tibia: medial-lateral diameter at the nutrient foramen	22.44	

**Burial: 7**                      **MNI: 1**                      **Sex: Indeterminate**                      **Age: 20-25 years old**

**Condition of Skeleton.** Skeleton is highly fragmented and poorly represented.

#### *Axial skeleton:*

Sternal rib end fragment

Three right ilium fragments

Right ischium fragment

*Appendicular Skeleton:*

Right lateral femoral condyle fragment

Fibular diaphysis fragment

Three indeterminate fragments

**Sex and Age.**

*Sex:*

The sex could not be determined due to lack of diagnostic elements.

*Age:*

Age was determined due to an indeterminate sternal rib end. The rib end was characterized by a shallow pit with a wavy surface and was determined to be consistent with individuals 20-25 years old (White 2000, Buikstra and Ubelaker 1994, Bass 2005). Also, the distal portion of the right femur was fused, which is consistent with individuals over 15 years of age (White 2000, Buikstra and Ubelaker 1994).

**Pathologies.** No pathologies were noted on elements present.

**Stature.** Stature was indeterminate due to fragmentary state.

**Measurements.** No measurements were taken due to fragmentary state.

**Burial: 9**      MNI: 2

This burial is a minimum of two individuals. It is represented by a relatively complete cranium and the distal portion of the right femoral diaphysis. The cranium is an obvious sub-adult, while the femoral fragment is much larger than expected for the cranium.

**Burial: 9a**      MNI: 1      Sex: Indeterminate      Age: approximately 2 years old

**Condition of Skeleton.** Skeleton is represented by the cranium only. Though fragile due to the age of the individual, the element is relatively complete and in good condition. Skull had been previously reconstructed.

*Cranium:*

Occipital

Left and right parietals

Frontal

Sphenoid

Nasals

Left and right maxillae

Left and right palatines

Volmer

Ethmoid

Left and right zygomatics

**Sex and Age.***Sex:*

Sex was indeterminate due to the individual's age. Individuals must have undergone secondary changes during puberty in order to assess sex skeletally (White 2000, Bass 2005).

*Age:*

Age was determined using dental eruption. None of the molars had yet erupted. Based on studies of dental development conducted by Ubelaker, the individual would have been approximately 2 years of age.(White 2000, Bass 2005, Buikstra and Ubelaker 1994:51, Ubelaker 1989). Though the incisors and canines were lost post mortem, the deciduous first molars appear fully erupted, while the deciduous second molars appear to be in the process of erupting and are not in occlusion. The molars posterior to the deciduous second molars are visible in the crypt. There is no noticeable wear on any of the teeth present. Also, none of the cranial sutures are fused, which indicates a younger individual (Buikstra and Ubelaker 1994, Bass 2005).

**Pathologies.** No pathologies noted.

**Stature.** Stature was indeterminate due to age and lack of diagnostic elements.

**Measurements.** No measurements were taken due to reconstruction of elements.

**Burial: 9b**                      MNI: 1                      Sex: Indeterminate                      Age: Indeterminate

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**Condition of the Skeleton.** Though bone cortex is good, the element has been damaged by heavy equipment and is only represented by a portion of long bone.

*Appendicular Skeleton:*

Distal portion of right femoral diaphysis

**Sex and Age.**

*Sex:*

Sex could not be determined due to the lack of diagnostic elements.

*Age:*

Age could not be determined due to a lack of diagnostic elements including a lack of any clear indication of the epiphyseal surface. It cannot be determined if the distal femur element had undergone fusion.

**Pathologies.** None were noted on the element present.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to a lack of elements.

**Burial: 11**                      MNI: 1                      Sex: Male                      Age: 30-34 years of age

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**Condition of Skeleton.** Elements generally have good cortex. Long bones show evidence of breakage previous to excavation activities. This is evident by the discoloration within the broken

area. It is feasible that this breakage occurred historically when the area was utilized for farming and orchard activity.

*Axial Skeleton:*

Lumbar vertebrae: two complete, one body with left portion of neural arch, one body, three neural arch fragments

Left and right os coxae (3 fragments each) present – both pubis missing.

Sacrum

*Appendicular Skeleton:*

Left and right proximal femora

Left and right distal tibiae

Distal portions of both fibulae

Tarsals: both calcanei, both tali, right navicular, left cuboid, left first and second cuneiform

Metatarsals: left first, third and fourth, right second, third, fourth, and fifth

One intermediate foot phalange

Six indeterminate fragments

**Sex and Age.**

*Sex:*

Sex was determined using the greater sciatic notch. The greater sciatic notch on this individual is narrow, indicating male (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

*Age:*

Age was determined by examining the auricular surface. The auricular surface exhibited some striae, but a general loss of billowing. Also, there was a coarsening of granularity indicating that

this individual was approximately 30-34 years of age (White 2000:358, Buikstra and Ubelaker 1994).

### **Pathologies.**

#### *Age Related:*

- Two of the lumbar vertebrae exhibit small depressions on the superior body surface. These depressions are consistent with Schmorl's nodes.

**Stature.** Stature was indeterminate due to a lack of diagnostic elements.

### **Post Cranial Measurements.**

	Left	Right
Humerus: epicondylar breadth		59.08
Femur: maximum head diameter		40.32
Tibia: anterior-posterior diameter at the nutrient foramen		36.77
Tibia: medial-lateral diameter at the nutrient foramen		22.84
Calcaneus: maximum length		75.8
Calcaneus: middle breadth		48.18

**Burial: 12**    MNI: 1    Sex: possible Female    Age: 17-25 years of age

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### **Condition of Skeleton.**

The skeleton is fragmentary and very incomplete. Damage to the left humeral shaft is consistent with construction activities. One medial hand phalange was recovered from the faunal collection. Notes on the bag that contained the phalange indicated that the bone was associated with Burial 12.

#### *Cranium:*

Mandible: mental eminence fragment, right ascending ramus

Upper right first molar

Frontal fragment with portion of orbit

Right mastoid process (temporal)

56 miscellaneous cranial vault fragments

*Axial Skeleton:*

Eight cervical vertebrae fragments

Three thoracic vertebrae fragments

Fragment of the right clavicle

Two left scapular fragments

*Appendicular Skeleton:*

Two left humeral fragments

Complete right lesser multangular

Complete right first metacarpal

Seven complete hand phalanges

One right tibia fragment

One incomplete right 4<sup>th</sup> metatarsal fragment

Four indeterminate long bone fragments

14 indeterminate fragments

**Sex and Age.**

*Sex:*

The only two indicators available for sex determination were cranial traits. The sharpness of the supraorbital margin and the shallowness of the ascending ramus both indicated a possible female

(Bass 2005, White 2000, Buikstra and Ublaker 1994). The remainder of the skeleton was also gracile, though this factor alone can not be used to determine sex.

