

**Archaeological Survey, Site Verification, and Monitoring Performed
During the Phase 3 Soil Chemical Sampling in
Area IV, the Northern Buffer Zone, and Adjacent Lands
Santa Susana Field Laboratory
Ventura County, California**



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Acronyms and Abbreviations

AOC	Administrative Order on Consent
ARMR	Archaeological Resource Management Reports
BC	Before Christ
bgs	Below ground surface
cal	Calibrated
CESA	California Endangered Species Act
D&D	Decontamination and demolition
DOE	United States Department of Energy
DPR	California Department of Parks and Recreation
DPT	Direct push technology
DTSC	Department of Toxic Substances Control
ESA	Federal Endangered Species Act
ETEC	Energy Technology Engineering Center
FSP	Field Sampling Plan
ft	Feet
GIS	Geographical Information System
GPS	Global Positioning System
JMA	John Minch and Associates
NAA	North American Aviation
NASA	National Aeronautics and Space Administration
NBZ	Northern Buffer Zone
PCB	Polychlorinated biphenyls
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SSFL	Santa Susana Field Laboratory
T&E	Threatened and endangered
USEPA	United States Environmental Protection Agency

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Management Summary

The present report describes the archaeological survey, site verification, and monitoring that was performed by Leidos personnel during the Phase 3 soil chemical sampling in Area IV, the Northern Buffer Zone (NBZ), and adjacent lands at Santa Susana Field Laboratory, Ventura County, California. Phase 3 soil chemical sampling included surface and subsurface sampling, and excavation of geological test pits and trenches. Archaeological survey, site verification, and monitoring took place during the period from March 27, 2011 until June 4, 2014.

The flag-and-avoid approach to archaeological sites that was begun during the USEPA's radiological study (Corbett et al. 2012) was continued during the present study; that is, previously recorded archaeological sites or isolated artifacts were avoided during the Phase 3 soil chemical sampling. In addition, Phase 3 soil chemical sample locations that were proposed inside previously recorded site boundaries were moved to avoid affecting any cultural resources.

Prior to the excavation of the soil chemical samples, the individual locations were surveyed by Leidos Senior Archaeologist Stephen Bryne. Two prehistoric isolated artifacts (56-100139 and 56-100151) were identified during this task.

Excavation of Phase 3 soil chemical samples was monitored by Native American monitors. No new archaeological sites or isolates were reported as a result of the Native American monitoring.

The locations of 19 geological soil test pits and trenches were surveyed by Leidos Senior Archaeologist Stephen Bryne; the excavation of the test pits and trenches were monitored by Mr. Bryne and a Native American monitor. No new archaeological sites or isolates were identified during the excavation of the soil test pits or trenches.

During the course of the archaeological survey, site verification, and monitoring, two isolated artifacts were recorded (56-100139 and 56-100151) and updates to three previously recorded archaeological sites (CA-VEN-1413, CA-VEN-1772 and CA-VEN-1775) were completed. In addition, the boundaries of the previously recorded sites in Area IV and the NBZ, including their 50-foot buffer zones, were recorded using a Global Positioning System (GPS) with sub-meter accuracy. Twenty-three sites (including the three with updated site forms) had updates to their boundaries, and three sites required no additional recording or updating.

Acknowledgements

Many thanks are due to John Jones, Stephanie Jennings, and Jazmin Bell of the United States Department of Energy (DOE).

Thanks to Project Manager John Wondolleck and geologist Pamela Hartman of CDM Smith.

Thanks to geologists Shelby Valenzuela and Rob Ellis of MWH.

I would like to express my appreciation to Alan Salazar, Jaime Folkes and Isa Folkes, Chumash/Tataviam Native American Monitors.

Thanks to Ray Corbett, Ph.D., Principal Archaeologist of John Minch and Associates, Inc., for sharing his extensive knowledge of the area.

Much appreciation to Al Knight for sharing his knowledge of the prehistory and archaeology of the area.

Leidos personnel who assisted with this project included:

- Colleen Amoruso, Production
- Stephen Bryne, Senior Archaeologist and Principal Author
- Elizabeth Farrell Hale, Program Manager
- Cay FitzGerald, Graphics
- Karen Foster, Ph.D., Senior Archaeologist
- Lorraine Gross, Senior Archaeologist and Technical Editor
- Tom Mulroy, Ph.D., Senior Biologist
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- Christopher Woods, GIS

1 Introduction

The Santa Susana Field Laboratory (SSFL) is located 30 miles northwest of downtown Los Angeles in southeastern Ventura County, near the crest of the Simi Hills at the western border of the San Fernando Valley. A former rocket engine test and nuclear research facility, the 2,849-acre field laboratory is currently the focus of a comprehensive environmental investigation and cleanup program, conducted by Boeing, the United States Department of Energy (DOE) and the National Aeronautics and Space Administration (NASA), and overseen by the Department of Toxic Substances Control (DTSC).

SSFL is divided into four administrative areas (Areas I, II, III, and IV) and undeveloped land areas to both the north and south (Figure 1). The property in Areas I, III, and IV is owned by Boeing. The federal government property administered by NASA includes a 42-acre portion of Area I and all of Area II. Ninety acres of Area IV were leased to DOE. The northern and southern undeveloped lands of SSFL are owned by Boeing and have not been used for operational activities.

SSFL Area IV consists of 290 acres located in the northwestern portion of the SSFL property where DOE will complete final demolition and remediation activities. The adjacent Northern Buffer Zone (NBZ) abuts the northern boundary of SSFL Area IV and is approximately 182 acres in extent. Although there was no use of the NBZ for nuclear research, steep-sided drainages leading northward from Area IV cross a portion of these lands.

From the mid-1950s until the mid-1990s, DOE and its predecessor agencies were engaged in or sponsored nuclear operations including the development, fabrication, disassembly, and examination of nuclear reactors, reactor fuel, and other radioactive materials. Associated experiments included large-scale liquid sodium metal testing for fast breeder reactor components. Nuclear operations at Energy Technology Engineering Center (ETEC) included 10 nuclear research reactors, seven critical facilities, the Hot Laboratory, the Nuclear Materials Development Facility, the Radioactive Materials Handling Facility, and various test and radioactive material storage areas. In addition to the handling and processing of radioactive materials, these DOE facilities also used non-radioactive chemicals, a variety of specialty metals, and other hazardous materials (e.g., polychlorinated biphenyls [PCBs], solvents, and lead-based paints) in their operations (CDM Smith 2012a).

All nuclear research in Area IV was terminated in 1988 when DOE shifted its focus at SSFL from research to decontamination and demolition (D&D). Decontamination and demolition of the sodium test facilities started in 1996, when DOE determined that the entire ETEC facility was surplus to its mission. At that time, DOE began formal closure of its facilities in Area IV and began cleanup activities in preparation for return of the property to Boeing. Department of Energy discontinued D&D of the remaining facilities in 2007, but has continued surveillance, maintenance, monitoring, and investigation activities. This includes prior investigation of soil and groundwater, as required under the DTSC Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and the United States Environmental Protection Agency (USEPA) radiological investigation (CDM Smith 2012a).

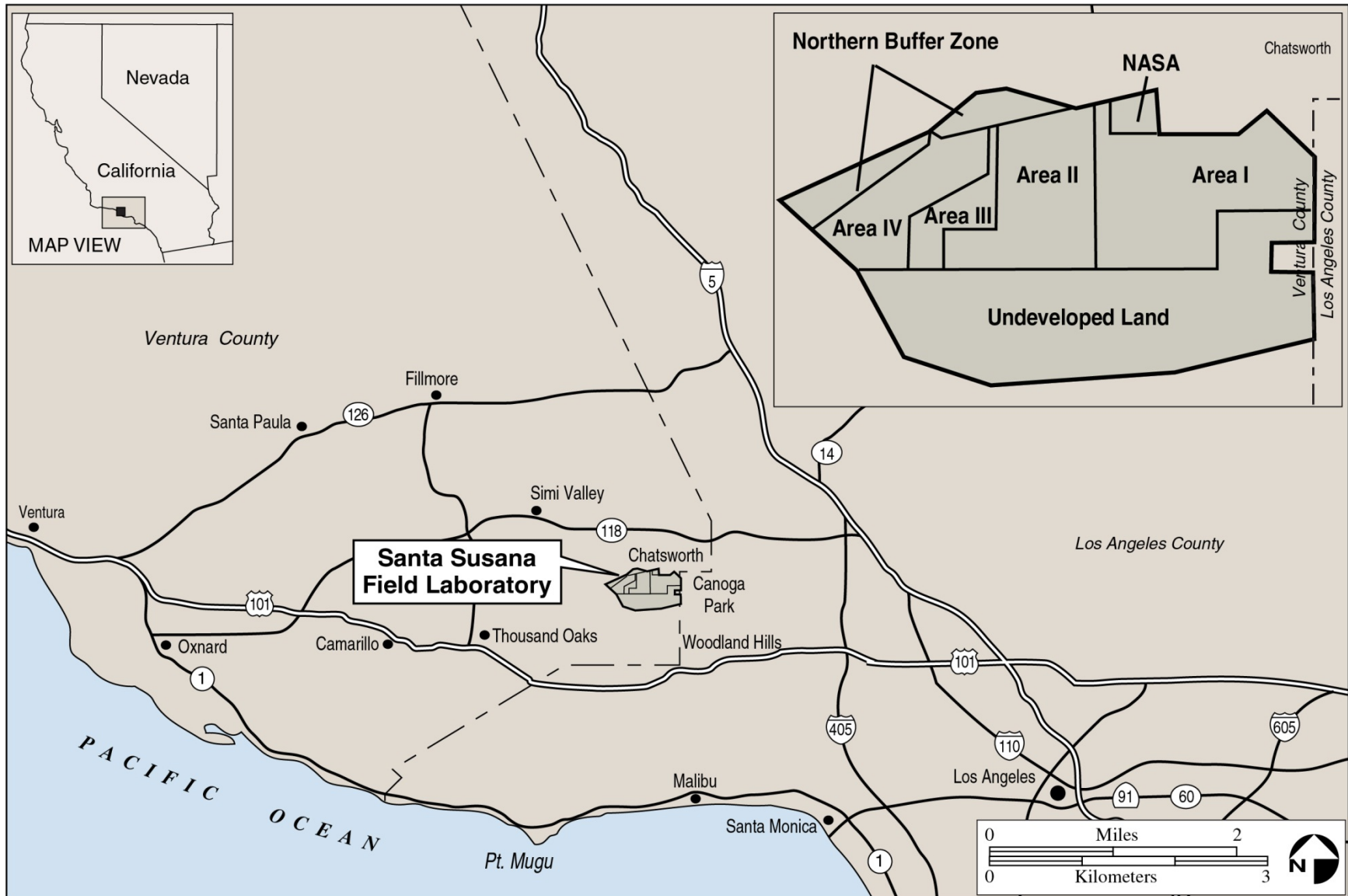


Figure 1. Regional Location of SSFL

2 Undertaking Information

The drainage soil/sediment sampling program is described in the *Master Field Sampling Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California* (Master Field Sampling Plan [FSP], CDM Smith 2012a). The Master FSP addresses soil/sediment sampling within Area IV of the SSFL as required under the *Administrative Order on Consent for Remedial Action* (Docket Number HSA-CO 10/11-037) (AOC) signed by the DTSC and the DOE on December 6, 2010. The AOC between DTSC and DOE is a legally binding order that describes the characterization of soils/sediments in Area IV and NBZ of SSFL. The AOC also further directs that characterization of soil and sediment chemical contamination contiguous to or emanating from Area IV or NBZ shall be performed. The AOC addresses three phases of chemical soil sampling. Phase 1 was co-located soil sampling with the USEPA during which USEPA identified sample locations, conducted the sampling, and provided CDM Smith with sample material for chemical analyses. Phase 1 was completed in April 2012. Phase 2 was co-located random sampling with USEPA in the NBZ, and was also completed during April 2012.

Phase 3 is the data gap investigation, which included an assessment of data adequacy using the data collected under the RCRA RFI program, the results of co-located soil samples collected during Phase 1 of the AOC, and multiple lines of evidence as described in the *Work Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California* (CDM Smith 2010b) (Phase 3 Work Plan). The purpose of the data gap investigation was to identify additional soil/sediment chemical data needed to support the Soil Remedial Action Implementation Plan for Area IV.

The present archaeological monitoring report describes the cultural resources procedures that were used in the field during the Phase 3 soil chemical sampling and geological testing. This present report is designed to conform to the state guidelines for archaeological resource management reports, as outlined in the State of California Department of Parks and Recreation (DPR), Office of Historic Preservation's Preservation Planning Bulletin entitled *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format* (State of California 1989).

3 Setting

3.1 Climate

The SSFL project site lies in a semi-arid Mediterranean-climate region, with precipitation falling mostly during the cooler months (November through March). The summer months are typically dry. Temperatures are moderated by the relatively cool waters of the nearby Pacific Ocean, and a "marine layer" of overcast and fog that frequently reaches the SSFL, moderating temperatures and elevating humidity, especially from May through July.

3.2 Topography

The topography within the study area has a high degree of variability, which influences the plants and animals that may be present. In the majority of Area IV, the land is relatively flat with a few large sandstone outcrops in scattered locations, primarily in the northern part of the study area. The southwestern portions of Area IV encompass hills that continue off the SSFL to the west and south.

The NBZ is distinguished by very steep north-facing slopes and massive sandstone outcrops. The NBZ adjacent to and north of Area IV is characterized by steep, nearly barren sandstone outcrops that parallel the northern border of Area IV to the west, giving way to relatively dense chaparral on less rocky slopes toward the northeastern boundary of Area IV.

3.3 Vegetation

Vegetation on the SSFL consists of a variety of different plant communities, ranging from oak and walnut woodlands, to chaparral, to grasslands as well as areas that are unvegetated disturbed/developed. Sandstone outcrops are also prominent throughout the SSFL and support a unique vegetation community.

