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Title

A Plan for the Management of the Cultural Heritage at Los Alamos National Laboratory, New Mexico

Prepared by

Environmental Stewardship Group

Prepared for

The U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Field Office

Los Alamos
NATIONAL LABORATORY
Los Alamos, New Mexico 87545

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Cover photo: Entrance into Los Alamos during the 1940s

Executive Summary

The Cultural Resources Management Plan (CRMP) for Los Alamos National Laboratory (LANL) is an institutional comprehensive plan that defines the responsibilities, requirements, and methods for managing its cultural resources. The CRMP provides an overview of the cultural resources program, establishes a set of procedures for effective compliance with historic preservation laws specific to the cultural heritage at LANL and specific to the mission of the U.S. Department of Energy, National Nuclear Security Administration Los Alamos Field Offices (Field Office), addresses land-use constraints and flexibility, and makes the public aware of the stewardship responsibilities and steps being taken by the Field Office for managing the cultural heritage at LANL. The CRMP implements the LANL-specific procedures, streamlined Section 106 consultation, and historic property documentation defined within the Programmatic Agreement between the Field Office, the New Mexico State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP).

A critical aspect of the CRMP is that of defining strategies to increase land-use flexibility in support of the Field Offices' missions at LANL while at the same time effectively managing those cultural resources in compliance with the federal law. The CRMP also provides a Ten-Year Road Map that summarizes and prioritizes the steps necessary for the LANL management and operating (M&O) contractor, and the Field Office to manage these cultural resources. The LANL M&O contractor works with the Field Office to meet federal historic preservation compliance mandates, and the CRMP defines roles and relationships in the compliance process.

This CRMP outlines legal requirements and defines LANL's compliance process. The CRMP is divided into 25 sections grouped into 6 parts as follows:

Part I. Background. Sections 1–7 provide background information for the CRMP. Section 1 describes the purpose of the CRMP. Section 2 discusses applicable historic preservation laws, regulations, guidelines, and policies. Section 3 provides a glossary of commonly used cultural-resources management terms. Section 4 briefly describes the physical and environmental setting of LANL. Section 5 presents a summary of Pajarito Plateau culture from the earliest known occupations of the Paleoindian period 11,500 years ago through that of the Manhattan Project and the Cold War (ending in 1990). Section 6 lists the numbers and types of historic properties at LANL and provides brief descriptions of each general type. Section 7 presents a summary of a major data recovery project conducted during 2002–2006 as part of the United States Department of Energy (DOE) Land Conveyance and Transfer Project.

Part II. Historic Preservation Project Compliance and the Federal Section 106 Process. Sections 8–11 address how the M&O contractor and the Field Office assess effects of undertakings (*i.e.*, projects) on historic properties, as required by 54 USC 306108 and the regulations at 36 Code of Federal Regulations (CFR) Part 800 (Section 106). Section 9 presents the revised and streamlined process by which the M&O contractor complies with the requirements of Section 106 project review using the LANL project requirements identification system and excavation/fill/soil disturbance permit identification requests, both of which are part of the Integrated Review Tool.

Section 10 outlines the methods used to evaluate, document, and manage post-1942 historic buildings and structures, and lists standard requirements for documenting historic structures and

buildings to be used in lieu of case-by-case memoranda of agreement in the event of adverse effect undertakings. Section 11 outlines archaeological resources management at LANL and provides an outline of the significance standards for archaeological sites, along with a discussion of their application to specific project research designs, data recovery plans, and associated comprehensive agreements. The section also highlights the methods associated with archaeological surveys, general fieldwork for excavations, and archaeological laboratory procedures.

Part III. Historic Preservation Planning Compliance and the Federal Section 110 Process. Sections 12–16 address how DOE complies with its obligations to establish a preservation program at LANL. Section 12 presents an overview of the historic preservation responsibilities of federal agencies and describes federal and state compliance oversight.

Section 13 discusses the conduct and status of archaeological surveys at LANL. Section 14 describes issues and responsibilities for compliance with 36 CFR Part 79, Curation of Federally Owned and Administered Archaeological Collections. Section 15 discusses the Manhattan Project National Historical Park. Section 16 discusses management goals for properties at LANL that have exceptional significance and may warrant National Register designations. Section 17 identifies potential National Register Archaeological Districts at LANL.

Part IV. Native American Consultation and Outreach. A number of laws require various types of consultation with culturally affiliated, federally recognized Native American tribes. Section 18 provides information on Native American consultation and outreach programs. It provides a detailed discussion of cultural affiliation as it relates to Ancestral Pueblo archaeological sites and human remains at LANL. This section also considers issues relating to the Native American traditional cultural properties, the Native American Graves Protection and Repatriation Act, Section 106 consultation, and various outreach programs.

Part V. Strategic Planning and Long-Term Management Issues and Goals. Sections 19–23 address issues concerning strategic planning and aspects of the long-term management of cultural resources at LANL. Section 19 notes that cultural resources management at LANL must be integrated with strategic planning, including integration with the Ten-Year Site Plan, the Long-Term Strategy for Sustainability and Stewardship, the Site-Wide Environmental Impact Statement, and other strategic planning efforts.

Section 20 discusses working with the SHPO to complete National Register of Historic Places (Register) eligibility determinations for previously identified archaeological sites that have not yet been evaluated, and to potentially reassess the boundaries and integrity of previously documented sites. The purpose of moving forward to complete these evaluations is to increase land-use flexibility at LANL, while focusing on those resources most needing long-term management and protection. Section 21 outlines the rationale and steps for long-term monitoring, protection, and maintenance of key archaeological sites and historic buildings and structures, as required under the Archaeological Resources Protection Act and Section 110. Section 22 discusses public education, interpretation, and outreach. Section 23 outlines emergency management issues at LANL. The May 2000 Cerro Grande fire and the June 2011 Las Conchas fire required coordinated strategic planning for emergencies to reduce the likelihood of unintentional damage to cultural resources.

Part VI. Safety, Security, and Quality Assurance. Sections 24–25 deal with issues of safety, security, and the quality of processes and products associated with the cultural resources program at LANL. Section 24 describes cultural resources program records management (e.g., Native American consultation and formal consultation with the SHPO and the ACHP). Section 25 describes how all work performed by and on behalf of the cultural resources program will be guided by specific standards and procedures and by a general quality assurance program plan.

Appendix A. The Ten-Year Road Map for the CRMP. The Ten-Year Road Map identifies specific cultural resource priorities that support LANL mission requirements while complying with federal historic preservation laws.

Appendix B. The Archaeological Site Significance and Eligibility Standards (2015). This document was originally developed in association with excavations and laboratory analyses as part of the DOE Land Conveyance and Transfer Project in 2008 to provide the basis to evaluate the eligibility of archaeological sites located at LANL. This document addresses Register eligibility by site type and discusses situations where sites have lost their research information potential or integrity and are no longer eligible to be included in the Register. It was updated in 2015 and is included in Appendix B.

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Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
AEC	United States Atomic Energy Commission
ARPA	Archaeological Resources Protection Act
CFR	Code of Federal Regulations
CRMP	Cultural Resources Management Plan
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
DOE	United States Department of Energy
EO	executive order
EX-ID	excavation/fill/soil disturbance permit identification (request)
Field Office	United States Department of Energy, National Nuclear Security Administration Los Alamos Field Office
FY	fiscal year
GIS	Geographic Information System
GPS	Global Positioning System
HE	high explosives
Laboratory	Los Alamos National Laboratory
LA-CP	Los Alamos controlled publication
LANL	Los Alamos National Laboratory
LA-UR	Los Alamos unlimited release
M&O	management and operating (contractor)
MOA	memorandum of agreement
NAGPRA	Native American Graves Protection and Repatriation Act
NDAA	2015 National Defense Authorization Act
NEPA	National Environmental Policy Act
NMCRIS	New Mexico Cultural Resources Information System
NNSA	National Nuclear Security Administration
PR-ID	project requirements identification (system)
Register	National Register of Historic Places
RFI	Resource Conservation and Recovery Act facility investigation

SHPO	State Historic Preservation Officer
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area
THPO	Tribal Historic Preservation Officer
USC	United States Code
WWII	World War II

Part I. Background

The Cultural Resources Management Plan (CRMP) for Los Alamos National Laboratory (LANL or the Laboratory) is an institutional comprehensive plan that defines the responsibilities, requirements, and methods for managing its cultural resource compliance. Federal laws relating to cultural resources management require the United States Department of Energy (DOE) to identify, evaluate, and manage cultural resources under its control and jurisdiction.

Cultural resources include: archaeological materials (artifacts) and sites that date to the prehistoric, historic, and ethnohistoric periods and that are currently located on the ground surface or buried beneath it; standing structures and/or their component parts that are over 50 years of age; or standing structures that represent a major historical theme or era, including the Manhattan Project and the Cold War era and structures that have an important technological, architectural, or local significance; cultural and natural places, select natural resources, and sacred objects that have importance for American Indians; and American folklife traditions, and arts.

DOE Order 141.1 (Department Of Energy Management Of Cultural Resources) requires DOE Field Office managers to develop, fully implement, and periodically review the cultural resources management plan at all DOE facilities and Government-owned, contractor-operated facilities as needed. Each plan must strive to appropriately reflect local concerns.