*Age:*

Aging was determined by assessing fusion of epiphyseal plates and dental wear. All plates that were present were fused, which primarily consisted of one metacarpal, one metatarsal, and hand phalanges. Annular rings on the cervical vertebral bodies are also fused. The upper right first molar has slight wear to the occlusal surface, flattening the cusps. However, the wear has not exceeded the enamel. This is consistent with an individual 17-25 years of age (Brothwell 1965:69).

**Pathologies.**

*Dental Disease:*

- The upper right first molar contained an interproximal cavity, with another small cavity forming on the occlusal surface.
- Calculi is present on the upper molar.
- Excessive porosity throughout remaining sockets. Sockets were in the process of healing and indicated ante-mortem tooth loss due to dental disease.

**Stature.** Stature was not calculated due to lack of diagnostic elements.

**Measurements.** Measurements were not taken due to the fragmentary nature of the elements.

**Burial: 13**                      MNI: 1                      Sex: Indeterminate                      Age: Adult

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**Condition of Skeleton.**

Only a portion of the calvarium is present. Due to the age of the individual, all elements are fused together.

*Cranium:*

Frontal with a portion of the right orbit

Left and right parietals

**Sex and Age.**

*Sex:*

Sex could not be determined. Both the supraorbital margin and the supraorbital ridge were present, but were ambiguous. Scoring for these elements was done using the standards implemented by Buikstra and Ubelaker (1994).

*Age:*

Age was determined to be an adult due to fusion of cranial sutures. All sutures appeared fused and were only visible ectocranially (White 2000). No other indicators were present.

**Pathologies.** None noted on element present.

**Stature.** Indeterminate due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to a lack of elements

**Burial: 14**

MNI: 1

Sex: Male

Age: 25-30 years old

---

**Condition of Skeleton.** Skeleton is very fragmentary and incomplete, primarily representing the upper body.

25 indeterminate fragments

*Cranium:*

Complete mandible in five fragments

Nearly complete cranium with damage to the right frontal/parietal area and to the facial area

Maxilla is complete in two pieces

Teeth (*in situ*): both lower third molars, both lower second molars, both lower first molars, right first and second premolars, upper left first, second, and third premolars, upper right first molar, upper right first and second molars.

Teeth (*loose*): upper left medial incisor

Frontal fragment

Six indeterminate cranial vault fragments

*Axial Skeleton:*

Cervical vertebrae: atlas and axis are complete, and one vertebral body with right portion of the neural arch, and one neural arch fragment

Thoracic vertebrae: one spinous process fragment

Lumbar vertebrae: one transverse process fragment

Os coxa: one right fragment and three indeterminate fragments containing acetabulum

Indeterminate rib fragment

*Appendicular Skeleton:*

Right humerus fragment

Radii: left has one fragment, right is complete

Ulnae: left and right each have one fragment

Left femur: one fragment

Indeterminate tibia: three fragments

Left fibula: one fragment

### **Sex and Age.**

#### *Sex:*

Sex was determined using the mental eminence and the gonial angle of the mandible and the supraorbital margin of the cranium. The mental eminence was prominent and the gonial angle was steep. The supraorbital margin was rounded, though the supraorbital ridge was moderate (indeterminate). These indicators suggest a male even though the remainder of the skeleton appeared more gracile (White 2000, Bass 2005, Buikstra and Ubelaker 1994).

#### *Age:*

Aging was determined by assessing dentition and epiphyseal fusion. All of the dentition had erupted, including the third molars. This indicates an individual over 17 years of age (White 2000, Bass 2005). Wear on the teeth average a score of three, which indicates an individual approximately 25-30 years of age (Smith 1984). Also, both lower third molars and upper left third molar are erupted and have wear showing they have been in occlusion for some time. Third molars typically erupt near the age of 17 years. Therefore, this individual had to be older than 17 years for teeth to be erupted and worn. Also, all epiphyseal plates appear to be closed, indicating an individual over 18 years of age (White 2000).

## **Pathologies.**

### *Dental Disease:*

- The upper left third molar and both lower third molars exhibit caries.

### *Pathology location and description:*

- Slight depression on the left parietal just posterior to the coronal suture. Inner table has a very slight bulge in the same area. Possible well-healed fracture.

**Unique Non-pathological Traits.** The upper left first molar has a distinctive wear pattern.

Pattern is lateral to medial, with more wear on the medial surface. There is no corresponding wear on the lower molar.

**Stature.** Stature was indeterminate due to a lack of diagnostic elements.

## **Cranial Measurements.**

Chin height	32.27
Height of mandibular body	30.77
Breadth of the mandibular body	9.94
Minimum ramus breadth	33.02
Mandibular length	79.78
Mandibular angle	32 degrees

## **Post Cranial Measurements.**

	Left	Right
Radius: maximum length		231
Radius: anterior-posterior diameter at midshaft		9.66
Radius: medial-lateral diameter at midshaft		11.62

**Burial: 15**

MNI: 1

Sex: Indeterminate

Age: >12 years old

**Condition of Skeleton.** Element that is present is in good condition and complete.

*Appendicular Skeleton:*

Complete left patella

**Sex and Age.**

*Sex:*

Sex could not be determined due to a lack of diagnostic elements.

*Age:*

Age was determined by the complete fusion of the patella. Fusion of the patella typically occurs by 12 years of age (Schaefer et al. 2009).

**Pathologies.** No pathologies were noted.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to a lack of elements.

**Burial: 17**                      MNI: 1                      Sex: Male                      Age: 35-44 years old

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**Condition of Skeleton.** Skeleton is fragmented and incomplete.

*Cranium:*

One indeterminate cranial fragment

Left temporal fragment with mastoid process

*Axial Skeleton:*

Vertebrae – one thoracic spinous process, two lumbar body fragments, one neural arch fragment

One sacrum fragment

One right os coxa fragment

One right clavicle fragment

One indeterminate scapula fragment

*Appendicular Skeleton:*

Two right humeral fragments

Right and left radial fragments

Complete right metacarpal

Left and right femur fragments

Both complete patellae

Left and right tibial fragments

Right fibular fragments

Complete right talus

**Sex and Age.**

*Sex:*

Sex was determined by assessing the greater sciatic notch, femoral head diameter, and humeral epicondyle. The greater sciatic notch of this individual is very narrow, indicating a male (Bass 2005, White 2000, Buikstra and Ubelaker 1994). The measurement of the femoral head is 48.99 mm. A measurement greater than 46.5 mm indicates male (Bass 2005, White 2000, Buikstra and Ubelaker 1994). The humeral epicondyle measures 46.82 mm. Measurements greater than 47

mm indicates male while measurements less than 43 mm indicates female (Bass 2005, Buikstra and Ubelaker 1994, White 2000). This individual falls in the higher end of the indeterminate range for that factor. The left mastoid process is also present and is quite large. Therefore, based on the other two indicators and the mastoid process, this individual was most likely male.