Vegetation across most of the SSFL was burned during the September 2005 Topanga Fire and different portions of the SSFL were burned with variable intensity, resulting in a mosaic of degree of burning. A few localized areas were not burned including patches of oaks and chaparral in the NBZ and chaparral in the western corner of the SSFL.

3.4 Wildlife

SSFL's locality and diversity of vegetation communities provides suitable habitat conditions for a variety of wildlife species including birds, mammals, reptiles, amphibians and invertebrates. Prior to the 2005 Topanga Fire, 19 species of birds, 13 species of mammals, 10 reptiles, 3 amphibians, and 2 fish were documented throughout SSFL (Ogden Environmental and Energy Services 1998). Since then general wildlife and protocol surveys have been performed in Area IV and the NBZ. Sixty-four bird species have been identified during these surveys, as well as numerous mammals, reptiles and invertebrates. No fish were identified in Area IV, which lacks surface water during most of the year.

Rodents found within the SSFL include the California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*) and species of kangaroo rats (*Dipodomys* sp.), deer mice (*Peromyscus* sp.), meadow mice (*Microtus californicus*), and harvest mice (*Reithrodontomys megalotis*) also utilize nonnative grasslands and are expected to occur in the project vicinity. Lagomorphs include the desert cottontail (*Sylvilagus audubonii*). Small mammals include the common gray fox (*Urocyon cinereoargenteus*), introduced red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), and bobcat (*Lynx rufus*). Larger mammals such as mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), and mountain lion (*Puma concolor*) occur in these habitats as well.

Raptors such as red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and turkey vulture (*Cathartes aura*), along with many species of grassland foragers, such as blue grosbeak (*Passerina caerulea*), black phoebe (*Sayornis nigricans*), lazuli bunting (*Passerina amoena*), American crow (*Corvus brachyrhynchos*), lark sparrow (*Chondestes grammacus*), and mourning dove (*Zenaida macroura*) have been observed at SSFL.

Common reptile species include western whiptail (*Aspidoscelis [Cnemidophorus] tigris*), side-blotched lizard (*Uta stansburiana*), and western fence lizard (*Sceloporus occidentalis*). Other reptiles, such as the gopher snake (*Pituophis melanoleucus*), southern alligator lizard (*Gerrhonotus multicarinatus*), and southern Pacific rattlesnake (*Crotalus oreganus* subsp. *helleri*) also occur.

3.5 Hydrology

Because of the SSFL's location at and near the summit of a low mountain range in a semi-arid environment, water is scarce and localized to intermittent drainages and small man-made impoundments.

Several intermittent drainages lead north from Area IV into the NBZ and southeast into Areas II and III. There is no permanent water flow or natural water bodies within the study area.

3.6 Geology

The SSFL is located in the Transverse Ranges of Southern California, a geomorphic province resulting from north-south compression associated with the San Andreas Fault. As a result, geologic structures such as faults and folds generally trend approximately in an east-west direction at the SSFL (CH2M Hill 2008). Alluvium and Chatsworth and Santa Susana Formations are described in this section.

Near-surface soil consists of alluvium, primarily composed of weathered Chatsworth Formation bedrock, colluvium, and fill soil. Alluvium and colluvium are present primarily in topographic lows and stream drainages, and range in thickness from less than 1 foot (ft) to approximately 20 ft. Fill materials have been used at all building demolition locations, as needed, and as backfill in soil removal actions (CH2M Hill 2008).

The Santa Susana Formation is present in the southernmost portion of Area IV with the remainder underlain by the Chatsworth Formation. The Santa Susana Formation is predominantly composed of micaceous claystone and siltstone, with a few minor sandstone beds (Dibblee 1992).

The SSFL in general is characterized by steep outcrops of the Chatsworth Formation, a thick sequence of steeply dipping sandstone beds interbedded with siltstone that are conspicuous features of the SSFL. Between the resistant outcrops are more-or-less level areas that overlie more erodible portions of the sandstone. Much of the development in Area IV took place on "Burro Flats," the largest of these areas of relatively flat topography.

The Chatsworth Formation comprises the upper Cretaceous strata in the Simi Hills. The Chatsworth Formation formed on submarine fans and it was subsequently faulted, offset, and rotated to its current location. The Chatsworth Formation is predominantly composed of sandstone interbedded with siltstone and shale. The overlying native soils encountered in this area range from predominantly silty sands to sandy silts at shallow depths with increasing clay content to 10 feet below ground surface (bgs). Disturbed locations comprise fill soil of unknown origin and debris such as concrete, asphalt, and wood. The observed contact with the lithified Chatsworth Formation occurs between one and nine feet bgs.

3.7 Prehistory

Human prehistory in the Santa Susana Mountains and Simi Valley area extends back some 10,000 to 12,000 years (Johnson 1997:5). The summary of the project area's prehistory is adapted from Glassow et al. (2007) and King (1990), unless otherwise cited.

3.7.1 Paleo-Coastal Period (11,000-7000 calibrated [cal.] B.C.)

The Paleo-Coastal use or occupation of the project area is unknown, but this period is thought to be coeval with Paleo-Indian manifestations elsewhere in North America. The earliest evidence for human occupation in North America is found on California's Channel Islands. Radiocarbon dates derived from

human bones as well as rodent bones at the Arlington Springs site on Santa Rosa Island have yielded dates of approximately 11,000 cal. B.C. On the coastal mainland opposite Santa Rosa Island, a basal corner of a Clovis type projectile point was found at an archaeological site, possibly indicating a mainland occupation of comparable age. At Daisy Cave (CA-SMI-261) on San Miguel Island, the earliest deposits appear to date to as early as 9,500 cal. B.C. The Surf site (CA-SBA-931) located near the mouth of the Santa Ynez River on the mainland was occupied from ca 8000-7500 cal. B.C. The data indicate that the inhabitants of this site collected shellfish 10,000 years ago and utilized flaked stone tools manufactured from local chert. The Malaga Cave site (CA-LAN-138) near Palos Verdes on the southern edge of the Los Angeles basin was occupied very early, possibly as early as 8000 cal. B.C.

3.7.2 Millingstone Horizon (7000-5000 cal. B.C.)

The Millingstone Horizon is the earliest well-established cultural manifestation in the general area. Sometime between 7000 and 6500 cal. B.C. the population of the whole Southern California region began expanding. Most sites of this age are at or near the coast. However, the apparent lack of inland sites dating to this period may be due to their decreased visibility and to the lack of easily recoverable organic remains from which radiocarbon dates can be obtained.

Sites of this age typically contain abundant grinding stones (manos and metates). In addition to ground stone artifacts, hammerstones that may have originally been cores or core tools are common. In the Santa Monica Mountains, flaked stone tools include abundant fist-sized plano-convex cores and core tools (scraper planes) and flake tools of quartzite, basalt, and other volcanic rock. Few or no projectile points are typically found at Millingstone Horizon sites. Little faunal data is available from interior sites prior to 5000 B.C., but rabbits and deer are assumed to have been important food resources. The production of olive shell (*Olivella biplicata*) beads began during this period and the widespread trade of these beads may represent the start of a regional exchange network. Millingstone Horizon sites often contain substantial deposits and hundreds of artifacts, indicating regular use of the sites and long periods of residence. Social organization may have consisted of up to 50 people occupying a residential base; these individuals may have represented an extended family.

3.7.3 Early Period (5000-500 cal. B.C.)

King (1990), based on a sequence of changes in beads and ornaments, identified three phases (Phases X, Y, and Z) for the Early period in Southern California. In central and southern California and the Great Basin, rectangular beads of *Olivella biplicata*, *Haliotis* spp., *Mytilus californianus*, double perforated *Haliotis* spp. (abalone) ornaments have been found in Early period mortuary and midden contexts (King 1990:29). In the Santa Barbara Channel, Early period collections are also characterized by the presence of clam shell disc beads, stone disc and cylinder beads and whole *Olivella biplicata* shells with both their spires and bases ground or chipped (King 1990:29).

3.7.4 Middle Period (500 cal. B.C. – cal. A.D. 1100)

During the Middle period, the use of mortars and pestles became prevalent. These artifacts may have been used to process acorns, or alternatively, to process tuberous roots of plants found in marshland settings (Johnson 1997:5). Side-notched projectile points appear at this time, suggesting that the hunting of large game, including deer, was important (Glenn 1991). About 1,500 years ago, the bow and arrow was introduced. Arrow points included leaf-shaped (convex base) and square-stemmed types, which were attached to arrow shafts with asphaltum. Digging stick weights also occur suggesting the importance of corms, bulbs, and tubers in the diet. Residential bases in inland valleys as well as coastal campsites were occupied. In inland valleys, populations appear to have occupied the large residential

bases while making seasonal rounds. Trade with coastal areas may have included toolstone, basketry, bone tools, and pine nuts.

King (1990) identified five phases (Phases 1-5) for the Middle Period in Southern California. The beginning of the Middle period in both central and southern California is characterized by a change from rectangular *Olivella biplicata* and abalone beads to circular (disc) beads and from two-holed abalone pendants to one-holed pendants (King 1990:32).

During the Middle period, more types of ornaments are used in every phase than during the Early period (King 1990:32). In the Santa Barbara Channel region, keyhole limpet ornaments are first used at the beginning of the Middle period and were made in large numbers throughout the Middle period (King 1990:32). Punched beads of *Trivia californiana* and other small cowries are especially common during the first four phases of the Middle period (King 1990:33). Small to medium sized *Olivella biplicata* shells with ground spires are common in contexts dated from the early phases of the Middle period.

During the Middle period/Late period transition, the plank canoe (*tomol*) began to be used for fishing and for transportation between the mainland and the Channel Islands (Johnson 1997:5). Also at this time, a regional exchange network, based on shell bead money produced on the Northern Channel Islands, was established (Johnson 1997:5).

3.7.5 Late Period (cal. A.D. 1100-1840)

During the Late period, populations peaked and settlements were integrated into regional sociopolitical organizations based on hereditary ranking, specialization, and exchange (Glassow et al. 2007:209). At the time of Spanish contact, the Chumash and their neighbors had the most complex political and economic organization in California.

King (1990) identified three phases (Phases 1-3) for the Late period. The Late period in southern California is marked by the occurrence of *Olivella biplicata* callus beads and clam disc and cylinder beads (King 1990:39). Also during the Late period, abalone ornament types are adapted to be strung together with beads into necklaces.

Phase 2 of the Late period ended with the colonization of the Central Chumash Indians beginning in 1782 and the period of Spanish colonization corresponds to Phase 3 of the Late period (King 1990:43). Phase 3 of the Late period is marked by the presence of glass beads, iron tools, and other goods acquired from the Spanish, as well as changes in beads and ornaments of Chumash manufacture.

3.8 Ethnography

The SSFL is located near the boundary of the Chumash, Tataviam, and Fernandeño/Gabrielino Native American ethnographic groups. Kroeber (1925) places the present study area within the Chumash territory, near the border of Fernandeño/Gabrielino (Tongva) territory. These ethnographic groups are discussed individually below.

3.8.1 Chumash

Chumash refers to a group of people who shared a language belonging to the Hokan linguistic family (Landberg 1965). There were at least six Chumash languages including Ventureño, Barbareño, Ynezeño, Purismeño, Obispeño, and the Island language (Grant 1978a:505). Grant (1978b:509) divided the Coastal Chumash into three linguistic/geographic entities: Barbareño, Ynezeño, and Ventureño. These three groups shared a common culture (Grant 1978a:509). The Ventureño group is also referred to as the

Eastern Coastal Chumash (Grant 1978b). The SSFL area is most closely associated with the Ventureño or Eastern Coastal Chumash cultural group.

The Chumash settlement pattern consisted of a main settlement or village (called *rancherías* by the Spanish) with one or more outlying seasonally occupied camps (Landberg 1965:28). A typical village consisted of several houses, a semi-subterranean sweathouse (*temescal*), store houses, a ceremonial enclosure, a gaming area, and a cemetery (Grant 1978b:510; Landberg 1965:26).

Chumash dwellings consisted of hemispherical houses, which were made by driving strong, pliable poles into the ground and then arching them into the center where they were tied (Grant 1978b:510). Houses were thatched with interwoven grasses. Reed matting was used for mattresses, flooring, and to create room divisions and doors (Grant 1978b:510).

Chumash material culture includes steatite (soapstone) pots and griddles, beads, medicine tubes, smoking pipes, fish hooks, whale effigies, and charmstones (Grant 1978b:514; Landberg 1965). Large bowls, in addition to mortars and pestles, were manufactured from sandstone (Grant 1978b:515). Sandstone “doughnut” stones, perforated sandstone discs, may have had multiple uses, including as weights on digging sticks (Grant 1978b:515). Natural asphaltum was used for attaching shell inlays to stone, caulking canoes, sealing water baskets, and fastening projectile points to arrow and spear shafts (Grant 1978b:515).

Projectile points were manufactured from chert, obsidian, and fused shale, in addition to those manufactured from bone and wood (Landberg 1965). Chipped stone tools included knives, scraper planes, and choppers (Landberg 1965:40). Wooden plates and bowls are known from the ethnographic literature. Chumash basketry included water bottles, seed beaters, large burden baskets, flat trays, cradles, hoppers, bait baskets, and large twined tule mats (Grant 1978b:516).

Chumash subsistence was based on hunting and gathering. Jan Timbrook (2007) has reconstructed traditional Chumash ethnobotany before the coming of the Europeans. According to Timbrook (2007:12), virtually everything Chumash people made and used involved plants. Utilized plants included acorns, walnuts, pine nuts, buckeye nuts, laurel berries, wild strawberries, yucca, prickly pears, wild onion, chia seeds, soap plant, wild cherry, berries, mushrooms, and water cress (Grant 1978b:516; Landberg 1965:78-80). Animal foods included California mule deer, coyote, bobcat, fox, rabbits, ground squirrel, pocket gopher, and woodrat (Grant 1978b:517; Landberg 1965:50). Birds hunted and eaten included eagle, hawk, dove, quail, duck, geese, crane, and mudhen (Landberg 1965:76). Reptiles, amphibians, and insects were collected and eaten (Landberg 1965:81). Shellfish, fish, and marine mammals were important food items, particularly along the coast. Fish were obtained with spears, nets, fishhooks, poison, and traps (Landberg 1965:39).