Section 1. Purpose of the Cultural Resources Management Plan

LANL consists of approximately 40 square miles of the Pajarito Plateau, adjacent to the Jemez Mountains in northern New Mexico. There are over 2000 cultural and historic resources on LANL property. The CRMP is a plan that describes how the management and operations (M&O) contractor will comply with preservation laws and fulfill the requirements set forth in the *Programmatic Agreement Among the United State Department of Energy, National Nuclear Security Administration, Los Alamos Field Office, the New Mexico State Historic Preservation Office and the Advisory Council on Historic Preservation Concerning Management of the Historic Properties of Los Alamos National Laboratory, Los Alamos, New Mexico* (PA). Absent the PA, routine operational tasks such as mowing and facilities maintenance would be subject to six- to eight-week project approval timelines through the Field Office and from the State Historic Preservation Officer (SHPO). The CRMP provides for a streamlined LANL-specific compliance process and includes the following:

- A list of LANL-specific property types and undertakings exempt from statutory review
- A LANL-specific description of ineligible archaeological site categories
- Annual reporting from the Field Office to the SHPO, instead of project-by-project reporting, to include No Historic Properties Affected. This includes No Effect Through Avoidance (all eligible properties within the area of potential effects will be avoided by project activities) and for archaeological surveys with negative findings
- Standard in-field data recovery procedures for adverse effects to specific archaeological site types upon SHPO concurrence

- Standard documentation measures for adverse effects to historic buildings and structures (except for exceptionally significant properties identified in Section 10) upon SHPO concurrence
- Letters and appropriate documentation from the Field Office to the SHPO of preliminary documentation for projects related to historic building mission changes or closures
- Email communication from the Field Office to the SHPO for Section 106 notifications regarding implementation of standard in-field data recovery and historic building standard documentation resolving adverse effects (exceptions identified in Section 9)

LANL is bordered by the Bandelier National Monument, the Santa Fe National Forest, the Pueblo de San Ildefonso, and the communities of White Rock and Los Alamos (Figure 1.1). It is subdivided into 49 technical areas. The CRMP is designed to provide a practical and user-friendly set of steps and procedures for complying with federal historic preservation laws and regulations and with DOE policies and directives relating to cultural resources. A critical aspect of the CRMP is defining strategies, which increase land-use flexibility in support of the DOE while most effectively managing those cultural resources.

There are about 1900 known archaeological sites at LANL. The great majority of these represent the villages, farmsteads, resource exploitation areas, rock art panels, trails, and shrines of more than 11,500 years of Native American use of the Pajarito Plateau, knowledge of which is still actively preserved in the living memory of modern Pueblo neighbors and other nearby tribes. The Ancestral Pueblo remains are themselves of such cultural richness and significance that in the early 1900s the lands now occupied by LANL were included in the then-proposed Pajarito Park, which, because of political pressures, was eventually scaled back to that of the present Bandelier National Monument. The other archaeological sites at LANL represent the remains of homes, wagon roads, trails, trash scatters, fences, and fields of early twentieth-century Hispanic and Anglo homesteaders. In addition, the built environment includes approximately 400 historic buildings and structures that represent locations where significant research and development activities took place—beginning with the Manhattan Project in 1943 and continuing through the end of the Cold War in 1990—that helped to define the recent history of the United States and many aspects of the modern technological world.

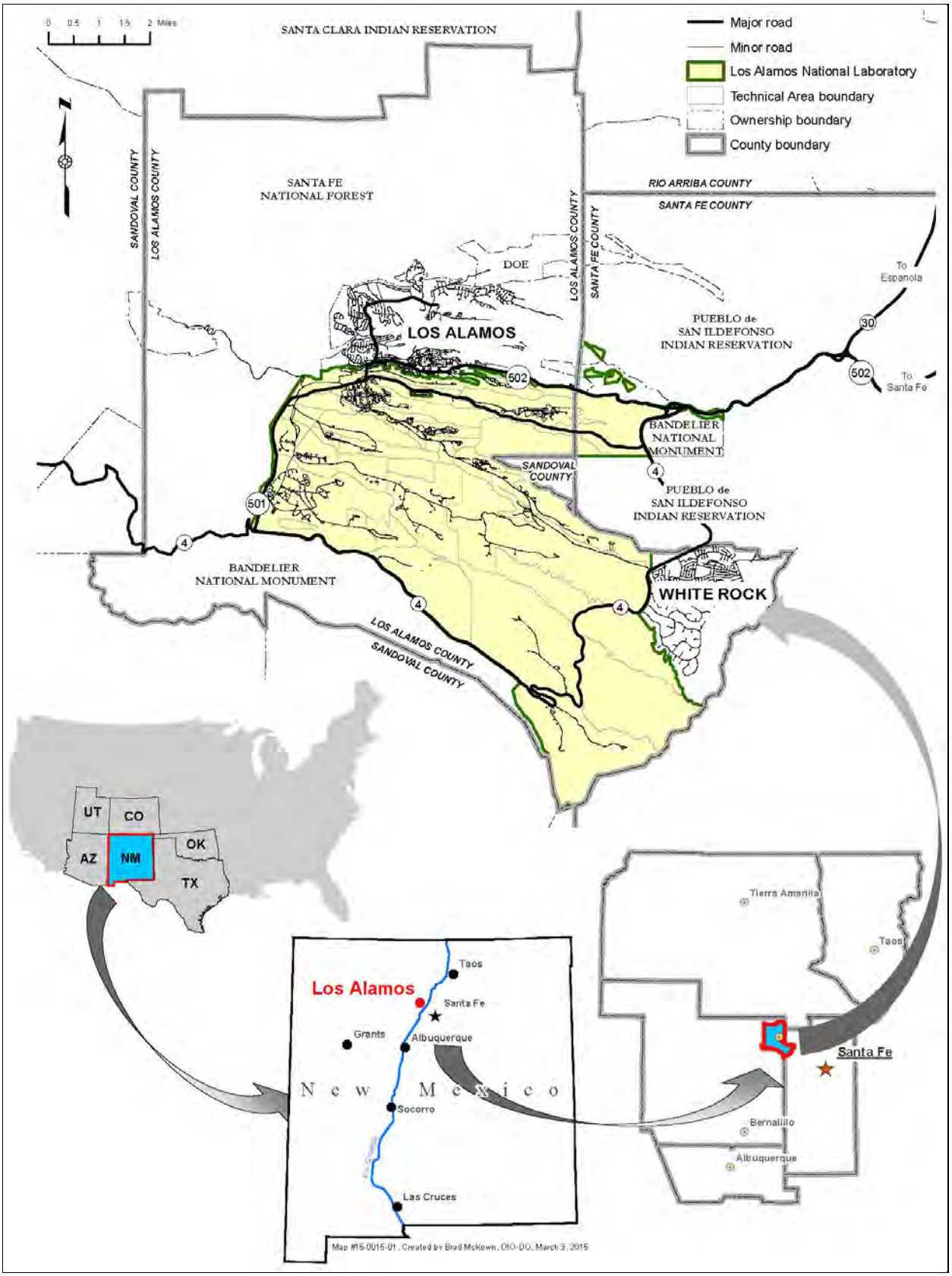


Figure 1.1 Location of Los Alamos National Laboratory

Section 2. Cultural Resources Statutes, Executive Orders (EOs) and Memoranda, Regulations, Policies, Standards, and Guidelines

Multiple federal and state historic and cultural preservation laws, summarized below, have substantive application to the lands and operations at LANL.

Statutes

National Historic Preservation Act (54 United States Code [USC] 300101 et seq.; formerly 16 USC 470 et seq.)

The National Historic Preservation Act became law on October 15, 1966, Public Law 89-665, and was codified in Title 16 of the USC. Various amendments followed through the years.

On December 19, 2014, Public Law 113-287 moved the National Historic Preservation Act Title 16 provisions to Title 54 of the USC. The purpose of Public Law 113-287 was to codify certain existing laws relating to the National Park System into Title 54, National Park Service and Related Programs. This recodification was carried out as part of an effort to better organize all the statutes related to the National Park Service. Popular names of certain acts, e.g., the National Historic Preservation Act, were technically repealed. However, because references such as National Historic Preservation Act or Section 106 and Section 110 have been used since 1966, the Advisory Council on Historic Preservation (ACHP) has indicated it will continue using those common terms.

National Environmental Policy Act of 1969, as amended (NEPA) (42 USC 4321 et seq.)

NEPA requires that the federal government use all practicable means to preserve the productive harmony of the environment while fulfilling social, economic, and other requirements of generations of Americans. Included in preserving the environment is the preservation of important historic and cultural aspects of national heritage. NEPA's aim is to have a fully-informed decision-making process.

NEPA requires all federal agencies to prepare a statement that assesses the impact of any proposed action on the environment, including any unavoidable adverse environmental effects, and to present alternatives to the proposed action before implementing the proposed action. This statement shall be prepared as early in the planning process as possible and shall accompany the action's proposal through the agency review process, ensuring that environmental concerns are addressed in the decision-making process.

Implementing regulations issued by the Council on Environmental Quality are codified at 40 Code of Federal Regulations (CFR) Parts 1500–1508. DOE has published counterpart regulations that are codified at 10 CFR Part 1021 and are addressed in DOE Order 451.1B Admin Chg 3. These regulations encourage combining NEPA compliance with other regulatory requirements such as those for cultural resource compliance, the American Indian Religious Freedom Act of 1978 and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA).

