FINAL REPORT
CULTURAL RESOURCE COMPLIANCE AND MONITORING RESULTS FOR USEPA'S RADIOLOGICAL STUDY OF THE SANTA SUSANA FIELD LABORATORY AREA IV AND NORTHERN BUFFER ZONE

Ventura County, California

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) conducted a radiological characterization of a portion of the Santa Susana Field Laboratory (SSFL), located in the Simi Hills of eastern Ventura County, California (Figure 1). The two areas at SSFL characterized are Area IV, a 290-acre administrative section where the U.S. Department of Energy (DOE) and its contractors once operated several nuclear reactors and associated fuel facilities and laboratories, and the Northern Buffer Zone (NBZ), a 182-acre area with no history of development that lies adjacent to Area IV. These two areas comprise the Area IV Study Area. This report describes and documents compliance with applicable federal environmental regulations pertaining to cultural resources for the radiological characterization survey completed in the Area IV Study Area.

Several activities associated with the radiological study of the Area IV Study Area have the potential to impact cultural resures known to occur or that potentially occur in the study area. These activities include vegetation cutting, gamma scanning, geophysical survey, surface and subsurface soil sampling, groundwater monitoring well sampling, surface water sampling, and sediment sampling. To minimize the potential impact to cultural resources, protection measures were developed and implemented throughout the duration of ground disturbing activities.

USEPA is conducting this project pursuant to federal legislative mandate HR2764, the Consolidated Appropriations Act of 2008, and the authority granted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). HydroGeoLogic, Inc. (HGL) was tasked by USEPA to to conduct the radiological characterization survey to determine the presence of potential radioactive and chemical contamination in surface soils, and subsurface soils, groundwater, surface water, and sediment within SSFL Area IV and the NBZ. John Minch and Associates, Inc. (JMA), under subcontract to HGL, conducted all cultural resource studies and oversaw archaeological and Native American monitoring for the duration of all ground disturbing activity, which began July 19, 2010 and concluded in August 2012.

Consultation in accordance with Section 106 of the National Historic Preservation Act (NHPA) commenced in December 2009 and continued through September 2012. The background of the cultural history of the area, and the findings of previous archaeological surveys completed in the project area are described in Section 2. Section 3 describes the NHPA consultation process, the activities monitored, and the general avoidance measures

that were implemented to avoid adverse cultural resources. The findings of the archaeological and Native American monitoring effort and recommendations for future actions are detailed in Section 4. The references cited in the preparation of this report are listed in Section 5.

1.1 Description of Project Area

The SSFL is located within the Simi Hills in the northwest San Fernando Valley approximately 30-35 miles northwest of downtown Los Angeles. The Simi Hills are mostly located in southeast Ventura County, although the eastern end is in Los Angeles County. The Simi Hills form part of the geomorphic province known as the Transverse Ranges. These scenic hills are about 16 miles long southwest-northeast, and about half as wide or less southeast-northwest. The highest point is Simi Peak at 2401 feet (732 meters). "The Simi Hills are one of the few places where streams radiate away toward the four cardinal directions: Simi Valley creeks to the north, creeks draining into the San Fernando Valley to the east, Arroyo Conejo to the west, and Malibu Canyon tributaries to the south" (King and Parsons 2000:2). These tributaries flow through steep and narrow canyons; the most important of which are Wolsey, Box, and Lake Manor Canyons. The northwest side of the Simi Hills are made of Eocene and Paleocene marine deposits, while the southeast side, over-looking and to the west and north of Chatsworth Reservoir, is composed of the massive sedimentary rocks of the Cretaceous Chatsworth Formation, which are a thick sequence of often steeply uplifted sandstone beds, that are interbedded with clays, shale, sandstones and siltstones. Many of the archaeological sites and isolated artifacts discovered in both Area IV and the NBZ were found within or in close proximity to outcrops of the Chatsworth Formation, where small caves and rock shelters are abundant. Plant communities include chaparral, coastal sage scrub, coast live oak woodland, willow scrub, mulefat scrub, native and non-native grasslands, and riparian forest (King 2000:7-17; NASA 2010:9).

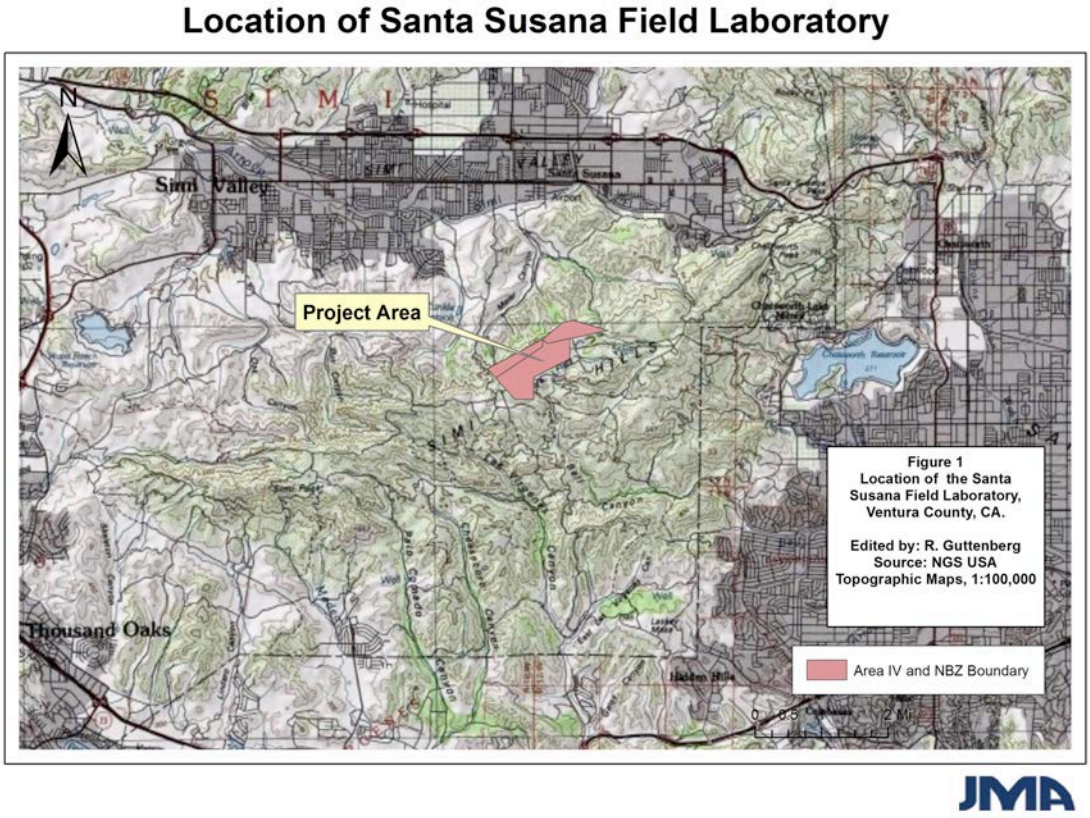

Figure 1. Project Area at the Santa Susana Field Laboratory.

1.2 Project Personnel

JMA conducted all cultural resource studies and oversaw monitoring activities during the course of the USEPA undertaking. Ray Corbett, Ph.D., RPA, served as the Principal Investigator and, as the Cultural Resource Specialist (CRS), supervised all field activities related to cultural resources. Richard Guttenberg served as Project Manager and conducted field monitoring as well. Other staff archaeologists who worked on the project as archaeological monitors were: Albert Knight, Nick Poister, Heather McDaniel, Sebastian Garza, Darlene Deppe, Aaron Elzinga, Karen Clericuzio, Brittany Bankston, and Rebekka Knierim. All staff archaeologists have a minimum of a bachelor's degree and were well qualified to conduct field monitoring.

Native American monitoring was conducted concurrently with archaeological monitoring. Native American monitors were subcontracted directly by HGL and participated in all aspects of the project. Monitors from the indigenous Chumash and Tataviam tribes were: Charlie Cook, Patrick Tumamait, Alan Salazar, Jaime Julian, Lisa Folkes, Austin Martin and Ben Martinez.

2.0 BACKGROUND

2.1 Prehistoric Cultural Setting

There are several chronologies that are used to illustrate the cultural sequences for Southern and Central California (King 1990; Wallace 1955; Rogers 1929). Each of these sequences describes cultural horizons and phases observed in the archaeological records of the Santa Barbara Channel region, Los Angeles Basin, Southern California coastal region, and the Mojave Desert respectively. For our purposes we will define cultural sequences using the most recent description (Glassow et al. 2007).

Paleo-Coastal Prehistoric Period: 11000 – 7000 cal B.C.

The earliest evidence for human occupation in North America is found on the California Channel Islands. The Arlington Springs site on Santa Rosa Island, and Daisy Cave on San Miguel Island both date to approximately 11000 cal B.C., and provide evidence of human occupation of the Northern Channel Islands in the Terminal Pleistocene (Erlandson et al. 1996; Glassow et al. 2007; Johnson et al. 2000). However, there is limited evidence on the coastal mainland for human occupation prior to approximately 8000 – 7500 cal B.C. Archaeological sites dating to this time period are predominately small and characterized as short-term habitations used for gathering and processing shellfish.

Millingstone Horizon: 7000 – 5000 cal B.C.

The Millingstone Horizon is characterized by an increase in population densities along the coastal mainland, and artifact assemblages consisting mostly of large millingstones, such as manos, metates, and stone bowls, and a general scarcity of finely flaked stone tools (Glassow et al. 2007). Archaeological evidence from this time period shows an increase in diversification of food resources, such as shellfish, birds, and small mammals. Early mainland coastal groups exploited bay and estuary marine habitats (Erlandson and Rick 2002; Rick and Erlandson 2000) but the diet from this period appears to have relied heavily on the processing and milling of hard seeds (Wallace 1955). It is likely that these populations consisted of small extended families of mobile foragers using these sites as a residential base with limited socio-political complexity (Glassow et al. 2007).

Wallace (1955) describes Millingstone sites in the immediate area at Porter Ranch, east of SSFL in the northern San Fernando Valley, Encino (CA-LAN-111) and Topanga Canyon on the southern side of the valley, and the Little Sycamore shellmound in Ventura County.

Early Period: 5500 – 600 cal B.C.

Based on extensive analysis of artifact sequencing in mortuary assemblages, Chester King (1990) developed a widely used regional archaeological chronology. His chronology defines three general prehistoric periods: Early, Middle, and Late. The Early period dates roughly from 5500 BC – 600 BC. Archaeological evidence indicates that subsistence on the mainland during this period was heavily dependent on terrestrial plant foods, particularly grass seeds and nuts, as well as shellfish for people who lived close enough to access the coast (Erlandson 1994; Glassow 1992). As the Early period advanced, based on the increasing prevalence of mortars and pestles and fishing related technology, it appears that there was a shift toward a reliance on acorns, land mammals, and fish (Erlandson and Colten 1991). On the Channel Islands, because land mammals and food plant species were much more limited, shellfish and the available plants were more intensively utilized in the Early period (Erlandson and Rick 2002; Glassow 2004).

Middle Period: 600 cal B.C. – 1150 A.D.

The Middle period represents a greater increase in population densities, more complex tool technology, expansion of food resources, increased social complexity, and greater evidence of trade and interaction between coastal and inland populations (Glassow et al. 2007). Technological changes during this period include change in lithic technology. Mortars and pestles appear in the archaeological record, indicating an increase in acorn processing, and a greater abundance of flaked stone appears, suggesting a marked increase in hunting of larger game. Other technological innovations are seen during the middle period the circular shell fishhook, and a wide array of bone and shell tools and ornaments. Archaeological sites from this period are characterized by small year-round and seasonal settlements (Glassow et al. 2007).

Evidence for a vast network of trade and exchange emerges during the Middle period. Items such as shell beads manufactured on the Channel Islands appear in inland sites on the mainland. In exchange, obsidian was traded from the inland deserts to the coastal regions and both the northern and southern Channel Islands. It is likely that these materials were traded through the Simi Valley and Newhall pass, which makes the area around SSFL a highly significant corridor for contact between inland and coastal populations. Additionally, the Middle period saw an influx of Shoshonean Takic speaking groups migrating from the inland deserts to the coastal region (Kroeber 1976). It is during the Middle period that the archaeological record exhibits the development of ritual specialists and increased ceremonial integration in the Chumash region (Corbett 1999, 2004).

Late Period: 1150 – circa 1769 A.D.

The Late period is characterized by a notable increase in coastal settlements and marine subsistence, particularly fishing. An intensification of fishing is observed in coastal sites, along with significant changes in technology and social organization. Technological

changes to marine subsistence patterns include the introduction of the circular shell fishhook and net weights, which allowed for coastal populations to significantly expand their diet (Glassow et al. 2007). Inland populations developed innovations in lithic technology which allowed for intensified hunting, and further diversified their subsistence with an increase in acorn production, pulpy tubers and roots, as well as marine resources (Glassow et al. 2007). An increase in sedentism occurs in this period as evidence of extended occupation is observed in archaeological records, particularly in the coastal region. There are additional developments in social organization that indicate an increase in ceremonial and elaborate ritual practice, and socially stratified society (Gamble 2008). By the beginning of the Late period, mortuary practice was significantly more homogeneous throughout the Chumash region compared to the Early and Middle periods (Corbett 2009). Wealth and status differentiation are apparent in mortuary assemblages and more elaborate ornamentation is observed, suggesting a change in social and political complexity. This feature accompanies evidence of an increase in trade and exchange between coastal and inland populations (Glassow et al. 2007).

The Late Period saw continued increases in population densities and a rapid increase in social complexity. Permanent village sites with large populations are observed throughout the coastal and inland areas. Increased technological complexity is observed in the archaeological record, indicating that populations had developed a more diversified approach to subsistence. Perhaps the most significant developments of this period are the plank canoe (*tomol*) and bow and arrow. The plank canoe allowed for deep-water fishing and provided the vehicle for the transport of *Olivella sp.* shell beads from the Channel Islands to the mainland. This development further expanded the networks of trade and exchange between the islands and the mainland. The bow and arrow transformed hunting by providing a more effective and accurate tool for capturing larger game, and also served as an effective weapon. Further development of craft specialization is apparent in the increase in the manufacture of shell beads, bone and lithic ornaments, and ritual items. Religious paraphernalia, rock art, and elaborate burial practices suggest elaborate ritual activity and ceremonialism integration were practiced during this period (Corbett 2004).

The eastern Simi Hills were an area of major cultural interaction. The Ventureño Chumash inhabited the territory to the west and the Simi Valley immediately to the north, the Fernandeño, a group who spoke a dialect of Gabrielino (also called Tongva), inhabited the San Fernando Valley to the east, and the Tataviam occupied land further northeast in the upper Santa Clara River valley where the communities of Valencia, Newhall and Santa Clarita are today. Ethnographic, linguistic, and archaeological information suggest that each of these cultural groups had ties to and/or made use of the Simi Hills where the SSFL is located (Johnson 2006; King 2000; King and Parsons 2000:14-17). The Chumash occupied much of the southern California littoral and adjacent inland areas between Topanga Canyon in the south and the Monterey County line in the north (Gamble 2008:6). Linguistic evidence suggests that the Chumash may have inhabited this area for at least 10,000 years, and may be descended from the earliest inhabitants of California (Goddard 1996; Golla 2007:71-82; Grant 1978:509-519; King 2000; King and Parsons 2000:14-17; Mithun 1999). Descriptions of the prehistoric populations of the San Fernando Valley typically include the neighboring Gabrielino-Tongva who occupied the Los Angeles basin and coastal regions (Bean and Smith

1978:538-549, McCawley 1996). In fact, the term Gabrielino has often been used as a blanket term to encompass all of the peoples who inhabited the greater Los Angeles region, since mission San Gabriel was the first mission founded in the territory. However, as subsequent missions were established and local indigenous populations were incorporated into more proximate missions, these Indian subgroups became known as the Fernandeño (for their association with Mission San Fernando), the Luiseño (Mission San Luis Rey), and the Juaneño (Mission San Juan Capistrano). The term Tongva is an indigenous name for a village near San Gabriel, and may have been used by Gabrielinos to identify themselves (McCawley 1996). Although the Fernandeño are closely related to and spoke a dialect of Gabrielino, they are considered distinct from the Gabrielino relative to the SSFL.

The geographical area of SSFL represents a significant transitional zone between the Chumash and Fernandeño and would have served as a trade corridor between the Ventureño Chumash and the Tataviam inhabiting the upper Santa Clara River Valley in what is now the Santa Clarita/Newhall area.