Simi takes its name from the Chumash village of *Shimiyi* (Applegate 1974:40; Kroeber 1925:Plate 48). This village was named for the presence of thread-like clouds that sometimes may be seen in the Simi Valley (Johnson 1997:7-8). This village was a capital, or more populous and important town, where festivals, feasts, and perhaps councils were held (King and Parsons 1999:30). This village contributed recruits to both the Ventura and San Fernando Missions (King and Parsons 1999:30). The village of *Shimiyi* may be represented by archaeological sites CA-VEN-95, -96, and -340 (King and Parsons 1999:30)

At least two other Chumash villages, *Ta'apu* and *Kimishax*, were also located in Simi Valley (Johnson 1997:9). Chumash descendants are numerous in the area today and they have been involved in cultural revitalization throughout the 20th century (Glassow et al. 2007:191).

3.8.2 Tataviam

The Tataviam, possibly Takic language speakers, lived on the upper reaches of the Santa Clara River east of Piru Creek. Their territory extended over the Sawmill Mountains to the north and included the southwestern portion of the Antelope Valley (King and Blackburn 1978:535). To the west, the Tataviam territory bordered Chumash territory. To the south, in the vicinity of the Santa Susana Mountains, Tataviam territory met various Gabrielino speaking groups (King and Blackburn 1978:535).

Tataviam settlements ranged from small villages with populations of 10-15 people to large centers with more than 200 people (King and Blackburn 1978:536). Subsistence was based on hunting and gathering. The primary vegetable foods included buds of chaparral yucca (*Yucca whipplei*), acorns, sage seeds, juniper berries, and berries of the islay (*Prunus ilicifolia*). Animal foods included small mammals, deer, and perhaps antelope (King and Blackburn 1978:536). At the time of historic contact, the total Tataviam population was less than 1,000 individuals. By 1810, all or nearly all of the Tataviam had been baptized at the San Fernando mission (King and Blackburn 1978:536).

3.8.3 Fernandeano/Gabrielino (Tongva)

The Fernandeano/Gabrielino (Tongva) were Cupan language speakers; this language was in the Takic family and a part of Uto-Aztecan language stock. The names Gabrielino and Fernandeano (or Fernandino) refer to the two Spanish missions established in their territory: San Gabriel and San Fernando (Bean and Smith 1978:538). Fernandeano was a dialect of the Gabrielino language (Johnson 1997:7).

The Gabrielino (Tongva) occupied much of present-day Los Angeles and Orange counties (McCawley 1996:3). The Gabrielino (Tongva) were bordered to the northwest by the Chumash and to the north by the Tataviam. In addition to their mainland territory, the Gabrielino (Tongva) occupied three of the Channel Islands lying off the coast of southern California--Santa Catalina, San Clemente, and San Nicolas--and also made excursions to Santa Barbara Island (McCawley 1996:3).

The Gabrielino (Tongva) established permanent villages along rivers and streams (Bean and Smith 1978:540). Large, permanent villages were connected to smaller satellite villages through economic, religious, and social ties (Bean and Smith 1978:540). The distributions of known Gabrielino (Tongva) communities suggests considerable regional variation in the density of settlement; in some regions, such as the San Fernando Valley or the San Bernardino Valley, communities appear to have been rather widely distributed while other regions such as the San Gabriel Valley or the Palos Verdes Peninsula may have been more densely populated (McCawley 1996:26).

Gabrielino (Tongva) houses were domed, circular, thatched structures. Large structures could hold up to 50 people. Other structures included sweathouses, menstrual huts, and ceremonial enclosures (Bean and Smith 1978:542). The center of each community was occupied by an unroofed sacred enclosure known as the *yovaar* (Bean and Smith 1978:542; McCawley 1996:27). Generally, the *yovaar* consisted of an open, level courtyard surrounded by a brushwork fence (McCawley 1996:27). Outside the brushwork wall of the *yovaar* were the houses of the community's occupants (McCawley 1996:28). Small, semi-circular, semi-subterranean sweathouses with earthen roofs and larger, earth-covered ceremonial sweathouses were used by the Gabrielino (Tongva) (McCawley 1996:30).

The Gabrielino (Tongva) population at the time of European contact was estimated to reside in 50 to 100 villages, each with 50-100 inhabitants (Bean and Smith 1978:540).

Gabrielino (Tongva) material culture included steatite pipes, ritual objects, ornaments, and cooking utensils, bedrock and portable mortars, metates, mullers, mealing brushes, wooden stirrers, paddles, shell spoons, bark platters, wooden bowls, and ceramic vessels (Bean and Smith 1978:542). Tools included saws manufactured from deer scapulae, bone and shell needles, fishhooks and awls, scrapers, bone and shell flakers, wedges, flint and cane knives, and flint drills (Bean and Smith 1978:542). Basketry included mortar hoppers, plates, trays, winnowers, carrying and serving baskets, and storage baskets.

3.9 History

3.9.1 Early Exploration and Settlement

The first known contact by Euro-Americans in this area occurred when the Gaspar de Portolá expedition passed through the area in 1769. Portolá along with 65 soldiers and two Franciscan friars marched north from San Diego; although Portolá did not pass through Simi, scouts from his expedition reportedly crossed the Santa Susana Mountains between the villages of Camulos and Tapo and camped near present-day Simi (Cameron 1963:3-4).

The Pueblo of Los Angeles was founded in 1781 (Havens 1997:25). Rancho Simi was the first land grant in present-day Ventura County (Hoover et al. 1966:580). Rancho Simi, encompassing 113,009 acres, was granted in 1795 and 1821 to Miguel Patricio and Francisco Javier Pico. One of the largest land grants in California, Rancho Simi extended from the Santa Susana Mountains to the present-day town of Moorpark (Hoover et al. 1966:580; Havens 1997:23). An early structure on the rancho, called “Casa Viejo,” was established near the confluence of Tapo Creek and Arroyo Simi (Havens 1997:53). As with other Spanish ranchos, cattle and sheep were raised on Rancho Simi (Havens 1997:35). Olives and grapes were also cultivated (Havens 1997:53). In 1842, Rancho Simi was acquired by Jose de la Guerra y Noriega (Cameron 1963). He built an adobe house on the property (Hoover et al. 1966:581).

The mission of San Buenaventura in Ventura, established on March 31, 1782, was the first Spanish mission established in the area, but it was included in the District of Santa Barbara because of the location of a presidio there (Hoover et al. 1966:577; Ventura County Historical Society 1972). The Spanish Mission at San Buenaventura was situated near the Chumash village of *Shisholop*, one of the largest villages in the area. Ventura County was organized as a county in 1873, and Ventura was named the county seat (Hoover et al. 1966:576; Ventura County Historical Society 1972).

3.9.2 Anglo-American Settlement

In the early 1800s, farming and ranching were the area’s primary economic mainstays. By the early 1830s, there were 19 ranches in Ventura County covering nearly half a million acres. Cattle, sheep, horses, and mules were raised. After 1848 ranching declined and the production of wheat, barley, corn, and other dry-farmed crops expanded. The first commercial citrus grove in the county was planted near Santa Paula in 1874 (Edwards et al. 1970:1).

During the 1860s, a few white settlers moved into Simi Valley. A precarious passage was cut through the rocks of Santa Susana Pass in 1860 and this route became the new coast stage route (Roderick 2001:31). This route, known as “Devil’s Slide,” was challenging for horses and stagecoach drivers (Roderick 2001:31). A branch of the Butterfield Line ran over the old Fremont Grade (now Santa Susana Pass) daily from Santa Barbara to a connection with the main Butterfield Line near present-day Pacoima (Cameron 1963:7-8). The Overland Mail Company stage began using the new pass in September 1861 and the Pacific Coast Stage Line began running over the Santa Susana Pass into Simi Valley in 1861 on its route between Los Angeles and San Francisco (Havens 1997:56; Roderick 2001:31).

Also around this time, the Santa Susana Pass was a favorite hideout of several gangs of bandits (Cameron 1963:19). Tiburcio Vazquez was one of the most feared bandits during the 1870s and 1880s (Havens 1997:57). He was known to steal horses, hold up stages, and rob stores and banks. The stagecoach road remained the only way in and out of Simi Valley until the late 1890s (Havens 1997:56).

In 1865, the Philadelphia and California Petroleum Company purchased the Ranchos Simi, Las Posas, and San Francisco for possible oil exploration (Havens 1997:54).

Farming was the main occupation in Simi Valley for almost a century, from the 1860s until the 1950s (Havens 1997:65). Agriculture in Simi Valley consisted almost exclusively of raising grain (Cameron 1963:22). The farming method was dry land farming which relied on natural rainwater and no irrigation. In about 1877, the first ground was plowed for raising grain in Simi Valley (Havens 1997:56). Raising sheep, cattle and horses, and beekeeping were other occupations that began early in Simi Valley and continued through the years (Havens 1997:56).

Although Ventura County was considered backward and distant from the large population centers, there was a flurry of subdivision with some emphasis on Simi Valley in the late 1800s and early 20th century (Cameron 1963:27). The Simi Land and Water Company divided Rancho Simi into individual farms and ranches and advertised its lands in the Midwestern and New England states (Havens 1997:65). The towns of Simi and Santa Susana both resulted from the real estate boom of the late 19th and early 20th centuries (Hoover et al. 1966:581). Santa Susana was named for Saint Susana, the Roman virgin and martyr of the third century A.D. (Ricard 1972). These communities are now considered part of the Greater Los Angeles metropolitan area.

From 1939 through 1954, SSFL's rugged terrain provided the backdrop for many Western movies. As an example, "The Kansas Terrors," released in 1939, was filmed on location at Burro Flats and Simi Hills (Reid 2007). Other movie titles included, "Adventures of Red Ryder," "Robin Hood of the Pecos," "California," "Utah Wagon Train," "Shadows of Tombstone," "They Rode West," and "Iron Mountain Trail" (Reid 2007).

Santa Susana Pass and the Burro Flats area of SSFL were popular filming locations in the early 20th century (Mealey and Brodie 2005; Roderick 2001:89). More than 2,000 movies were shot on Karl Iverson's Ranch, set amid the rocks of Santa Susana Pass, after its craggy canyons and picturesque boulder fields were discovered by location scouts (Roderick 2001:89).

In the 1970s, SSFL was used for numerous TV shows, including the "Six Million Dollar Man," "Bionic Woman," "Wonder Woman," "Cannon," and "Barnaby Jones." SSFL was also the scene of science fiction movies, most notably Star Wars, which filmed some of its computer-bank scenes in a test stand blockhouse (American Institute of Aeronautics and Astronautics 2001).

3.9.3 Santa Susana Field Laboratory

Prior to its development, the land encompassing SSFL was ranch land. By the early 20th century, the land had been acquired by the Dundas and Silvernale families, who used the land for cattle grazing (Post/Hazeltine Associates 2009). In the 1920s and 1930s, Hollywood film studios shot a number of westerns on the property (Post/Hazeltine Associates 2009).

SSFL is a relic of the Cold War, when, after the end of World War II, it became clear that the character of the world had changed and onetime allies of the United States had become potential enemies (American Institute of Aeronautics and Astronautics 2001). Weapons systems which had previously been

viewed as offensive weapons, such as long range missiles, now began to be viewed as defensive systems which could be used as deterrents to aggression. Also, the success of the German V-1 and V-2 rockets spurred the United States to develop its own missile development programs (American Institute of Aeronautics and Astronautics 2001).

North American Aviation (NAA) (a predecessor company to Boeing) was started in 1934 in Dundalk, Maryland, and later moved to Southern California (McCarthy 1997:459). During World War II, NAA built the P-51 Mustang fighter, the T-6 Texan, and the B-25 Mitchell bomber (McCarthy 1997:460). NAA later built the F-86 Saber jet and F-100 Supersaber (supersonic) jet fighter (McCarthy 1997:460).

In 1947, NAA fired its first rocket engine in the company parking lot then located near Los Angeles International Airport. After experimenting with rocket engines, NAA opened an office in Canoga Park, where deliverable rocket engines would be assembled in the rocket engine production plant (McCarthy 1997:461). Meanwhile, experimental rocket engine research firings were set up on "The Hill" above Simi Valley in the Santa Susana Mountains. This area, locally known as Burro Flats, was officially named Santa Susana Field Laboratory. At the time, this location was considered very remote.

The remoteness of the area, along with the natural noise-dampening qualities of its rocky bowls and hillsides, made it an excellent location for engine testing (American Institute of Aeronautics and Astronautics 2001). The location was also chosen because the work was considered too dangerous to be performed in more densely populated areas. In 1948, NAA began using (by lease) what is now known as the northeastern portion, or Area I, of SSFL. Activities included research, development, and testing of liquid-fueled rocket engines and associated components such as pumps and valves (U.S. Department of Energy n.d.).

The majority of SSFL was acquired with the purchase of the Silvernale property in 1954, and the development of the western portion of the SSFL began soon thereafter (U.S. Department of Energy n.d.). Undeveloped land parcels to the south of the SSFL were acquired in 1968 and 1976 and to the north in 1998 (U.S. Department of Energy n.d.). Much of the development in Area IV took place on "Burro Flats," the largest area with relatively flat topography.

Predecessor companies to Boeing have included the Rocketdyne Propulsion and Power Division (Rocketdyne) of NAA and the Rockwell International Corporation. The majority of rocket engine testing and ancillary support operations took place from the 1950s through the early 1970s. At this time, SSFL covered some 1,700 acres and included, in Areas I and II, six major test-firing units, each with three test stands, five component test labs, and support groups including weld shops, experimental machine shops, test equipment groups, electronic/instrumentation groups, advanced program groups, security and fire departments, two cafeterias, two nurse's stations, supply and warehousing (Hayes 1997:466-467). These operations were conducted by Rocketdyne in Areas I and II on behalf of NASA.