American Indian Religious Freedom Act of 1978 (42 USC 1996)

The American Indian Religious Freedom Act reiterates the First Amendment recognition of religious freedom for the peoples of the United States. Specifically, it refers to the inherent right of indigenous peoples to believe, express, and exercise their traditional religions, including but not limited to access to religious sites, use and possession of sacred objects, and freedom to worship through ceremonial and traditional rites. Federal agencies are directed to evaluate their policies and procedures in consultation with native traditional religious leaders to determine appropriate changes necessary to protect and preserve Native American religious cultural rights and practices. The LANL M&O contractor and DOE work to plan activities so that they do not disrupt or adversely affect the practice of traditional religions. Tribal groups receive advance notification of major construction activities and are requested to inform the Field Office if these activities would affect a traditional cultural property. DOE provides access to resource collection areas for ceremonial activities and hunting.

Archaeological Resources Protection Act of 1979, as amended (ARPA) (16 USC 470aa et seq.)

ARPA establishes that archaeological resources on public and Indian lands, which are threatened by unauthorized excavation and looting, are a part of the nation's heritage and should be preserved for the benefit of the American people. ARPA specifically protects any material remains of past human life of archaeological interest and at least 100 years old, including pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, or any portion or piece of any of the above located on public or Indian lands of the United States. Public lands include LANL and Indian lands refer to lands of Native American tribes or of individuals held in trust by the United States.

Unauthorized excavation, removal, damage, alteration, defacement, or attempts to injure any archaeological resource on public or Indian land are prohibited. No one may purchase, sell, or exchange any archaeological resource derived from public or Indian lands. The law provides criminal and civil penalties for any violation, and has been successfully enforced against individuals at LANL.

Federal agency qualified individuals who propose to excavate or remove archaeological resources from federally owned or controlled land may do so by permit. The proposed work must be undertaken for the purpose of furthering archaeological knowledge for the benefit of the public. Archaeological resources recovered are to remain the property of the United States and must be preserved by a university, museum, or other qualified institution. The appropriate federal land manager must contact any Native American tribe that has a cultural or religious interest in a site proposed to be excavated under permit.

Federal agencies may not disclose any information pertaining to the location of sites which would require an excavation or artifact removal permit unless the disclosure would further the purposes of ARPA or would not create a risk to the condition of archaeological resources on the site. Federal agencies must develop plans for surveying lands not scheduled for specific undertakings and implement a system for recording and reporting archaeological violations. Federal managers are required to establish a program to increase public awareness of and the need to protect archaeological resources.

Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (25 USC 3001 et seq.)

The purpose and intent of the NAGPRA is to acknowledge the ownership of certain Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony by Native American tribes or organizations and to treat these remains and objects in a way that is agreeable to these tribes or organizations.

The first provision of NAGPRA covers Native American remains or objects discovered on federal or tribal lands after the date of enactment of NAGPRA. The federal land-managing agency must notify Native American tribes or organizations of the discovery, providing them an opportunity to issue a claim of affiliation to the remains or objects. The tribe or organization determined to have the right of ownership of the remains or objects may then consult with the agency to determine what action should be taken with the remains or objects. The agency is responsible for carrying out these determinations.

The second provision of NAGPRA covers Native American remains or objects possessed or controlled by federal or federally assisted institutions, curation facilities, or agencies. The curation facility shall inventory all of these remains and objects and provide these inventories to Native American tribes or organizations. The tribes or organizations may issue a claim of affiliation to the remains or objects. The tribe or organization determined to have the right of ownership of the remains or objects may then consult with the curation facility to determine what action should be taken to repatriate the remains or objects. The curation facility is responsible for carrying out these determinations.

NAGPRA also makes provisions for the prosecution of those who knowingly sell, purchase, use for profit, or transport for sale or profit Native American human remains or objects covered in this Act, whether or not they derive from federal or Indian lands.

Section 3039 of the 2015 National Defense Authorization Act (2014 NDAA) (Public Law 113-291 Section 3039, codified at 16 USC 410uuu)

The 2015 NDAA established the Manhattan Project National Historical Park as a unit of the National Park Service. At LANL, 17 Manhattan Project-period properties are currently closed to the public, including V-Site and Gun Site. Several historic properties within the County of Los Alamos are open to the public, including Fuller Lodge, an important community building in use during the Manhattan Project. The Secretary of the Interior and Secretary of Energy entered into a 2015 *Memorandum of Agreement Between the United States Department of the Interior and the United States Department of Energy for the Manhattan Project National Historical Park* to govern their respective roles in administering these facilities and areas under DOE's administrative jurisdiction that are included in the Manhattan Project National Historical Park.

EOs and Memoranda

Executive Memorandum, September 23, 2004

This executive memorandum addresses government-to-government relations with Native American tribal governments, to ensure that the rights of sovereign tribal governments are fully respected. Federal agencies are required to operate within a government-to-government

relationship with federally recognized tribal governments, including consultation with tribal governments before taking actions that affect those governments and assessing the potential impact of plans, projects, and activities on tribal trust resources. Federal agencies consider tribal government rights and concerns during the development of such programs and activities by working directly and effectively with tribal governments on activities that affect trust properties or tribal governmental rights. Federal programs may be designed to provide unique solutions to address specific needs of tribal communities.

EO 13007, May 24, 1996

EO 13007 concerns Indian sacred sites. In order to protect and preserve Indian religious practices, federal land managers must accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of sacred sites. A sacred site as defined in EO 13007 as "any specific, discrete, narrowly defined delineated location on federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." Federal agencies, where appropriate, shall maintain the confidentiality of sacred sites and will implement procedures to manage these resources.

EO 13175, November 6, 2000

EO 13175 addresses consultation and coordination with Indian tribal governments. This document states that each federal agency must establish a process for regular and meaningful consultation and collaboration with Native American tribal governments in the development of regulatory matters that directly affect their communities. Policies will take into account tribal self-government, sovereignty, and treaty rights.

EO 13287, March 3, 2003

EO 13287 requires the federal government to provide leadership in preserving America's heritage by actively advancing the protection, enhancement, and contemporary use of the historic properties owned by the federal government and by promoting intergovernmental cooperation and partnerships for the preservation and use of historic properties.

Regulations

There are a number of regulations that detail the requirements for compliance with the legislation described above, including:

36 CFR Part 60: National Register of Historic Places

36 CFR Part 63: Determination of Eligibility for Inclusion in the National Register of Historic Places

36 CFR Part 65: National Historic Landmarks Program

36 CFR 67.7: The Secretary of the Interior's Standards for Rehabilitation

36 CFR Part 68: The Secretary of the Interior's Standards for the Treatment of Historic Properties

36 CFR Part 78: Waiver of Federal Responsibilities under Section 110 of the National Historic Preservation Act

36 CFR Part 79: Curation of Federally Owned and Administered Archaeological Collections

43 CFR Part 7: Protection of Archaeological Resources

43 CFR Part 10: Native American Graves Protection and Repatriation Regulations

36 CFR 800: Section 106

36 CFR Part 800 contains federal regulations concerning the process by which a federal agency takes into account the effects of undertakings (i.e., projects) on historic properties and consults with the ACHP and the SHPO to resolve adverse effects.

Section 106 requires that if there is any actual or potential adverse effect to a cultural resource, then the ACHP, SHPO, Tribal Historic Preservation Officer (THPO), tribes, and the public must have an opportunity to comment on the undertaking's effect, unless it is determined that: (1) there is no effect, or (2) no historic property is involved in the undertaking. Federal agencies must take into account the effects of their undertakings on cultural resources at the planning stage and provide for protective measures or other mitigation and treatments for any affected resources.

Section 106 recognizes the unique legal relationship the federal government has with Indian tribes and states that consultation with these entities should be conducted in a sensitive manner that is respectful of tribal sovereignty and done in a manner that recognizes the government-to-government relationship between the parties.

DOE, the Field Office, and LANL M&O Contractor Policy

DOE Order 144.1 Admin Chg 1, (approved Jan 16, 2009)

DOE O 144.1 Admin Chg 1, *Department of Energy American Indian Tribal Government Interactions and Policy*, recognizes the sovereignty of tribal governments and provides for effective implementation of government-to-government relationships with American Indian and Alaska Native tribal governments, based upon the United States Constitution, decisions of the United States Supreme Court, executive orders, statutes, and other existing federal policies. The document provides guidance for DOE contractors regarding diligent fulfillment of trust obligations and other responsibilities arising from actions that may impact American Indians or Alaska Native traditional, cultural, and religious values and practices and implements a proactive outreach effort of notice and consultation regarding actions affecting tribes

DOE Policy 141.1 (approved May 2, 2001)

DOE Policy 141.1, *Department of Energy Management of Cultural Resources*, issued by the DOE in 2001, is designed to ensure that DOE programs, including field elements (such as the Field Office and LANL), integrate cultural resources management into their missions and activities. The policy is also designed to raise the level of awareness and accountability among DOE contractors concerning the importance of the Department's cultural-resource-related legal and trust responsibilities.

This policy states that preservation and protection of America's cultural heritage are important functions and responsibilities of the federal government for properties under its control or jurisdiction. This policy helps ensure that DOE maintains a program that reflects the spirit and intent of the legislative mandates.

The Field Office / Pueblo Accords, 1992

DOE entered into Accords with four pueblos (Cochiti, Jemez, San Ildefonso, and Santa Clara, collectively the Accord Pueblos) which formalize the government-to-government relationship between DOE and the four pueblos. The Pueblo Accords were originally executed in 1992. DOE and the Pueblos entered into Restatements of the Accords in 2005 and 2006.

LANL/Pueblo Cooperative Agreements, 2015–2020

The LANL M&O contractor entered into Cooperative Agreements with the four Accord Pueblos, with provisions similar to the DOE/Pueblo Accords. The cooperative agreements formalized the relationship between the M&O contractor and the pueblos, consistent with federal law as well as the provisions of the DOE Accords.