2.2 Ethnohistoric Period

At the time the Spanish entered California an important village in the western San Fernando Valley area was the village of *Momonga*, located in the vicinity of present day Chatsworth (Johnson 2006). In 1797, when the Spanish established Mission San Fernando in the north central San Fernando Valley, the Mission absorbed not only Fernandeño, but many of the easternmost of the Ventureño Chumash, including many people from *Simiyi* (today's Simi Valley), which also "contributed recruits to both Ventura and San Fernando Missions" (King and Parsons 2000:13). Individuals of other native groups including the Tataviam from the Santa Susana Mountains and the Santa Clara Valley to the north, and Kitanemuk from the western Mojave Desert also became integrated with the Fernandeño due to their association with that mission (Brown 1967:8; Forbes 1966:138; Johnson 2006:5-10; King 2003:2). The (prehistoric) Fernandeño spoke a language that belong to the Takic branch of Northern Uto-Aztecan; they called their linguistic cousins the Gabrielino *shivaviatam*.... which specifically referred to those who ".... lived on the lower San Gabriel and Santa Anna Rivers..." (King 2003:3). This supports the notion that these two groups were separate peoples.

Ethnographic accounts indicate that Chumash influence was felt across most of the San Fernando Valley, and all of the villages in the western part of the valley had both Chumash and Fernandeño names (Johnson 1997a: 249-290; 2006:5-10, 30-34; Romani 1981:14-18, 127; Romani, et al. 1988:119). Furthermore, a Kitanemuk informant stated: "... the religion of the yivar (siliyik) was the custom at Ventura and of the Castec (interior Ventureño) people, and of the Fernandeño... and Gabrielinos… The Gabrielino sang their long verses... in Ventureño Chumash" (Hudson and Underhay 1978:30; Hudson et al. 1977:17-28, 31, 39-42).

This demonstrates that Chumash influence was felt beyond the areas occupied by the Chumash themselves, and the ethnographic record indicates that at least in late prehistory the Fernandeño were closely tied to the Ventureño Chumash by a common religion, including many common rituals. For example, the Winter Solstice Ceremony honoring

Kakunupmawa (the Sun) was the most important annual ceremony of the Chumash and based upon his research in the area, John Romani posits that "the west San Fernando Valley was an area of religious and/or ceremonial prominence for both the Chumash and Fernandeño." (Romani 1981:91). The SSFL is therefore known to be located in proximity to several important Native American village and ceremonial sites, the most important of which was likely Burro Flats, which is discussed in detail in Section 2.3.

2.3 Historic Setting

Historical accounts of the Santa Susanna area began in 1782 with the founding of Mission San Buenaventura. In 1795 the Spanish government issued two land grants in the Ventura area, one of which was *Rancho Simi*. This rancho was 113,000 acre parcel granted to the Pico family, and included the SSFL project area (Post et al. 2009; Triem 1985). *Rancho Simi* was subdivided and sold by the Pico family, and the properties changed hands a number of times over the years. Early in the twentieth century the SSFL location was purchased by the Dundas and Silvernail families, who primarily used the properties for cattle ranching (Post et al. 2009; Sapere and Boeing 2005).

Early Hollywood studios used the Chatsworth and Santa Susana area as a film location for a number of movies, and in later years, television shows. Several movie location ranches were set up and used for the production of "B" Western movies. Ranch locations in direct proximity to SSFL included Iverson Ranch, Brandies Ranch, Bell Ranch, Corriganville Ranch, Spahn Ranch, and Burro Flats in the area now known as Area IV (England 2012). The sandstone outcrops and rugged terrain provided an excellent backdrop for western films, as well as other remote locales (Rocketdyne Archives 2012), and the already established cattle ranching in the area contributed to the aura of cowboy culture that was well-suited for the production of western movies. A number of films were shot at Burro Flats over the years, including: *Come on, Cowboys* (1937); *Call the Mesquiteers* (1938); *Zorro's Fighting Legion* (1939); *Code of the Cactus* (1939); *The Kansas Terrors* (1939); *Rovin' Tumbleweeds* (1939); *The Carson City Kid* (1940); *Sergeant York* (1941); *Robin Hood of the Pecos* (1941); and many others (England 2012). Later productions seeking unusual or science fiction locales included *Return from Witch Mountain* (1978); *Hooper* (1978); as well as television episodes of *The Six Million Dollar Man* (1973-1974); *Bionic Woman* (1976); *Barnaby Jones* (1973)*;* and *Star Trek: Deep Space Nine* (1996) (IMDb 2012; Rocketdyne Archives 2012) (Figure 2).

Iron Mountain Trail (1953), Republic (England 2012)

Return from Witch Mountain (1978), Walt Disney (England 2012)

Figure 2. Movie and television production at Burro Flats

Since 1947 the SSFL site, also known as "The Hill" has been occupied and used for the development and testing of aerospace and defense systems by a number of agencies and private industries (Post et al. 2009; Rocketdyne Archives 1987). The original occupant and operator of the SSFL facility was Rocketdyne, a division of North American Aviation (NAA). NAA acquired the SSFL property through a long-term lease with the Dundas family, resulting in the eventual purchase of a 620-acre parcel of the Dundas family ranch (Post et al. 2009). Rocketdyne used the SSFL to develop several liquid rocket engine systems that were later used in many cruise/ballistic missiles and rocket systems such as the Redstone, Thor, Jupiter, Delta, Atlas, and Saturn rockets, as well as the Space Shuttle Main Engine. The SSFL was also used by the Atomics International division of NAA to develop and test compact nuclear reactors, and operated the first commercial nuclear power plant in the United States (Archaeological Consultants and Weitz Research 2009; Post et al. 2009).

The property is divided into four areas and two buffer zones: Area I, II, III, IV, and the northern and southern buffer zones. (Fig). Much of the missile, munitions, and rocket testing were conducted in Areas I, II, and III. Area IV encompasses Burro Flats, and was used primarily for the development and experimentation of nuclear reactors between 1953 and the late 1960s (Archaeological Consultants and Weitz Research 2009; Post et al. 2009). In 1996 Rocketdyne sold their aerospace entities to Boeing, which now serves as the primary owner and operator of SSFL.

2.4 Previous Archaeological Work

In May 2010, in support of the Archaeological and Native American monitoring effort, JMA completed a record search of the California Historical Resources Inventory System was conducted at the South Central Coastal Information Center at California State University Fullerton for all documentation for cultural resources within the Area of Potential Effect (APE) of the project. The record search included reports of previous cultural resource studies, surveys, or reports, as well as site records of known

archaeological sites, and historic maps of the APE in Area IV. The results of this archival search revealed also that the first modern archaeological survey of part of Area IV date back to 1999 (Clewlow and Walsh 1999). The first complete survey of the entire 290 acres of Area IV was commissioned by the DOE and was conducted in 2001 by Whitley and Simon (Whitley and Simon, 2001). This survey discovered and recorded four archaeological sites within Area IV at the SSFL. In their written report summarizing the findings of their survey, Whitley and Simon (2001) determined that none of the four archaeological sites were eligible for inclusion in the National Register of Historic Places (NRHP) and thus should not be considered historic properties. However, concurrence of ineligibility had not been sought from or granted by the California SHPO so this determination was unofficial. In fact, another site in the immediate area, the Burro Flats pictograph complex, had already been placed on the NRHP. A subsequent survey for Southern California Edison of a 62-acre tract of land along a utility line was conducted in 2007 (Craft and Mustain 2007). Another survey on behalf of Southern California Edison, this time in preparation for installation of a fiber optic cable line, was conducted in 2009 by Compass Rose Archaeological, Inc. (Romani 2009). This survey included a small tract of land within Area IV.

Archival research revealed that no archaeological surveys had been conducted of the 182 parcel of land adjacent to and north of Area IV at the SSFL known as the NBZ. However, DOE commissioned an archaeological survey of the NBZ; this survey had been just been completed by CRM TECH and that the survey report was still in development at the time JMA's archival research was conducted in spring 2010 (CRM TECH 2010).

Due to security concerns and restricted access to the SSFL, with the exception of surveys related to land management, there has been limited archaeological research conducted at the site in recent decades. However, there is one archaeological site within the SSFL that has consistently drawn the attention of archaeologists, scholars, and the public. Within the SSFL the most important and well-known previous archaeological site and associated research involves the Burro Flats pictograph site, located in Area II of SSFL, and due south of the project area. The Burro Flats site is up canyon from the prehistoric village of *Huwam*, and may have served as a ceremonial complex for this village. The Burro Flats pictograph site includes (most famously) a large complex polychrome main panel, which incorporates two groups of small cupules into the panel. The other rock art loci include a few simple polychrome elements, monochrome pictographs in red, white, or black, simple black lines, deeply incised random grooves which are associated with red pigment, multiple loci of cupules, and bedrock mortars associated with some of the rock art (Knight 1997b:112-114, 256-266; 2001:47-48).

In an informational brochure produced by NASA, the current Area II property owners, the site is described as follows:

> *The pictographs at Burro Flats are a remarkable record of prehistoric Native American art. Archaeologists who have visited the site have said that it includes some of the most dramatic and best preserved pictographs known and is among the finest examples of prehistoric pictographic art in North America. The sites 1976 inclusion on the NRHP reflects its significance. While the main gallery is renowned for its aesthetic mastery,*

vibrant colors, and good state of preservation, the remaining galleries are generally in a poor state of preservation. Their ongoing degradation is a reminder that archaeological sites are often very fragile links to a knowledge of the past (NASA 2009:1-2).

The first archaeological excavations at the Burro Flats site complex were performed by the Archaeological Survey Association of Southern California (ASASC) in 1953 and 1954. Although many artifacts were recovered from this work, the ASASC never produced a report of their findings. The resulting collection from Burro Flats was stored at the Southwest Museum of the American Indian for many years (Steele 1982:184), and is now curated by the Autry National Center of the American West (Knight 2011:9).

The pictographs were first formally and methodically recorded in 1959-1960 by Charles Rozaire of the Los Angles County Museum of Natural History. He subdivided the various rock art panels into different loci, assigning each of them a separate site number. Unfortunately, Rozaire's numerous site numbers for the Burro Flats pictographs created considerable confusion among subsequent scholars and researchers. Rozaire also conducted excavations at the site complex during these years using an archaeological field class from San Fernando Valley State College (now California State University, Northridge).

By the mid-1960s the Burro Flats site was slowly becoming known to a broader spectrum of people as short descriptions of the site came to be published. Campbell Grant, for example, visited the site several times beginning in the late 1950s. Grant designated the rock art at the main panel as his Ventura-4, and he classified the pictographs as being Ventureño Chumash (Grant 1965:74-76, Plates 25 and 30). In 1973 Franklin Fenenga at California State University, Long Beach conducted the second detailed and methodical survey of the pictographs. Fortunately, Fenenga recorded the pictographs in their entirety with a single site number and the site is now conventionally referred to as CA-VEN-1072. Fenega (1973) wrote that, "Probably no archaeological site in California contains so spectacular a complex of features . . . neither vandalized nor intruded upon by modern development." He concluded that because of its magnitude, complexity, its dramatic physical setting, and its pristine state of preservation, it was one of the most important aboriginal archaeological sites in America and thus met the criteria for inclusion in the National Register of Historic Places (NRHP). Based on his recommendation, Burro Flats was nominated to and listed on the NRHP in 1976. More recently, John Romani, an archaeologist who has studied the site in detail elaborates the Burro Flats site as: "... unquestionably ceremonial in nature, although its true complexity awaits proper analysis of the archaeological data. The site has a Late Period component, based on the presence of Spanish trade beads. Although glass trade beads can by no means suffice to confidently date the rock art... the well-preserved appearance of these pictographs does show that at least the most recent superimposition (i.e. of the bright red pigment) is probably of recent origin" (Romani, et al. 1988:112).

Today, NASA owns the Area II property and controls access to the Burro Flats pictograph site complex. While it is not available for visitation by the public, qualified researchers, planning administrators, and Native Americans are allowed to visit the area by permission, on an as-needed basis.

3.0 MONITORING ACTIVITIES

3.1 NHPA Section 106 Consultation

Because this project was implemented by USEPA, efforts conducted under this action are subject to federal statutes, regulations, executive orders, and federal policies. In particular, Section 106 of the NHPA, 16 U.S.C. Section 470f, requires federal agencies to take into account the effects of their undertakings on historic properties. As part of these federal regulations, the 1992 ammendments to the NHPA requires that, in carrying out the requirements of Section 106, each federal agency must consult with any Indian tribe that attaches religious and cultural significance to historic properties that may be affected by the agency's undertakings (Advisory Council on Historic Preservation 2008:8). For the purposes of such consultation, the federal agency is only statutorily required to consult with tribes that are federally recognized. However, the federal agency (in this case USEPA) is not limited to consultation exclusively to federally recognized tribes. Under the Section 106 regulations at 36 CFR Section 800.2(c)(5), a federal agency may invite such groups to participate in consultation as "additional consulting parties" based on a "demonstrated interest" in the undertaking's effects on historic properties (Advisory Council on Historic Preservation 2008:9). The Advisory Council on Historic Preservation acknowledges that non-federally recognized tribes, groups, or individuals may have ancestral ties to a site, or be able to provide additional information to the federal agency that should be considered in the review process (Advisory Council on Historic Preservation 2008:10). Given that, it was appropriate to consult with individuals or groups with a demonstrated interest in the project, even if they are not members of a federally recognized tribe. For the radiolological characterization study at SSFL, USEPA enacted a more inclusive Section 106 Native American Consultation policy to include the Native American groups traditionally associated with the SSFL area, the Chumash (which included the federally recognized Santa Ynez Band of Chumash Indians), the Tataviam, and the Fernandeño, (a subgroup of the Tongva/Gabrielino).

Formal Section 106 consultation with Native American Stakeholders commenced December 3, 2009 when DOE, USEPA, and Boeing hosted a day-long Cultural Resources Tour onsite at the SSFL. During this event representatives from DOE and USEPA explained details of the radiological survey project and solicited questions, comments, and feedback from Native American Stakeholders. Twelve Native Americans were invited to participate and these individuals represented Chumash, Fernandeño, and Tataviam interests. The concerns and questions by Native American Stakeholders were documented and addressed specifically through development of Cultural Resource management policies and in follow-up consultation meetings.

A second formal Section 106 Native American Stakeholder consultation meeting was conducted June 9, 2010, at the SSFL. At this meeting the archaeological consulting team, JMA, presented their Cultural Resource Assessment (Appendix C) and CRPM protocols (Appendix B) which were proposed for the impending work in Area IV. The Native American Stakeholder consultants concurred that the cultural resource management approach in general, and the CRPM specifically, were appropriate and should be implemented. Specific questions, comments, and feedback regarding the Cultural

Resource Assessment and CRPM document were addressed at this meeting and the resulting suggestions were incorporated into subsequent policies and revisions to the CRPM document.

A third formal Section 106 Native American Stakeholder consultation meeting was conducted September 15, 2010, at the SSFL. At this meeting DOE solicited questions, comments, and feedback regarding the cultural resources survey of the NBZ completed by their subcontractor CRM TECH (CRM TECH 2010). Also at this meeting JMA presented a separate Cultural Resources Assessment (Appendix D), and monitoring protocols for the pending work in the NBZ. This included the most recent draft of the CRPM document (Appendix B), which had incorporated the comments and feedback from previous Native American Stakeholder consultation meetings. Again, the consensus among Native American Stakeholder consultants at this meeting was that the cultural resources management approach and the CRPM were appropriate and should be implemented for the impending work in the NBZ.

The final formal Section 106 Native American Stakeholder consultation meeting for USEPA's radiological characterization of the SSFL was conducted September 15, 2012. At this meeting JMA presented the documentation of the results of the cultural resources monitoring compilated over the duration of the study in Area IV and the NBZ. At this consultation meeting, Native American Stakeholders were offered the opportunity to review and comment on Site Records, maps, photos prepared for new archaeological sites, and isolated artifacts discovered during the project. In addition, an outline of content of this final report was discussed.

3.2 SHPO Consultation

In May 2010 JMA submitted the draft Cultural Resource Assessment (Appendix C) and CRPM (Appendix B) for Area IV to the California SHPO for consultation, comment, and concurrence. This was essentially a "flag-and-avoid" approach toward all identified archaeological sites within the APE of the project. Since a determination of ineligibility for the four previously recorded archaeological sites (Whitley and Simon 2001) had not been sought from or issued by SHPO, all known archaeological sites within the APE were considered significant and thus included in provisions of the Cultural Resource Assessment plan and the CRPM specifically. This strategy of "flag-and-avoid" known archaeological sites resulted in a determination of No Adverse Effects to historic properties (i.e., cultural resources) as a result of the project, by JMA's CRS. On July 15, 2010, after reviewing the cultural resources management plan, CRPM, and supporting documentation, pursuant to 36 CFR 800.4(d)(1), SHPO concurred with the finding of No Adverse Effect to historic properties in Area IV with conditions as long as the CRPMs were followed (Appendix A).