3.10 Previous Archaeological Research

A Phase I archaeological survey of Area IV was conducted by W&S Consultants in 2001 (W&S Consultants 2001). Four sites were recorded including: CA-VEN-1772, CA-VEN-1773, CA-VEN-1774, and CA-VEN-1775 (W&S Consultants 2001) [note: hereinafter the "CA-" will be omitted from the state site numbers in this report].

In 2009, Gwen Romani conducted an archaeological survey of the SCE Fiber Optic Replacement Project, which crossed Area IV. This study recorded one site (VEN-1302) (Romani 2009).

An archaeological survey of the NBZ was conducted by CRM TECH in 2010 (Hogan et al. 2010). This study identified three new sites (VEN-1803, -1804, and -1805) and five isolated artifacts (P-56-100471, -100472, -100473, -100474, and -100475 (Hogan et al. 2010).

John Minch and Associates, Inc. (JMA) provided cultural resources compliance and archaeological monitoring for USEPA's radiological study of Area IV and the NBZ from July 2010 through August 2012 (Corbett et al. 2012). A total of 19 new archaeological sites and 54 new isolated artifacts were recorded in Area IV and the NBZ during the monitoring of the radiological study (Corbett et al. 2012). The 19 sites are: VEN-1355, -1411, -1412, -1413, -1414, -1415, -1416, -1417, -1418, -1419, -1420, -1421, -1422, -1423, -1424, -1425, -1426, -1427, -1428. This work was conducted concurrently with the co-located Phase 1 soil sampling (see Section 2).

While JMA's monitoring efforts did not constitute formal survey for cultural resources (which typically involves crew members covering tracts of land by walking evenly spaced transects) because the various ground disturbing activities, particularly vegetation clearing and gamma scanning, did involve traversing large areas of open terrain, JMA's monitoring efforts can be favorably compared to a formal pedestrian survey (Corbett et al. 2012:21).

Locational and dimensional information for each archaeological resource has been entered into a Geographical Information System (GIS) data base. For every site, a buffer zone was drawn, extending the known site boundaries by 50 feet in all directions.

4 Archaeological Fieldwork for Phase 3 Soil Chemical Sampling

4.1 Phase 3 Chemical Soil Sampling: Surface and Subsurface

For surface soil samples, only the top 6-inches of soil (surface soil) was collected. The majority of sample locations involved the collection of subsurface samples. A direct push technology (DPT) rig was used to sample subsurface soil at all locations except those inaccessible due to terrain constraints. A DPT rig is a hydraulically-operated hammer device installed on the back of a van, pickup truck, or skid used to advance a hollow-stem rod and sampler into the subsurface soil (up to bedrock refusal) to collect subsurface soil samples. Areas inaccessible to the DPT rig were sampled using a hand auger and slide hammer. Figure 2 shows the locations of the 1,350 sampling points in Area IV, NBZ, and adjacent lands.

4.1.1 Archaeological Methods for Chemical Soil Sampling

Leidos Senior Archaeologist Stephen Bryne, RPA, surveyed/verified the locations of all of the chemical soil samples prior to their excavation. Concurrently, Leidos Senior Ecologist/Biologist Tara Schoenwetter, Ph.D., identified federal or state-listed threatened and endangered (T&E) species, nesting birds, and wetlands/vernal pools. Threatened and endangered plants include the Santa Susana Tar Plant (*Deinandra minthornii*) (listed under the California Endangered Species Act [CESA] and Braunton's milk-vetch (*Astragalus brauntonii*), listed as endangered under the Federal Endangered Species Act (ESA). Concurrently, a plant list was being developed for the Area IV of SSFL by Leidos biologists. Based on this list, a list of ethnographically important plants and their uses was compiled. This effort resulted in a list of 81 plants with Native American uses which occur in Area IV (see Appendix A).

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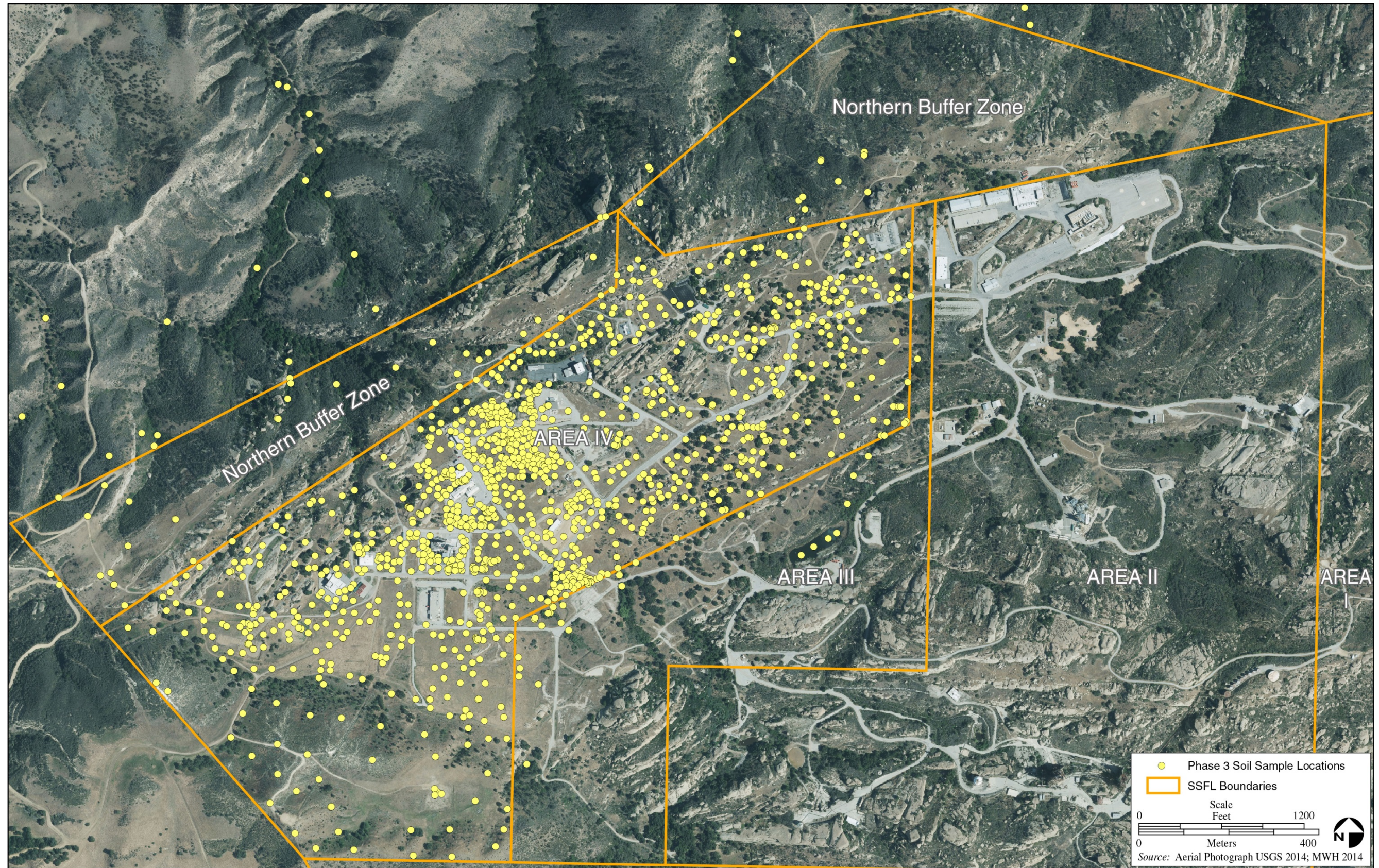


Figure 2. Phase 3 Soil Chemical Sample Locations

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Archaeological Investigations: Phase 3 Soil Chemical Sampling

The archaeological survey/verification of chemical soil sample points began in March 27, 2011 and continued through May 16, 2014. (see Table 1, which summarizes the archaeological and biological fieldwork conducted during this project).

The purpose of the archaeological survey/verification was to allow the collection of surface and subsurface soil samples for chemical testing, while avoiding as much as possible any impacts to any cultural resources. This entailed the following:

1. survey the proposed chemical soil sampling locations and identify any archaeological resources present;
2. ensure that none of the soil sampling locations would be placed in close proximity to any Native American cultural resources.
3. ensure that no soil samples were placed within the boundaries of previously recorded sites in Area IV or the NBZ.

If proposed soil samples fell within the boundaries of previously recorded sites or isolated artifacts, then these sample locations were moved so as not to impact the sites or isolates. Concurrently, a Global Positioning System (GPS) was used to record the previously-recorded site boundary/buffer zone of all previously-recorded sites in Area IV and the NBZ.

Table 1. Archaeological Survey/Verification Activities Related to Phase 3 Chemical Soil Sampling

Dates	Survey/Verification Location	Activities
March 27-30, 2011	Area IV, Subarea 5C	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
April 2, 2011	Area IV, Subarea 5C	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
June 18, 2012	Area IV, Subarea 5B	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
July 12, 2012	Area IV, Subarea 3 and Weed Abatement Areas	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
July 16, 2012	Subarea 5A and Weed Abatement Areas	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
September 19-21, 2012	Area IV, Subarea 5A	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
October 31, 2012	Area IV, Subarea 6/3	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
November 1-2, 2012	Area IV, Subarea 6/3	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
April 1-3, 2013	Area IV, Subarea 7	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.

**Table 1. Archaeological Survey/Verification Activities Related to Phase 3 Chemical Soil Sampling
(Continued)**

Dates	Survey/Verification Location	Activities
May 15- 16, 2013	Area IV, Subarea 5A (south of G Street) and Subarea 7	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
May 28, 2013	Area IV, Subarea 5A	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas. Identified/mapped an isolated prehistoric artifact (56-100139).
June 18-19, 2013	Area IV, Subarea 8	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
July 9, 2013	Area IV, Subarea 5A	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
July 18 and 25, 2013	Area IV, Subarea 5A	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
August 1, 2013	Area IV, Subarea 8	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
August 15 and 19, 2013	Area IV, Subarea 5D	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
August 20, 2013	Area IV, Subarea 5D	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
August 27, 2013	Area IV, Subarea 5D	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
November 11, 2013	Area IV, Subarea 5A	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
November 25, 2013	NBZ	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
December 9, 2013	Area IV, NBZ, and American Jewish University/Brandeis-Bardin property	Archaeological and biological surveys for 4 tritium sampling wells (SP-T01, SP-T02, SP-T03, and SP-T04). Archaeological and biological surveys for soil sampling on American Jewish University/Brandeis-Bardin property.
December 10, 2013	NBZ and American Jewish University/Brandeis-Bardin property	Archaeological and biological surveys for Phase 3 soil sampling points on American Jewish University/Brandeis-Bardin property.
December 20, 2013	NBZ	Archaeological and biological surveys for Phase 3 soil sampling points. Flagged sensitive resources and GPS'd archaeological site boundaries/buffer areas.
January 10, 2014	Area IV and NBZ	Archaeological and biological surveys for Phase 3 soil sampling "Go Back Round" sample points (approx. 17 locations). Flagged sensitive resources and GPS'd 4 archaeological site boundaries/buffer areas in NBZ.
April 29 and 30, 2014	Area IV, Subareas 5A, 5B, 5C, 5D North, 6, 7, 8 North, and 8 South	Archaeological and biological surveys for Soil Vapor Probe Sample locations. Identified/mapped an isolated prehistoric artifact (56-100151) on April 29, 2014.
May 1, 2014	Area IV, Subarea 5B	Archaeological and biological surveys for Soil Vapor Probe Sample and Geological Test Pit and Trench locations.

**Table 1. Archaeological Survey/Verification Activities Related to Phase 3 Chemical Soil Sampling
(Continued)**

Dates	Survey/Verification Location	Activities
May 12, 2014	Area IV	Archaeological and biological surveys for “Go Back Round” sample points, also bioremediation treatability study proposed replacement sample locations and proposed mercury sample locations.
May 15, 2014	Area IV	Archaeological and biological surveys for Soil Vapor Probe Sample and Geological Test Pit and Trench locations.
May 16, 2014	Area IV	Archaeological and biological surveys for “Go Back Round 2” sample points.

Monitoring of the Phase 3 chemical soil sampling was performed by Native American monitors. Native American monitors for the Phase 3 chemical soil sampling included Alan Salazar, Jaime Folkes, and Lisa Folkes, Chumash/Tataviam.

4.1.2 Results of Archaeological Survey and Native American Monitoring of Surface and Subsurface Soil Sampling

The archaeological surveys and Native American monitoring did not result in the location of any new archaeological sites; however, the survey/verification resulted in the identification of two isolated artifacts (SSFL-ISO-1 and SSFL-ISO-2), the updates of the site records for previously-recorded sites VEN-1413, VEN-1772, and VEN-1775, and updated location with 50-ft buffer area for another 20 sites. Three sites required no updating. The DPR site forms, forms 523, are appended to this report (Confidential Appendix B).

4.1.2.1 Newly Recorded Isolated Artifacts

Isolated artifact 56-100139 is an abalone (*Haliotis* sp.) shell fragment located in a rockshelter. This shell does not occur naturally in the area and it can be assumed to have been transported to this location, probably by the area’s prehistoric or ethnographic inhabitants. No other artifacts were identified in this rockshelter, although it is possible that exfoliation of the sandstone and rockfall could have buried any additional artifacts.

Isolated artifact 56-100151 is a quartzite core with at least four flake scars on its dorsal surface. No other artifacts appeared in the vicinity of this isolated artifact. It occurs between two large sandstone outcrops. Lithic artifacts from SSFL are dominated by quartzite material, such as 56-100151.

4.1.2.2 Updates to Existing Site Records

Over the course of the present archaeological survey, verification, and monitoring efforts, all of the previously recorded archaeological sites in Area IV and the NBZ were re-visited, some on multiple occasions. In addition to re-recording the sites’ boundaries (including their 50-ft buffer areas), the sites were examined for changes that might have occurred since they were originally recorded. Additional observations made at three sites warrant updates to their site records: VEN-1413, VEN-1772, and VEN-1775. These are discussed in more detail below: Copies of the state site record updates are appended to this report (Confidential Appendix B). Three sites that required no additional documentation (VEN-1803, VEN-1804 and VEN-1805) are not included in the appendix.