Field Office Management Procedure 13.07, Rev. 2 (effective date 01/08/2015)

Management Procedure 13.07, Rev. 2 outlines Field Office oversight responsibilities for cultural resource management. The Field Office Cultural Resource Program Manager oversees the M&O contractor's implementation of the CRMP, and other aspects of cultural resource management compliance, at LANL.

The Field Office / Pueblos / SHPO 2010 Memorandum of Agreement

In January 2010, the Field Office entered into a *Memorandum of Agreement Among the Department of Energy, National Nuclear Security Administration Los Alamos Site Office, the Incorporated County of Los Alamos, and the New Mexico State Historic Preservation Officer Regarding Management of the Rendija Canyon Traditional Cultural Properties District Listed in the New Mexico State Register of Cultural Properties* (MOA) to provide the Pueblo de San Ildefonso and Santa Clara Pueblo access to the traditional cultural property district located in Rendija Canyon. The MOA affords preservation and protection for the traditional cultural property district from future development when the Rendija Canyon Tracts (A-14A, A-14C, and A-14D) are conveyed to the Incorporated County of Los Alamos.

The Field Office / San Ildefonso Memorandum of Agreement (effective date 06/2015)

The Field Office entered into a *Memorandum of Agreement between the U.S. Department of Energy, National Nuclear Security Administration and the Pueblo de San Ildefonso* (MOA) to facilitate a cooperative effort regarding DOE's activities on Pueblo lands within the exterior boundaries of the Pueblo and to provide procedures by which the Pueblo, DOE, and DOE contractors will coordinate and carry out DOE activities. The MOA addresses responsibilities and functions that must be coordinated.

Federal Standards and Guidelines

Secretary of the Interior's Standards and Guidelines for Federal Agency Preservation Programs Pursuant to the National Historic Preservation Act, 63 Fed. Reg. 20496 (Apr 24, 1998) (Section 110)

Section 110 guidelines describe requirements for federal agency preservation programs and define important terms in cultural resource management compliance, such as "historic context" and "historic property" or "historic resource." The guidelines also define mitigation of an adverse effect as action to minimize, ameliorate, or compensate for the degradation and/or loss of those characteristics of a property that make it Register-eligible. Section 110 guidelines also cover federal agency responsibilities in conducting consultations relating to historic preservation activities, and include a statement that there should be public notice of agency plans and program activities so as to adequately inform the public of preservation issues in order to elicit public views in decision-making.

Section 110 guidelines describe the kinds of values considered when determining significance of a property, including: interpretive value, contribution to sense of time and place, research/information value, rare or typical examples, and sociocultural value. The guidelines also discuss the nature of integrity and its relation to Register-eligibility. Importantly, the Section 110 guidelines expressly allow for consideration of the cost to maintain/operate the property, and considers that full demolition and replacement with a modern building may be an appropriate option to meet programmatic needs.

Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, 48 Fed. Reg. 44716 (Sept. 29, 1983)

The Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation provide technical advice concerning archeological and historic preservation activities and methods. These standards address preservation planning, identification, evaluation, registration, historical documentation, architectural and engineering documentation, archeological documentation, and preservation projects (including rehabilitation).

These standards also set the Interior Secretary's Professional Qualification Standards, which define minimum education and experience required to perform identification, evaluation, registration, and treatment activities. Generally, graduate degrees and related job experience is required in the fields of history, archeology, architectural history, architecture, and historic architecture. A current list of cultural resources staff members conducting archaeological and

historic preservation activities at LANL, along with a brief description of their experience and qualifications, is maintained by the LANL M&O contractor and by the Field Office.

National Register Bulletin 15, Guidelines for Applying the National Register Criteria for Evaluation

National Register Bulletin 15 should be used by anyone who must decide if a particular property qualifies for the Register, and defines various categories of historic properties including buildings, structures, objects, sites, and districts. The bulletin outlines the process for evaluating a property with it historic context, the integrity of a property, and explains how to apply Criteria A through D in detail, as well as Criteria Considerations A through G, both of which are described in Section 8 below.

National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties

National Register Bulletin 38 provides further clarification for assessing whether a cultural resource qualifies as a traditional cultural property.

Other ACHP Informal Guidance

The ACHP maintains several relevant guidance documents at www.achp.gov. These guidance documents are informal guidance because they have not gone through the Federal Register publication process.

Section 3. Glossary of Cultural Resources Acronyms and Terms

Advisory Council on Historic Preservation (ACHP): An independent federal agency with statutory authority to: review and comment on federal actions affecting properties listed in, or eligible for, the National Register of Historic Places; advise the President and the Congress on historic preservation matters; and, to recommend measures to coordinate activities of federal, state, and local agencies. Its members include Cabinet-level representatives from federal agencies and presidential appointees from outside the federal government.

Accord Pueblos: In 1992, a set of agreement documents was signed between the Field Office and the Pueblos of Cochiti, Jemez, San Ildefonso, and Santa Clara. These four pueblos are often referred to as the Accord Pueblos, and the agreement documents are referred to as the Pueblo Accords. The Pueblo Accords were revised and restated in 2006.

Area of potential effects: A term that refers to the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

Archaeological resources: Any material remains of past human life or activities which are of archaeological interest, including (but not limited to) pottery, basketry, bottles, weapons, weapon projectiles, jewelry, tools and the chipped-stone debris from tool manufacture, structures or portions of structures, pit houses, rubble mounds, rock paintings, rock carvings, intaglios, graves

and grave associations, human skeletal materials, or any portion or piece of any of these items. The term also applies to agricultural sites and residue, resource collection sites and residue, and other materials that can provide information about past human lifeways. Under the guidelines of the ARPA, these items must be at least 100 years in age.

Cultural heritage: A term referring to the cumulative set of historical properties and values of specific cultural groups.

Cultural resources: Cultural resources include historic properties as defined in 54 USC 300308, archaeological resources as defined in the ARPA, and cultural items as defined in the NAGPRA.

Excavation/fill/soil disturbance permit identification request (EX-ID): This permit request is the initial step in a general environmental project review process at LANL in which proposed ground-disturbing activities are evaluated for potential impacts to the environment, including historic properties, as part of the Section 106 review process.

Historic American Building Survey: A standardized system of records and record keeping for documenting historic buildings.

Historic American Engineering Record: A standardized system of records and record keeping that produces graphic and written documentation of historically significant architectural, engineering, and industrial sites and structures.

Historic American Landscape Survey: A standardized system of records and record keeping for documenting historic landscapes.

Heritage resources: See Cultural Heritage. Heritage resources is an alternate term applied to cultural resources by some agencies.

Historic properties: These are defined as prehistoric (before the arrival of Europeans) or historic districts, sites, buildings, structures, or objects included in, or eligible for inclusion in the National Register including artifacts, records, and material remains that are related to such properties.

Historic structure: A building or other structure constructed after AD 1890, including both homestead structures and Laboratory-era buildings and structures that have been determined eligible or have not yet been evaluated for Register eligibility.

Listing Criteria: The National Park Service evaluation criteria, published at 36 CFR Part 60, used when determining whether districts, sites, buildings, structures, and objects should be listed in the Register.

Los Alamos Field Office (Field Office): The local DOE/NNSA organization charged with direct oversight of LANL operations, including compliance with federal historic preservation laws and with DOE cultural resources policy.

Mitigation Action Plan: A plan for mitigating impacts to cultural resources (a NEPA compliance document).

Memorandum of agreement (MOA): A legal agreement prepared between two federal agencies or a federal agency and other entity (e.g., state or county government, Native American tribe) that specifies various actions and responsibilities on the part of one or more signatory parties, typically for a single, specific project for a specific period of time.

National Register of Historic Places (Register): The nation's master inventory of known historic properties worthy of preservation. The Register is administered by the National Park Service on behalf of the Secretary of the Interior. Included are buildings, structures, sites, objects, and districts that possess historic architectural, engineering, archaeological, or cultural significance at the national, state, or local level.

National Historic Landmark: A special category designated by the Secretary of the Interior for historic properties exhibiting exceptional importance in American history, architecture, archaeology, engineering, or culture.

Official use only: A designation placed on many LANL cultural resources documents and maps indicating the presence of sensitive information (such as archaeological site locations) that must not be released to the general public.

Programmatic agreement: A programmatic agreement is a document that records the alternative terms and conditions agreed upon to resolve the potential adverse effects of a Federal agency program, complex undertaking or other situations pursuant to 36 CFR 800.14.

Project requirements identification system (PR-ID): An electronic system that facilitates the environmental, health, and safety review of proposed construction, remodeling, demolition, and maintenance activities at LANL. Cultural resources reviews through the PR-ID must meet the standards outlined in Section 106.

Section 106: Section 106 refers to the requirements of 54 USC 306108, and 36 CFR Part 800. Section 106 requires federal agencies to take into account the effect of any federal, or federally funded, undertaking on any district, site, building, structure, or object that is included in or is eligible for inclusion in the Register. The review process is administered by the SHPO, as delegated by the ACHP.

Section 110: Section 110 refers to the requirements of 54 USC 306101 to 306107 and the Secretary of the Interior's Standards and Guidelines for Federal Agency Preservation Programs Pursuant to the National Historic Preservation Act, 63 Fed. Reg. 20496 (April 24, 1998). Section 110 sets out the broad historic preservation responsibilities of federal agencies and is intended to ensure that historic preservation is fully integrated into the ongoing programs of all federal agencies. Section 110 makes explicit the federal agency's responsibility for identifying and protecting historic properties and avoiding unnecessary damage to them.