#### *Age:*

Age was determined by assessing long bone fusion, auricular surface, and the presence of osteoarthritis. All of the epiphyseal plates appeared to be fused which indicates an individual that is at least 17 years of age (White 2000, Bass 2005). The auricular surface exhibits some apical changes and coarse granularity on the surface. There is macroporosity forming and no striae present which is consistent with phases IV and V. These phases represent ages 35-44 (Bass 2005, Buikstra and Ubelaker 1994). Osteoarthritis was present, though there was strong evidence of pathology which may have affected its occurrence.

#### **Pathologies.**

##### *Age-related:*

- Indeterminate lumbar vertebra exhibits porosity on the anterior body surface and lipping on the inferior body margin. No other lipping or porosity was found on other vertebrae.
- Right patella has excessive porosity as well as bony spicules on the superior surface (ossified tendon attachment).

##### *Pathology Description and Location:*

- Right clavicle has a vascularization fova in the medial facet.
- The right first metacarpal exhibits sever lipping anteriorly of distal facet with increased vascularization on later edge. Proximal facet is unremarkable.
- Right femur distal articular surface has a deep groove on the lateral side (muscle attachment?).
- Right tibia exhibits a large depression on the surface of the distal facet. Porosity present in depression as well as evidence of healing due to smoothed edges as is apparent under magnifying lamp.

### **Unique Non-pathological Traits.**

The third lumbar vertebra has strong muscle markers on the inferior spinous process with unilateral spondylosis occurring on the left side (Mann and Hunt 2005).

**Stature.** Stature was indeterminate due to a lack of complete elements.

### **Post Cranial Measurements.**

	Left	Right
Humerus: vertical diameter of head	46.82	
Femur: maximum head diameter		48.99
Tibia: maximum distal epiphyseal breadth	52.33	

**Burial: 18**                      MNI: 1                      Sex: Indeterminate                      Age: 25-29 years old

---

### **Condition of Skeleton.**

Burial is represented by one fragment. Skeleton is less than 1% complete.

#### *Axial Skeleton:*

Right ilium fragment (auricular area)

### **Sex and Age.**

*Sex:*

Sex could not be determined due to a lack of diagnostic elements.

*Age:*

Age was determined by examining the auricular surface. The auricular exhibited very little coarse granularity and very little other activity. There was no noticeable billowing. This is consistent with phase II, which represent ages 25-29 years of age (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

**Pathologies.** No pathologies were noted on the element present.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to the fragmentary condition of the element present.

**Burial: 19**      MNI: 2      Sex: Male/Female\*      Age: 20-35 year of age

---

**Condition of Skeleton.** All elements are fragmented with the exception of a few hand and foot bones. In laying out the skeleton, it was evident that there were a minimum of two individuals due to duplication of femora, tibiae, and fibulae. Both individuals are similar in size and age, rendering separation of the individuals correctly as highly doubtful within the realm of this study.

*Cranium:*

Left portion of the frontal bone with superior orbit

Parietal fragment

Indeterminate fragment

Possible sphenoid fragment

Upper 2<sup>nd</sup> left molar

*Axial skeleton:*

Right clavicle diaphysis

Right scapula – portion of glenoid fossa with partial coracoid process and lateral border fragment, inferior angle fragment

Right scapula – partial coracoid process fragment (same side and section as previous fragment – second individual)

Ribs – two right rib fragments, four left rib fragments, 11 indeterminate rib fragments

Three sacrum fragments

Pelvis – both ischium, both iliopubic rami, two left acetabulum fragments, two left ilium fragments, two right ilium fragments

*Appendicular skeleton:*

Right humerus (missing proximal end)

Right proximal ulna

Right capitate

Right metacarpals – third, fifth

Left metacarpals – first, second

Proximal hand phalange

Indeterminate hand phalange

Left femoral head

Left proximal femoral diaphysis

Left distal femoral diaphysis

Right femoral head

Right proximal femoral diaphysis

Right femoral diaphysis

Two right femoral epicondyle fragments (one lateral, one medial)

Right patella

Left tibia diaphysis and partial distal epiphysis

Left tibia complete distal epiphysis

Left proximal fibula fragment

Left fibula diaphysis fragment

Two complete left distal fibula fragments

Right tibia with incomplete proximal and distal epiphyses

Right tibial diaphysis and distal epiphysis

Right fibula diaphysis and proximal end

Right fibular diaphysis

Complete right and partial left calcaneous

Complete right and partial left navicular

Right and left talus

Right and left cuboid

Right first and third cuneiform

Left first, second, and third cuneiform

Left metatarsals – second, third, fifth

Right metatarsals – first, second, third, two fourths, fifth

Five proximal foot phalanges and two intermediate foot phalanges

43 indeterminate fragments

## **Sex and Age.**

### *Sex:*

The elements represents a minimum of two different individuals. In assessing the cranial traits, the supraorbital margin was very rounded which indicates a possible male (Bass 2005, Buikstra and Ubelaker 1994, White 2000). The pelvis, however, had a very wide greater sciatic notch. The femoral head also measured 40.07 mm. Femoral head measurements less than 43.5 mm typically indicates female (Bass 2005). Therefore, based on the wide sciatic notch and the small femoral head, one of the individuals was most likely female.

### *Age:*

Age was determined by assessing the auricular surface and the sternal rib ends. The auricular surface was present on the same fragment which contained the greater sciatic notch. The auricular surface was fragmented, though the surface which was present did not express any visible striae on the demiface, fine granularity, and no apical activity. These markers are consistent with an individual who is approximately 24-35 years of age. The sternal rib ends exhibited a relatively shallow pit that is more u-shaped with slight scalloping on the margins. This is consistent with an individual who is approximately 20-24 years of age. It is unknown to whom the ribs belong.

## **Pathologies.**

### *Pathology location and description:*

- Left second and third left metatarsal are fused at the head. Anatomical position does not seem to be compromised, though fusion is complete. Also, corresponding second

proximal phalange shows evidence of fusion on the proximal/lateral surface to the adjacent phalange. No obvious signs of trauma. No signs of osteoarthritis on elements.

**Unique Non-pathological Traits.**

The molar exhibits an angled wear pattern from occlusal surface, which still exhibits enamel to below the cervioenamel junction.

**Stature.** Stature was not calculated due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to the fragmentary condition of the element present.

**Burial: 19-2**                      MNI: 1                      Sex: Possible Male                      Age: Adult

---

**Condition of Skeleton.** Burial is highly fragmented and incomplete, with only portions of the skull present.

*Cranium:*

Left parietal fragment with a portion of the sagittal and lambdoidal sutures, and a small right parietal fragment.