VEN-1413

In addition to what was reported by Corbett et al. (2012), the east-facing rockshelter/cave contains a second pictograph in addition to midden, four bedrock mortars, and a projectile point. A fused shale projectile point was observed lying on the cave floor. Based on its size, this projectile point is attributable to the Late Middle Period or the Late Period, according to Dr. Chester King (personal communication, April 6, 2013). This point may be a Type M5, L2, or L3, according to Dr. King's typology of Late Middle and Late Period projectile points from the nearby Burro Flats site.

The rockshelter contains two pictographs: an anthromorphic, zoomorphic, or aquatic figure painted in red pigment and an anthromorphic figure in black or charcoal. The two pictographs appear to be of the Chumash Painted Style. According to Hyder (1989:19) the two pictographs are Type B: Monochrome painted elements.

VEN-1772

This site was recorded by W&S Consultants in 2001. The original site record does not mention the graffiti or carved initials that are also present in the rockshelter. However, the W&S Consultants report from 2001 (on page 40) states, "Although some engraved graffiti is present at the site, the primary painted motif is intact."

In addition to the historic pictograph (purplish-pink) burro, there are several carved initials and numerals or dates carved into the sandstone rockshelter. Engraved letters include "WSH" over "2735"; "DR"; "JR" over an up-pointed arrow, and "JL 193" (or "JR 193").

In the five years since 2009, when Mr. Bryne first visited the site, the pictograph appears to have faded markedly, changing from a pinkish-purple to a brown color. Given the close proximity of this rockshelter to the road and the carved graffiti, this pictograph rockshelter appears to be recent, likely created during the post-World War II era, and it was possibly painted during the time when SSFL was in operation, i.e., since 1948.

VEN-1775

This site was recorded by W&S Consultants in 2001. D.S. Whitley mentions one bedrock mortar in the Cultural Constituents section. In fact, there are two bedrock mortars located on the sandstone bedrock slab immediately in front of the rockshelter. It is possible that more bedrock mortars may be present underneath accumulated soil. One of the bedrock mortars is 19 cm in diameter and the second is 20 cm in diameter. No effort was made to clean out or expose the mortar holes.

In addition to the two bedrock mortars, marine shell including a nearly complete abalone (*Haliotis* spp.) shell was observed on the surface of the midden in the rockshelter. The original site record does not mention the fire-blackened roof of the shelter, which suggests that fires were built within the overhang.

D.S. Whitley estimated that approximately 75 percent of the midden site had been excavated by looters and that only 25 percent remained intact. In the 2001 W&S Consultants report, the authors (on p. 44) suggested that "Because of the looting, however, the site currently lacks integrity." The present archaeological survey verified that the site appears to have been looted, but estimated that as much as 50 percent of the site, appears to be intact. Because of this, the site appears to be eligible for inclusion in the NRHP under Criterion D, since it could contain information important in prehistory, particularly datable prehistoric artifacts or ecofacts, i.e., marine shell fragments.

4.2 Phase 3 Chemical Soil Sampling: Geological Test Pits and Trenches

Nineteen geological test pits and trenches were excavated from May 19 through June 4, 2014 in Area IV of SSFL. A total of 10 test pits and 9 trenches were excavated. The test pits and trenches were excavated in Subareas 5A, 5B, 5C, 6, 8 North, and 8 South (see Figure 3 and Figure 4).

Both the test pits and trenches on the SSFL were used to identify debris and fill areas through backhoe trenching. The primary purpose of the trenches was to visually characterize fill material and to sample subsurface soil within the trench. Prior to any trenching, geophysical surveys of the trenching locations were conducted to identify potential buried debris and to assist in targeting trench locations. The geophysical surveys included ground penetrating radar, electromagnetic surveys, and soil density surveys.

Prior to the excavation of the geological test pits and trenches, all of the locations were surveyed for archaeological artifacts or sites, to ensure that none of the test pits or trenches was in, or in the immediate vicinity of, any previously-recorded archaeological sites or isolates. The preliminary archaeological surveys of the test pit and trench locations were accomplished by Leidos Senior Archaeologist Stephen Bryne on May 1 and May 15, 2014. None of the proposed test pits or trenches was located in or adjacent to any of the previously recorded sites in Area IV, including their buffer areas, and no new sites or isolated artifacts were located during the preliminary surface survey.

MWH geologists Shelby Valenzuela, Rob Ellis, and Andrew Payne directed the excavation of the test pits and trenches. Archaeological monitoring of the excavation of test pits and trenches was performed by Leidos Senior Archaeologist Stephen Bryne. Native American monitoring was provided by R. Indigenous Consultants Tribal Monitoring, LLC. Alan Salazar and Lisa Folkes of R. Indigenous Consultants Tribal Monitoring monitored all of the ground-disturbing activities during the excavation of the test pits and trenches.

Excavation of geological test pits and trenches was performed by Ralph Hall and Dan Hall of B.L. Hall Company using a backhoe with a 24-inch-wide (61 cm) bucket. The test pits and trenches varied in length and depth, but the width was consistent at just over 24 inches wide. All test pits and trenches were excavated to bedrock or to the maximum depth the backhoe could excavate (approximately 15 ft deep).

According to Ralph Hall of B.L. Hall Company, who has worked on the SSFL for 12 years, the maximum soil depth on the SSFL is more than 35 ft deep, while the average soil depth is 8-10 ft (Ralph Hall, personal communication on May 22, 2014). Soil depth varies according to how much soil accumulates between the tilted sandstone formations in the area.

4.2.1 Archaeological Survey and Monitoring of Test Pit and Trench Excavation

Prior to excavation, the ground surface was visually inspected by Mr. Bryne to ensure no artifacts were present. During the excavation, the archaeologist, Mr. Bryne, and a Native American monitor observed all of the excavating and made notes on soil types, disturbances, etc. Archaeological and Native American monitoring of the 19 test pits and trenches occurred from May 19-June 4, 2014 (Table 2). Descriptions of the individual test pits and trenches are provided below and locations are shown in Figure 3. Simplified soil profiles for each test pit and trench were recorded at the time; representative examples of the soil profiles are provided below (Figure 5 through Figure 9).

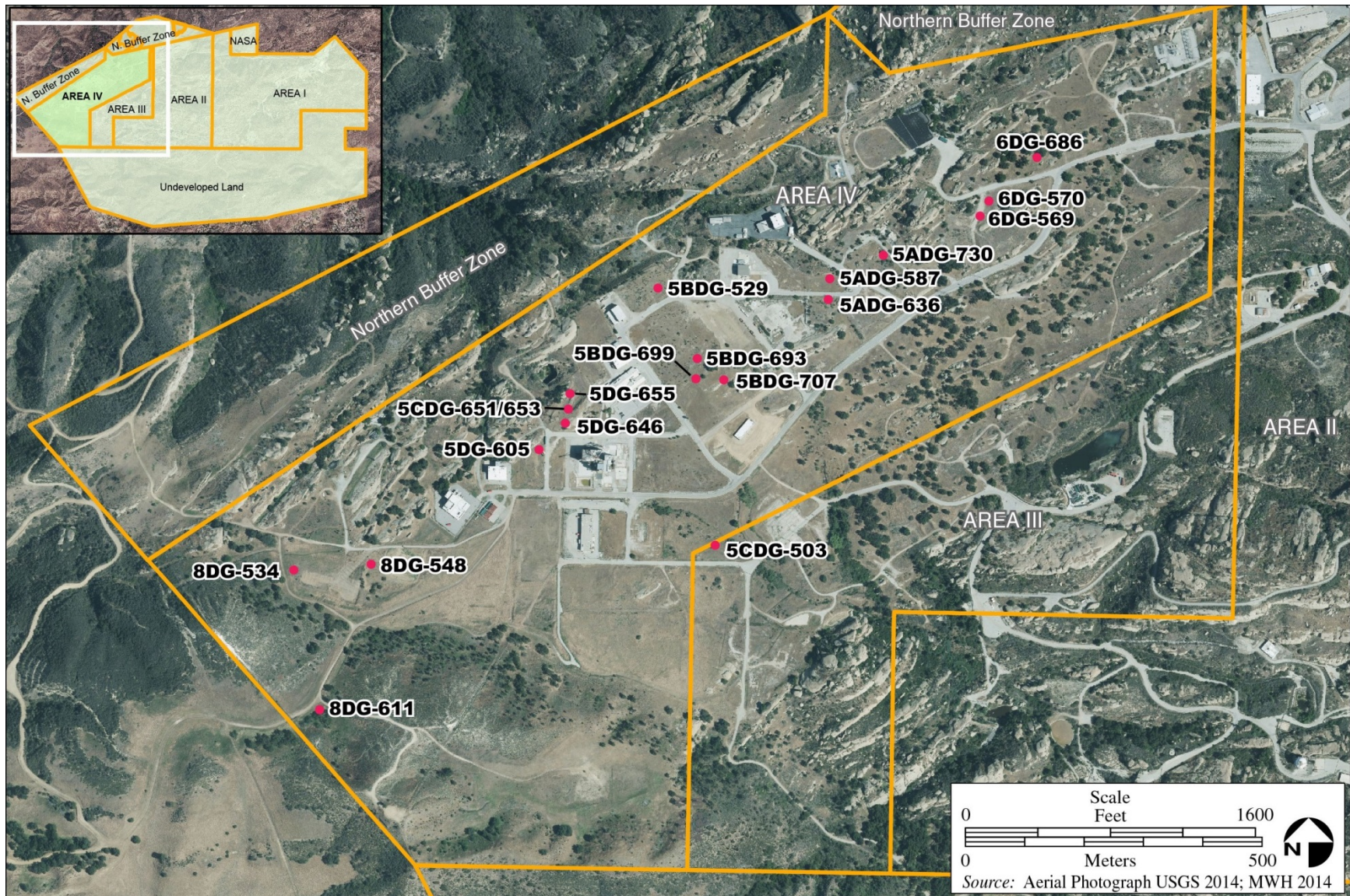


Figure 3. Geological Test Pit and Trench Locations



Figure 4. Trenching Activity

Table 2. Geological Test Pits and Trenches

Unit Type & Number	Location	Date	Depth to Bedrock	Fill or Disturbance Depth	Notes
Test Pit 5ADG-587	Subarea 5A	May 22, 2014	8 ft	2 to 4.25 ft	Former building pad; asphalt in upper 2 ft; steel pipe at 4.25 feet
Test Pit 5ADG-636	Subarea 5A	May 23, 2014	8 ft	0	Former building pad (# 4042),
Test Pit 5ADG-730	Subarea 5A	May 22, 2014	11.5 ft	0	
Test Pit 5BDG-699	Subarea 5B	May 28, 2014	9.6 ft	2.5 ft	Placed to investigate a linear geophysical feature
Test Pit 5BDG-707	Subarea 5B	May 27, 2014	3.5 ft	0	Steel bolt was observed in the test pit spoil pile
Test Pit 6DG-569	Subarea 6	May 20, 2014	3 ft	0	
Test Pit 6DG-570	Subarea 6	May 20, 2014	8 ft	1 to 2 ft	2-ft length of 1-inch diameter steel pipe in the upper foot
Test Pit 6DG-686	Subarea 6	May 21, 2014	12.5 ft	0	
Test Pit 8DG-534	Subarea 8 North	May 19, 2014	5 ft	3 ft	Chatsworth Formation close to the Burro Flats Fault
Test Pit 8DG-611	Subarea 8 South	May 20, 2014	12.5 ft	0	Possibly located in an old landslide
Trench 5BDG-529	Subarea 5B	May 28, 2014	11.75	11 ft	Yellow "Caution" tape was encountered at 11 ft
Trench 5BDG-693	Subarea 5B	May 27-28, 2014	5.5 ft	1.5 ft	33 ft long by 2 ft wide by 2 ft to 5 ½ ft deep
Trench 5CDG-503	Subarea 5C	May 29, 2014	10	5 ft	
Trench 5CDG-605	Subarea 5C	May 29-June 2, 2014	12 ft	7 ft	
Trenches 5CDG-651 & 5CDG-653	Subarea 5C	May 30-June 2, 2014	14.5 ft	2 ft	Near former building # 4065; trench is 70 feet long
Trench 5CDG-646	Subarea 5C	June 4, 2014	4 ft	0	
Trench 5CDG-655	Subarea 5C	June 4, 2014	4 ft	1 ft	
Trench 8DG-548	Subarea 8 North	May 19, 2014	12.5 ft	2 ft	10 ft long by 2 ft wide by 12 ½ ft deep

4.2.1.1 Test Pit 8DG-534

Test Pit 8DG-534 in Subarea 8 North was excavated on May 19, 2014. This test pit is on the western edge of a former building pad. This test pit is in the Chatsworth Formation close to the Burro Flats Fault. Vegetation in the vicinity consists of coast live oak trees and plants including elderberry, purple sage, and laurel sumac. The test pit profile consisted of imported fill to a depth of approximately 3 ft below the ground surface. Native soil was encountered at 3 ft below the ground surface followed by weathered sandstone bedrock at 5 ft below the ground surface. There were no cultural artifacts discovered either in or near this test pit.