Likewise, following the release of the CRM TECH cultural resources survey report for the NBZ in August 2010, JMA developed a draft Cultural Resources Assessment for the NBZ (Appendix D), which included the most recent version of the CRPM (Appendix B). In October 2010 these plans and supporting documents were submitted to the California

SHPO for consultation, comment, and concurrence. Again, this was essentially a "flag-and-avoid" approach toward the three archaeological sites discovered by CRM TECH within the APE of the project in the NBZ. Since the report made no determination of eligibility for the three newly recorded archaeological sites (CRM TECH 2010: 20), all known archaeological sites within the APE were considered significant by JMA and thus were included in the provisions of the Cultural Resource Assement and the CRPM specifically. The adoption of the "flag-and-avoid" approach for all known archaeological sites resulted in a determination of No Adverse Effects to historic properties (i.e., cultural resources) as a result of the project, by JMA's CRS. On December 1, 2010, after reviewing the Cultural Resources Assessment, CRPM, and supporting documentation, pursuant to 36 CFR 800.4(d)(1), SHPO concurred with the finding of No Adverse Effect to historic properties in the NBZ (Appendix A).

3.3 Cultural Resource Protection Measures

The cornerstone of JMA's cultural resource management approach for USEPA's radiological characterization survey at the SSFL was to "flag-and-avoid" all known archaeological sites, and to monitor all ground disturbing activity related to the project. The provisions and logistics for implementing these policies were specified in detail in the CRPM document. As noted above, the CRPM were developed in conjunction with Native American Stakeholders through formal Section 106 consultation, and were reviewed and approved by SHPO. These planning documents and the protocols that they outlined were prepared as dynamic documents to allow adaptations in response to ground conditions encountered during the surveys, and flexibility to respond to the concerns of Native American Stakeholders as they arose. Minor revisions were made to the CRPM several times in response to USEPA's ongoing Section 106 consultation efforts. The goals of the CRPM were to: (1) ensure that no known cultural resources were adversely affected, 2) fully document previously unknown cultural resources discovered, and (3) ensure that newly discovered cultural resources were not adversely affected by the project. In the end, the CRPM proved to be highly effective at accomplishing these goals. The full text of the final version of the CRPM is provided in Appendix B.

3.4 Ground Disturbing Activity Monitoring Protocols

HGL conducted seven activities during the course of the USEPA's radiological characterization, five of which were monitored by JMA on either a full-time or part-time basis, depending on sensitivity and the potential to affect cultural resources. Before the radiological sampling began, the following measures were conducted to avoid the adverse effects associated with ground disturbing activities.

- JMA's CRS identified the locations of previously recorded archaeological sites in the APE.
- The CRS established a 50 foot (ft) exclusion zone around the site boundaries. The 50 ft buffer was delineated with colored flagging tape. No ground disturbing activities, or any other activities that had the potential to affect cultural resources were allowed within the exclusion zone

In addition, all ground disturbing activities in areas deemed sensitive by the CRS (e.g.,

previously undisturbed areas) were monitored by an archaeological monitor and Native American monitor, on a full-time basis (see CRPM protocols, Appendix B). JMA's CRS made the determination to monitor activities based on levels of ground disturbance. The following activities are described in full detail, and their potential to affect cultural resources are considered. A full description of the undertaking is detailed in the Cultural Resource Assessment documents compiled by JMA at the outset of project (Appendices C and D).

3.4.1 Vegetation Clearing

To provide access for project-related vehicles/equipment and allow operation of gamma scanning equipment at optimum levels of sensitivity, vegetation within the APE was cut or trimmed to a height of approximately 6 to 18 inches. Vegetation cutting in previously undisturbed areas was conducted using a combination of hand held mechanical equipment and hand tools. In addition, heavy equipment such as tracked or wheel-driven mowers (i.e. a tractor with a mower attachment) was only allowed to operate in previously disturbed areas in Area IV. As discussed in the Avoidance Measures below, known archaeological sites were delineated with a 50 ft. buffer around site boundaries and flagged for avoidance by either JMA's CRS or an archaeological monitor.

3.4.2 Gamma Scanning

HGL/USEPA characterized surface soil for gamma activity over 100 percent of the accessible areas of Area IV and the NBZ to identify and characterize elevated areas of gamma radiation. Scanning was conducted at a rate of one to three feet per second and normally required only one pass over each area being scanned. Gamma scanning was conducted using a combination of hand-held, cart-mounted, mule-mounted, track-mounted (TMGS), and off-road, forklift mounted systems (ERGS). The cart-mounted, mule-mounted, track-mounted, and forklift-mounted systems were custom-built systems that were capable of detecting low levels of gamma radiation. JMA's CRS considered the potential for each of the gamma scanning methods to affect cultural resources and made the determination for monitoring based on the following criteria:

1. Hand-held scanning– foot traffic. No expected ground disturbance, no monitoring required;
2. Wheel mounted scanning– foot traffic, light vehicle traffic. Minimal potential for ground disturbance, no monitoring required;
3. Mule mounted scanning- foot traffic, mule traffic. Minimal potential for ground disturbance, no monitoring was required;
4. TMGS– foot traffic, light vehicle traffic and vegetation alteration. The TMGS was used on slopes, but was observed to disturb soil so was identified as an activity that required monitoring. The TMGS was monitored on both a full-time and part-time basis, depending on sensitivity and proximity to known cultural resources;
5. ERGS–foot traffic, vehicle traffic and vegetation alteration. Heavy equipment operation has a potential for ground disturbance, thus the ERGS was monitored on a full-time basis.

3.4.3 Geophysical Survey

HGL/USEPA conducted geophysical surveys to determine areas of potential subsurface disturbance that may be indicative of waste burial areas. The subsurface geophysical surveys were conducted using ground-penetrating radar (GPR) (or other appropriate technology) and either electromagnetometer (EM) or magnetometer in locations suggested by USEPA's Historical Site Assessment (HSA) report. The impacts associated with each type of geophysical survey were foot traffic and light vehicle traffic. The presence of personnel and equipment during the geophysical surveys (regardless of the type of equipment used) were determined to have minimal impact to cultural resources. All HGL personnel were provided with training outlining the sensitivity and potential to impact cultural resources at the outset of the project (Appendix B). Based on this training and the minimal potential to impact cultural resources, the geophysical surveys were not monitored.

3.4.4 Soil Sampling

HGL/USEPA collected surface and subsurface soil samples to characterize the representative concentration of each radionuclide of concern in surface and subsurface soil within the Area IV and NUL Study Area. Several soil sampling methods were used to conduct the radiological characterization, all of which were determined by the CRS to be ground disturbing. Sample locations identified within an area of known archaeological sensitivity were relocated nearby so impacts to cultural resources were totally avoided. A total of 3,646 soil samples were collected; of these, sampling activities at approximately 3,462 locations were monitored. The remaining samples were collected from drainages and storm sewer water sample locations. In Area IV 3,400 sample locations were monitored, and 246 soil sample locations in the NBZ were monitored. The surface and subsurface samples were co-located; thus minimizing the surface disturbance during drilling. As described below, two to four closely spaced boreholes were required at each sample location to conduct the gamma logging, define the subsurface sample interval, and collect the requisite soil volume for sample analysis. Both an archaeological monitor and a Native American monitor directly observed all of the following surface and subsurface soil sampling.

Borehole gamma logging was performed to identify depth intervals for subsurface soil samples. Boreholes were made using a mechanized direct push technology (DPT) rig and 3.25-inch tooling. Each borehole was advanced to a depth of approximately 10 feet deep below ground surface (bgs) or until refusal was reached if less than 10 feet. Continuous cores were collected in each borehole; the lithology was logged by HGL field staff; and the soil classification was documented for each sample.

Downhole gamma logging was completed after the lithologic logging effort or concurrently with the lithologic logging effort. A 2-inch inner diameter polyvinyl chloride (PVC) pipe was inserted into the open borehole. A probe attached to a Ludlum 2221 ratemeter was lowered down the PVC piping at 6-inch intervals to document total gamma radiation counts. After the lithologic and gamma logging

efforts were completed at the borehole, the sample interval was selected based on the previously described parameters.

Soil sample collection was conducted at locations offset by approximately 6 to 12 inches from the initial borehole. Surface soil samples were collected from 0 to 6 inches bgs using stainless steel trowels, stainless steel shovels and/or spoons to collect enough soil to fill the appropriately sized sampling container. Subsurface soil sample intervals were selected based on subsurface gamma scanning results and material noted during the lithologic logging effort. The DPT rig was then offset to the surface sample location and advanced to the desired depth to collect the subsurface soil sample. Additional offset boreholes, as needed, were also spaced between 6 to 12 inches from the previous borehole. After the logging and sampling efforts were completed, each borehole was backfilled with any unused soil volume from the same borehole and high solids bentonite.

3.4.5 Monitoring Well Sampling

HGL/USEPA evaluated existing radiological conditions in groundwater at on-site and off-site locations. Approximately 70 existing on-site monitoring wells were sampled during one event in 2010 and approximately 20 existing off-site wells were sampled during one event in 2011. The impacts resulting were determined by the CRS to have no potential to impact to cultural resources and were not monitored.

3.4.6 Surface Water and Sediment Sampling

HGL/EPA collected surface water and sediment samples to determine radionuclide concentrations in on-site and off-site surface water and seeps. The surface water sampling was conducted in two phases. Phase 1 focused on identifying the general extent of contamination and identification of key radionuclides. Phase 2 involved conducting a detailed evaluation of the radionuclides that were detected during Phase 1. The collection of surface water samples was focused on drainage pathways with specific sample locations being determined during the site reconnaissance. Approximately 30 surface water sample locations and 40 sediment sample locations were anticipated. Surface water sampling targeted major drainage ways downstream of potential radiological source areas. Sediment sampling targeted the fine-grained sediment located within the stream and associated stream bank. The CRS determined that there was potential to effect cultural resources during the sediment sampling in and around streambed locations. There locations were monitored on an as-needed basis, based on sensitivity determined by the CRS. Both an archaeological monitor and a Native American monitor conducted monitoring at soil/sediment sampling locations that were designated for monitoring by the CRS.

3.4.7 Support Activities

HGL/USEPA conducted various support activities during the course of the project. These activities consisted of a variety of actions including:

- use of office and equipment storage space at the USEPA field office area located at Building 204 in SSFL Area II,
- use of a mule stable located within the USEPA field office area,
- mobilization, staging, and equipment storage,
- investigation derived waste (IDW) management and storing,
- access, on-site travel, and access improvement, and
- vegetation alteration and vegetation/soil removal.

USEPA's field office area was located approximately 300 feet from Area IV and consisted of Building 204, nearby outbuildings and adjacent paved areas (Appendix C:12). The mule stable was located within the USEPA field office area and the entire field office area was fenced and locked outside normal working hours. Gamma scanning equipment was moved to and from the field office and Area IV/NBZ via existing dirt, gravel, and paved roads that transverse a small portion of Areas II and III. Support vehicles accessed the field office area via existing paved roads. Several of the identified Support Activities were determined to be ground disturbing in nature, and were monitored by both an ArchaeologicalMonitor and a Native American monitor, at the direction of the CRS. The activities monitored were: mobilization and staging, access improvement, vegetation alteration, and vegetation/soil removal.

4.0 MONITORING RESULTS

4.1 Discovery and Recordation of New Archaeology Sites

One of the advantages of USEPA's Area IV radiological characterization project in terms of cultural resources management was the fact that the project involved vegetation clearing. While this in itself is a ground disturbing activity that entails the risk of negative impacts to cultural resources, it also had the potential to greatly enhance the ability to discover previously undiscovered archaeological sites. This is because natural vegetation, particularly dense chaparral, greatly obscures the ground surface where prehistoric artifacts would otherwise be visible. Most pedestrian archaeological surveys are severely hampered by limited ground visibility due to vegetation cover. In fact, monitoring vegetation clearance was instrumental in the success of discovering and recording new archaeological sites at the SSFL.

While JMA's monitoring efforts did not constitute a 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, they can be favorable compared to a formal pedestrian survey.

For the purposes of this report, an archaeological site is defined as a concentration of two or more artifacts within appoximately 5 meters of each other. In all, 19 new archaeological sites were discovered as a result of cultural resources monitoring efforts by archaeologists and Native American monitors during USEPA's radiological characterization survey. Twelve new sites were discovered in or immediately adjacent to the boundary of Area IV. These are in addition to the five previously known sites in Area IV (Whitley and Simon 2001, Romani 2009). Seven new sites were discovered in the NBZ, these are in addition to the three previously known sites in the NBZ (CRM TECH 2010).

Once a new site was discovered, it was immediately flagged off with a 50-ft buffer zone and ground disturbing activity was prohibited within the exclusion zone. The presence and location of each new site was made known to HGL field teams and subcontractors and archaeological monitors periodically assessed their condition. JMA's CRS maintained a running list of newly discovered sites and provisions were made for formally recording and mapping the new sites.

Formally recording each new archaeological site entailed completing a series of Archaeological Site Record forms so that each new site is fully documented and can be added to the California Historical Resources Inventory System. A team consisting of the CRS and an archaeological monitor conducted recording and mapping sites. Each site was mapped in detail and a photographic record of each site compiled. Site recordation commenced in March 2011 and was completed in May 2012. In addition to the seven newly discovered sites in the NBZ, one site that had been inadequately documented by the previous cultural resources survey (VEN-1804) was re-recorded by JMA in April

2011. A map of newly discovered and recorded archaeological site locations within the project area is provided in Appendix E. Site Record forms are provided in Appendix F.

4.2 Discovery and Recordation of Isolated Artifacts

Also during the monitoring effort, numerous isolated artifacts (artifacts found singly, out of context, and/or not representing an archaeological site proper), were discovered. The point of origin of each isolated artifact was recorded in the field using hand-held GPS units and then temporarily recovered in order to remove them from inadvertent disturbance by work crews. Each isolated artifact was photographed and then fully documented utilizing Archaeological Site Record forms so that the location and description of each isolated artifact can also be added to the California Historical Resources Inventory System. In all, 54 new isolated artifacts were discovered and documented as a result of cultural resources monitoring efforts by archaeologists and Native American monitors during USEPA's Radiological Characterization Survey. Seventeen isolated artifacts were discovered in Area IV, and 37 new isolates were discovered in the NBZ in addition to 5 previously recorded isolates. Near the end of the project, once fieldwork was completed, with the exception of three artifacts which were retained by Boeing, all of the isolated artifacts were returned to their original point of origin by a JMA team member accompanied by a Native American monitor. The three isolated artifacts retained by Boeing were: #2011SSFL2.17.1, a steatite arrowshaft straightener (Figure 4); #2011SSFL11.2.1, a granite mano (Figure 3); and #2012SSFL4.4.1, a dark gray fused shale projectile point (Figure 5, center). A fourth artifact, a fragment of worked mammal bone, was also retained by Boeing. This artifact was not assigned an isolate number because it was recovered from and documented with Project Site 24. A map of isolate locations within the project area is provided in Appendix E. Isolate Record forms are provided in Appendix G.

4.3 Discussion and Interpretation of Findings

The discovery of new sites within the SSFL provides new data that can be compared to other areas. In terms of the distribution of sites within the APE, site density is similar between Area IV and NBZ. There are now 19 sites recorded in the 290-acre Area IV. This yields a site density of 0.065 sites per acre. Similarly, there are now 8 sites recorded in the 180-acre NBZ. This yields a site density of 0.044 sites per acre.

Regarding isolated artifacts, there are some distinct differences in the distribution across the APE. To date, 18 isolated artifacts have been discovered and recorded in the 290-acre Area IV. This yields a density of 0.062 artifacts per acre. In contrast, there are now 42 isolated artifacts recorded in the 180-acre NBZ. This yields a density of 0.233 artifacts per acre. Comparing the two tracts of land, the NBZ contains almost four times as many artifacts per acre as Area IV. Of course there are some factors that have influenced this distribution of sites across the APE. A large percentage of Area IV has been developed with buildings, and graded or paved areas. Undoubtedly, many artifacts have been displaced by this development. In contrast, comparatively little development has been completed at the NBZ relative to Area IV. However, the NBZ contains some of the most rugged terrain in the SSFL and, therefore, much of the NBZ was not surveyed during this

project. It is difficult to determine how significantly these two factors influence the actual prehistoric distribution of artifacts.

Combining the known sites and isolates in Area IV and the NBZ, there are now 27 recorded sites and 60 isolates in the USEPA Area IV Study Area. Of the 27 recorded sites, 17 represent rockshelters, and 10 are open-air sites, that is, a site not within or immediately associated with a cave/rockshelter. The SSFL area of the Simi Hills exhibits an abundance of large sandstone outcrops and cliffs. This fact, coupled with the high daytime temperatures that prevail in the summer months, makes it unsurprising those prehistoric populations made frequent use of the shaded refuge of rockshelters in the area. A wide range of prehistoric activities can be inferred from the sites themselves, the artifact assemblages associated with them, and the isolated artifacts found throughout the study area. In general, the production, manufacture, and use of stone tools appears to be the predominant activity associated with prehistoric use of the SSFL. This is evidenced by the abundance of chipped stone debitage. At almost every site, some form of chipped stone was observed to be the prevalent artifact type. The archaeological and Native American monitors found choppers, scraper planes, an arrowshaft straightener, and finished projectile points (arrowheads). Bedrock mortars were found at some rockshelter sites as well as at one open-air site. The occurrence of such mortars has been interpreted as plant food processing implements, typically used for pulverizing oak acorns into meal. Certainly, the Simi Hills features a significant population of Coast Live Oak (*Quercus agrifolia*) trees. A number of manos (handstones) were also discovered and recorded in the study area (Figure 3). Manos are used in conjunction with metates (a stone base) to grind hard seeds into a fine meal or flour. Manos were found as isolated artifacts as well as within rockshelters. The presence of manos indicates that plant seeds, such as grass, sage seeds, were also gathered and processed in the SSFL prehistorically.