Left orbit fragment

31 indeterminate cranial fragments

**Sex and Age.**

*Sex:*

Sex was determined to be male based on a partial reconstruction of the left orbit. The supraorbital margin is rounded and there appears to be a robust supraorbital ridge. Both of these are indicative of a male (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

*Age:*

Age was determined by fusion of cranial sutures. Sutures are slightly visible endocranially, but are fused. Fusion of sutures indicates an adult individual (White 2000).

**Pathologies.** No pathologies were noted.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken.

**Burial: 20**      MNI: 1      Sex: Indeterminate      Age: >25 years old

**Condition of Skeleton.**

Skeleton is represented only by cranial fragments.

*Cranium:*

22 parietal and frontal fragments

**Sex and Age.**

*Sex:*

Sex was indeterminate due to a lack of diagnostic elements.

*Age:*

Age was determined by assessing fusion of cranial sutures. The coronal suture was fused and the sagittal suture was almost completely obliterated. Using Meindi and Lovejoy (1985), the sutures would score 2 and 3 respectively. This indicates a person over 25 years of age (Meindi and Lovejoy 1985).

**Pathologies.** No pathologies were noted.

**Stature.** Stature is indeterminate due to a lack of diagnostic elements.

**Measurements.** Cranial measurements not taken due to fragmentary nature of elements.

Postcranial measurements not taken due to a lack of elements

**Burial: 21**                      MNI: 1                      Sex: Male                      Age: 17-21 years old

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**Condition of skeleton.** Remains are fragmented and are incomplete.

*Axial skeleton:*

One left rib

Sacral promontory

Left ilium fragment

*Appendicular skeleton:*

Right femoral diaphysis

Proximal first foot phalange

Three indeterminate long bone fragments

**Sex and Age.**

*Sex:*

Sexing of the individual was accomplished using the fragment of the left os coxa, which included the greater sciatic notch. The greater sciatic notch on this individual was narrow and scored a 5 (Buikstra and Ubelaker 1994, White 2000). Based upon this singular criterion it was determined that the individual is most likely a male (Bass 2005, Buikstra and Ubelaker 1994, White 2000).

*Age:*

Age was determined primarily by the billowy appearance of the proximal facet on the first foot phalange. This indicates a lack of fusion, which generally occurs by the about 17 years of age (Schaefer et al. 2009). Other factors considered were the lack of osteoarthritis on the surface of the sacral promontory, and also the shallowness of the sternal rib end. The sternal rib end also had relatively smooth margins, which indicated an individual 18-21 years of age (White 2000, Bass 2005, Buikstra and Ubelaker 1994). By employing these criteria, it was determined that the individual was approximately 17-21 years of age at the time of death.

**Pathologies.** No pathologies were noted.

**Stature.** Stature was indeterminate due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to the fragmentary nature of the elements present.

**Burial: 22**                      **MNI: 1**                      **Sex: Indeterminate**                      **Age: Probable Adult**

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**Condition of Skeleton.**

Burial is represented by one small fragment only.

*Axial Skeleton:*

One possible thoracic vertebral body fragment (inferior/posterior margin portion)

**Sex and Age.**

*Sex:*

Sex is indeterminate due to lack of diagnostic elements.

*Age:*

Age is probably an adult due to the fusion of the annular ring on the vertebral fragment. Fusion of the annular ring indicates an individual over 18 years of age (Schaefer et al. 2009).

**Pathologies.** No pathologies noted on element present.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to a lack of elements.

**Burial: 23**                      MNI: 1                      Sex: Indeterminate                      Age: 4 – 12 years old

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**Condition of Skeleton.**

Burial is represented by one element.

*Cranium:*

Deciduous lower left first molar

**Sex and Age.**

*Sex:*

Sex could not be determined due to the individual is a sub adult and lack of elements.

*Age:*

Age is known to be a subadult due to the presence of a deciduous first molar. The molar roots exhibit resorption from exfoliation due to the growth of the permanent tooth in the crypt. Tooth development indicates an individual between 4 to 12 years of age (Schaefer et al. 2009).

**Pathologies.** No pathologies were noted on the element present.

**Activity.** Molar has extensive wear into the dentin, which may be an indicator of a diet heavily containing ground foods that had residual grit.

**Stature.** Stature could not be determined due to the age of the individual and lack of diagnostic elements.

**Measurements.** No measurements were taken due to a lack of elements.

**Burial: 24**                      MNI: 1                      Sex: Indeterminate                      Age: Adult

---

**Condition of Skeleton.** Skeleton is highly fragmented and incomplete.

*Cranium:*

Six indeterminate calvarium fragments

Left upper medial incisor

*Axial Skeleton:*

Three rib fragments

Vertebrae: one cervical superior facet, one cervical vertebral body fragment, 10 indeterminate body fragments, two thoracic superior facets, one thoracic transverse process, one spinous process, one neural arch fragment, three lumbar inferior facets

Two indeterminate ilium fragments

*Appendicular Skeleton:*

Two indeterminate ulnar diaphysis fragments

Indeterminate distal radial epiphysis fragment

Left lesser multangular

Right femur – greater trochanter fragment and shaft fragment

Right patella

Distal right fibula fragment

Two proximal foot phalanges

134 indeterminate fragments

**Sex and Age.**

*Sex:*

Sex was indeterminate due to a lack of diagnostic elements.

*Age:*

Age determination was made using the fusion of the annular rings on the vertebrae and fusion of the distal fibula. The distal fibula fuses at approximately 15 years of age and the annular rings fuse at approximately 17 years of age (Shaefer et al. 2009). Therefore, the individual is an adult.

No osteoarthritis was noted on the joint surfaces (Jurmain 1990).

**Pathologies.** No pathologies noted.

**Unique Non-pathological Traits.**

Mesial to lateral wear pattern on occlusal surface of upper incisor possibly indicating a processing groove.

**Stature.** Stature was not determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to fragmentary nature of elements present.

**Burial: 24-2**                      MNI: 1                      Sex: Indeterminate                      Age: >18 years old

**Condition of Skeleton.**

Skeleton is represented by four fragments.

*Axial skeleton:*

Thoracic vertebral body fragment

Thoracic vertebral transverse process fragment

Lumbar vertebral spinous process fragment

*Appendicular Skeleton:*

Proximal hand phalange

**Sex and Age.**

*Sex:*

Sex was indeterminate due to a lack of diagnostic elements.

*Age:*

Age was determined by the fusion of epiphyseal plates a hand phalange and the fusion of the annular ring on the thoracic vertebral body. No other elements were complete enough to assess.

The fusion of the phalange and the annular ring indicates the individual was >18 years old (White 2000, Schafer et al. 2009).