State Historic Preservation Officer (SHPO): The SHPOs ensure cultural resource compliance. The ACHP has delegated its oversight authority to the SHPOs. The New Mexico SHPO is responsible for reviewing planned activities by federal, state, or local entities that may affect historical, cultural, or archaeological resources in New Mexico and for ensuring that those planned activities comply with Section 106.

Sacred site: A location of religious significance or ceremonial use by Native American religious practitioners and made known to the administering federal agency by an appropriately authoritative representative of a Native American religion.

Traditional cultural property (or place): Property of traditional religious and cultural importance to an Indian tribe may be Register-eligible under 54 USC 302706. Traditional cultural properties are associated with the cultural practices or beliefs of a living community that (a) are rooted in the histories of those communities and (b) are important in maintaining the continuing cultural identity of the communities (NPS 1998).

Tuff: Welded (consolidated and chemically bonded) volcanic ash from ancient pyroclastic flows.

Section 4. LANL Physical and Environmental Setting

The Jemez Mountains are located at the intersection of three major physiographic provinces: the southern Rocky Mountains, the Colorado Plateau, and the Rio Grande rift valley. The Valles Caldera is the dominant feature of the Jemez Volcanic Field, active during the past approximately 16 million years ago, and responsible for the immense quantities of rhyolitic ash that now cap the plateaus and mesas sloping outward from the caldera edge. Volcanic activity is also responsible for the basalt and other igneous materials, including obsidian outcrops located in the Valles Caldera vicinity.

Elevations range from 1676 meters (5500 feet) along the Rio Grande valley to over 3050 meters (10,000 feet) in the Sierra de los Valles and the Valles Caldera. The average growing season is from 120 to 160 days, with annual precipitation averaging from 30 to 45 centimeters (12 to 18 inches). Moisture comes in the form of winter snows and summer monsoonal rainfall. Maximum summer temperatures at LANL average between 90°F and 100°F, with minimum winter temperatures averaging between 15°F and 25°F.

The Pajarito Plateau consists of a series of narrow mesas and deep canyons (Figure 4.1) that trends east-southeast from the Jemez Mountains to the Rio Grande Valley. The defining feature of the Plateau is the Tshirege Member of the Bandelier Tuff, a massive series of ignimbrites, or ash-flow tuffs, which is the result of a series of large eruptions from the Valles and Toledo calderas, about 1.6 and 1.2 million years ago, respectively.

Figure 4.1 Aerial view of some of the mesas and canyons of the Pajarito Plateau

Mesa orientation, solar radiation, and differences in soils and moisture levels contribute to the presence of highly varied ecotones found throughout the Pajarito Plateau. The elevation gradient and the corresponding variable climatic conditions are reflected by the presence of five major vegetation types. These major types are defined by their dominant tree species and by their structural characteristics. These types are juniper savannas, piñon-juniper woodlands, ponderosa pine forests, mixed conifer forests, and spruce-fir forests.

Within these five general vegetation types, there are several specific vegetation communities, which are not primarily influenced by elevation or climatic gradients. These communities are the aspen forests, grasslands, scrublands, floodplains, open water, and non-vegetated lands. These communities are influenced by a variety of topographic features including soils, geologic structures, and moisture conditions.

Ponderosa pine forests extend to as low as 1890 meters (6200 feet) in some of the topographically protected canyons such as Ancho and Water. In more open canyons, like Sandia

and Los Alamos, ponderosa pine is not normally found below 1921 meters (6300 feet). On the mesa tops and the lower slopes of the Sierra de los Valles, ponderosa pine forests extend to 2378 meters (7800 feet) in elevation. The ponderosa pine is the only overstory species found throughout most of the higher elevation range. However, at lower elevations juniper is also present, and at higher elevations an occasional Douglas fir may be found. The understory characteristic of this community commonly consists of kinnikinnik, Colorado barberry, and Gambel oak with numerous species of herbs and grasses in the forb layer.

Mixed conifer forests appear at higher elevations in the mountains and consist of trees that are at least 5 meters (16 feet) tall. Douglas fir, also known as white fir, is the dominant overstory species, although other tree species may also be present in the overstory or mid-story. On north aspects of canyons and on the canyon bottoms above 2104 meters (6900 feet), the mixed conifer forest intergrades with ponderosa pine communities. In flat areas or on eastern exposures, the mixed conifer forest extends to 2591 meters (8500 feet). In protected drainage bottoms and on southern exposures, mixed conifer forests extend to 2744 meters (9000 feet). Some limber pine may be present sporadically. The understory may consist of several shrubs, including ninebark, wild rose, cliff bush, and dwarf juniper with numerous species of herbs and grasses. The average annual precipitation ranges from 51 to 76 centimeters (20 to 30 inches).

There is an obvious relationship between the ecological and topographic characteristics of the area, and these relationships may impact the kinds of species that inhabit various areas of the Laboratory. The following is a sampling of these species. Coyote, rattlesnake, bobcat, gray fox, red-tailed hawk, spiny lizard, mule deer, deer mouse, and desert cottontail are found in the lower elevation zone (1700 to 2000 meters; 5610 to 6600 feet). In the middle elevation zone (2000 to 2400 meters; 6600 to 7920 feet), particularly in the canyons, coyote, raccoon, mountain lion, American black bear, turkey vulture, American kestrel, golden eagle, gopher snake, rock squirrel, and mule deer can be found. In the same elevation zone on the mesa tops are the American black bear, mountain lion, common raven, pygmy nuthatch, Colorado chipmunk, pine squirrel, and mule deer. The upper elevations (2400 to 3200 meters; 7920 to 10,560 feet) are inhabited by the American black bear, mountain lion, green-tailed towhee, hairy woodpecker, Rocky Mountain elk, mule deer, western bluebird, and gray-headed junco.

Section 5. A Brief Summary of Pajarito Plateau Culture History

Occupation and use of the Pajarito Plateau began as early as 11,500 years ago. Table 1 depicts the sequence as currently understood for the central portion of the Pajarito Plateau where LANL is situated. For additional information, see recent studies that examine the prehistory and history of the Pajarito Plateau, including the wartime and Cold War years of the Laboratory (Machen et al. 2010, Machen et al. 2011, McGehee et al. 2003a, McGehee et al. 2004, Vierra and Schmidt 2008).

Table 1 Culture History Chronology for Northern Rio Grande

Culture	Period	Dates
Paleoindian	Clovis	9500 to 9000 BC
	Folsom	9000 to 8000 BC
	Late Paleoindian	8000 to 5500 BC
Archaic	Jay	5500 to 4800 BC
	Bajada	4800 to 3200 BC
	San Jose	3200 to 1800 BC
	Armijo	1800 to 800 BC
	En Medio	800 BC to AD 400
	Trujillo	AD 400 to 600
Ancestral Pueblo	Early Developmental	AD 600 to 900
	Late Developmental	AD 900 to 1150
	Coalition	AD 1150 to 1325
	Classic	AD 1325 to 1600
Native American, Hispanic, and Euro-American	Early Historic Pajarito Plateau	AD 1600 to 1890
	Homestead	AD 1890 to 1943
Federal Scientific Laboratory	Manhattan Project	AD 1942 to 1946
	Cold War (Early Cold War)	AD 1946 to 1990 (AD 1946 to 1956)

Paleoindian Period: 9500 BC to 5500 BC

During this early period, small groups of highly mobile Paleoindian hunter-gatherer populations may have followed bison herds up and down the Rio Grande, making frequent trips onto the Pajarito Plateau where they were able to procure obsidian and a variety of subsistence resources. Jemez obsidian has been found at Paleoindian sites in northern Colorado. The period is represented at LANL and elsewhere on the Pajarito Plateau by isolated projectile points.

Archaic Period: 5500 BC to AD 600

Archaic hunter-gatherer groups hunted with spear and atlatl and relied on a wide variety of small game and plant species. The piñon-juniper woodlands on LANL land contain evidence of the temporary campsites left behind by these groups as they moved across the landscape (Figure 5.1a). Remains representing these campsites are in the form of lithic scatters (Figure 5.1b), consisting of obsidian tools, chipping debris, and diagnostic projectile points. These sites presumably reflect the seasonal use of upland settings during summer and fall months for pine nut collecting, hunting, and lithic procurement activities. During the last 1500 years of the sequence, cultigens (such as maize) slowly became the dominant food resource.

Figure 5.1a Artist rendering of Archaic period campsite (Cory Dangerfield)

Figure 5.1b Archaic period lithic scatter; artifacts are pin flagged.

Developmental Period: AD 600 to 1150

Along the northern Rio Grande, maize horticulturists lived first in semi-subterranean pit structures and then in adobe surface structures. They began to make painted pottery with simple designs and continued to pursue hunting and gathering, relying on the bow and arrow. Most habitation sites dating to this time period are located at lower elevations near the Rio Grande, and the Pajarito Plateau presumably was used on a seasonal basis. However, hunter-gatherer groups may have also continued to use these upland resource areas. The general lack of recorded Developmental period sites at LANL and elsewhere on the Pajarito Plateau may be indicative of a depopulation of the Plateau at this time. The Developmental period is generally thought by archaeologists to represent the earliest demonstrable link with modern Pueblo populations. This begins what used to be called the Anasazi culture but is more properly termed Ancestral Pueblo culture.