Figure 3. Mano (handstone) found during archaeological monitoring.

The arrowshaft straightener and the number of projectile points discovered (Figures 4 and 5), suggests that hunting was an important activity in the Simi Hills for the indigenous peoples. In fact, the Simi Hills today serve as an important habitat and refuge for wild

animals and deer in particular. The landscape of the NBZ exhibits abundant evidence that it is an active wildlife corridor between the rugged terrain and protreros of the upper Simi Hills and the valleys to the north and east. While surveying and recording sites in the NBZ, the CMS observed many active game trails wending their way through the rock outcrops. Deer were frequently seen by field crew members. A few of the rockshelters were situated adjacent to these active game trails and would have been optimal locations for hunting blinds. In fact, one rockshelter in the NBZ, Project Site # 20, was a small rockshelter in an area that exhibited abundant sign of deer. This particular rockshelter was too small to be used for habitation, but it had two small openings, one of which was partially walled up by stones stacked up in front of it. At the time of recordation, the CMS observed how strategically this shelter was situated and how the cultural modification served to create and extremely effective hunting blind adjacent to a game trail. Additionally, the tops of numerous outcrops proved to be strategic vantage points to survey and monitor the movement of game in the area.

Figure 4. Arrowshaft Straightener (made from steatite).

Figure 5. Projectile Points from the Project Area

In general, rockshelter sites exhibited the widest variety of artifacts and range of activities. Not surprisingly, some of the largest rockshelters exhibited the widest variety of activities. The polychrome pictographs at the Burro Flats site just to the south of the project area are well known and have already been discussed, and one of the sites recorded by Whitley and Simon in Area IV in 2001 also contained pictographs. In addition, one of the rockshelter sites (Project Site #8) discovered and recorded during this project features a small pictograph panel. The motif, in red pigment, appears to be an anthropomorphic figure, although some of the panel is faded or otherwise obscured (see Figure 6). Clearly, there exists demonstrable evidence that the SSFL, including Area IV was also used for ritual activities in addition to subsistence pursuits.

Figure 6. Pictograph from Project Site 8.

4.4 Summary and Recommendations

The objective of this component of the radiological characterization survey completed in the Area IV and NBZ Study Area was to conduct all field operations in a manner that complied with applicable federal environmental regulations pertaining to cultural resources. To meet this objective, JMA developed appropriate protection measures and working with HGL, implemented them throughout the duration of ground disturbing activities to minimize the potential impact to cultural resources. Additionally, archaeological monitors and Native American monitors were assigned to oversee field operations, ensuring that existing known culturally significant sites were protected, and to identify and document new archaeological sites. The "flag-and-avoid" approach employed for this project is the least intrusive and has the lowest potential to disturb cultural resources. The CRPMs developed for Area IV and the NBZ proved to be highly

effective at accomplishing the stated objectives of the cultural resources monitoring effort: (1) ensure that no known cultural resources were adversely affected, 2) fully document previously unknown cultural resources discovered, and (3) ensure that newly discovered cultural resources were not adversely affected by the project. The objectives were achieved: no culturally significant resources were compromised during the USEPA's action in the Area IV and NBZ Study Area, and new sites were identified and documented.

Besides protecting cultural resources, the findings of the monitoring effort and the identification of new sites documented archaeological evidence for many different uses of the tract of land that is now referred to as Area IV and the NBZ. These include plant gathering and processing activities as evidenced by bedrock mortars, manos, and scraper planes. There is abundant evidence of hunting as demonstrated by projectile points, an arrowshaft straightener, and the prolific distribution of chipped stone debitage. Further, these efforts extended the data regarding ritual use of the area through the discovery of additional rock art.

The SSFL represents an area where cultural resources have been subject to much less modern disturbance than is usually the case in southern California. Due to restricted access to the public and the lack of residential development, much of the Simi Hills remains in a relatively natural state. This condition has benefited cultural resources, especially prehistoric archaeological sites. Indigenous rock art in particular has avoided significant vandalism and remains better preserved than in many other locations. For these reasons, the extant cultural resources at the SSFL warrant comprehensive protection and diligent monitoring of their status.

It is recommended that during future characterization and remediation activities at the SSFL, a strict "flag-and-avoid" approach be maintained for all prehistoric archaeological sites within the SSFL. In addition, an archaeologist and Native American monitor should monitor future projects that involve ground disturbing activities. Though not included in the scope of this project, for future efforts at the SSFL, it would be important to obtain temporal information regarding newly discovered sites. A research design could be developed to address questions regarding the way that prehistoric peoples used the Simi Hills through time. Radiocarbon dating of artifacts would provide direct information about the temporal relationships of various activities, prehistoric land use, or cultural adaptations to the environment over time were obtained. Obtaining this chronological data would significantly facilitate a fuller understanding of the nature of cultural changes through time in the study area. For example, radiocarbon dates obtained on shellfish fragments and bone would provide direct evidence of when certain sites were occupied. This information would provide a better understanding of the nature and timing of prehistoric cultural adaptations to the SSFL landscape.

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APPENDIX A

SHPO Concurrence Letters of No Adverse Effect

Department of Energy
Washington, DC 20585

April 20, 2009

Milford Wayne Donaldson, FAIA - State Historic Preservation Officer
California Department of Parks and Recreation
Office of Historic Preservation
1416 9th Street, Room 1442
P.O. Box 942896
Sacramento, CA 94296-0001

RE: Santa Susana Field Laboratory Proposed Action

Dear Mr. Donaldson:

The United States (US) Department of Energy (DOE) proposes an undertaking that could affect historic properties at the Santa Susana Field Laboratory (SSFL). The proposed action concerns clean-up options for the remediation of the 290 acre Area IV at the SSFL (Figures 1 and 2).

The Energy Technology Engineering Center (ETEC) is located on 90 acres within Area IV, and is where various nuclear programs including nuclear engineering, nuclear research and development, and nuclear manufacturing operations were conducted until 1988.

The DOE and the US Environmental Protection Agency (EPA) have signed an Interagency Agreement for EPA to conduct a radiological background study at locations outside of the boundaries of SSFL. In addition, EPA will conduct a radiological characterization survey of SSFL Area IV of the Northern undeveloped land.

Section 106 of the National Historic Preservation Act (NHPA) (36 CFR Part 800) requires federal agencies to take into account the effects of their undertakings on historic properties. In accordance with 36 CFR 800.2(c), DOE requests initiation of additional consultation with the California SHPO.

In addition to Section 106 of NHPA, this consultation is in compliance with the National Environmental Protection Act (NEPA) of 1969 (42 United States Code (U.S.C.) 4321-4347) and the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR Parts 1500-1508).

In proceeding with the planning of this undertaking, coordination of NHPA Section 106 consultation will occur with the development of an Environmental Impact Statement (EIS) to meet our NEPA requirements pursuant to 36 CFR 800.8. The DOE is preparing the EIS, which will be developed in accordance with NEPA and will focus on environmental restoration activities for Area IV, including soil and groundwater remediation and the decontamination and

decommissioning or dismantlement of government buildings and structures on the site. Our plan to involve the public will follow our established procedures for completing the NEPA process as well as fulfill our responsibilities under 36 CFR 800.3(e).

Please provide any concerns you have regarding this approach so that we many incorporate them into our process. Shortly after sending this letter, we will be initiating consultation with federally recognized Indian tribes affiliated with SSFL lands. Similarly, we will also be notifying non-federally recognized Indian tribes subject to 36 CFR 800.3(f). The purpose, pursuant to 36 CFR 800.3(f)(2), is to determine if the Tribes have any religious or cultural interest in the Area of Potential Effect. Please provide any comments you have regarding our efforts to identify all potential consulting parties and gather information as outlined in 36 CFR 800.3(f) and 800.4(a)(4).

At this time DOE is still collecting information regarding the extent and methodology of the inventory of Area IV, and the NRHP eligibility of the resources located there. Therefore, we would like to begin our consultation with the SHPO as early as possible in this process, to discuss the undertaking, and hear about any areas of specific concern, questions or other input. Please feel free to contact me via telephone at (818) 466-8162, or by email at Stephanie.jennings@emcbc.doe.gov.

Sincerely,

Stephanie G. Jennings
U.S. Department of Energy
NEPA Document Manager

Enclosure

cc: Craig Cooper - EPA
Nicole Moutoux - EPA
Norman Riley - DTSC
Allen Elliott - NASA
Thomas Johnson - DOE/OAK
Richard Schassburger - DOE/OAK
Simon Lipstein - DOE/CBC
Patricia Berry - DOE/OAK
Ravnesh Amar - Boeing
Sandra Enyeart – Administrative Record

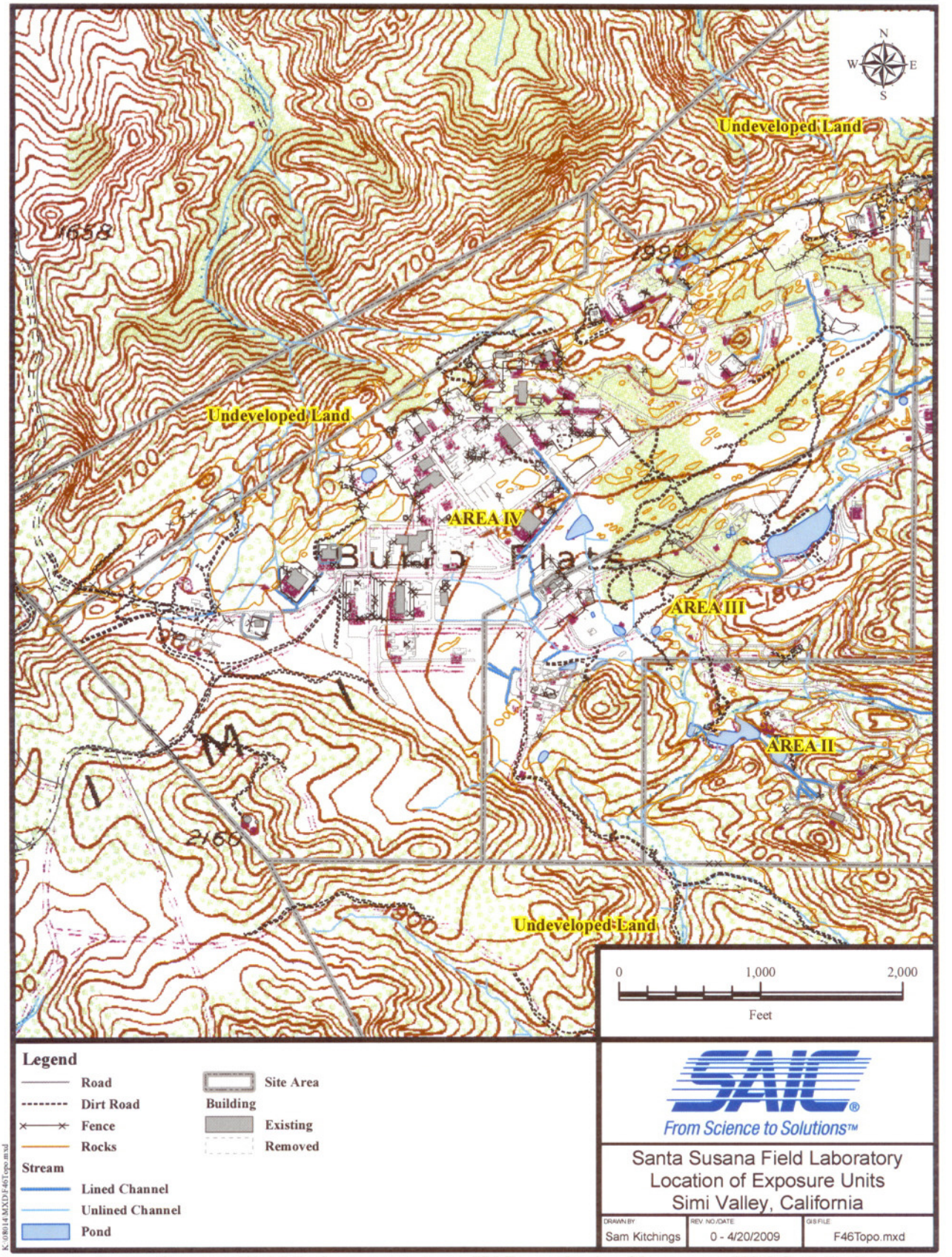

Figure 1. Santa Susana Field Laboratory Area IV Boundaries Shown on USGS 7.5' Calabasas Quadrangle; and is in Land Grant, Civil Colonies Area of the Public Land Survey System (PLSS)

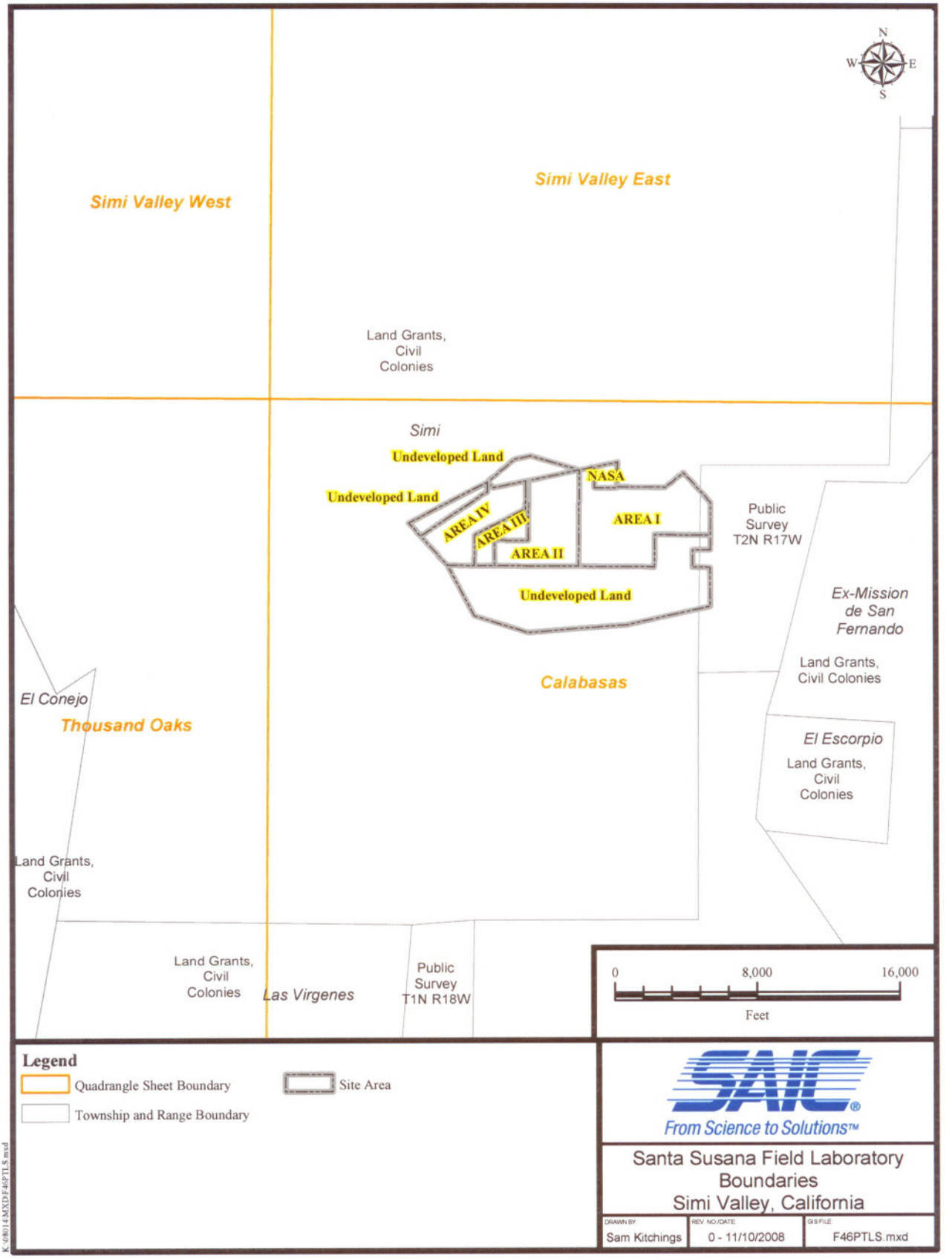

Figure 2. Santa Susana Field Laboratory Boundaries

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
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calshpo@ohp.parks.ca.gov
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July 15, 2010 In Reply Refer To: EPA100603A

Craig Cooper
Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Re: Santa Susana Field Laboratory Area IV Radiological Testing, Ventura County, California

Dear Mr. Cooper:

Pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act, the Environmental Protection Agency (EPA) is seeking my comments on its determination of effects that the proposed undertaking will have on historic properties.