**Pathologies.** No pathologies noted on elements present.

**Stature.** Stature could not be determined due to lack of diagnostic elements.

**Measurements.** No measurements were taken due to lack of elements.

**Burial: 25**

MNI: 1

Sex: Indeterminate

Age: >15 years old

---

**Condition of Skeleton.**

The skeleton is very fragmented and poorly represented.

*Cranium:*

Six small fragments of the cranial vault

One premolar

*Axial Skeleton:*

Vertebrae: one lumbar body rim, one lumbar spinous process, two thoracic spinous processes, one cervical spinous process, one superior lumbar facet, one superior thoracic facet, one thoracic transverse process

Os coxa: left ischium fragment

Two left scapula fragments (acromion process and scapular spine fragment)

Ribs: one left rib fragment, seven indeterminate fragments

*Appendicular Skeleton:*

One left ulna fragment

Complete right third metacarpal and one indeterminate metacarpal shaft

Two complete hand phalanges

Three indeterminate femur fragments

One left tibia fragment

One right fibula fragment

Both taluses

Right navicular fragment

Right second metatarsal fragment

19 indeterminate long bone fragments

**Sex and Age.**

*Sex:*

Sex is indeterminate due to a lack of diagnostic elements.

*Age:*

Age was deemed adult due to complete fusion of the distal fibula. Fusion of the distal fibula occurs by 15 years of age (White 2000, Bass 2005, Buikstra and Ubelaker 1994, Schaefer et al. 2009). There are no indications of osteoarthritis on any of the joint surfaces.

**Pathologies.** No pathologies were noted.

**Unique Non-pathological Traits.** Excessive uneven wear on premolar possibly indicates some sort of processing. Tooth has wear across most of the occlusal surface with one high peak at the mesial edge.

**Stature.** Stature was not calculated due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to the fragmentary and incomplete nature of the remaining elements.

**Burial: 25-2a** MNI: 1                      Sex: Indeterminate                      Age: <15 years old

---

**Condition of Burial.** This burial is represented by one fragmented element. It was intermingled with Burial 25-2b. Due to the differences in age (based on epiphyseal fusion), it was determined that two individuals were present. Burial 25-2 was then separated into Burial 25-2a and Burial 25-2b.

*Appendicular skeleton:*

Proximal right femur

**Sex and Age.**

*Sex:*

The sex could not be determined due to the lack of diagnostic elements and due to the age of the individual.

*Age:*

Age was determined using the proximal end of the right femur. The epiphyseal plate was still present and the femoral head was not yet fused. Fusion of the femoral head occurs between the ages of 15 and 19 years (White 2000, Buikstra and Ubelaker 1994, Shaefer et al. 2009). Due to the lack of fusion, it was determined that this individual was less than 15 years of age.

**Pathologies.** No pathologies were noted on the elements present.

**Stature.** Stature was indeterminate.

**Measurements.** No measurements were possible due to the fragmentary state of the remains.

**Burial: 25-2b** MNI: 1      Sex: Possible Female      Age: 30-35 years old

---

**Condition of Skeleton.** Skeleton is only approximately 15% complete.

*Cranium:*

Occipital fragment with wormian bone

Right occipital condyle

Lower left third molar

Upper right medial incisor

*Axial skeleton:*

Cervical vertebrae – C2, C3 neural arch, C4, C6

Three right rib fragments

Two indeterminate rib fragments

*Appendicular skeleton:*

Both radii

Right ulna

Right metacarpals – second, third, fourth, and fifth

Five proximal hand phalanges

Both tibiae

Left fibula

Right fibular diaphysis

Left metatarsals – second, third, fourth, and fifth

Right metatarsals – third and fifth

## **Sex and Age.**

### *Sex:*

Though both tibiae were present and measurable, there are no current studies that have examined the sexual dimorphism of the tibiae in Native American populations. This is important as Iscan and Miller-Scaivitz (1984) noted differences in accuracy based on ethnicity. However, using the criteria set forth by Slaus et al. (2013), this individual would have fallen into the female range based on proximal epiphyseal breadth and anterior-posterior measurement at the nutrient foramen. Therefore, it is with caution, that the individual is determined to be female.

### *Age:*

Aging was determined by fusion of the elements present and wear on the upper third molar. Fusion of the long bones indicated that this individual was most likely over the age of 18 (White 2000, Bass 2005, Buikstra and Ubelaker 1994). This determination corresponds with the fusion of the annular rings on the cervical vertebrae (Cardoso and Rios 2011, Buikstra and Ubelaker 1994). Furthermore, joints which could be assessed for age-related disease showed slight levels, indicating the individual was over 18, but not elderly (Bass 2005, Buikstra and Ubelaker 1994). Eruption of the third molar indicates an age over 17 years (Bass 2005, Buikstra and Ubelaker 1994). Wear on the occlusal surface of the teeth displays slight exposure of the dentine surface. By employing the dental wear scale created by Skeleton (1996), and using published data derived from prehistoric California Central Valley Native Americans, the degree of wear indicates an individual 25-55 years of age. Smith (1984), created a scale for occlusal attrition using hunter-gather populations. Using Smith's scale, this individual can be aged to approximately 30-35 years old.

## **Pathologies.**

### *Dental Disease:*

- Dental calculi is present.
- Small caries on the occlusal surface of the third molar

## **Unique Non-pathological Traits.**

Lambdoidal suture is complex and contains wormian bones.

**Stature.** The stature of the individual was determined using Genoves' (1967) research on Mesoamerican populations, specific to females and calculated to approximately 151.13 cm to 157.48 cm (4' 11 ½" to 5' 2"). Using Auerbach and Ruff's (2010) research on indigenous North American populations, the individual is approximately 154.90 cm (5' 1")

## **Postcranial Measurements:**

	Left	Right
Tibia: maximum length	335	
Tibia: maximum proximal epiphyseal breadth	65.74	
Tibia: maximum distal epipheseal breadth	43.61	
Tibia: anterior-posterior diameter at the nutrient foramen	26.43	
Tibia: medial-lateral diameter at the nutrient foramen	19.75	

**Burial: 26-2**                      MNI:1                      Sex: Male                      Age: 40-45 years old

---

**Condition of Skeleton.** This burial is fragmented, but relatively complete with approximately 60% of the elements present. This individual is also unique in having six lumbar vertebrae. The twelfth thoracic vertebra and sacrum are also present and complete, confirming the presence of six, interlocking lumbar vertebrae.