Coalition Period: AD 1150 to 1325

During the Coalition period, there was a substantial increase in the number, size, and distribution of aboveground habitation sites, with year-round settlements expanding into upland areas throughout the Pajarito Plateau. A long-term process of site aggregation began during this time, with early sites containing adobe and masonry rectangular structures with 10 to 20 rooms (Figures 5.2a and 5.2b). The remains of these sites are present in the hundreds of small mounds of shaped tuff blocks and dense artifact scatters commonly found throughout LANL. In contrast, later sites of this period consist of large masonry plaza pueblos that contain more than 100 rooms. Thirty-one of these large plaza pueblos have been identified at LANL. The construction of agricultural features associated with these sites, including terraces, gravel mulch gardens, and dams, suggests an even greater reliance on horticulture than previously evidenced in the region. Cavate structures, rooms dug into the compacted volcanic tuff cliffs, likely make their first appearance on the Plateau towards the end of the Coalition period. The increase in Coalition-period site density is attributed both to population migration and local population growth.

Classic Period: AD 1325 to 1600

The Classic period is characterized by intensive maize agriculture. Ancestral Pueblo settlements on the Pajarito Plateau became increasingly aggregated into three large population clusters with sizeable numbers of associated outlying fieldhouses and farmsteads. The central site cluster consists of four temporally overlapping sites: Tsankawi (Bandelier National Monument), Tsirege (LANL), Navawi (Pueblo de San Ildefonso), and Otowi pueblo (Pueblo de San Ildefonso). The initial occupation of these four pueblos may have occurred during the fourteenth century with Navawi and Otowi, continuing with Tsirege and Tsankawi into the early portion of the sixteenth century. Oral traditions from the contemporary Pueblo de San Ildefonso indicate that Tsankawi was the last of the Pajarito Plateau pueblos to be abandoned. This central group of four Classic period communities is ancestral to the Tewa speakers of the Pueblo de San Ildefonso. Tsirege, one of the largest of the Classic period pueblos, is also noted for its associated impressive cavate structures and rock art images (see Section 16).

Figure 5.2a Excavated Coalition period habitation site

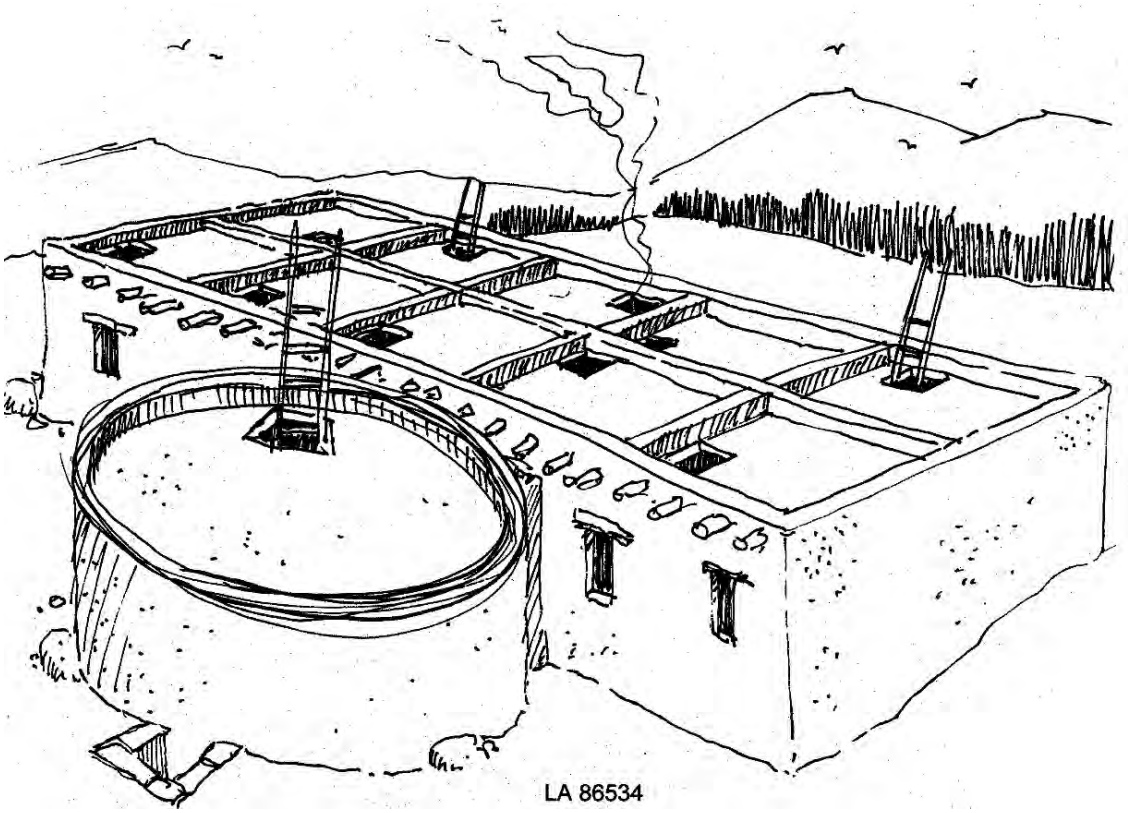


Figure 5.2b Artist reconstruction of site depicted in Figure 5.2a (Dave Brewer)

Early Historic Pajarito Plateau Period: AD 1600 to 1890

Due to a series of droughts, the Pajarito Plateau was eventually abandoned as a year-round residential area during the mid-1500s. At this time, new pueblos were constructed and occupied along the Rio Grande Valley. Although the historic period in northern New Mexico begins with Coronado's exploratory expedition up the Rio Grande from 1540 to 1542, most researchers date the period beginning in AD 1600. This date corresponds with Juan de Oñate's settlement in New Mexico and imposition of the Spanish land grant ranch system into Rio Grande communities. In 1680, the Pueblo Indians revolted against the Spanish. At this time, several Ancestral Pueblo sites situated on the topographically isolated and elevated Pajarito Plateau (including LANL) were reoccupied, as they offered natural protection and defense for groups of refugees. With the conquest and resettlement of this area by de Vargas (1693 to 1696), the economic and settlement systems of the pueblos were completely overhauled and revamped. The large mission communities, characteristic of the earlier period, disappeared, as did the large ranches. Instead, lands were granted to dozens of Hispanic families and other individuals who had worked the lands during previous years. Only one site dating to this period, a Pueblo revolt refuge in a late Coalition-period plaza pueblo, has thus far been identified at LANL.

Athabaskan groups from northern and western areas have occupied or used portions of northwestern New Mexico since the fifteenth century (Figure 5.3a); however, evidence for Navajos and Jicarilla Apaches in the northern Rio Grande begins with the Spanish Colonial period. The Navajo and Jicarilla made periodic visits to the Rio Grande Valley and Jemez Mountains for seasonal hunting and gathering trips, with the Navajo also conducting periodic raiding of the Pueblos. The only definable Athabaskan archaeological sites at LANL, a few stone tipi rings in Rendija Canyon (Figure 5.3b), appear to relate to the Jicarilla and date to the last half of the nineteenth century.

Mexico declared independence from Spain in 1821, which brought about a more lenient land grant policy and an expansion of existing trade networks. Trade between Missouri and Santa Fe along the Santa Fe Trail began soon after independence and dominated many of the events in the area for the next quarter-century. Increased trade brought many comparatively inexpensive Euro-American goods into the northern Rio Grande region, a fact that is reflected in the increase of manufactured items identified at sites dating to this period. No sites that date specifically to this period have been identified at LANL.

The lands that eventually came to be New Mexico remained a part of Mexico until the United States–Mexican war began in the mid-1800s. Troops led by Colonel Stephen W. Kearny raised the American flag in Santa Fe and took possession of these lands for the United States on August 18, 1846. Grazing and seasonal use of the Pajarito Plateau by non-Indians were common during the early Historic period, and the first homesteads were established on the Plateau during the early 1880s. New Mexico was provided with a territorial government in 1850, and it remained a territory until being granted statehood in 1912.

Figure 5.3a Athabaskan campsite

Figure 5.3b Tipi ring suggesting Athabaskan occupation

Homestead Period: AD 1890 to 1943

The period of 1890 to 1943 is typically referred to as the Homestead period at LANL. During the early 1900s, New Mexico saw a continuation of traditional farming strategies, cattle grazing, timbering, and a wide variety of cultural practices. However, large-scale sheepherding, timber, and mining activities during this period displaced some Hispanic communities. Seasonal homesteading continued to be prevalent on the Plateau. Wooden cabins, corral structures, and rock or concrete cisterns characterize Hispanic and Anglo Homestead era sites (Figure 5.4a). Many of the wooden structures burned during the May 2000 Cerro Grande fire (Figure 5.4b) (Nisengard et al. 2002). Artifact scatters, consisting of historic debris associated with household and farming/grazing activities, are also commonly found at this time period. Much of the evidence for homesteading at LANL dates between 1912 and 1943, likely a reflection of changes relating to both the Enlarged Homestead Act of 1909 and the Grazing Homestead Act of 1916. Most of the central Pajarito Plateau homestead patents were filed by Hispanic peoples who maintained permanent homes in the Rio Grande Valley, using the Pajarito Plateau sites for seasonal farming and resource gathering. Notable exceptions to this pattern included the establishment of a few permanent Anglo commercial concerns such as the Anchor Ranch and the creation of the Los Alamos Ranch School, the latter of which was in operation from 1918 until the late spring of 1943. The end of the Homestead period coincides with the appropriation of lands on the Pajarito Plateau for the Manhattan Project in 1942–1943 (Machen et al. 2011).