The undertaking consists of the vegetation clearing, gamma scanning, geophysical survey, soil sampling, water monitoring, and sediment sampling and radiological testing on 290 acres within Area IV of Santa Susana Field Laboratory (SSFL). Vegetation clearing will cut or trim vegetation to a height of six to 18 inches using a combination hand held mechanical equipment and hand tools. Heavy equipment such as wheel-driven mowers will be operated in previously disturbed areas. Gamma scanning is passive scanning for radiation using hand held, wheel mounted (stroller), mule mounted, and forklift mounted scanners. Geophysical survey will be conducted using ground-penetrating radar and electro-magnetometer to identify potential buried materials. Up to 3500 of each surface and subsurface soil samples will be collected. Sampling will be both targeted and random samples. All samples initially planned in areas of archaeological sensitivity or known historic properties will be relocated to an adjacent, less sensitive location. Each borehole will be a maximum of ten feet deep. Water sampling will involve both surface and groundwater samples. All ground water samples will be taken from pre-existing monitoring wells both in and near Area IV of SSFL. Surface water and sediment will be sampled from active water locations, mainly drainage pathways within banks in areas of recent deposition. In addition to your letter and maps of June 3, 2010, you have submitted the following documents as evidence of your efforts to identify historic properties in the APE:

● *Cultural Resources Assessment Santa Susana Field Laboratory: Area IV Radiological Study, Ventura County* (Richard Guttenberg and Ray Corbett; John Minch and associates, Inc.: June 2010).

● *Historic Structures/Sites Report for Area IV of the Santa Susana Field Laboratory* (Post/Hazeltine Associates: April 2009).

● *Class III Inventory/Phase I Archaeological Survey of the Santa Susana Field Laboratory* Area 4, Ventura County, California (W & S Consultants: September 2001).

● *Archaeological Survey Report: Southern California Edison Proposed Fiber Optic Moorpark East Copper Cable Replacement Project* (Gwen Romani, Compass Rose Archaeological Inc.: September 2009).

Based on their identification efforts, through research at the South Central Coastal Information Center and previous pedestrian surveys of the APE, the EPA has concluded that there are 263 previously recorded structures and ruins within the APE most of which are modern. All of the structures within the APE have been determined not eligible by the EPA. The EPA has also identified five archaeological sites (CA-VEN-1772, CA-VEN-1773, CA-VEN-1774, CA-VEN-1775, and CA-VEN-1362) within the APE. All five of these sites have not been formally evaluated and will be treated as eligible for the purposes of this undertaking. The EPA, proposes to prevent adverse effects to these sites by flagging a fifty foot buffer around each site and avoid site disturbance including complete avoidance by vegetation clearing, use of only hand held gamma scanning equipment with the presence of a qualified archaeological monitor within the protected buffer area, and complete avoidance by the geophysical survey and soil sampling programs.

The EPA has determined that all of the structures identified within the APE are not eligible for the National Register. Pursuant to CFR 800.4(c), I concur with your finding of not eligible for the 263 historic structures listed in Table 1 of the report: *Historic Structures/Sites Report for Area IV of the Santa Susana Field Laboratory* by Post/Hazeltine Associates (pages 11-17).

The EPA has determined that the appropriate finding of effect for this undertaking is that of No Adverse Effects with the condition of avoiding the five identified archeological sites within the APE (CA-VEN-1772, CA-VEN-1773, CA-VEN-1774, CA-VEN-1775, and CA-VEN-1362).

After reviewing your letter and supporting documentation, pursuant to 36 CFR 800.4(d)(1), I concur with your finding of No Adverse Effect with conditions as long as the previously discussed mitigation measures are followed.

Be advised that under certain circumstances, such as unanticipated discovery or a change in project description, the EPA may have additional future responsibilities for this undertaking under 36 CFR Part 800.Thank you for seeking my comments and for considering historic properties in planning your project. If you require further information, please contact Trevor Pratt of my staff at phone 916-445-7017 or email tpratt@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

The Office of Historic Preservation will be moving to a new location as of July 14, 2010. The new address for the office will be 1725 23rd Street, Suite 100, Sacramento CA 95816. Please update your records accordingly. The entire office will also be receiving new phone numbers, and those numbers will be posted on our website at www.ohp.parks.ca.gov when they are active.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

Via Express Mail

October 15, 2010

Milford Wayne Donaldson, FAIA – State Historic Preservation Officer
California Department of Parks and Recreation
Office of Historic Preservation
1414 9th Street, Room 1442
P.O. Box 942896
Sacramento, CA 94296-0001

RE: Santa Susana Field Laboratory Proposed Action

Dear Mr. Donaldson:

The United States (US) Environmental Protection Agency (EPA) has identified a proposed undertaking on the Boeing-owned property of Santa Susana Field Laboratory (SSFL) Northern Undeveloped Lands (NUL), Ventura County, California and is initiating this correspondence in compliance with Section 106 of the NHPA. This undertaking is closely related to the EPA project in the Area IV of the SSFL that was foreshadowed in our previous consultation letter regarding Area IV, dated June 3, 2010 (attached). Please note that the tract of land hereby referred to as the Northern Undeveloped Lands (NUL), was referred to as the Northern Boundary Zone (NBZ) in that document. On July 15, 2010 your office concurred with our finding of No Adverse Effect regarding the undertaking in Area IV, reference # EPA100603A (attached).

The currently proposed undertaking is to conduct a radiological characterization survey of the NUL of the SSFL. The Area of Potential Effect (APE) is 182 acres within the NUL of the SSFL (Figure 1.). A complete description of the project is detailed in the attached document titled *Project Description and Cultural Resources Assessment Santa Susana Field Laboratory Northern Undeveloped Lands Radiological Study, Ventura County, California* (attached).

Section 106 of the National Historic Preservation Act (NHPA) (36 CFR Part 800) requires federal agencies to take into account the effects of their undertakings on historic properties. In accordance with 36 CFR 800.2(c), the EPA requests consultation and concurrence with the California SHPO regarding the proposed undertaking. EPA's SSFL Cultural Resource Specialist (CRS) has reviewed the proposed undertaking and he has determined that the proposed project would have No Adverse Effect on historic properties within the APE.

In anticipation of this and future projects, the US Department of Energy (DOE) commissioned a

survey and assessment of potential historic properties within the NUL in 2010.

Also in preparation for this project a separate record search of the surrounding area was conducted with the South Central Coastal Information Center at the California State University, Fullerton. Archaeological surveys that include all or part of the APE were conducted in 2001, and 2010 survey #s VN-2480, and VN-2889 respectively (attached).

The results of the recently completed survey and assessment of the NUL (attached) determined that there are no existing built structures or developments within the APE (Hogan, et al. 2010:15). The survey identified and recorded a total of three (3) previously unknown prehistoric archaeological sites and five (5) isolated artifacts within the APE for this undertaking. Absent of subsurface testing the authors of the report were unable to determine whether the three (3) new archaeological sites within the APE were eligible or ineligible for inclusion in the National Register of Historic Places (NRHP) (Hogan, et al. 2010:20). However, all archaeological sites within the APE (CA-VEN-1803, CA-VEN-1804, and CA-VEN-1805, site records attached) are hereby considered eligible for inclusion in the NRHP and considered historic properties for the purposes of this undertaking.

The undertaking currently presented proposes a No Adverse Effect on historic properties through a "flag and avoid approach". The specifics of the methodology are detailed in the document titled, *Cultural Resources Protection Measures, dated September 2010)* (attached). These measures are substantially identical to those previously submitted to SHPO during consultation regarding the parallel project in the adjacent Area IV of the SSFL.

These measures were originally derived from the draft *Cultural Resources Management Plan* prepared for the SSFL site by National Aeronautics and Space Administration (NASA) in February 2010 (attached); the draft *Cultural Resources Clearance Survey* prepared by the Department of Energy (DOE) in November 2009(attached); and from formal and ongoing consultations with Native American representatives conducted by the DOE and EPA on December 3, 2009, June 9, 2010, and September 15, 2010. Documentation of Tribal consultation is attached.

In accordance with applicable regulations and policies, the EPA requests concurrence from the California SHPO that No Adverse Effect occurs to historical properties with the proposed undertaking following a "flag and avoid" approach and provided the mitigation measures detailed in the *Cultural Resources Protection Measures, dated September 2010* are employed.

If you have any questions regarding this request for consultation and concurrence, please call Ray Corbett, Ph.D. at 805-682-4711 ext 141. If you would like to contact me, I can be reached at (415) 947-4148.

Sincerely,

Craig Cooper
Project Manager
Superfund Division

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December 1, 2010 Reply in Reference To: EPA101020A

Craig Cooper
Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Re: Santa Susana Field Laboratory Northern Undeveloped Lands (NUL) Radiological Testing, Ventura County, California

Dear Mr. Cooper:

Thank you for seeking my consultation regarding the above noted undertaking. Pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act (NHPA), the Environmental Protection Agency (EPA) is seeking my comments on its determination of effects that the proposed undertaking will have on historic properties.

The undertaking consists of the vegetation clearing, gamma scanning, geophysical survey, soil sampling, water monitoring, and sediment sampling and radiological testing on 182 acres within the NUL of Santa Susana Field Laboratory (SSFL). Vegetation clearing will cut or trim vegetation to a height of six to 18 inches using a combination of hand held mechanical equipment and hand tools. Heavy equipment such as wheel-driven mowers will be operated in previously disturbed areas. Gamma scanning is passive scanning for radiation using hand held, wheel mounted (stroller); mule mounted, and forklift mounted scanners. Geophysical survey will be conducted using ground-penetrating radar and electro-magnetometer to identify potential buried materials. Up to 1500 of each surface and subsurface soil samples will be collected. Sampling will be both targeted and random samples. All samples initially planned in areas of archaeological sensitivity or known historic properties will be relocated to a less sensitive adjacent location. Each borehole will be a maximum of ten feet deep. Water sampling will involve both surface and groundwater samples. All ground water samples will be taken from pre-existing monitoring wells both in and near NUL of SSFL. Surface water and sediment will be sampled from active water locations, mainly drainage pathways within banks in areas of recent deposition In addition to your letter received October 20, 2010, you have submitted the following documents as evidence of your efforts to identify historic properties in the APE:

- *Project Description and Cultural Resources Assessment Santa Susana Field Laboratory Northern Undeveloped Lands Radiological Study* (Richard Futtenberg and Ray Corbett, JMA, October 2010)
- *Cultural Resources Identification Survey: Northern Undeveloped Land at the Santa Susana Field Laboratory Site* (Michael Hogan and Bai “Tom” Tang, CRM Tech, June 2010)

The EPA has performed a records search at the South Central Coastal Information Center and identified than no previous inventories have been conducted within the APE, however 26 previous inventories have been performed within a one mile radius of the APE. Only three archaeological sites and no historic buildings were identified during a pedestrian survey of the APE. Approximately one third of the APE was not surveyed due to steep and loose terrain. The three historic properties, CA-VEN-1803, -1804, and -1805, have not been formally evaluated and will be treated as eligible for the purposes of this undertaking. The EPA, proposes to prevent adverse effects to these sites by flagging a fifty foot buffer around each site and avoid site disturbance including complete avoidance by vegetation clearing, use of only hand held gamma scanning equipment with the presence of a qualified archaeological monitor within the protected buffer area, and complete avoidance by the geophysical survey and soil sampling programs. Native American consultation was undertaken with letters including an invitation to meet with tribes sent August 20, 2010 and a meeting held with interested individuals including paid Native American monitors on September 15, 2010.

I suggest, for better management, an appropriate testing plan be enacted and the three archaeological sites be evaluated for eligibility for the National Register of Historic Places.

Based on your identification efforts, the EPA has determined that there will be No Adverse Effect to historic properties from this undertaking given the above condition. Pursuant to 36 CFR 800.5(c)(1), I concur with the USN determination of No Adverse Effects with the self-imposed condition of avoiding the three identified archeological sites (CA-VEN-1803, CA-VEN-1804, and CA-VEN-1805) within the APE.

Be advised that under certain circumstances, such as unanticipated discovery or a change in project description, the EPA may have additional future responsibilities for this undertaking under 36 CFR Part 800. Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact Trevor Pratt of my staff at (916) 445-7017 or at email at tpratt@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

APPENDIX B

Cultural Resource Protection Measures

CULTURAL RESOURCES PROTECTION MEASURES
SANTA SUSANNA FIELD LABORATORY
AREA IV AND THE NORTHERN UNDEVELOPED LANDS
REVISION 8, SEPTEMBER 2010

Field activities associated with the U.S. Environmental Protection Agency's (EPA) proposed action at the Santa Susana Field Laboratory (SSFL) site that disturb the ground surface may potentially have an adverse effect on known and unknown cultural resources. Cultural resources include archaeological deposits (soils that contain material evidence of human activity including the remains of houses, hearths, cemeteries, and other features), artifacts (objects made by people such as whole or broken grinding stones, bowls and tools of various kinds), and rock paintings and carvings that are tied to the landscape, all of which provide information about the culture of the people who made and used them. Cultural resources also include certain plants and sacred sites (natural features of the landscape that are recognized in local traditions and places with religious significance).

To mitigate the potential for disturbing cultural resources within Area IV of the SSFL a record search was conducted to identify all archaeological sites that have been recorded through previous surveys. Field work has been designed so as to avoid all known and previously identified cultural resources. The measures that will be taken by EPA to protect cultural resources during execution of the proposed action were derived from the draft *Cultural Resources Management Plan* prepared for the SSFL site by the National Aeronautics and Space Administration (NASA) in February 2010; the draft *Cultural Resources Clearance Survey* prepared by the Department of Energy (DOE) in November 2009; and from consultations held between EPA, State Historic Preservation Office and Tribal Representatives on December 2 and 3, 2009. The DOE conducted an additional survey within the Northern Undeveloped Lands of the SSFL in the Spring of 2010. The additional archaeological sites and cultural resources identified in this or subsequent surveys will be integrated into the Cultural Resources Protection Measures, which are outlined herein.

Applicable Federal and State Laws

The following regulations were evaluated for their potential applicability to EPA's proposed action:

- National Historic Preservation Act
- National Environmental Policy Act
- American Indian Religious Freedom Act
- Archaeological Resources Protection Act

Field protocols will be implemented to meet the substantive requirements of these regulations. No ground disturbing activity including vegetation clearing, mechanical gamma scanning, or soil sampling will be conducted within 50 feet of identified archaeological sites. Hand-held gamma scanning (non ground disturbing activity) will be allowed at identified archaeological sites if the

Cultural Resource Monitor and Native American Advisor/Consultant are present. Field crew members will be trained to identify potential cultural objects, and will not disturb, remove, or collect any artifacts. A Cultural Resources Monitor and Native American Advisor/Consultant have been retained to monitor all ground disturbing activity and to provide archaeological monitoring support as necessary during the execution of the field work. If any previously unknown or unrecorded cultural resources are encountered or discovered through the field work, the Cultural Resources Monitor and Native American Advisor/Consultant will be notified and consulted immediately. The Cultural Resource Monitor operates under the supervision of the Cultural Resource Specialist, and has the authority to redirect work as necessary in order to evaluate and protect newly discovered cultural resources.

The Cultural Resources Monitor is a qualified archaeologist and specialist in southern California Native American artifacts and culture. As part of this work activity, the Cultural Resources Monitor will identify and flag all archaeological sites, areas, or artifacts, and oversee the execution of avoidance and protection measures as necessary throughout the field effort.

Field Protocols

Identification, avoidance, and protection measures will be taken during the execution of field activities at the SSFL site to protect Cultural Resources in accordance with all applicable laws, regulations, and policies as follows:

- HydroGeoLogic, Inc. (HGL) and subcontractor field personnel will receive training for identifying cultural features, archaeological sites, and artifacts. This training will be jointly conducted by the Cultural Resource Specialist and a local (Southern California) Tribal Representative before work begins.
- Cultural resources protection measures will be applied during all ground disturbing field activities. All known cultural resources, as identified through previous surveys, as well as all archeological sites and artifacts discovered through the course of this undertaking will be avoided. If potential artifacts are identified, the field crew will leave them in place and notify the Cultural Resources Monitor and Native American Advisor/Consultant immediately.
- A Cultural Resources Monitor and Native American Advisor/Consultant will be present to oversee all field work that:
  a) May uncover or expose cultural resources (e.g. vegetation cutting and removal).
  b) Involves ground disturbance (e.g. mechanical gamma scanning and soil sampling).
  c) In the unforeseen event that a Native American Advisor/Consultant is temporarily unavailable for monitoring, a notification via email will be sent to Native American stakeholders requesting concurrence that the work can proceed during the interim. Based on comments received within 24 hours of such notification, a decision will be made to proceed in the absence of a Native American Advisor/Consultant if necessary.
- Previously undiscovered cultural resources that are encountered during any portion of the Undertaking shall be protected and avoided as noted above, and fully documented and recorded by the JMA Cultural Resource Specialist. Site Record forms for these sites will

be submitted to the South Central Coastal Information Center (SCCIC) at the California State University Fullerton and thus be recorded in the California Historical Resources Information System (CHRIS) inventory. Upon request, site record forms will be provided to Native American groups that have confidentiality agreements with the SCCIC.