*Cranium:*

Occipital, left parietal, and left temporal are fused

Left occipital condyle

Left zygomatic fragment

One indeterminate cranial fragment

Maxilla

Mandible

Teeth – (upper – in situ) right medial incisor, right canine, right first premolar, right first molar, right third molar, left second premolar, left first molar, left third molar; (lower – in situ) right third molar, right second molar, right first molar, right first premolar, left lateral incisor, left canine, left second premolar, left first molar, left second molar, left third molar; (lower – loose) right medial incisor, right lateral incisor

*Axial skeleton:*

Left scapular fragment with glenoid fossa and lateral border

Two right scapular fragments (coracoid process and lateral border)

Right clavicle (lateral portion)

Ribs – right first rib, eight right rib fragments, eight left rib fragments, 14 indeterminate rib fragments

Cervical vertebrae – C1, one body, two complete

Thoracic vertebrae – one superior left facet, six neural arches, four bodies, three complete (including T12)

Lumbar vertebrae – six complete (individual has six lumbar vertebrae)

Sacrum

Right and left os coxae

Sternum fragment

*Appendicular skeleton:*

11 indeterminate fragments

right and left humeri

right and left radii

right and left ulnae

right and left patellae

carpals – right and left capitate, left trapezium, right hamate, right navicular, right lunate

metacarpals – left 2-5, right 1-5

three proximal hand phalanges

two intermediate hand phalanges

right and left femora

right and left tibiae

distal left fibula

right and left calcanei

right and left cuboids

left talus

left navicular

left first and second cuneiform

left fifth metatarsal

2-4 right metatarsals

three proximal foot phalanges

## **Sex and Age**

### *Sex:*

Sex determination was achieved using a suite of traits derived from the pelvis and skull. The sub-pubic angle is v-shaped and the shape of the pubis is triangular. No ventral arch or dorsal pits are present. The greater sciatic notch is narrow with a score of 4 (Buikstra and Ubelaker 1994). Cranial traits included a larger mastoid process and a projecting mental eminence. The nuchal crest is present, but considered indeterminate for sexing. These traits support a determination that this individual is male (Bass 2005, Buikstra and Ubelaker 1994, White 2000). Metric measurements were available for the humeral head and epicondyle, and the femoral head. The humeral head measures 42.68 mm, which falls within the female range (<42.8 cm) (Bass 2005:158). Due to the preponderance of the non-metric evidence, this one metric marker was considered close to borderline and therefore, dismissed. The humeral epicondylar breadth and femoral head diameter measurements fell within the indeterminate range (Bass 2005).

### *Age:*

Age determination relied upon eruption and wear of dentition, long bone fusion, assessing the pubic symphysis and auricular surface, and the presence of osteoarthritis (Bass 2005). All the dentition was erupted, including the third molars. Third molar eruption indicates an age over 18 years. Wear patterns on the teeth, including the third molars displayed large sections of the dentine on the occlusal surface. According to Smith's (1984) scale, this individual is aged to approximately 40-45 years based upon Stage 6 wear. Using Skeleton's (1996) scale, the individual is >40.

All long bones appear to be fused with no visible separation at the epiphyseal line. The sacrum, which is one of the last bones to fuse at about 25 years of age, is fused (White 2000). The pubic symphysis has a fine grained face with minimal lipping. This makes it consistent with a Phase IV, which indicates 26-45 years of age (Buikstra and Ubelaker 1994, White 2000, Bass 2005).

The auricular surface had slight irregularities on the apical surface and the margins. The characteristics of the auricular are consistent with Phases V-VII, with an age range of 40-59 years of age (Bass 2005, Buikstra and Ubelaker 1994, White 2000).

The appendicular skeleton exhibits slight osteoarthritis, while the spinal column averaged moderate osteoarthritis. Employing a combination of factors, it was determined that the individual is 40-45 years old at time of death.

## **Pathologies.**

### *Age-Related Disease:*

- Mild osteoarthritis was noted on both elbows, both wrists, and both hands. It was also noted in both hips, both knees, both ankles, and in the left foot. The osteoarthritis was determined to be slight with minimal changes.
- The spine exhibited mild osteoarthritis on all vertebrae throughout the entire length.

### *Dental Disease:*

- Calculi is noted on all teeth.
- The palate exhibits excessive porosity as well as bone loss around tooth roots indicating possible periodontal disease.
- Left upper first molar has bone loss consistent with an abscess.

### *Pathology – Location and Description:*

- The sixth lumbar vertebra has a body that is detached and healed from the neural arch. Bilateral spondylosis.

**Unique Non-pathological Traits.** Shovel shaped incisors, Inca bone, six lumbar

**Stature.** The stature of this individual was determined using Genoves' (1967) research on Mesoamerican populations, specific to males and calculated to approximately 170.66 cm to 175.89 cm (5'7" to 5'9 ¼"). Independently employing Auerbach and Ruff's (2010) research on indigenous North American populations, yielded a similar stature estimate indicating that this individual was approximately 172.99 cm (5'8") tall.

### **Cranial Measurements**

Bicondylar breadth	32.86
Mandibular length	88
Mandibular angle	37 degrees

### **Post-cranial Measurements:**

	Left	Right
Humerus: epicondylar breadth		59.06
Humerus: vertical diameter of head		41.54
Radius: maximum length		257
Radius: anterior-posterior diameter at midshaft		10.29
Radius: medial-lateral diameter at midshaft		12.52
Ulna: maximum length		276
Ulna: anterior- posterior diameter at midshaft		11.6
Ulna: medial-lateral diameter at midshaft		12.26
Ox coxae: iliac breadth		152.4
Os coxae: pubis length		48.97
Femur: maximum head diameter		46.34
Femur: maximum length		473
Femur: anterior-posterior diameter at midshaft		28.01
Femur: medial-lateral diameter at midshaft		26.56
Tibia: maximum length		384
Tibia: maximum proximal epiphyseal breadth		61.01
Tibia: maximum distal epiphyseal breadth		47.61
Tibia: anterior-posterior diameter at the nutrient foramen		34.67

Tibia: medial-lateral diameter at the nutrient foramen	21.12
Calcaneus: maximum length	81.23
Calcaneus: middle breadth	44.88

**Burial: 26a**                      MNI: 1                      Sex: Indeterminate                      Age: >15 years old

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**Condition of skeleton.** Remains are fragmented and incomplete. Remains were also commingled with a sub-adult.

*Axial skeleton:*

Indeterminate scapular spine fragment

Left scapular border fragment

Left ischium fragment

Distal portion of sacrum

*Appendicular skeleton:*

Right proximal ulna

Left distal ulna

Left radial shaft

Distal portion of left first metacarpal

Distal portion of left femoral diaphysis

Two proximal left tibial plateau fragments

Left second metatarsal

**Sex and Age.**

*Sex:*

Sex is indeterminate due to a lack of diagnostic elements.

*Age:*

Age is determined to be >15 years of age due to the fusion of the epiphyseal plate in the distal radius (White 2000, Schafer et al. 2009).