Figure 5.4a Homestead era habitation on LANL land

Figure 5.4b Homestead depicted in Figure 5.4a after the Cerro Grande fire

Manhattan Project Period: AD 1942 to 1946

In 1942, Franklin D. Roosevelt approved the development of the world's first atomic bomb. The geographic and topographic isolation of the Pajarito Plateau that had been a benefit to Ancestral Pueblo peoples during the Pueblo Revolt was attractive to project developers and the site was selected as the location for design and construction of the atomic bomb. Manhattan Project (code-named Project Y) activities at Los Alamos officially began with the closure of the Los Alamos Ranch School after the end of the graduating class of 1943. At the same time, additional lands were secured from government agencies, such as the Forest Service, and from the predominantly Hispanic homesteaders. Construction of Project Y began at the Los Alamos site in 1943 (Figure 5.5). The atomic age was ushered in with the detonation of the first atomic device at the Trinity test site in southern New Mexico on July 16, 1945. The detonation of the Little Boy device rapidly followed and on August 6, 1945, was detonated over the Japanese city of Hiroshima. The subsequent detonation of Fat Man over Nagasaki on August 9, 1945, led to the official surrender of Japan on August 14, 1945. During the period between the surrender of Japan and the middle of 1946, Project Y was downsized, with many Los Alamos scientists returning to their pre-Manhattan Project academic jobs. The primary mission of the Laboratory at that point became that of stockpiling and developing additional atomic weapons. The Manhattan Project officially came to an end at Los Alamos with the beginning of the atmospheric testing program in the Pacific and the development of the civilian United States Atomic Energy Commission (AEC). The AEC officially took over the operation of the Los Alamos site in 1947. Under the 2015 NDAA legislation, 17 Manhattan Project−period properties in 8 technical areas were

identified as eligible for inclusion in the Manhattan Project National Historical Park. The MOA between the Department of the Interior and the DOE, signed in November 2015, included nine DOE properties within the Manhattan Project National Historical Park boundary.

Figure 5.5 Remains of wooden protective cover used to shelter Manhattan Project bomb casings at the end of World War II

Cold War Period: AD 1946 to 1990

The Cold War period is defined as 1946 until approximately 1990. At LANL, the Cold War can be divided into an early Cold War period lasting between 1946 and 1956, and the Late Cold War from 1957 until 1990. Many of the Cold War period buildings are now over 50 years old.

Early Cold War: 1946 to 1956

The future of the early Laboratory was in question after the end of World War II (WWII). Norris Bradbury was appointed director of the Laboratory following J. Robert Oppenheimer's return to his pre-WWII duties. Bradbury felt that the nation needed "a laboratory for research into military applications of nuclear energy" (LANL 1993). In late 1945, General Groves directed Los Alamos to begin stockpiling and developing additional atomic weapons (Gosling 2001). Post-war weapon assembly work was tasked to Los Alamos's Z Division, which had been relocated to an airbase (now Sandia National Laboratories) in nearby Albuquerque, New Mexico (Gosling 2001).

In 1946, Los Alamos became involved in Operation Crossroads, the first of many atmospheric tests in the Pacific. Later, also in 1946, the AEC was established to act as a civilian steward for the new atomic technology born of WWII. The AEC formally took over the Laboratory in 1947, making a commitment to retain Los Alamos as a permanent weapons facility.

During the early Cold War, weapons research once again became a national priority. Weapons research at Los Alamos was spearheaded by Edward Teller and Stanislaw Ulam and focused on the development of the hydrogen bomb, the feasibility of which had been discussed seriously at Los Alamos as early as 1946. The simmering Cold War came to a full boil in late 1949 with the successful test of Joe I, the Soviet Union's first atomic bomb. In January 1950, President Truman approved the development of the hydrogen bomb. Truman's decision led to the remobilization of the country's weapons laboratories and production plants. The year 1950 also marked the initial meeting of Los Alamos's Family Committee—a committee tasked with developing the first two thermonuclear devices (LANL 2001). In 1951, the Nevada Proving Ground (now known as the Nevada Test Site) was established and the first Nevada atmospheric test, Able, was conducted. In the same year, Los Alamos directed Operation Greenhouse in the Pacific and successfully conducted both the first thermonuclear test, George, and the first thermonuclear boosted test, Item. In 1952, the first thermonuclear bomb, known as Mike, was detonated at Enewetak Atoll in the Pacific (LANL 1993). The Soviet Union responded with a successful fusion demonstration in August 1953, followed by a test of a hydrogen bomb in 1955. The arms race was on. By 1956, Los Alamos had successfully tested a new generation of high explosives (HE, specifically plastic-bonded explosives) and had begun to make improvements to the primary stage of a nuclear weapon (LANL 2001).

Although weapons research and development has always played a major role in the history of LANL, other key themes for the years 1946–1956 include supercomputing advancements, fundamental biomedical and health physics research, HE research and development, reactor research and development, pioneering physics research, and the development of the field of high-speed photography (McGehee and Garcia 1999). The early Cold War era at Los Alamos ended in 1956, a date that marks the completion of all basic nuclear weapons design at LANL. Later research at Los Alamos focused on the engineering of nuclear weapons to fit specific delivery systems. The year 1956 was also the last year that Los Alamos was a closed facility—the gates into the Los Alamos townsite came down in 1957.

Late Cold War (1957−1990)

The late Cold War era saw the Laboratory's continued support of the atmospheric testing programs in the Pacific and at the Nevada Test Site. In 1957, the first of many underground tests in Nevada was conducted, and in 1963, the Limited Test Ban Treaty was signed, which banned atmospheric testing and nuclear weapons tests in the oceans and space (DOE 2000a). Defense mission undertakings during this time included treaty and test-ban verification programs (such as the satellite detection of nuclear explosions), research and development of space-based weapons, and continued involvement with stockpile stewardship. Non-weapons undertakings supported nuclear medicine, genetic studies, National Aeronautics and Space Administration collaborations, superconducting research, contained fusion reaction research, and other types of energy research (McGehee and Garcia 1999, Garcia et. al 2015a, and Garcia et. al 2015b).

The Cold War Ends

The Cold War ended in the early 1990s. Its demise was marked by the Strategic Arms Reduction Treaty (signed by President George H. W. Bush and Soviet President Mikhail Gorbachev), and by President Bush's announcement in September 1991 of a unilateral decision to significantly decrease the United States nuclear weapon stockpile. That announcement was followed in June 1992 by an agreement between President Bush and Russian president Boris Yeltsin to reduce each country's nuclear arsenal gradually over the next decade. The arms race that had lasted nearly half a century was over (Machen et al. 2010).

Section 6. Numbers and Types of Historic Properties at LANL

As of March 2017, 1886 archaeological sites have been recorded at LANL. As noted in the glossary, the term archaeological applies to any location exhibiting the traces of past human activity that can yield information through use of archaeological methods and principles. Homestead sites and features are included in the category of archaeological resources, along with trash deposits dating to the Manhattan Project and Cold War. However, more recent historic buildings and structures are excluded from consideration as archaeological resources. Archaeological sites are roughly divided into prehistoric resources and historic resources. Prehistoric archaeological sites at LANL refer to locations containing items used or modified by people, or other physical evidence of the use of people, before the establishment of a European presence in the upper Rio Grande Valley in the middle of the sixteenth century. Historic archaeological sites at LANL include any archaeological resources dating after that date through the Homestead period, including trash scatters and other nonstructural remains dating to the Manhattan Project and the Cold War.

As of March 2017, intensive archaeological surveys have been conducted on approximately 90 percent of LANL land in compliance with federal standards for complete survey coverage. Currently, 1742 prehistoric archaeological sites have been recorded at LANL, most of which date to the thirteenth through fifteenth centuries. About 770 of these prehistoric sites have been assessed by for eligibility for inclusion in the Register. Of these, 532 were determined eligible, 89 ineligible, and 157 undetermined. The remaining 973 sites have not yet been assessed for Register eligibility and are treated as eligible until assessed otherwise.

Concerning historic archaeological sites, 144 have been recorded at LANL, the majority of which (117 sites) are structures or artifact scatters associated with the early Historic or Homestead periods. The remaining 25 sites are experimental areas and artifact scatters dating from the Manhattan Project and Cold War periods. Of these 144 sites, 32 have been determined eligible for inclusion in the Register, 44 determined ineligible, and 12 undetermined. The remaining 56 sites have not yet been assessed for Register eligibility and are treated as eligible until assessed otherwise.

Concerning the historic built environment, 431 buildings and structures date to the Manhattan Project and Cold War. Of these, 20 date to the Manhattan Project. To date, of the 431 buildings and structures, 323 have been evaluated for Register eligibility. Of these 323 buildings and structures, 167 are eligible and 156 are not eligible. These numbers include a small number of properties younger than 50 years in age that are deemed of exceptional significance (Register Criterion Consideration G) and are thus eligible for inclusion in the Register despite not yet

having achieved the 50-year age limit normally required for inclusion in the Register. The *2008 Site-wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory* (SWEIS) (DOE 2008) identified some of these potentially exceptional properties as the 15 key facilities identified in the 2008 SWEIS. In addition to the 167 assessed eligible structures and 156 ineligible structures, 108 structures have not yet been assessed for Register eligibility and are treated as eligible until assessed otherwise.

The following is a classification and brief description of the types of archaeological sites or features within sites and historic building and structure categories known to be present at LANL. Archaeological site types are defined on the basis of their size, morphological characteristics of associated features, and the nature of the associated artifact assemblages.

Administration building: A category of historic building that includes office buildings and facilities housing cafeterias and health and safety offices (the latter being change rooms and offices for monitoring staff).