- In the event that temporally diagnostic artifacts or other isolated artifacts that are vulnerable to damage and/or unauthorized collection are encountered, the archaeological monitor shall obtain a GPS position of the artifact's exact location and then collect them. They will either be returned to their original locations after the project has concluded, or deposited in a public curation facility as appropriate. The ultimate disposition of artifacts will be determined in consultation with Native American representatives.
- Cultural materials that are found to be contaminated that are non-porous will be decontaminated to the levels considered safe for handling and storage.
- Cultural materials found to be contaminated but which cannot be decontaminated to levels considered safe due to their porosity, will be packaged and labeled with appropriate warnings.

In addition, the Cultural Resource Specialist will provide periodic oversight of the gamma scanning field activities. This level of monitoring is appropriate in order to oversee the implementation of the cultural resource avoidance and protection measures described herein, identify previously unrecorded archaeological sites or artifacts, and to ensure that previously unrecorded cultural resources are avoided and protected when encountered.

- The Cultural Resources Monitor and Native American Advisor/Consultant have the authority to redirect work if there are archaeological concerns associated with vegetation clearing, gamma scanning, and/or sampling activities.
- The Cultural Resources Specialist and Native American Advisor/Consultant will consult with EPA during the execution of field activities as necessary to protect cultural resources.

APPENDIX C

Cultural Resource Assessment, SSFL Area IV

Restricted/Confidential Information Removed

CULTURAL RESOURCES ASSESSMENT
SANTA SUSANA FIELD LABORATORY
Area IV Radiological Study
Ventura County, California

Restricted/Confidential Information Removed

Prepared by:

Richard Guttenberg
Ray Corbett, Ph.D.

John Minch and Associates, Inc.
26623 Sierra Vista
Mission Viejo, CA 92692
TEL (949) 367-1000
FAX (949) 367-0117

Contact Person
Edwin Minch (714) 501-4163 (cell)

Prepared for:

Hydro Geologic, Inc
Bldg 204
5800 Woolsey Canyon Rd.
Canoga Park, CA 91340

Contact Person
Steven Vaughn, Project Manager

June, 2010

INTRODUCTION

JMA (John Minch and Associates, Inc.) has been retained to provide consulting services for cultural resources at the Santa Susana Field Laboratory (SSFL) in Simi Valley, CA. The purpose of this summary is to provide a description of the U.S. Environmental Protection Agency's (EPA's) proposed Santa Susana Field Laboratory (SSFL) Area IV Radiological Characterization Survey in sufficient detail to determine to what extent the proposed undertaking may affect any of the known, and potentially undiscovered cultural resources that exist within the Area of Potential Effect (APE). JMA's Cultural Resource Specialist (CRS) has reviewed the previous archaeological investigations conducted on the property, performed an independent records search at the South Central Coastal Information Center at California State University, Fullerton, and is reviewing all available previous correspondence between stakeholders, the Native American Heritage Commission, Native American Tribal Representatives, and the California State Historic Preservation Officer (SHPO). This summary is prepared in accordance with legal requirements set forth under regulations implementing Section 106 of the National Historic Preservation Act of 1966, (NHPA) 36 CFR Part 800.

DESCRIPTION OF THE PROPOSED UNDERTAKING

The Agency and Applicant proposing the undertaking are the same, namely, EPA. The Undertaking is to be administered by EPA pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The EPA is undertaking the project in accordance with federal legislative mandate, HR 2764, the Consolidated Appropriations Act of 2008. Funding for the proposed Undertaking originates from the American Recovery and Reinvestment Act of 2009.

The proposed Undertaking is the radiological characterization of a portion of SSFL, consisting of administrative Area IV, and an adjacent undeveloped area to the north referred to as the Northern Buffer Zone, or NBZ. Area IV consists of 290 acres owned by The Boeing Company (Boeing), where upon the United States Department of Energy (DOE) and its contractors once operated several nuclear reactors and associated fuel facilities and laboratories. The NBZ consists of 182 acres, where industrial activities have never occurred, but a lawsuit settlement stipulated purchase of this area by Boeing from the adjoining American Jewish University's Brandeis-Bardin

Campus.

The purpose and need for the Undertaking is to determine the presence of potential radioactive contamination in surface soils, and subsurface soils, groundwater, surface water, and sediment within SSFL Area IV and the NBZ.

Environmental Setting

Area IV of the SSFL was developed within Burro Flat, a plateau near the crest of the Simi Hills at approximately 550 meters in elevation. Structures, facilities, and roads are concentrated within the relatively flat area of the site. Of the 272 structures that once existed in Area IV, only 23 structures remain standing today. The surrounding undeveloped area of Area IV consists of naturally vegetated flat terrain, hills and rock outcrops. The NBZ is adjacent to the northern boundaries of Areas II, III and IV. The NBZ is undeveloped and distinguished by very steep north-facing slopes and numerous large sandstone rock outcrops.

PREVIOUSLY IDENTIFIED CULTURAL RESOURCES

A Class III Inventory/Phase I archaeological survey was conducted for Area IV of the SSFL by Whitley and Simon Consultants, (W & S) in 2001. W&S conducted the 2001 investigation in advance of the Environmental Assessment being prepared by the DOE for the proposed closure and remediation of Area IV. The results of the pedestrian survey included the identification and recordation of four archaeological sites located in the project boundaries. Three of the sites identified by W&S are characterized as small rockshelters. CA-VEN-1772 is a small rockshelter featuring a single pink painting of a burro. Age of the painting and cultural origin are unknown. CA-VEN-1773 is a small rockshelter that contained a small amount of lithic debitage and a fire-blackened ceiling. CA-VEN-1775 is a small rockshelter that contained a midden deposit, but may lack integrity due to looting and disturbance (W&S Consultants, 2001). CA-VEN-1774 is a single bedrock mortar. An additional Southern California Edison Fiber Optic survey, conducted in August, 2009, resulted in the identification of CA-VEN-1302, a surface lithic scatter which yielded several chipped-stone secondary flakes (Toren and Romani, 2009). At the time they issued their survey report, W&S deemed the four sites they recorded not eligible for inclusion to the National Register of Historic Places. However, since concurrence of ineligibility has not been sought from or granted by SHPO, all archaeological sites within Area IV are considered eligible and treated accordingly for the purposes of this undertaking. In addition, the presence of the

known archaeological sites in Area IV indicates the potential for elements of the project activities involving ground disturbance and clearing of vegetation to impact previously undiscovered cultural resources. Such activities were not considered in the proposed action addressed in the 2001 investigation conducted by W&S.

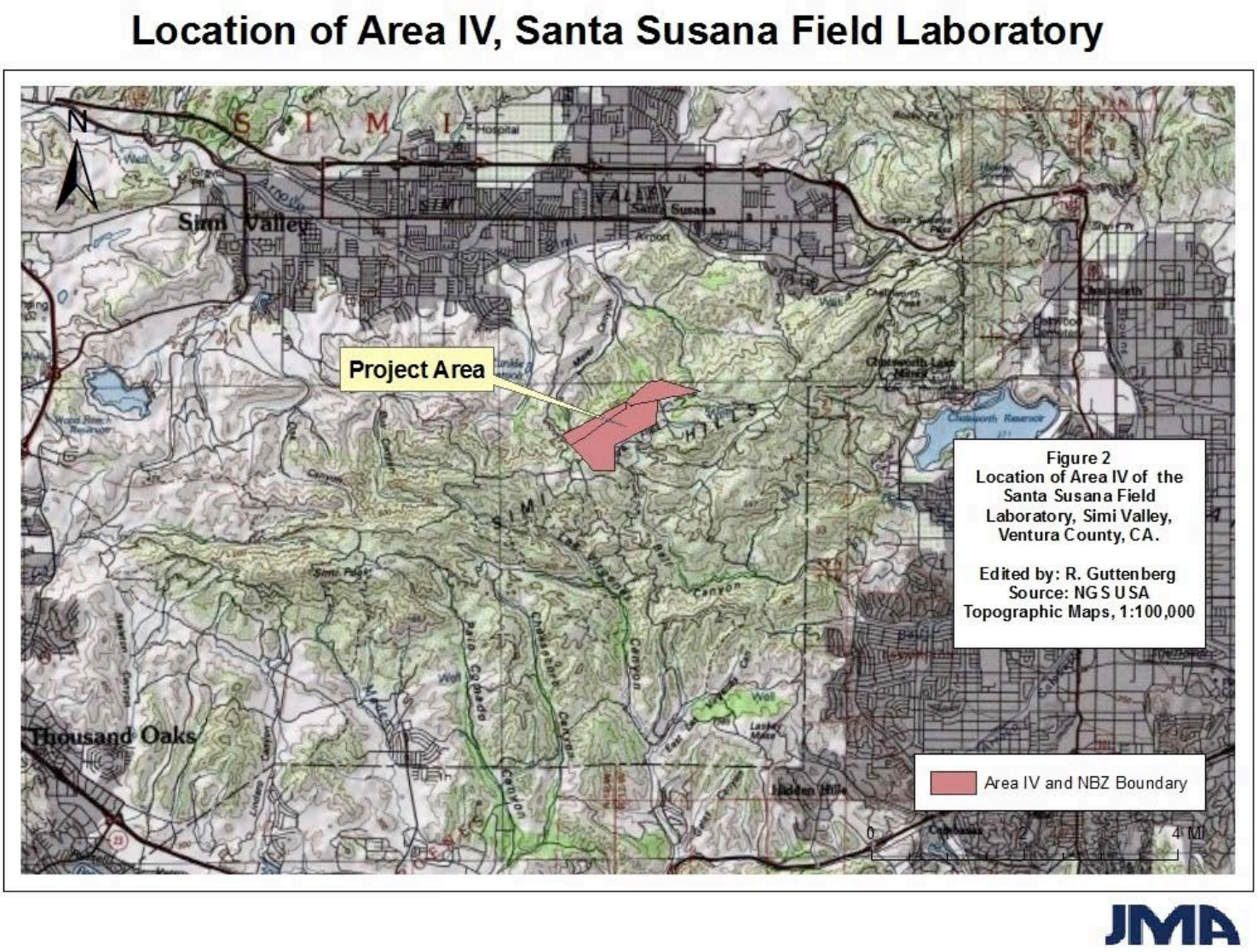
The Project Area

An area map, showing the location of the entire SSFL site, including the Area of Potential Effects (APE) in relation to the surrounding areas is provided on **Figure 1**. Also included on Figure 1 are the locations of the known archaeological sites previously referenced. The vicinity map shown on the United States Geologic Survey Calabasas 7.5-minute topographic quadrangle map is shown on **Figure 2**. The latter map more clearly identifies the project area in relation to the entire SSFL.

Figure 1 Locations of the recorded archaeological sites in Area IV.

(Restricted/Confidential Information Removed)

Figure 2 Vicinity Map of Santa Susana Field Laboratory



The Proposed Undertaking

General Description of Activities

The Undertaking involves several activities that are not anticipated to have any adverse affect on cultural resources in the project area, and is proposed to begin in June 2010 and be completed by September 2011. The separate components of the Undertaking include Vegetation Clearing, Gamma Scanning, Geophysical Survey, Surface and Subsurface Soil Sampling, Groundwater Monitoring Well Sampling, Surface Water and Sediment Sampling, and Support Activities. A discussion of each component of the Undertaking is provided below, as well as a description of general avoidance measures that will be implemented to avoid adverse impacts to cultural resources.

Vegetation Clearing

To provide access for project related vehicles/equipment and allow operation of gamma scanning equipment at optimum levels of sensitivity, vegetation within the APE will be cut or trimmed to a height of approximately six to 18 inches. Vegetation cutting in previously undisturbed areas will be conducted using a combination of hand held mechanical equipment and hand tools. In addition, heavy equipment such as tracked or wheel-driven mowers (i.e. a tractor with a mower attachment) can only be operated in previously disturbed areas in Area IV. As discussed in the Avoidance Measures below, known archaeological sites will be delineated with a 50 ft. buffer around site boundaries and flagged for avoidance by either JMA's CRS or the Cultural Resource Monitor.

Vegetation Clearing Avoidance Measures

The following measures have been identified to avoid the adverse effects associated with vegetation clearing activities:

VC-1 Before initiation of vegetation clearing activities, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 ft. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and will be avoided from vegetation clearing and removal. In addition, all vegetation clearing activities in areas deemed sensitive by the CRS (e.g., previously undisturbed areas) will be

performed under the supervision of the Cultural Resources Monitor.

Gamma Scanning

EPA will characterize surface soil for gamma activity over 100 percent of the accessible areas of Area IV and the NBZ to identify and characterize elevated areas of gamma radiation. Scanning will be conducted at a rate of one to three feet per second and will normally require only one pass over each area being scanned. Gamma scanning will be completed using a combination of hand-held, stroller-mounted, mule-mounted, and off-road, forklift mounted systems. The stroller-mounted, mule-mounted and forklift mounted systems will be custom-built systems that are capable of detecting low levels of gamma radiation. The potential ground disturbance that may result from the use of each scanning system is provided below:

- Hand-held – foot traffic and vegetation alteration. No expected ground disturbance.
- Wheel mounted – foot traffic, light vehicle traffic and vegetation alteration. Minimal potential for ground disturbance.
- Mule mounted - foot traffic, mule traffic, and vegetation alteration. Minimal potential for ground disturbance.
- Forklift mounted - foot traffic, vehicle traffic and vegetation alteration. Heavy equipment operation has a potential for ground disturbance.

Gamma Scanning Avoidance Measures

The following measures have been identified to avoid and minimize the effects associated with gamma scanning activities:

GS-1 Before initiation of gamma scanning activities, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 ft. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and scanning within the exclusion zone will be limited to hand-held equipment and performed under the supervision of the Cultural Resources Monitor. In addition, all gamma scanning in areas deemed sensitive by the CRS will be performed under the supervision of the Cultural Resources Monitor.

Geophysical Survey

EPA will conduct a geophysical survey to determine areas of potential subsurface disturbance that may be indicative of waste burial areas. The sub-surface geophysical survey will be conducted using ground-penetrating radar (GPR) (or other appropriate technology) and either electromagnetometer (EM) or magnetometer in locations suggested by the EPA's Historical Site Assessment (HSA) report. It is assumed that the EM and magnetometer survey will be completed at target locations in search of potential buried materials covering as much as approximately 10 acres. The GPR survey will be conducted over approximately 2 acres, based on the results of the EM and magnetometer surveys. The impacts associated with each type of geophysical survey are foot traffic and light vehicle traffic. The presence of personnel and equipment during the geophysical surveys (regardless of the type of equipment used) may impact cultural resources.

Geophysical Survey Avoidance Measures

The following measures have been identified to avoid and minimize the effects associated with geophysical survey activities:

GP-1 Before initiation of the geophysical survey, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 ft. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and will be avoided from geophysical survey activities. In addition, all activities in areas deemed sensitive by the JMA CRS will be performed under the supervision of the Cultural Resources Monitor.

Soil Sampling

EPA will collect surface and subsurface soil samples to characterize the representative concentration of each radionuclide of concern in surface and subsurface soil within the Area IV Study Area. Biased and random sampling techniques will be used to identify surface and subsurface soil sampling locations. Should a sample location be identified within an area of known archaeological sensitivity then that location will be relocated nearby so impacts will be totally avoided. EPA anticipates that up to approximately 3,500 surface and 3,500 subsurface soil samples will be initially collected. The surface and subsurface samples will be co-located; thus minimizing the surface disturbance during drilling. As explained below, from two to four closely spaced boreholes will be needed at each sample location to conduct the gamma logging, define

the subsurface sample interval and collect the requisite soil volume for sample analysis.

Borehole gamma logging will be performed to identify depth intervals for subsurface soil samples. Boreholes will be made using a mechanized direct push technology (DPT) rig and 3.25 inch tooling. Each borehole will be advanced to a depth of approximately 10 feet deep below ground surface or until refusal is reached if less than 10 feet. Continuous cores will be collected in each borehole, the lithology will be logged, and the soil classification will be documented for each sample.

Downhole gamma logging will be completed after the lithologic logging effort or concurrently with the lithologic logging effort. A 2-inch inner diameter polyvinyl chloride (PVC) pipe will be inserted into the open borehole. A probe attached to a Ludlum 2221 ratemeter will be lowered down the PVC piping at 6-inch intervals to document total gamma radiation counts. After the lithologic and gamma logging efforts have been completed at the borehole, the sample interval will be selected based on the previously described parameters.