**Pathologies.** No pathologies noted.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken.

**Burial: 26b**                      MNI: 1                      Sex: Indeterminate                      Age: <17 years old

**Condition of skeleton.** Remains were co-mingled with an adult.

*Cranium:*

Five frontal fragments

Six parietal fragments

Three indeterminate cranial fragments

*Axial skeleton:*

Indeterminate scapular fragment

Indeterminate cervical fragment

Right ischium

*Appendicular Skeleton:*

Proximal right tibia

Three left tibial diaphysis fragments

Right talus

Right first metatarsal

**Sex and Age:**

*Sex:*

Sex could not be determined due to a lack of diagnostic elements and due to the age of the individual.

*Age:*

Age was determined by the lack of fusion of the long bones, specifically the proximal tibia. Fusion of the tibia occurs by 18 years of age (Shaefer et al. 2009). Also, there was a lack of fusion of the talus, proximal and distal epiphyseal plates of the first metatarsal, and billowing on the auricular surface. All of these indicate an individual less than 17 years of age (Shaefer et al. 2009).

**Pathologies.** No pathologies noted.

**Stature.** Stature was indeterminate due to age of individual.

**Measurements.** No measurements were taken for this individual.

**Burial: 27**

MNI: 2

Sex: Indeterminate

Age: >17 years old

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**Condition of skeleton.** Due to the presence of two left fibulae, it has been determined that there is a minimum of two individuals. Due to the general size and age of the individuals, it is not reasonable to separate them.

*Cranium:*

Nasal spine fragment

Two occipital fragments

Maxillary fragment with right medial and lateral incisors, and right canine – teeth appear small and are worn to the cervicoenamel junction.

*Axial skeleton:*

Anterior end of 11<sup>th</sup> or 12<sup>th</sup> rib

Transverse process of thoracic vertebra

Right superior facet of lumbar vertebra (1)

Left iliopubic ramus

*Appendicular Skeleton:*

Right proximal humeral diaphysis

Left ulna

Left distal radius fragment

Femoral diaphysis fragment

Left fourth metacarpal

Proximal hand phalange

Right radial diaphysis fragment

Left tibial diaphysis fragment

Left proximal tibia (2)

Two left distal fibulae

Right distal tibia

Left calcaneous

Right first metatarsal

Indeterminate femoral head containing a small section of the fovea capita

Indeterminate bone fragment

### **Sex and Age.**

*Sex:*

There are no diagnostic features on any of the elements in which to ascertain sex.

*Age:*

The long bones that have their epiphyseal plates all appear fused including both left fibulae.

The distal fibula fuses by age 17 (Schafer 2009). Therefore, this individual is >17 years of age.

### **Pathologies.**

*Pathology location and description:*

- (1) Macroporosity is visible on the posterior surface of the facet. This porosity is not visible on the lamina.
- (2) Reactive bone on medial portion at the mid diaphysis. Roughness and slight porosity is consistent with periosteal reaction possibly due to infection.

**Stature.** Stature was indeterminate due to a lack of diagnostic elements.

**Measurements.** Measurements were not taken due the fragmentary nature of the elements.

**Burial: 27-2**                      **MNI: 1**                      **Sex: Indeterminate**                      **Age: 16-18 years old**

**Condition of Skeleton.** Skeleton is represented by four small fragments.

*Cranium:*

Occipital fragment

Lower third molar

*Axial skeleton:*

Two left rib fragments

**Sex and Age.**

*Sex:*

No sex could be determined on this individual due to a lack of diagnostic elements.

*Age:*

Age was determined by examining an indeterminate sternal rib end. The rib end exhibited slight billowing which is consistent with phase 0-1 (White 2000, Buikstra and Ubelaker 1994). Phase 0-1 was found to be consistent with ages 16-18 years. One third molar fragment was also present. The fragment exhibited no wear on the occlusal surface. Due to the development of the tooth, it is estimated that the individual was >15 (Bass 2005, White 2000, Buikstra and Ubelaker 1994). It can not be determined if the tooth had erupted or was still in the crypt at the time of death.

**Pathologies.** No pathologies were noted.

**Stature.** Stature was indeterminate due to the lack of diagnostic elements.

**Measurements.** Measurements were not taken due to the lack of elements and the fragmentary nature of the few elements that were present.

**Burial: 28** \_\_\_\_\_ **MNI: 1** \_\_\_\_\_ **Sex: Indeterminate** \_\_\_\_\_ **Age: >15 years old**

**Condition of Skeleton.** The cranium is represented by seven small fragments. The axial skeleton is represented by three thoracic vertebrae fragments and two indeterminate scapular fragments. The appendicular skeleton is represented by one right ulna fragment and one incomplete hand phalange.

*Cranium:*

Superior orbit fragment

Zygomatic arch fragment

Temporal fragment

Four indeterminate cranial fragment

*Axial skeleton:*

Two vertebral body fragments (possible cervical)

Two indeterminate scapular fragments

Two thoracic spinous processes

One first rib fragment

Three right rib fragments

19 indeterminate rib fragments

Three sternum fragments

*Appendicular skeleton:*

Left ulna superior portion of the olecranon process

Intermediate hand phalange fragment

23 indeterminate fragments

### **Sex and Age.**

*Sex:*

Sex was indeterminate due to a lack of diagnostic elements.

*Age:*

Aging could only be determined by the fusion of one phalange. Fusion of the phalange occurs at approximately 15 years of age (Shaefer et al. 2009). Since this element was fused, it was determined that this individual was >15 years old.

**Pathologies.** No pathologies were noted.

**Stature.** Stature is indeterminate due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to the fragmentary nature of the burial.

**Burial: 29**

MNI: 1

Sex: Male

Age: 40-45 years old

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**Condition of skeleton.** Skeleton is represented by the cranium only. Portions of cranium and maxilla were previously reconstructed and glued with an unknown adhesive.

*Cranium:*

100+ indeterminate cranial fragments

Occipital

Left and right parietals

Left and right temporals

Right superior orbital fragment

Maxilla

Right portion of mandible

**Sex and Age.**

*Sex:*

Sex for this individual was determined by a large mastoid process, very robust nuchal area, rounded supraorbital margin, large mental eminence, and a sharp gonial angle (Bass 2005, White 2000, Buikstra and Ubelaker 1994).

*Age:*

Age was determined by tooth wear. The tooth wear on the molars is worn down near the cervicoenamel junction. This is consistent with an individual who was approximately 40-45 years of age (Griffin 2007, Smith 1984). The cranial sutures on this individual are not fused and are wide open. Lack of closure cannot be conclusively used as an indicator of age as cranial fusion can happen at drastically different rates (White 2000).

## **Pathologies.**

### *Dental Disease:*

- Dental calculi present on most teeth.
- Abscess at the base of the lingual root of the upper right first molar has perforated into the sinus cavity (no noticeable signs of infection in cavity).
- Large carie on upper right second molar on the distal surface.
- Both upper medial incisors are fully formed and impacted.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to a lack of elements.