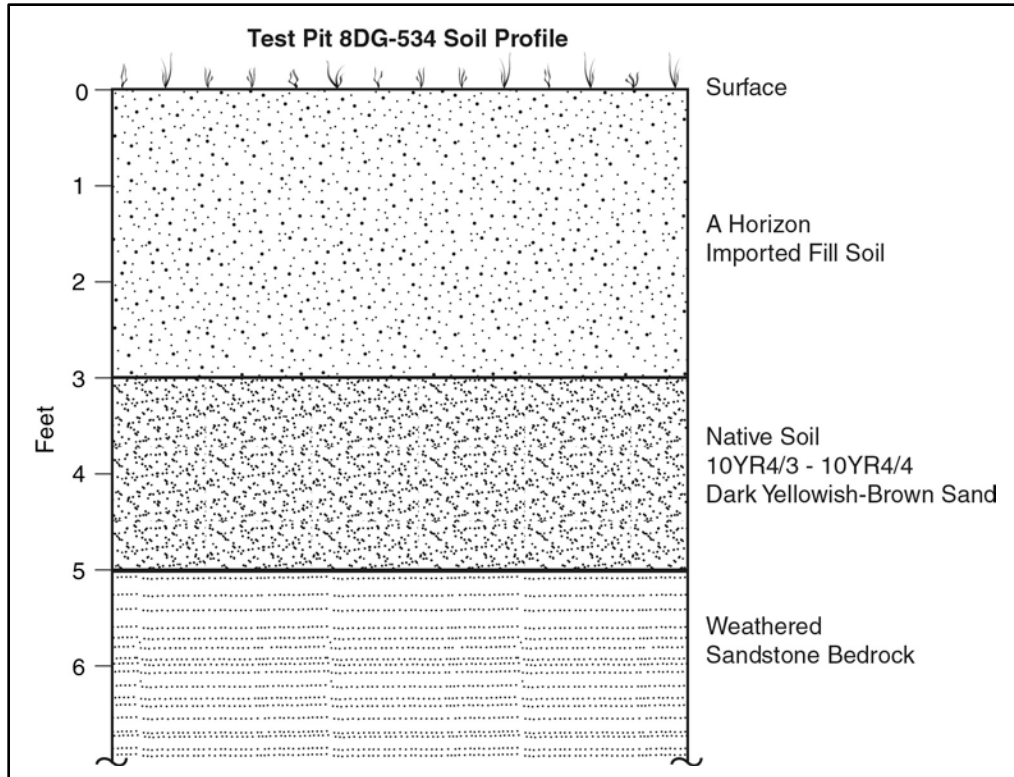


Figure 5. Test Pit 8DG-534 Soil Profile

4.2.1.2 Test Pit 8DG-611

Test Pit 8DG-611 in Subarea 8 South was excavated on May 20, 2014. MWH geologist Rob Ellis stated that this area is an old landslide (Rob Ellis, personal communication, May 20, 2014). The general area was not an operational area. The soil profile in the test pit consisted of medium brown native soil which graded to yellowish-brown soil before encountering sandstone bedrock at 12 ½ ft. No cultural artifacts were discovered in or near this test pit.

4.2.1.3 Test Pit 6DG-569

Test Pit 6DG-569 in Subarea 6 was excavated on May 20, 2014. This test pit is in the vicinity of a former Fire Station. The profile of this test pit was native soil to approximately 3 ft where sandstone bedrock was encountered. No cultural artifacts were discovered in or near this test pit.

4.2.1.4 Test Pit 6DG-570

Test Pit 6DG-570 in Subarea 6 was excavated on May 20, 2014. This test pit is located approximately 125 ft northwest of Test Pit 6DG-569 in the same previously developed area. A 2-ft length of 1-inch diameter steel pipe was encountered in the upper foot of this trench. The soil profile consists of medium brown soil to approximately 2 ft below the surface, then yellow-brown sand to approximately 8 ft, where sandstone bedrock was encountered (Figure 6). No cultural artifacts were discovered in or near this test pit.

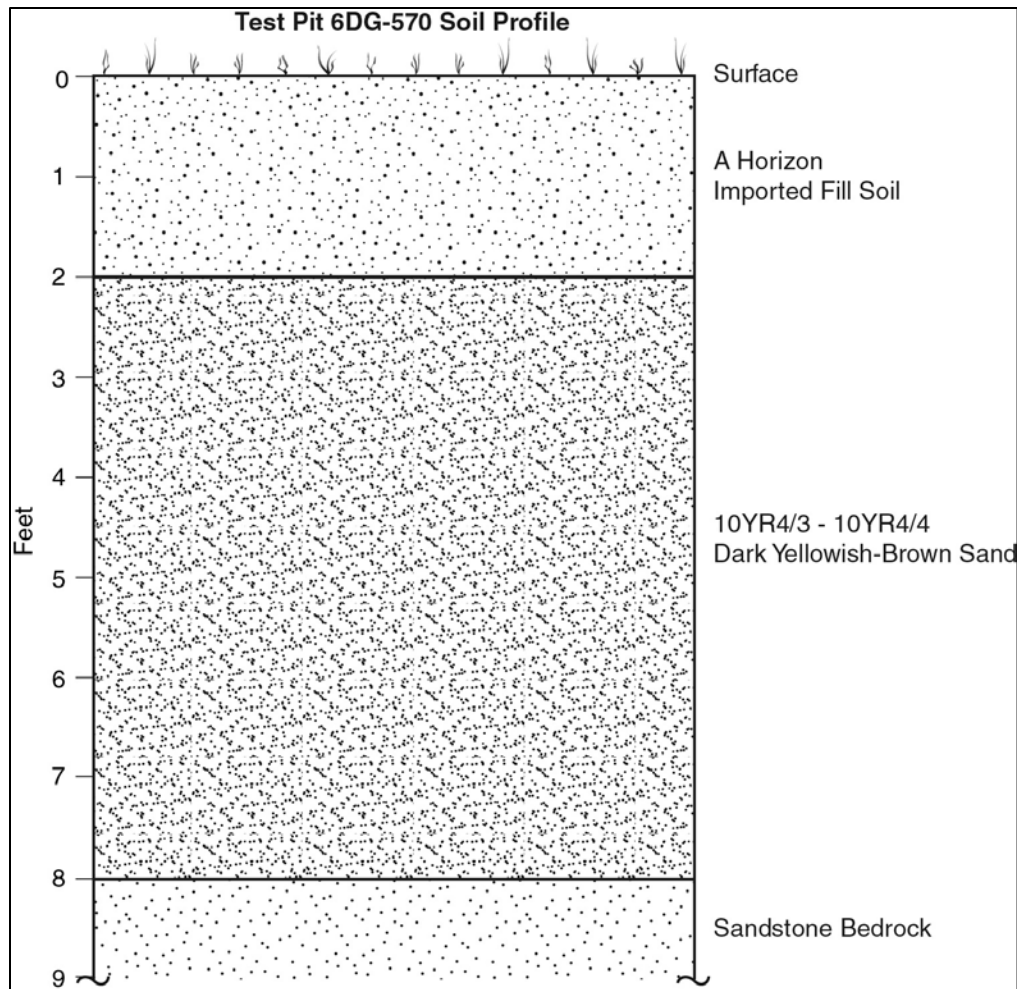


Figure 6. Test Pit 6DG-570 Soil Profile

4.2.1.5 Test Pit 6DG-686

Test Pit 6DG-686 in Subarea 6 was excavated on May 21, 2014. The soil profile of this test pit was composed of brown sandy clay soil to a depth of approximately 2 ft, followed by reddish-brown clay from 2-5 ft, followed by yellowish sand and decomposed sandstone from 5-12 ½ ft, where sandstone bedrock was encountered. No cultural artifacts were discovered in or near this test pit.

4.2.1.6 Test Pit 5ADG-730

Test Pit 5ADG-730 in Subarea 5A was excavated on May 22, 2014. The soil profile in this test pit consisted of medium brown sand to a depth of approximately 2 ft, which graded into yellowish-brown sand, which graded into fractured bedrock or decomposed sandstone. Sandstone bedrock was encountered at 11 ½ ft below the ground surface. No cultural artifacts were discovered in or near this test pit.

4.2.1.7 Test Pit 5ADG-587

Test Pit 5ADG-587 in Subarea 5A was excavated on May 22, 2014. This area appears to be a former building pad. There is a lot of asphalt in the upper 2 ft of soil in this test pit. A steel pipe was encountered at 4'4" below the ground surface. The soil profile consists of 0-2 ft disturbed soil with

asphalt chunks, 2-8 ft brown sandy soil grading to yellowish sand. Sandstone bedrock was encountered at 8 ft below the ground surface. No cultural artifacts were discovered in or near this test pit.

4.2.1.8 Test Pit 5ADG-636

Test Pit 5ADG-636 in Subarea 5A was excavated on May 23, 2014. The general area is a former building pad (Building # 4042), with tamarisk trees currently growing in the area. There is a large sandstone outcrop to the east of the test pit. Glass, copper wire, steel cable, red-painted concrete, and ceramic insulators were encountered in the test pit and on the ground surface. The soil profile consists of yellowish-brown sand and gravel to a depth of 2 ft, followed by light brown sand to a depth of 5 ft, followed by fractured bedrock from 5-7 ½ ft, with sandstone bedrock encountered at 8 ft below the ground surface. No cultural artifacts were discovered in or near this test pit.

4.2.1.9 Test Pit 5BDG-707

Test Pit 5BDG-707 in Subarea 5B was excavated on May 27, 2014. The soil profile of this test pit consisted of medium brown sand to a depth of approximately 1 ft, followed by yellowish-brown sand to a depth of 3 ½ ft where sandstone bedrock was encountered. A steel bolt was observed in the test pit spoil pile. A sawed beef or pork rib was located near the sandstone rock outcrop east of the test pit. No cultural artifacts were discovered in or near this test pit.

4.2.1.10 Test Pit 5BDG-699

Test Pit 5BDG-699 in Subarea 5B was excavated on May 28, 2014. This test pit was excavated in order to investigate a linear geophysical feature. A 2"-diameter steel gas line was encountered approximately 30" below the ground surface. The soil profile of this test pit consisted of medium brown sand to a depth of 1 ft, followed by yellowish-brown sand to a depth of 8 ft. Decomposed sandstone occurred from 8 ft to 9 ft 7 inches, where sandstone bedrock was encountered. No cultural artifacts were discovered in or near this test pit.

4.2.1.11 Trench 8DG-548

Trench 8DG-548 in Subarea 8 North was excavated on May 19, 2014. This trench is close to a former observatory. The dimensions of this trench were approximately 10 ft long by 2 ft wide by 12 ½ ft deep. The trench profile was as follows: 0-2 ft: A Horizon, i.e., recent or fill soil; 2-10 ½ ft: native soil; 10 ½ ft: incompetent bedrock; 12 ½ ft: bedrock (Figure 7). A rusted steel 5-gallon bucket was present on the ground surface near the trench, but otherwise there were no cultural artifacts in or near the trench. A sawed food bone, apparently a beef or pork rib, was present on the ground surface near the trench; however, this bone appeared to be recent. A southern Pacific rattlesnake was observed in a small hole close to this trench.

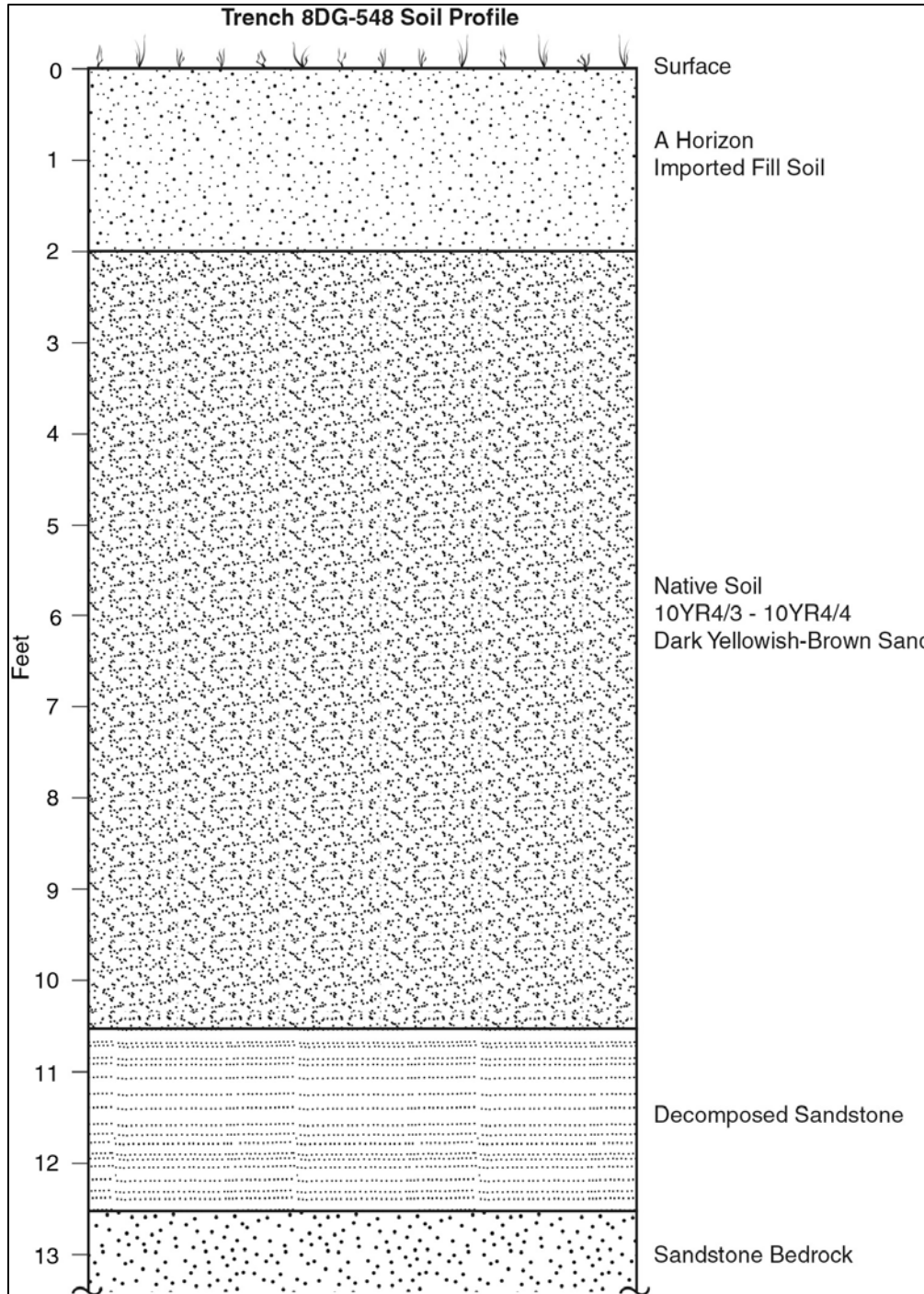


Figure 7. Test Pit 8DG-548 Soil Profile

4.2.1.12 Trench 5BDG-693

Trench 5BDG-693 in Subarea 5B was excavated on May 27-28, 2014. This trench is just south of groundwater monitoring well # PZ-122. The excavator encountered a 1"-diameter gas line in the trench approximately 18" below the ground surface. Chunks of concrete and three metal anchors were found in this trench. The dimensions of the trench were approximately 33 ft long by 2 ft wide by 2 ft to 5 ½ ft deep. The soil profile of this trench consisted of medium brown sand to a depth of 1 ft, followed by

yellow sand to a depth of between 2 ft and 5 ½ ft, where sandstone bedrock was encountered. On May 28, this trench was re-excavated in order to sample a gravel lens. During the trench re-excavation, a clay pipe encased in concrete was discovered. No cultural artifacts were discovered in or near this trench.