Soil sample collection will then begin at a location offset by approximately 6 to 12 inches from the initial borehole. Surface soil samples will be collected from zero to six inches below the ground surface using stainless steel trowels, stainless steel shovels and/or spoons to collect enough soil to fill the appropriately sized sampling container. Subsurface soil sample intervals will be selected based on subsurface gamma scanning results and material noted during the lithologic logging effort. The DPT rig will then off-set to the surface sample location and advance the desired depth to collect the subsurface soil sample. Additional off-set boreholes may be necessary to meet sample volume requirements. Additional off-set boreholes, if needed, will also be 6 to 12 inches from the previous borehole. EPA does not anticipate more than four boreholes per location: one for lithologic and gamma logging and one to three for soil sample collection.

After the logging and sampling efforts are completed, each borehole will be backfilled with any unused soil volume from the same borehole and high solids bentonite. The impact of each activity is listed below:

- Surface soil sampling – foot traffic, light vehicle traffic and vegetation alteration, ground disturbance.

- Subsurface soil sampling – foot traffic, light vehicle traffic, heavy vehicle traffic, vegetation alteration, ground disturbance.
- Subsurface gamma scanning – foot traffic, light vehicle traffic, heavy vehicle traffic and vegetation alteration, ground disturbance.

Soil Sampling Avoidance Measures

The following measures have been identified to avoid the effects associated with soil sampling activities:

SS-1 Before initiation of soil sampling activities, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 ft. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and avoided from all soil sampling activities. In addition, all soil sampling in areas deemed sensitive by the CRS will be performed under the supervision of the Cultural Resources Monitor.

Monitoring Well Sampling

EPA will evaluate existing radiological conditions in groundwater at on- and off-site locations. Groundwater sampling will be conducted at existing on-site and off-site wells. Approximately 70 existing on-site monitoring wells will be sampled during one event in 2010 and approximately 20 existing off-site wells will be sampled during one event in 2011. The impacts resulting from this sampling activity is expected to be foot traffic and light vehicle traffic.

Monitoring Well Sampling Avoidance Measures

JMA has determined that there is no potential for the Monitoring Well Sampling to have any adverse affects on known or unknown cultural resources.

Surface Water and Sediment Sampling

EPA will collect surface water and sediment samples to determine radionuclide concentrations in on-site and off-site surface water and seeps. The surface water sampling will be conducted in two phases. Phase 1 will focus on identifying the general extent of contamination and identification of key radionuclides. Phase 2 will involve conducting a detailed evaluation of the radionuclides that were detected during Phase 1. Phase 2 may include a more extensive sediment sampling

effort in areas of sediment contamination identified during Phase 1, and a targeted radionuclide suite. The collection of surface water samples will be focused on drainage pathways with specific sample locations being determined during the site reconnaissance. Approximately 30 surface water sample locations and 40 sediment sample locations are anticipated. Surface water sampling will target major drainage ways downstream of potential radiological source areas. Sediment sampling will target the fine-grained sediment located within the stream and associated stream bank. Environmental impacts are expected to consist of foot traffic and light vehicle traffic.

Surface Water and Sediment Sampling Avoidance Measures

The following measures have been identified to avoid and minimize the effects associated with surface water and sediment sampling activities:

SWSS-1 In the event that surface water and sediment sampling activities are located within or adjacent to areas of known archaeological sensitivity the sampling crew shall coordinate with JMA's CRS to identify a means of access that avoids impacts to cultural resources. If surface water samples are to be collected from areas of known archaeological sensitivity, all sampling is to be conducted under the supervision of a JMA Cultural Resources Monitor.

Support Activities

The support activities may consist of a variety of actions including use office and equipment storage space at EPA field office area located at Building 204 in SSFL Area II, use of a animal (e.g.. mule) stable located within the EPA field office area, mobilization/staging, equipment/Investigation Derived Waste (IDW) stock piling, IDW management, access/on-site travel, access improvement, vegetation alteration and vegetation/soil removal.

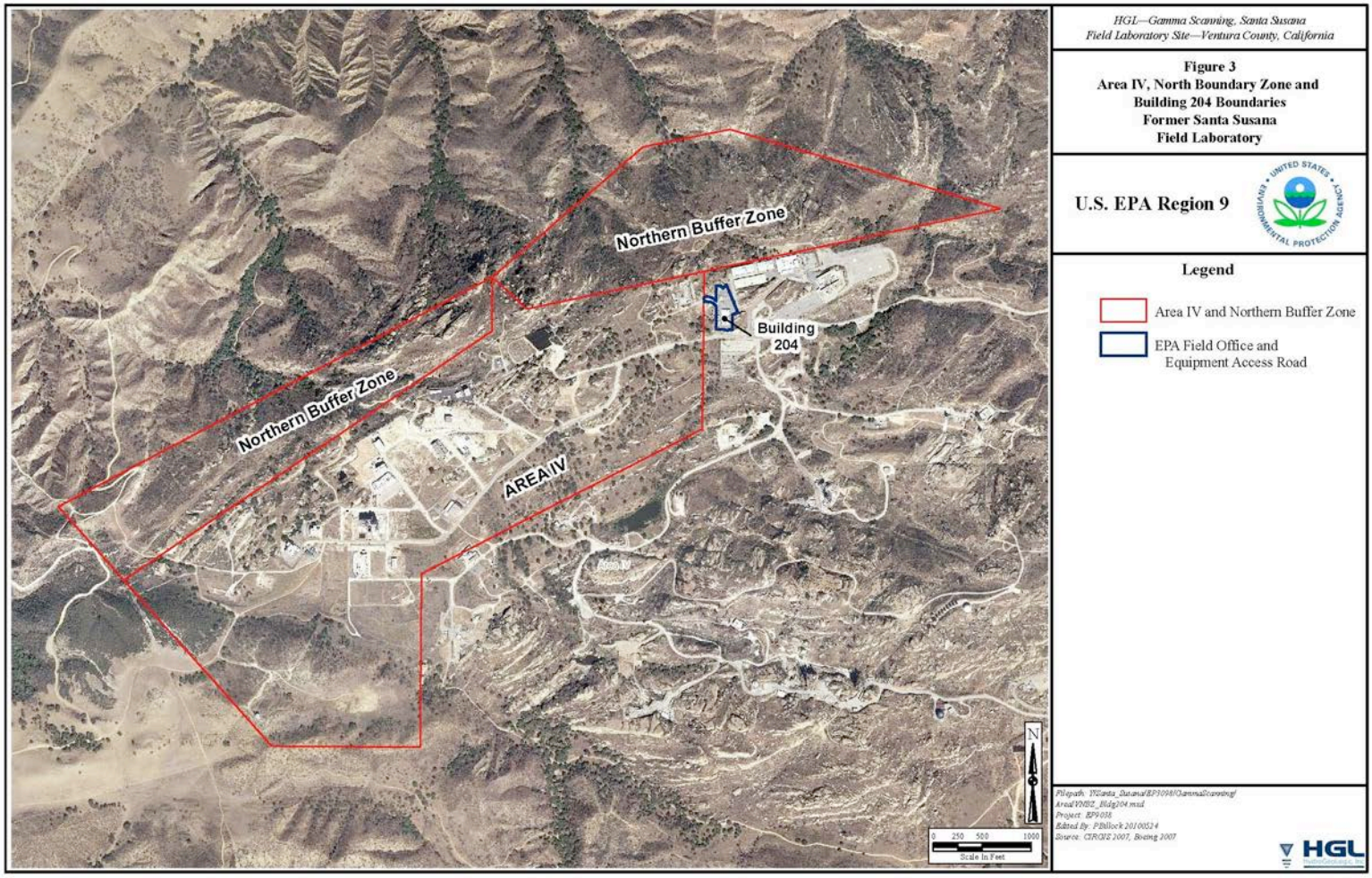
As indicated in **Figure 3**, EPA's field office area is located approximately 300 feet from Area IV and consists of Building 204, nearby outbuildings and adjacent paved areas. The animal (e.g. mule) stable is located within the EPA field office area and the entire field office area is fenced and locked outside normal working hours. Gamma scanning equipment will move to and from the field office and Area IV via an existing dirt/gravel road that transverses a small portion of Area III. Support vehicles will access the field office area via existing paved roads.

IDW associated with the site activities will consist of purge water, decontamination water and soil cuttings.

- Purge water will be generated during monitoring well sampling activities.
- Decontamination water will be associated with every sampling activity.
- Soil cuttings will be collected during soil logging activities.

The IDW generated during field activities will be placed in leak tight vessels (55 gallon drums or similar containers) and transported to a temporary staging area near the on-site office for subsequent removal by a disposal contractor.

Figure 3 Location of SSFL Field Office, Area II



Support Activities Avoidance Measures

Avoidance, documentation and minimization measures for support activities are provided below:

SA-1 Before initiation of any support activities, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 ft. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and the exclusion area will be avoided. In addition, all support activities in areas deemed sensitive by the CRS will be performed under the supervision of the Cultural Resources Monitor.

SA-2 Additionally, any previously undiscovered cultural resources that are encountered during any portion of the Undertaking shall be fully documented and recorded by JMA's CRS. Site Record forms for these sites will be submitted to the South Central Coastal Information Center at the California State University Fullerton and thus be recorded in the California Historical Resources Information System (CHRIS) inventory.

SA-3 In the event that temporally diagnostic artifacts or other isolated artifacts that are vulnerable to damage and/or unauthorized collection are encountered, the Cultural Resources Monitor shall obtain a GPS position of the artifact's exact location and then collect them. They will either be returned to their original locations after the project has concluded, or deposited in a public curation facility as appropriate.

References Cited

Toren, George and Gwen Romani

2009 *Archaeological Survey Report: Southern California Edison Proposed Fiber Optic Moorpark East Copper Cable Replacement Project, Los Angles and Ventura Counties, California*. California archeological survey. Submitted to Southern California Edison, (IO 304272).

Whitley and Simon Consultants

2001 *Class III Inventory/Phase I Archaeological Survey of the Santa Susana Field Laboratory Area 4, Ventura County, California*. California archaeological survey. Submitted to United States Department of Energy.

APPENDIX D

Cultural Resource Assessment, SSFL NBZ

Restricted/Confidential Information Removed

PROJECT DESCRIPTION AND CULTURAL RESOURCES ASSESSMENT
SANTA SUSANA FIELD LABORATORY
Northern Undeveloped Lands Radiological Study
Ventura County, California

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October 18, 2010

INTRODUCTION

JMA (John Minch and Associates, Inc.) has been retained to provide consulting services for cultural resources at the Santa Susana Field Laboratory (SSFL) in Simi Valley, CA. The purpose of this summary is to provide a description of the U.S. Environmental Protection Agency's (EPA) proposed Santa Susana Field Laboratory (SSFL) Northern Undeveloped Lands (NUL) Radiological Characterization Survey in sufficient detail to determine to what extent the proposed undertaking may affect any of the known, and potentially undiscovered cultural resources that exist within the Area of Potential Effect (APE). JMA's Cultural Resource Specialist (CRS) has reviewed the previous archaeological investigations conducted on the property, performed an independent records search at the South Central Coastal Information Center at California State University, Fullerton, and is reviewing all available previous correspondence between stakeholders, the Native American Heritage Commission, Native American Tribal Representatives, and the California State Historic Preservation Officer (SHPO). This summary is prepared in accordance with legal requirements set forth under regulations implementing Section 106 of the National Historic Preservation Act of 1966, (NHPA) 36 CFR Part 800.

DESCRIPTION OF THE PROPOSED UNDERTAKING

The Agency and Applicant proposing the undertaking are the same, namely, EPA. The Undertaking is to be administered by EPA pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The EPA is undertaking the project in accordance with federal legislative mandate, HR 2764, the Consolidated Appropriations Act of 2008. Funding for the proposed Undertaking originates from the American Recovery and Reinvestment Act of 2009.

The proposed Undertaking is the radiological characterization of the northern portion of SSFL referred to as the Northern Undeveloped Lands, or NUL. The NUL is adjacent to Area IV of SSFL owned by The Boeing Company (Boeing), where upon the United States Department of Energy (DOE) and its contractors once operated several nuclear reactors and associated fuel facilities and laboratories. A similar Undertaking is currently ongoing in Area IV. The NUL consists of 182 acres, where industrial activities have never occurred, but a lawsuit settlement stipulated purchase of this area by Boeing from the adjoining American Jewish University's

Brandeis-Bardin Campus.

The purpose and need for the Undertaking is to determine the presence of potential radioactive contamination in surface soils, and subsurface soils, groundwater, surface water, and sediment within the NUL.

Environmental Setting

The NUL consists of naturally vegetated steep terrain, hills and rock outcrops. The project boundary is adjacent to the northern boundaries of Areas II, III and IV of SSFL. The SSFL property lies approximately 1.5 miles southeast of the City of Simi Valley. The NUL is undeveloped and distinguished by very steep north-facing slopes and numerous large sandstone rock outcrops.

PREVIOUSLY IDENTIFIED CULTURAL RESOURCES

A Class III Inventory/Phase I archaeological survey was conducted for the NUL by CRM TECH, Inc. in 2010. The results of the pedestrian survey included the identification and recordation of three prehistoric archaeological sites located in the project boundaries. Two of the sites identified by CRM TECH are characterized as lithic scatters, CA-VEN-1803 and CA-VEN-1804. The third, CA-VEN-1805 is described as a lithic scatter featuring a natural water cistern (Hogan and Tang, 2010). All three sites are noted to contain prehistoric artifacts, however, CA-VEN-1804 is also thought to possibly contain historic artifacts as well (Hogan and Tang, 2010).

At the time they issued their survey report, CRM TECH deemed the three sites they recorded as undeterminable for eligibility for inclusion to the National Register of Historic Places without further subsurface testing. However, since concurrence of ineligibility has not been sought from or granted by SHPO, all archaeological sites within NUL are considered eligible and treated accordingly for the purposes of this undertaking. In addition, the presence of the newly identified archaeological sites in NUL indicates the potential for elements of the project activities involving ground disturbance and clearing of vegetation to impact previously undiscovered cultural resources. Such activities were considered and addressed in the 2010 investigation conducted by CRM TECH, and the recommendations made in the survey report take into account the potential effects that the proposed Undertaking may have on any cultural resources that exist within the APE.

The Project Area

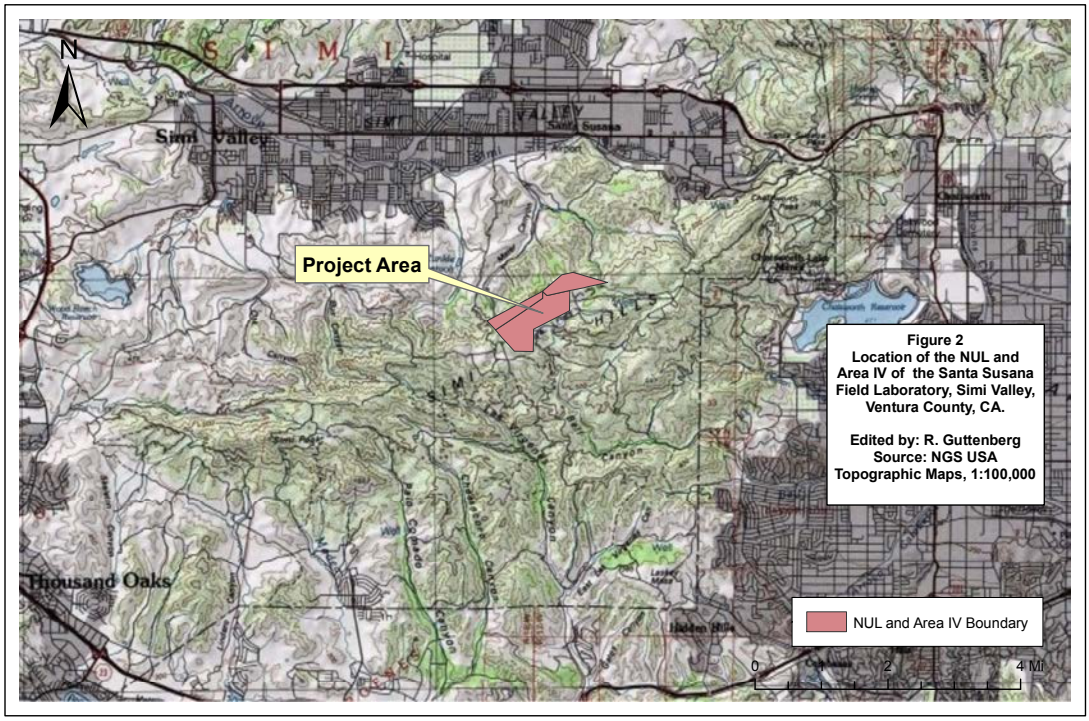
An area map, showing the location of the entire SSFL site, including the Area of Potential Effects (APE) in relation to the surrounding areas is provided on **Figure 1**. Also included on Figure 1 are the locations of the newly identified archaeological sites previously referenced. The vicinity map shown on the United States Geologic Survey Calabasas 7.5-minute topographic quadrangle map is shown on **Figure 2**. The latter map more clearly identifies the project area in relation to the entire SSFL.