**Burial: 30**                      MNI: 1                      Sex: Indeterminate                      Age: >17 years old

**Condition of Skeleton.** This individual is represented by one element. The element (left radius) is complete in one piece and is in relatively excellent condition.

## **Sex and Age.**

### *Sex:*

Sex cannot be determined due to lack of diagnostic elements.

### *Age:*

Age is determined to be an adult due to long bone fusion. The left radius is completely fused.

The distal epiphyseal plate fuses later than the proximal plate. Typically, the plate begins fusing by 17 years of age (White 2000, Bass 2005, Buikstra and Ubelaker 1994).

**Pathologies.** None noted on the element.

**Stature.** Stature was indeterminate due to damage at the proximal end, which did not allow for a total length measurement. If it had been present, Genoves (1967) had calculated the ratio of long bones to stature among the indigenous populations of Central Mexico. Table 12 includes the radius.

**Measurements.** No measurements were taken due to the damage to the proximal end of the radius. No other measurements were possible due to the lack of elements.

**Burial: 32**                      MNI: 1                      Sex: Female                      Age: 16-23 years old

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**Condition of skeleton.**

*Axial Skeleton:*

Cervical vertebra body

Thoracic vertebral neural arch

Thoracic vertebral inferior facet

Six sternal rib ends

One vertebral rib end

Two sternum fragments

Right and left ischium fragments

Four sacral fragments

*Appendicular Skeleton:*

Right radial epiphysis

Right ulnar diaphysis

Left ulnar epiphysis

Right capitate

Metacarpals: right first, second, third, fourth, and fifth; left second, fourth, and fifth

Five proximal hand phalanges

Two intermediate hand phalanges

Two distal hand phalange

Proximal portion of the left femur

Right tibia

Right patella

Left tibia

Tarsals – right and left calcaneous fragments, right talus

Metatarsals – right first, second and third; left first and fourth

### **Sex and Age.**

#### *Sex:*

Sex was determined by the diameter of the femoral head which was 40.22 mm. According to

Bass (2005), measurements under 42.5 mm indicates that the individual is female.

#### *Age:*

Age was determined by the sternal rib ends. The rib ends have a shallow pit with slight scalloping around the margins. The floor of the pit has been eroded from taphonomic conditions, though no projections or irregularities appear in what is left of the pit or on the margins. This is

consistent with phases 1 and 2 which correspond to an individual who is 16-23 years of age (Iscan 1984, Bass 2005, Buikstra and Ubelaker 1994).

**Pathologies.** No pathologies were noted.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.**

	Left	Right
Femur: maximum head diameter	40.2	
Tibia: maximum distal epipheseal breadth	45.35	45.86

**Burial: 36**                      MNI: 2                      Sex: Possible Male                      Age: >15 years old

**Condition of skeleton.** These individuals were excavated by West Valley College.

*Cranium:*

Occipital fragment

Frontal fragment

*Axial Skeleton:*

One cervical vertebral neural arch

Left ilium fragment

*Appendicular Skeleton:*

Proximal portion of left ulna

Left radial tuberosity

Right proximal femur

Tarsals – two left and two right tali; one left, one right, and one indeterminate naviculars

Metatarsals – left fourth and fifth, right second and fourth

Two proximal phalanges

One distal phalange

### **Sex and Age.**

#### *Sex:*

Sex was determined on one element to be a possible male. The supraorbital ridge is pronounced which is indicative of a male (Bass 2005, White 2000, Buikstra and Ubelaker 1994). The os coxa fragment appears to have a larger sciatic notch, which would indicate female (Bass 2005, White 2000, Buikstra and Ubelaker 1994). Due to the number of tali, it was already apparent that there are multiple individuals represented.

#### *Age:*

Age was indeterminate on most of the elements. All elements appear fused, therefore all individuals represented were adults. All tali were fused, which indicates an individual over 15 years of age. The exception is the incomplete fusion of the iliac crest on the left os coxa fragment. The iliac crest typically fuses between the ages of 14 and 21 (Schaefer et al. 2009). Fusion of this element is nearly complete, therefore placing the age between 16 and 21 years of age.

**Pathologies.** No pathologies were noted.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to the fragmentary nature of the material.

**Burial: 37**                      **MNI: 1**                      **Sex: Indeterminate**                      **Age: >17 years old**

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**Condition of skeleton.**

*Axial Skeleton:*

Acetabulum fragment

Two sacral fragments

*Appendicular Skeleton:*

Indeterminate proximal fibula fragment

**Sex and Age.**

*Sex:*

Sex could not be determined due to a lack of diagnostic elements.

*Age:*

Proximal fibula appears fused. Fusion of this element occurs 16 and 20 years of age. Complete fusion indicates an individual that is at least 17 years of age (Shaefer et al. 2009).

**Pathologies.** No pathologies were noted.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to the fragmentary nature of the material.

**Burial: 40**                      MNI: 1                      Sex: Indeterminate                      Age: Indeterminate

**Condition of skeleton.** Skeleton is represented by one fragment. Also, this burial is not mentioned in the NAGPRA report. The fragment present has a catalog number of 40-5, so where is the rest of the burial?

*Cranium:*

Lateral fragment of the frontal bone

**Sex and Age.**

Due to the lack of diagnostic elements, neither sex or age could be determined.

**Pathologies.** No pathologies were noted.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to a lack of elements.

**Burial: UK 33**                      MNI: 1                      Sex: Probable Male                      Age: Adult

Burial is represented by cranium only. Cranium was recovered by a resident in the area who discovered the burial during an irrigation project. Remainder of the individual was not recovered.

**Condition of skeleton.** Skeleton is represented by one element. Also, this burial is not included in the NAGPRA report which was published after acquisition of this piece.

*Cranium:*

Cranial vault including occipital, portion of left parietal, right parietal, right temporal

**Sex and Age.**

*Sex:*

The sex of the individual is tentatively determined by the large mastoid process and the robust nuchal crest. Both are consistent with a male individual (Bass 2005, White 2000, Buikstra and Ubelaker 1994). Due to a lack of other elements to assess, assignment is probable.

*Age:*

Age of the individual is determined to be an adult due to the fusion of the saggital and lambdoidal sutures. The saggital suture is completely obliterated endocranially and is partially obliterated ectocranially (White 2000).

**Pathologies.**

*Pathology location and description:*

- On the surface of the right parietal near the junction of the saggital and coronal sutures, there is a depression and increased vascularization. There is no evidence ectocranially for the pathology.

**General Notes.** Very complicated cranial sutures with wormian bones.

**Stature.** Stature could not be determined due to a lack of diagnostic elements.

**Measurements.** No measurements were taken due to a lack of elements.