4.2.1.13 Trench 5BDG-529

Trench 5BDG-529 in Subarea 5B was excavated on May 28, 2014. A 1"-diameter steel pipe and a Dr. Pepper soda bottle were encountered in this trench at 2 ft below the ground surface. The soil profile of this trench consisted of grey-brown sand with gravel (A Horizon) to a depth of 1 ½ ft below the ground surface, followed by medium brown sand with chunks of asphalt, PVC pipe fragments, chunks of concrete, and wire to a depth of 4 ft. At 4 ft below the ground surface, decomposed sandstone was encountered, which continued from 4 ½ ft to 11'9" deep, where sandstone bedrock was encountered. A piece of yellow "Caution" tape was encountered at 11 ft below the ground surface, indicating at least 11 ft of fill are present here from the former building demolition. No cultural artifacts were discovered in or near this trench.

4.2.1.14 Trench 5CDG-503

Trench 5CDG-503 in Subarea 5C was excavated on May 29, 2014. The soil profile of this trench consists of medium brown sand (A Horizon) to 1 ft depth, followed by light grey-brown sand to a depth of 5 ft. The upper 5 ft appear to be fill soil (Figure 8). Below 5 ft, yellowish-brown sandy clay occurred, followed by yellow sand to a depth of 9 ft. Decomposed sandstone and shale occurred at 9 ft below the ground surface and sandstone bedrock at 10 ft. No cultural artifacts were discovered in or near this trench.

4.2.1.15 Trench 5CDG-605

Trench 5CDG-605 in Subarea 5C was excavated on May 29-June 2, 2014. The soil profile of this trench consists of medium brown sand to a depth of 2 ft, followed by medium brown sand with gravel to a depth of 7 ft (Figure 9). The upper 7 ft appears to be fill soil. Below 7 ft, dark brown native soil was encountered, which continued to 10 ft below ground surface. At 10 ft below ground surface, yellow sand was encountered. Yellow sand continued until sandstone bedrock was encountered at 12 ft. No cultural artifacts were discovered in or near this trench.

4.2.1.16 Trench 5CDG-651/653

Trenches 5CDG-651 and 5CDG-653 were combined into one trench. Trenches 5CDG-651/653 in Subarea 5C were excavated from May 30-June 2, 2014. This trench is in the vicinity of former building # 4065. The soil profile of this trench consists of fill soil and building rubble in the upper 2 ft of soil, followed by tan-yellow sand to a depth of 10 ft to 14 ½ ft, where sandstone bedrock was encountered. Wire, a steel pipe section, and chunks of concrete were found in the upper 2 ft of soil. Approximately 35 ft of the length of this trench was completed on May 30 and the remaining 35 ft of the length of this trench was completed on June 2. On June 2, concrete chunks, asbestos pipe wrap, and pink-colored concrete were encountered. No cultural artifacts were discovered in or near this trench.

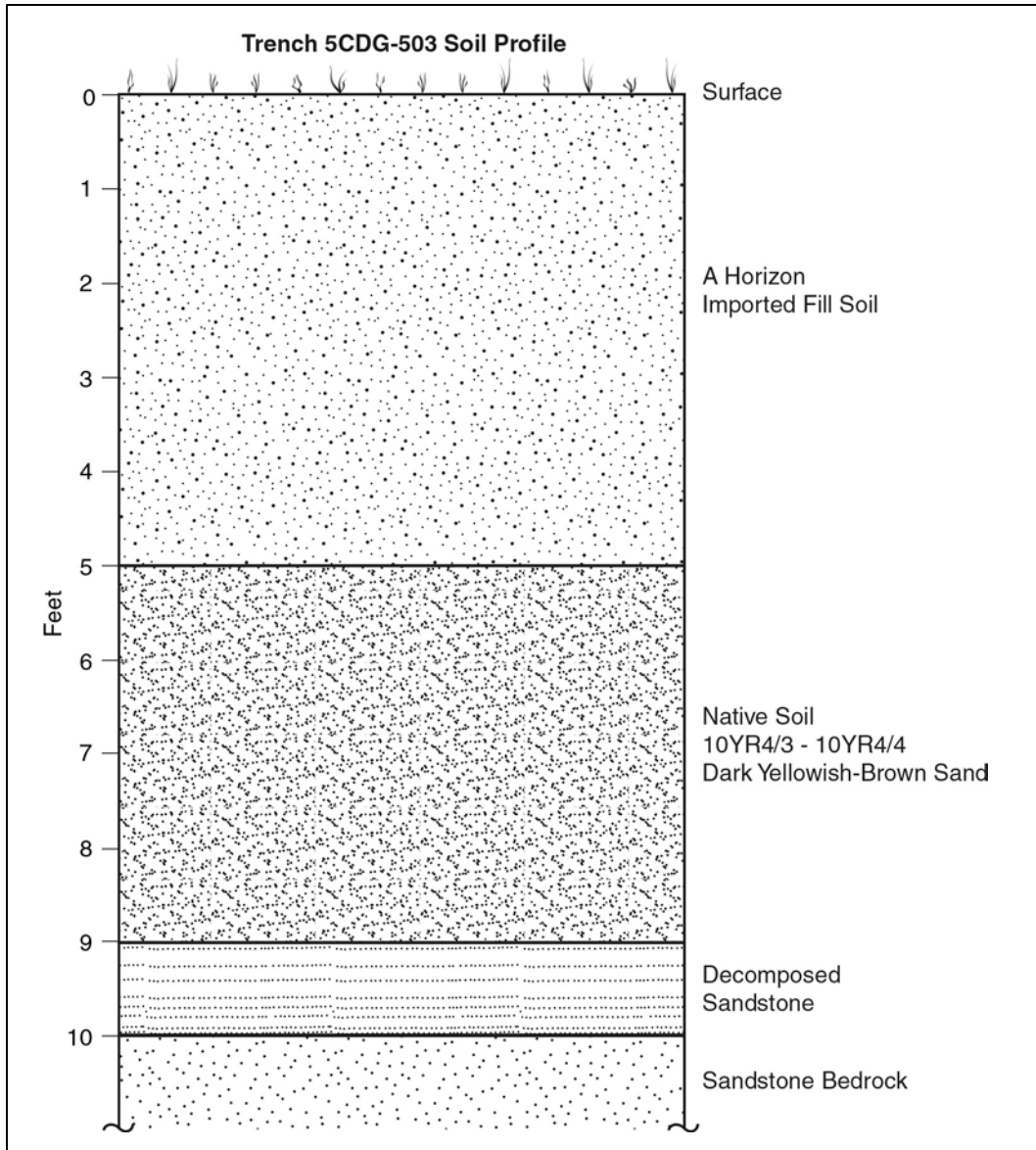


Figure 8. Trench 5CDG-503 Soil Profile

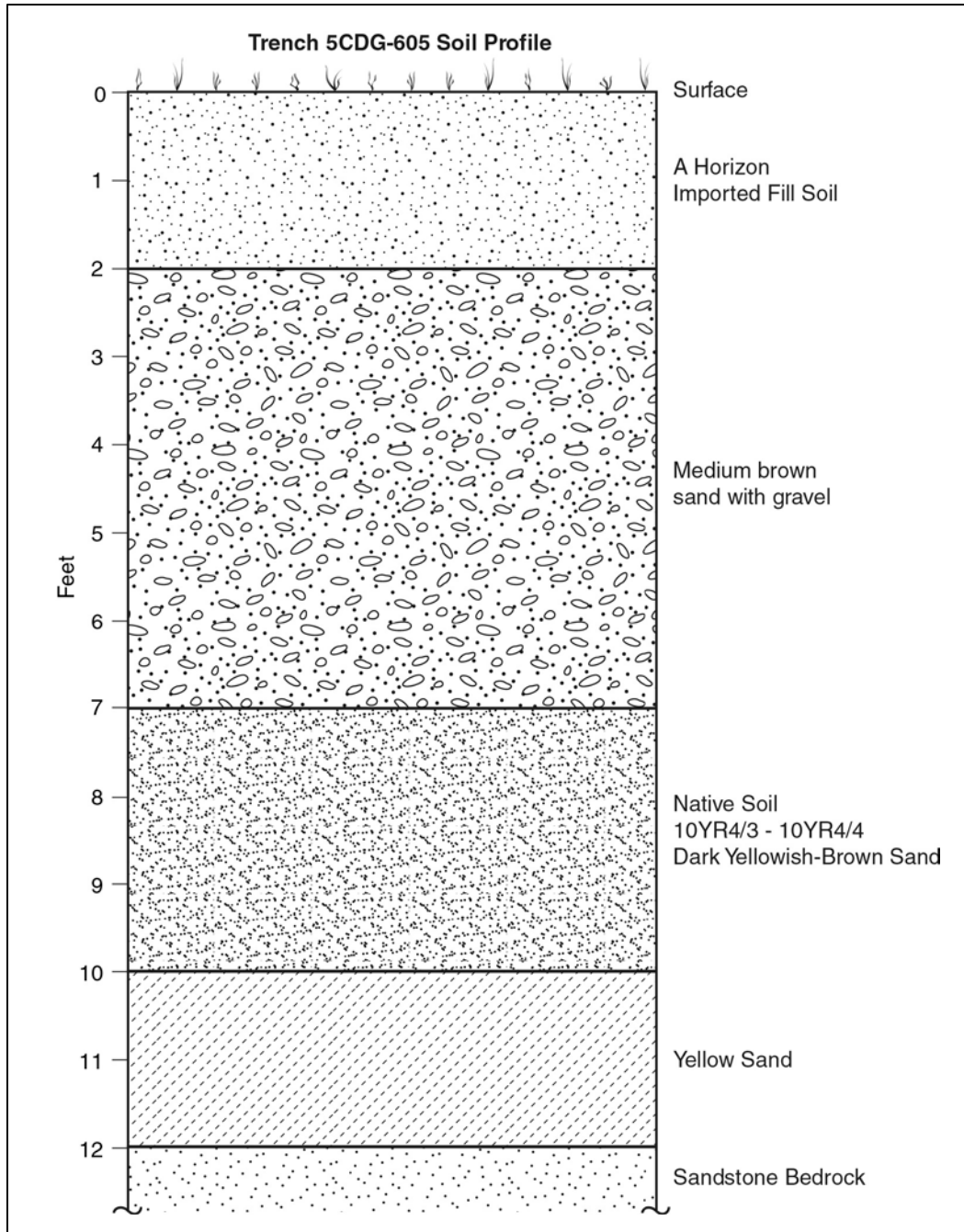


Figure 9. Trench 5CDG-605 Soil Profile

4.2.1.17 Trench 5CDG-655

Trench 5CDG-655 in Subarea 5C was excavated on June 4, 2014, on the same hill as Trench 5CDG-651. This trench was excavated near the base of the hill on the east side. The soil profile of this trench consists of grey-brown sand (A Horizon) to a depth of 1 ft., followed by yellow-brown sand (native soil) to a depth of 4 ft bgs, where sandstone bedrock was encountered. No cultural artifacts were discovered in or near this trench.

4.2.1.18 Trench 5CDG-646

Trench 5CDG-646 in Subarea 5C was excavated on June 4, 2014. This trench was located on the west side of the same hill or knoll as Trenches 5CDG-651/653 and Trench 5CDG-655. The soil profile of this trench consists of medium brown sand (Native soil) to a depth of 2.5 ft where decomposed sandstone was encountered. Decomposed sandstone continued to 4 ft BGS, at which point sandstone bedrock was encountered. No cultural artifacts were discovered in or near this trench.

4.2.2 Results of Archaeological Monitoring of Test Pits and Trenches

No new archaeological sites or isolates were recovered during the archaeological and Native American monitoring of the test pits or trenches. All of the test pits and trenches were placed in areas that were previously surveyed (by both W&S Consultants in 2001 and for the present project) or were located in areas that were monitored extensively for the Phase 1 soil sampling conducted by USEPA (Corbett et al. 2012). Most of the previously-recorded archaeological sites in Area IV and NBZ are located in rockshelters. Moreover, all of the previously recorded sites appear to be located on the ground surface and they appear to lack deeply buried components or are located on the ground surface. Deeply buried sites are not expected in this area of SSFL.

A sawed food bone, apparently a beef or pork rib, was present on the ground surface near Trench 8DG-548. A second sawed beef or pork rib was located near the sandstone rock outcrop east of Test Pit 5BDG-707. Both of these items were of relatively recent origin.

5 Summary and Recommendations

5.1 Summary of Results

Twenty-six sites were re-surveyed and their locations verified (Table 3) in the course of the Phase 3 soil chemical sampling. No new sites were located during the surface and sub-surface probes. Marine shell found at several of the sites and an isolated abalone shell fragment (SSFL-ISO-1) is evidence of trade or direct ties to the Pacific coast. A newly identified prehistoric archaeological isolate provides further evidence that the land comprising the SSFL was used for hunting. Evidence of hunting is provided by the presence of chipped stone tool fragments, including a newly identified quartzite core (SSFL-ISO-2), and also projectile points.