Figure 1 Locations of the recorded archaeological sites in NUL.

(Restricted/Confidential Information Removed)

Figure 2 Vicinity Map of Santa Susana Field Laboratory

Location of NUL and Area IV, Santa Susana Field Laboratory



JMA

The Proposed Undertaking

General Description of Activities

The Undertaking involves several activities that are not anticipated to have any adverse affect on cultural resources in the project area, and is proposed to begin in November 2010 and is anticipated to be completed by December 2011. The separate components of the Undertaking include Vegetation Clearing, Gamma Scanning, Geophysical Survey, Surface and Subsurface Soil Sampling, Groundwater Monitoring Well Sampling, Surface Water and Sediment Sampling, and Support Activities. A discussion of each component of the Undertaking is provided below, as well as a description of general avoidance measures that will be implemented to avoid adverse impacts to cultural resources.

Vegetation Clearing

To provide access for project related vehicles/equipment and allow operation of gamma scanning equipment at optimum levels of sensitivity, vegetation within the APE will be cut or trimmed to a height of approximately six to 18 inches. Vegetation cutting in previously undisturbed areas will be conducted using a combination of hand held mechanical equipment and hand tools. In addition, heavy equipment such as tracked or wheel-driven mowers (i.e. a tractor with a mower attachment) can only be operated in previously disturbed areas in the NUL. As discussed in the Avoidance Measures below, known archaeological sites will be delineated with a 50 ft. buffer around site boundaries and flagged for avoidance by either JMA's CRS or the Cultural Resource Monitor.

Vegetation Clearing Avoidance Measures

The following measures have been identified to avoid the adverse effects associated with vegetation clearing activities:

VC-1 Before initiation of vegetation clearing activities, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 ft. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and will be avoided from vegetation clearing and removal. In addition, all vegetation clearing activities in areas deemed sensitive by the CRS (e.g., previously undisturbed areas) will be

performed under the supervision of the Cultural Resources Monitor.

Gamma Scanning

EPA will characterize surface soil for gamma activity over 100 percent of the accessible areas of the NUL to identify and characterize elevated areas of gamma radiation. Scanning will be conducted at a rate of one to three feet per second and will normally require only one pass over each area being scanned. Gamma scanning will be completed using a combination of hand-held, stroller-mounted, mule-mounted, and off-road, forklift mounted systems. The stroller-mounted, mule-mounted and forklift mounted systems will be custom-built systems that are capable of detecting low levels of gamma radiation. The potential ground disturbance that may result from the use of each scanning system is provided below:

- Hand-held – foot traffic and vegetation alteration. No expected ground disturbance.
- Wheel mounted – foot traffic, light vehicle traffic and vegetation alteration. Minimal potential for ground disturbance.
- Mule mounted - foot traffic, mule traffic, and vegetation alteration. Minimal potential for ground disturbance.
- Forklift mounted - foot traffic, vehicle traffic and vegetation alteration. Heavy equipment operation has a potential for ground disturbance.

Gamma Scanning Avoidance Measures

The following measures have been identified to avoid and minimize the effects associated with gamma scanning activities:

GS-1 Before initiation of gamma scanning activities, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 ft. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and scanning within the exclusion zone will be limited to hand-held equipment and performed under the supervision of the Cultural Resources Monitor. In addition, all gamma scanning in areas deemed sensitive by the CRS will be performed under the supervision of the Cultural Resources Monitor.

Geophysical Survey

EPA may conduct a geophysical survey to determine areas of potential subsurface disturbance that may be indicative of waste burial areas. The sub-surface geophysical survey will be conducted using ground-penetrating radar (GPR) (or other appropriate technology) and either electromagnetometer (EM) or magnetometer in locations suggested by the EPA's Historical Site Assessment (HSA) report. It is assumed that the EM and magnetometer survey will be completed at target locations in search of potential buried materials covering as much as approximately 80 acres within area IV and the NUL. The GPR survey will be conducted over approximately 15 acres, based on the results of the EM and magnetometer surveys. The impacts associated with each type of geophysical survey are foot traffic and light vehicle traffic. The presence of personnel and equipment during the geophysical surveys (regardless of the type of equipment used) may impact cultural resources.

Geophysical Survey Avoidance Measures

The following measures have been identified to avoid and minimize the effects associated with geophysical survey activities:

GP-1 Before initiation of the geophysical survey, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 foot. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and will be avoided from geophysical survey activities. , and in addition, all activities in areas deemed sensitive by the JMA archaeologist CRS will be performed under the supervision of the archaeological Cultural Resources Monitor.

Soil Sampling

EPA will collect surface and subsurface soil samples to characterize the representative concentration of each radionuclide of concern in surface and subsurface soil within the NUL Study Area. EPA is also collecting and containerizing soil samples which will be analyzed for potential chemical contamination by the Department of Energy. Biased and random sampling techniques will be used to identify surface and subsurface soil sampling locations. Should a sample location be identified within an area of known archaeological sensitivity then that location will be relocated nearby so impacts will be totally avoided. In the NUL, EPA anticipates that soil

samples will be initially collected from approximately 1,500 surface locations and 1,500 subsurface locations. As explained below, from two to four closely spaced boreholes up to approximately 10 feet below ground surface will be needed at each subsurface sample location to conduct the gamma logging, define the subsurface sample interval and collect the requisite soil volume for sample analysis.

Borehole gamma logging will be performed to identify depth intervals for subsurface soil samples. Boreholes will be made using a manually operated hand auger or mechanized direct push technology (DPT) rig with 3.25 inch tooling. Each borehole will be advanced to a depth of approximately 10 feet deep below ground surface or until refusal is reached if less than 10 feet. Continuous cores will be collected in each borehole, the lithology will be logged, and the soil classification will be documented for each sample.

Downhole gamma logging will be completed after the lithologic logging effort or concurrently with the lithologic logging effort. A 2-inch inner diameter polyvinyl chloride (PVC) pipe will be inserted into the open borehole. A probe attached to a Ludlum 2221 ratemeter will be lowered down the PVC piping at 6-inch intervals to document total gamma radiation counts. After the lithologic and gamma logging efforts have been completed at the borehole, the sample interval will be selected based on the previously described parameters.

Surface soil samples will be collected from 0 to 6 inches below the ground surface using stainless steel trowels, stainless steel shovels and/or spoons, and/or hand driven 3 inch sample tubes to collect enough soil to fill the appropriately sized sampling container. Subsurface soil sample intervals will be selected based on subsurface gamma scanning results and material noted during the lithologic logging effort. The DPT rig or hand auger will then be advanced to the desired depth to collect the subsurface soil sample. Additional off-set boreholes may be necessary to meet sample volume requirements. Additional off-set boreholes, if needed, will also be 6 to 12 inches from the previous borehole. EPA does not anticipate more than four boreholes per sample location: one borehole for lithologic and gamma logging and one to three boreholes for soil sample collection.

After the logging and sampling efforts are completed, each borehole will be backfilled with any unused soil volume from the same borehole and high solids bentonite. The impact of each activity is listed below:

- Surface soil sampling – foot traffic, light vehicle traffic and vegetation alteration, ground disturbance.
- Subsurface soil sampling – foot traffic, light vehicle traffic, heavy vehicle traffic, vegetation alteration, ground disturbance.
- Subsurface gamma scanning – foot traffic, light vehicle traffic, heavy vehicle traffic and vegetation alteration, ground disturbance.

Soil Sampling Avoidance Measures

The following measures have been identified to avoid the effects associated with soil sampling activities:

SS-1 Before initiation of soil sampling activities, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 ft. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and avoided from all soil sampling activities. In addition, all soil sampling in areas deemed sensitive by the CRS will be performed under the supervision of the Cultural Resources Monitor.

Monitoring Well Sampling

EPA will evaluate existing radiological conditions in groundwater at on- and off-site locations. Groundwater sampling will be conducted at existing on-site and off-site wells. Approximately 10 existing monitoring wells in the NUL will be sampled during 2011. In addition, approximately 20 existing off-site wells will also be sampled in 2011. The impacts resulting from this sampling activity is expected to be foot traffic and light vehicle traffic.

Monitoring Well Sampling Avoidance Measures

JMA has determined that there is no potential for the Monitoring Well Sampling to have any adverse affects on known or unknown cultural resources.

Surface Water and Sediment Sampling

EPA will collect surface water samples to determine radionuclide concentrations in on-site and

off-site surface water and seeps. The surface water sampling will be conducted in two phases. Phase 1 will focus on identifying the general extent of contamination and identification of key radionuclides. Phase 2 will involve conducting a detailed evaluation of the radionuclides that were detected during Phase 1. Phase 2 may include a more extensive sediment sampling effort in areas of sediment contamination identified during Phase 1, and a targeted radionuclide suite. The collection of surface water samples will be focused on drainage pathways with specific sample locations being determined during the site reconnaissance. EPA will also collect sediment samples to determine radionuclide concentrations in major drainage areas. Sediment sampling will target the fine-grained sediment located within the stream and associated stream bank. EPA is also collecting and containerizing soil samples which will be analyzed for potential chemical contamination by the Department of Energy.

Approximately 60 surface water sample locations and 80 sediment sample locations are anticipated. Surface water and sediment sampling will target major drainage ways downstream of potential radiological source areas in Area IV and the NUL. Based on data obtained from the on-site sample locations in Area IV and the NUL, surface water and sediment sampling may extend further downstream at locations on-site (but outside Area IV and the NUL) and into adjacent off-site properties. Environmental impacts are expected to consist of foot traffic and light vehicle traffic.

Surface Water and Sediment Sampling Avoidance Measures

The following measures have been identified to avoid and minimize the effects associated with surface water and sediment sampling activities:

SWSS-1 In the event that surface water and sediment sampling activities are located within or adjacent to areas of known archaeological sensitivity the sampling crew shall coordinate with JMA's CRS to identify a means of access that avoids impacts to cultural resources. If surface water samples are to be collected from areas of known archaeological sensitivity, all sampling is to be conducted under the supervision of a JMA Cultural Resources Monitor.

Support Activities

The support activities may consist of a variety of actions including: use office and equipment storage space at the EPA field office area located at Building 204 in SSFL Area II, use of a animal (e.g.. mule) stable located within the EPA field office area, mobilization/staging, equipment/Investigation Derived Waste (IDW) stock piling, IDW management, access/on-site travel, access improvement, vegetation alteration and vegetation/soil removal.

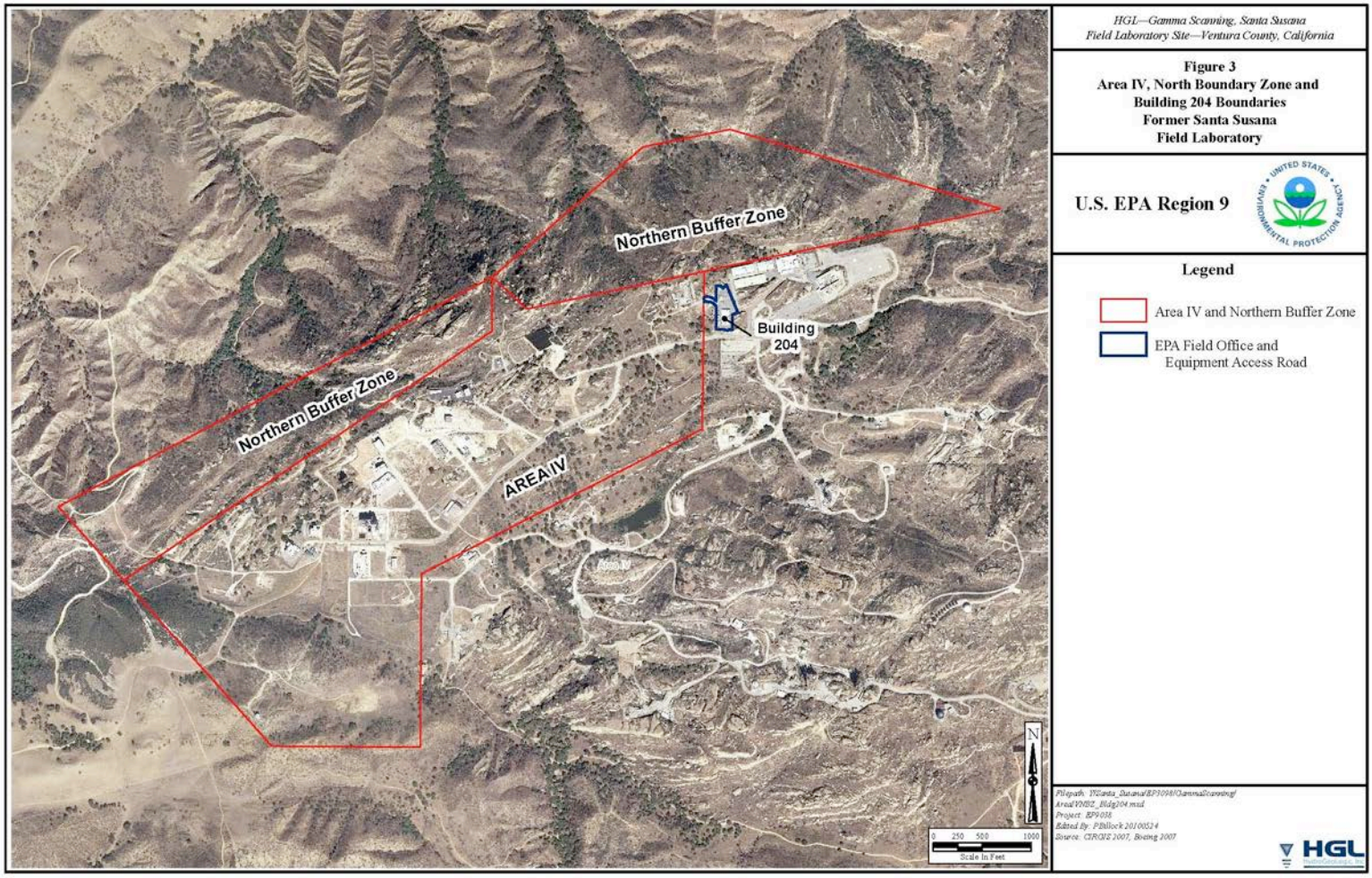
As indicated in **Figure 3**, EPA's field office area is located approximately 300 feet from Area IV and consists of Building 204, nearby outbuildings and adjacent paved areas. The animal (e.g. mule) stable is located within the EPA field office area and the entire field office area is fenced and locked outside normal working hours. Gamma scanning equipment and support vehicles will move to and from the field office and the NUL via existing paved and dirt/gravel roads located both onsite and offsite.

IDW associated with the site activities will consist of purge water, decontamination water and soil cuttings.

- Purge water will be generated during monitoring well sampling activities.
- Decontamination water will be associated with every sampling activity.
- Soil cuttings will be collected during soil logging activities.

The IDW generated during field activities will be placed in leak tight vessels (55 gallon drums or similar containers) and transported to a temporary staging at Buildings 4011 and 4015 for subsequent removal by a disposal contractor.

Figure 3 Location of SSFL Field Office, Area II



Support Activities Avoidance Measures

Avoidance, documentation and minimization measures for support activities are provided below:

SA-1 Before initiation of any support activities, JMA's CRS will identify the locations of previously recorded archaeological sites in the APE, and establish a 50 ft. exclusion zone around the site boundaries. The 50 ft. buffer will be delineated with colored flagging tape and the exclusion area will be avoided. In addition, all support activities in areas deemed sensitive by the CRS will be performed under the supervision of the Cultural Resources Monitor.

SA-2 Additionally, any previously undiscovered cultural resources that are encountered during any portion of the Undertaking shall be fully documented and recorded by JMA's CRS. Site Record forms for these sites will be submitted to the South Central Coastal Information Center at the California State University Fullerton and thus be recorded in the California Historical Resources Information System (CHRIS) inventory.

SA-3 In the event that temporally diagnostic artifacts or other isolated artifacts that are vulnerable to damage and/or unauthorized collection are encountered, the Cultural Resources Monitor shall obtain a GPS position of the artifact's exact location and then collect them. They will either be returned to their original locations after the project has concluded, or deposited in a public curation facility as appropriate.

References Cited

Hogan, Michael and Bai "Tom" Tang
2010 *Cultural Resources Identification Survey: Northern Undeveloped Land at the Santa Susana Field Laboratory Site, Simi Hills Area, Ventura County, California*. California archaeological survey. Submitted to United States Department of Energy.

APPENDIX E

Location of Archaeological Sites and Isolated Artifacts

Restricted/Confidential Information Removed

APPENDIX F

Site Record Forms

Restricted/Confidential Information Removed

APPENDIX G

Isolate Records

Restricted/Confidential Information Removed