Monitoring of the test pits and trenches did not identify any new sites or any deeply buried archaeological sites. All of the previously identified sites in Area IV and the NBZ are surficial and no deeply buried sites are expected to occur in this area.

The presence of what appears to be well-developed midden at two sites (VEN-1413 and -1775), as well as the presence of bedrock milling features and the smoke-blackened roofs of the rockshelters, indicates that both of these sites were probably residential locales for small groups or families.

It can be inferred that the SSFL was used for gathering and processing edible and useful plants. Many native plants whose use is documented in the ethnographic record occur at the SSFL and it is assumed that these would have been gathered and used during the prehistoric era (refer to Appendix A). Although evidence of this gathering is impossible to demonstrate, the presence of milling features for processing implies their collection.

Table 3. Summary of Site Documentation Activity During Phase 3 Sampling Program, SSFL

Site Number	Location & Boundary Verified	Boundary Recorded & Updated	Site Information Updated	Location
VEN-1302	Yes	Yes		Area IV
VEN-1355	Yes	Yes		Area IV
VEN-1411	Yes	Yes		Area III & IV
VEN-1412	Yes	Yes		Area IV
VEN-1413	Yes	Yes	Yes	Near IV
VEN-1414	Yes	Yes		Area IV
VEN-1415	Yes	Yes		Area IV
VEN-1416	Yes	Yes		Area IV
VEN-1417	Yes	Yes		Area III & IV
VEN-1418	Yes	Yes		Area IV
VEN-1419	Yes	Yes		Area IV & NBZ
VEN-1420	Yes	Yes		Area IV
VEN-1421	Yes	Yes		NBZ
VEN-1422	Yes	Yes		NBZ
VEN-1423	Yes	Yes		NBZ
VEN-1425	Yes	Yes		NBZ
VEN-1426	Yes	Yes		NBZ
VEN-1427	Yes	Yes		NBZ
VEN-1428	Yes	Yes		Area IV
VEN-1772	Yes	Yes	Yes	Area IV
VEN-1773	Yes	Yes		Area IV
VEN-1774	Yes	Yes		Area IV
VEN-1775	Yes	Yes	Yes	Area IV
VEN-1803	Yes			NBZ
VEN-1804	Yes			NBZ
VEN-1805	Yes			NBZ

5.2 Recommendations

The “flag and avoid” approach to cultural resources that was instituted during the Phase 1 soil sampling by Corbett et al. (2012) was continued during the Phase 3 soil chemical sampling and geological testing. The 50-ft buffer around each site established during the Phase 1 soil sampling was maintained during this project and no sites were adversely affected by the project. This technique is the least intrusive and has the lowest potential to disturb cultural resources, and should continue to be the preferred field method to avoid impacts to archaeological sites and other culturally important resources.

In the future, an archaeologist and a Native American monitor should monitor all projects that involve ground disturbing activities, continuing the protocol established for this Phase 3 soil chemical sampling, including surface and sub-surface sampling, as well as geological sampling programs.

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Appendix A

List of Native Plants with Ethnographic Uses from Area IV

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Appendix A - List of Native Plants with Ethnographic Uses from Area IV

Common name	Scientific name	Use(s)	References
Arroyo willow	<i>Salix</i> spp.	Medicinal	Hedges and Beresford 1986:39; Lightfoot and Parrish 2009:269; Timbrook 2007:182-183
Bigberry manzanita	<i>Arctostaphylos glauca</i>	Food	Hedges and Beresford 1986:15
Birdfoot fern	<i>Pellaea mucronata</i>	Food, ornamental	Hedges and Beresford 1986:28
Blue dick	<i>Dichelostemma capitatum</i>	Food	Lightfoot and Parrish 2009:259; Timbrook 2007:75-77
Blue elderberry	<i>Sambucus mexicana</i>	Medicinal, bowmaking	Hedges and Beresford 1986:41; Lightfoot and Parrish 2009:264; Timbrook 2007:195-198
Broad-leaved cattail	<i>Typha latifolia</i>	Food	Lightfoot and Parrish 2009:260; Timbrook 2007:219-220
California bay laurel	<i>Umbellularia californica</i>	Food, wooden bowls, medicinal	Lightfoot and Parrish 2009:265; Timbrook 2007:220-221
California black walnut	<i>Juglans nigra</i>	Food	Lightfoot and Parrish 2009:265; Timbrook 2007:95-97
California broom/deerweed	<i>Acmispon glaber</i>	Brooms, dye, thatching	Timbrook 2007:117-118
California buckwheat	<i>Eriogonum fasciculatum</i>	Medicinal	Hedges and Beresford 1986:21; Lightfoot and Parrish 2009:259; Timbrook 2007:84-85
California dodder	<i>Cuscuta californica</i>	Medicinal	Hedges and Beresford 1986:17
California fuchsia	<i>Epilobium canum</i>	Medicinal	Timbrook 2007:80
California sagebrush	<i>Artemisia californica</i>	Tools, medicinal	Lightfoot and Parrish 2009:266; Timbrook 2007:36-37
California wild rose	<i>Rosa californica</i>	Medicinal	Hedges and Beresford 1986:39; Lightfoot and Parrish 2009:269; Timbrook 2007:172-174
Chalk live-forever/chalk lettuce/deer's tongue	<i>Dudleya pulverulenta</i>	Medicinal	Hedges and Beresford 1986:19
Chamise	<i>Adenostoma fasciculatum</i>	Tools, arrow foreshafts	Timbrook 2007:22-23
Chaparral currant/gooseberry	<i>Ribes malvaceum</i>	Food	Lightfoot and Parrish 2009:266; Timbrook 2007:170-171
Chaparral yucca/Our Lord's Candle	<i>Yucca whipplei</i>	Food, cordage, tools, clothing	Hedges and Beresford 1986:45; Lightfoot and Parrish 2009:269-270; Timbrook 2007:226:229
Chaparral mallow	<i>Malacothamnus fasciculatus</i>	Cordage, medicinal	Timbrook 2007:120
Cheeseweed	<i>Malva</i> spp.	Medicinal	Timbrook 2007:121-122

SSFL Area IV Ethnobotanical Resources
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Common name	Scientific name	Use(s)	References
Chia sage/chia	<i>Salvia columberiae</i>	Food	Hedges and Beresford 1986:41; Lightfoot and Parrish 2009:260; Timbrook 2007:188-193
Chilcothe/wild cucumber	<i>Marah macrocarpus</i>	Paint binder	Lightfoot and Parrish 2009:263; Timbrook 2007:122-124
Coast live oak	<i>Quercus agrifolia</i>	Food	Timbrook 2007:160-162
Common fiddleneck	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	Food	Timbrook 2007:28
Common reed/Carrizo grass	<i>Phragmites australis</i>	Thatching, arrows	Timbrook 2007:137-139
Coyote brush	<i>Baccharis pilularis</i>	Medicinal	Timbrook 2007:44
Cudweed	<i>Pseudognaphalium californicum</i>	Medicinal	Timbrook 2007:88
Curly dock	<i>Rumex crispus</i>	Medicinal	Tilford 1997:168
Death camas/Fremont's star lily	<i>Toxicoscordion fremontii</i>	Medicinal, food	Lightfoot and Parrish 2009:260; Timbrook 2007:230
Deer grass	<i>Muhlenbergia</i> spp.	Baskets	Timbrook 2007:125
Deer weed	<i>Acmispon glaber</i>	Brooms, thatching	Timbrook 2007:117-118
Douglas nightshade/purple nightshade	<i>Solanum xanti</i>	Food, medicinal	Timbrook 2007:211
Fremont's cottonwood	<i>Populus fremontii</i>	Housepoles, bowls, trays	Timbrook 2007:149-150
Fringed Indian pink	<i>Silene lacinata</i>	Medicinal	Timbrook 2007:210
Giant rye	<i>Elymus condensatus</i>	Arrow shafts, thatching	Timbrook 2007:111-113
Golden yarrow	<i>Eriophyllum confertiflorum</i>	Medicinal	Timbrook 2007:22
Gooseberry	<i>Ribes</i> spp.	Medicinal	Tilford 1997:46
Hoary-leaf ceanothus	<i>Ceanothus crassifolia</i>	Digging sticks, poles	Timbrook 2007:51-52
Holly-leaved cherry/islay	<i>Prunus ilicifolia</i>	Food	Hedges and Beresford 1986:32; Lightfoot and Parrish 2009:266; Timbrook 2007:151-154
Honeysuckle	<i>Lonicera hispidula</i>	Brooms, baskets, toy arrows	Timbrook 2007:213-214
Horehound	<i>Marrubium vulgare</i>	Medicinal	Hedges and Beresford 1986:25; Timbrook 2007:125
Indian warrior	<i>Pedicularis densiflora</i>	Medicinal	http://botanicalguides.com/indian-warrior.html
Laurel sumac	<i>Malosma laurina</i>	Food	Timbrook 2007:120-121
Lemonadeberry	<i>Rhus integrifolia</i>	Food	Hedges and Beresford 1986:37; Lightfoot and Parrish 2009:267; Timbrook 2007:165-166
Lomatium	<i>Lomatium lucidum</i>	Medicinal	Timbrook 2007:113
Lupine	<i>Lupinus</i> spp.	Food	Timbrook 2007:118

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Common name	Scientific name	Use(s)	References
Manzanita	<i>Arctostaphylos</i> spp.	Food	Hedges and Beresford 1986:15; Lightfoot and Parrish 2009:267; Timbrook 2007:34-35
Mariposa lily	<i>Calochortus</i> spp.	Food	Lightfoot and Parrish 2009:261; Timbrook 2007:49
Milkweed	<i>Asclepias eriocarpa</i> , <i>A. fascicularis</i>	Medicinal, food	Tilford 1997: 96
Miner's lettuce	<i>Claytonia perfoliata</i>	Food	Hedges and Beresford 1986:17; Timbrook 2007:59
Mistletoe	<i>Phoradendron</i> spp.	Medicinal	Hedges and Beresford 1986:28; Timbrook 2007:136-137
Monkey flower	<i>Mimulus</i> sp.	Medicinal, food	Tilford 1997: 98
Mountain mahogany	<i>Cercocarpus betuloides</i>	Tools, knives	Timbrook 2007:118-120
Mugwort	<i>Artemisia douglasiana</i>	Medicinal	Timbrook 2007:37-39
Mulefat	<i>Baccharis salicifolia</i>	Firestarter	Timbrook 2007:44-45
Mustard (Introduced)	<i>Brassica</i> spp.	Food	Hedges and Beresford 1986:15; Timbrook 2007:45-46
Narrow-leaved milkweed	<i>Asclepias fascicularis</i>	Cordage	Lightfoot and Parrish 2009:261; Timbrook 2007:40-42
Pitcher sage/Hummingbird sage	<i>Salvia spathacea</i>	Medicinal	Timbrook 2007:193-194
Poison oak	<i>Toxicodendron diversilobum</i>	Medicinal	Hedges and Beresford 1986:43; Lightfoot and Parrish 2009:268; Timbrook 2007:214-217
Popcorn flower	<i>Plagiobothrys nothofulvus</i>	Dye	Timbrook 2007:146
Prickly lettuce	<i>Lactuca serriola</i>	Food	Tilford 1997: 116
Purple sage	<i>Salvia leucophylla</i>	Medicinal	Timbrook 2007:184
Redstem stork's bill	<i>Erodium cicutarium</i>	Food	Hedges and Beresford 1986:21
Sacapellote	<i>Acourtia microcephala</i>	Medicinal	Timbrook 2007:22
Shooting star	<i>Dodecatheon clevelandii</i>	Food	Timbrook 2007:78
Slender wild oats	<i>Avena barbata</i>	Food	Hedges and Beresford 1986:15
Soap plant/Amole	<i>Chlorogalum pomeridianum</i>	Medicinal, fish poison	Hedges and Beresford 1986:17; Lightfoot and Parrish 2009:262; Timbrook 2007:55-56
Sugar bush	<i>Rhus ovata</i>	Food	Timbrook 2007:165-166
Tarweed	<i>Deinandra minthornii</i>	Food	Lightfoot and Parrish 2009:262; Timbrook 2007:90-91
Telegraphweed	<i>Heterotheca grandiflora</i>	Repel fleas	Timbrook 2007:95
Thickleaf yerba santa	<i>Eriodictyon crassifolium</i>	Medicinal	Hedges and Beresford 1986:21; Timbrook 2007:83-84
Toloache/Jimsonweed/Datura	<i>Datura wrightii</i>	Medicinal	Hedges and Beresford 1986:17; Timbrook 2007:65-73
Toyon	<i>Heteromeles arbutifolia</i>	Food	Lightfoot and Parrish 2009:269; Timbrook 2007:91-94

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Common name	Scientific name	Use(s)	References
Tree tobacco	<i>Nicotiana glauca</i>	Medicinal	Lightfoot and Parrish 2009:263-264; Timbrook 2007:126-133 Hedges and Beresford 1986:27
Vinegar weed	<i>Trichostema lanceolatum</i>	Medicinal	http://plants.usda.gov/plantguide/pdf/cs_trla4.pdf
Western sycamore	<i>Platanus racemosa</i>	Wooden bowls, medicinal	Hedges and Beresford 1986:30; Timbrook 2007:147-149
Western vervain	<i>Verbena lasiostachys</i>	Medicinal	Timbrook 2007:223-224
White sage	<i>Salvia apiana</i>	Food	Hedges and Beresford 1986:39; Timbrook 2007:184-186
Wild oats (Naturalized)	<i>Avena</i> spp.	Food	Hedges and Beresford 1986:15
Wild onion	<i>Allium</i> spp.	Food, medicinal	Timbrook 2007:26
Wild paeonia	<i>Paeonia californica</i>	Food, medicinal	Hedges and Beresford 1986:28
Woolly blue curls	<i>Trichostema lanatum</i>	Medicinal	Timbrook 2007:217-219

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Confidential Appendix B

State of California Department of Parks and Recreation 523 Site Forms
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