Bedrock/boulder features: Cultural features excavated into bedrock or boulders that are not cavates or game pits. Examples include grinding slicks, mortars, water-channeling grooves, and isolated hole(s) in horizontal rock surfaces. Grinding slicks, the most common bedrock feature, are concave depressions created by the sharpening of stone axes, the pulverizing and grinding of plants, or other activities.

Cavate: A room carved into a cliff face within the Bandelier Tuff geological formation. The category includes isolated cavates, multiroom contiguous cavates, and groups of adjacent cavates that together form a cluster or complex.

Game pit: A cavity dug down into the tuff bedrock presumed to have been used as a passive hunting drop site for larger game animals (e.g., deer) or as concealment from which to lure and trap birds.

Garden plots: Small, formal agricultural areas, often bounded with cobbles and containing gravel mulch (e.g., grid gardens and/or terraces). This site category typically consists of square- to rectangular-shaped rock alignments, with individual units being more than 3 meters in length (in contrast with one- to three-room structures, defined below).

Historic artifact scatter / trash scatter: A concentration of items, including Euro-American artifacts, produced and deposited after AD 1600 (but most typically in the Los Alamos area deposited after about AD 1890).

Historic infrastructure: The basic physical and organizational structures and installations needed to support a community, such as transportation systems, water supply, sewers, electrical grids, telecommunications, etc. LANL examples include historic water catchment devices (reservoirs, stock ponds, and cisterns), fence lines, and telephone lines. Roads, trails, and corrals (rock/wood enclosure) are not included as they are listed as separate site types. Historic buildings are not included in this category as they are organized by their use.

Historic structure: A building or other structure constructed after AD 1890, including both homestead structures and Laboratory-era buildings and structures that are eligible or have not yet been evaluated for Register eligibility.

Inscriptions and dendroglyphs: Historic designs, letters, numbers, or symbols scratched, pecked, scraped, or carved in stone or tree bark.

Isolated object or occurrence: Individual artifacts (such as a projectile point) or small clusters of a single type of prehistoric and historic artifact (e.g., pottery sherds from the same vessel; related chippings from the manufacture of a chipped stone tool) found outside the boundaries of a defined archaeological site. While such items are treated differently than those from defined archaeological sites for management purposes, they can nevertheless inform on past human behaviors and occupations at LANL.

Kiva: An Ancestral Pueblo ceremonial room, typically circular in shape and partially or fully underground, in some cases being excavated deeply into bedrock. Most kivas are associated with habitation sites, but some can be found in isolation. Cave kiva is a term sometimes used for unusually large cavate rooms exhibiting a square shape, substantial plaster, and other features such as petroglyph panels and floor loom holes.

Laboratory-processing building: A category of historic building in which laboratory and/or processing activities were conducted. This category includes scientific research laboratories or facilities that processed chemicals or other experimental materials (such as HE, tritium, plutonium, metals, alloys, etc.).

Lithic scatter: Clusters of chipped stone tools, ground stone tools, and/or pieces of chipped stone produced during the manufacturing of chipped stone tools.

Lithic and ceramic scatter: A combination of ceramic sherds, chipped stone, and/or ground stone artifacts, which lack identifiable surface structural remains or evidence of pit structures.

One- to three-room structures: The remains of a small surface structure constructed of adobe, jacal (thatch), or masonry. This site typically consists of square- to rectangular-shaped rock alignments, with individual units being no more than 3 meters in length. The majority of these sites are identical to what many researchers term fieldhouses and farmsteads. Also included in the one- to three-room structure category are examples of unusually large rectangular structures, along with several rather small structures, which are unusual because of the presence of upright stones or because of location, such as at the eastern tips of mesas. Some of these unusual structures may represent shrines or have been used for purposes not directly related to agriculture.

Pit structure: Presumed habitation sites with evidence (e.g., depressions) of one or more structures built entirely or partially underground.

Plaza or complex pueblo: Contains one pueblo roomblock that partially encloses (on three sides) or completely encloses a plaza and/or contains two or more roomblocks located close together (less than 200 meters apart). Plaza pueblos typically are much larger (in both room numbers and site size) than single pueblo roomblock sites, often representing structures originally two or three stories in height.

Pueblo roomblock: The remains of a contiguous, multiroom habitation structure (four or more rooms with no enclosed plaza) constructed of adobe, jacal, or masonry. Somewhat amorphous mounds contain evidence of stone rubble (rubble mounds).

Rock art: This category includes several subtypes including petroglyphs, pictographs, and rock art panels. A petroglyph consists of a design or set of symbols scratched, pecked, or scraped into a rock or plastered surface, which are distinguished from historic and modern graffiti. A pictograph consists of a design or set of symbols painted rather than pecked, scratched, or scraped. A rock art panel consists of series of petroglyphs (and, rarely, pictographs inside rock shelters and cavates) grouped together on a cliff face or boulder.

Rock/wood enclosure: A small area enclosed by loosely stacked rock or log alignments (e.g., corral or lambing pen). These are distinguished from one- to three-room structures by the nature of the stacking methods and often by the presence of historic artifacts in and around the enclosure.

Rock feature: Typically isolated examples of rock piles, amorphous rock concentrations, and/or upright stones. The latter sometimes are in the shape of a ring several meters in diameter and are often referred to as rock rings. Some rock features may be what researchers refer to as shrines and boundary markers.

Rock ring: A circular arrangement of rocks. Some of these represent the residue from a dismantled tipi or wikiup. Another category of rock rings includes circular arrangements of shaped or unshaped tuff blocks, sometimes with upright shaped stones, which may represent Ancestral Pueblo shrines.

Rock shelter: An overhang, indentation, or alcove formed naturally in a rock face or large boulder, or alternatively, a partly enclosed area created by rock falls leaning against a rock face or large boulder, and which exhibits evidence of human use. Rock shelters generally are not of great depth, in contrast to caves.

Security buildings and structures: A category of historic buildings and structures that includes guard stations, security lights, and fencing.

Stairway: A set of two or more steps carved into a steep section of tuff bedrock, typically associated with trails or access to cavates.

Support buildings and structures: A category of historic buildings and structures that includes warehouses, water tanks, utilities, and waste-treatment facilities.

Talus house: The remains of a one- to three-room structure located adjacent to a canyon cliff face. Typically, talus houses are built in front of cavates and are included as an associated feature under the cavate site type. Under this site type, the talus room is not associated with a cavate.

Thermal features: Heating or cooking features indicated by concentrations of ash and/or charcoal (with or without burned rock) that indicate a hearth, or rock concentrations that are thermally discolored and/or broken into debris (fire-cracked) that indicate a roasting pit or hearth.

Trail: Prehistoric or historic path defined by use-wear or cutting into bedrock or soil surfaces, along with any revetments, embankments, or other structural components of the trail.

Road: A formal route used for the passage of vehicles, along with revetments, embankments, or other structural components of the road. Roads that exhibit rutted tracks in bedrock formed as a result of historic wagon use form the majority of sites in this category.

Water-control feature: A device (e.g., a stone check-dam) that controls the flow of water, particularly runoff.

Section 7. DOE Land Conveyance and Transfer Project

A major archaeological data recovery project was conducted at LANL between 2002 and 2006 as part of the DOE Land Conveyance and Transfer Project (Vierra and Schmidt 2008). This project produced an invaluable management baseline of archaeological data.

On November 26, 1997, Congress passed Public Law 105-119. Section 632 of that law directed the Secretary of Energy to convey tracts of land to the County of Los Alamos, New Mexico, and the Pueblo de San Ildefonso through the Department of the Interior. To be considered eligible, tracts of land (1) had to be no longer needed by DOE for the national security mission, (2) could be restored or remediated by November 26, 2007, and (3) would be suitable for historic, cultural, or environmental preservation; economic diversification; or community self-sufficiency. In January 2011, an Amended Record of Decision, Federal Register Vol. 77, No. 14, *Transfer of Land Tracts Located at Los Alamos National Laboratory, New Mexico,* was issued, extending the public law to 2022.

In response to Public Law 105-119, DOE identified 10 tracts of land (1942 hectares; 4796 acres), with portions of 3 tracts designated for transfer to the Pueblo de San Ildefonso and the remainder designated for conveyance to the County of Los Alamos. A combination of existing and new archaeological surveys documented 213 archaeological sites within these tracts, of which 180 were eligible or had an undetermined eligibility for inclusion in the Register. Land transferred to the Department of the Interior to hold in trust for the Pueblo de San Ildefonso is not an undertaking under Section 106. Therefore, no further compliance was required. However, under 36 CFR 800.5(vii), the conveyance of lands to the County of Los Alamos is considered an adverse effect to historic properties, unless adequate and legally enforceable restrictions to ensure the long-term preservation of these properties' historic significance are met.

The County of Los Alamos expressed its intention to develop the conveyed land, although three parcels within these tracts were identified for preservation. A data recovery strategy plan was developed, and approved by the SHPO, for the remaining lands designated for conveyance to the County of Los Alamos. In order to implement the approved data recovery strategy plan, a *Programmatic Agreement Among the United States Department of Energy, The Advisory Council on Historic Preservation, the New Mexico State Historic Preservation Officer, and the Incorporated County of Los Alamos, New Mexico, Concerning the Conveyance of Certain Parcels of Land to Los Alamos County, New Mexico,* was entered into. As a result, excavations were conducted in the Rendija Tract north of the Los Alamos townsite, the Airport Tract immediately south and east of the Los Alamos airport, and the White Rock Tract west of the White Rock townsite (see Figure 7.1 for the approximate locations of these tracts).

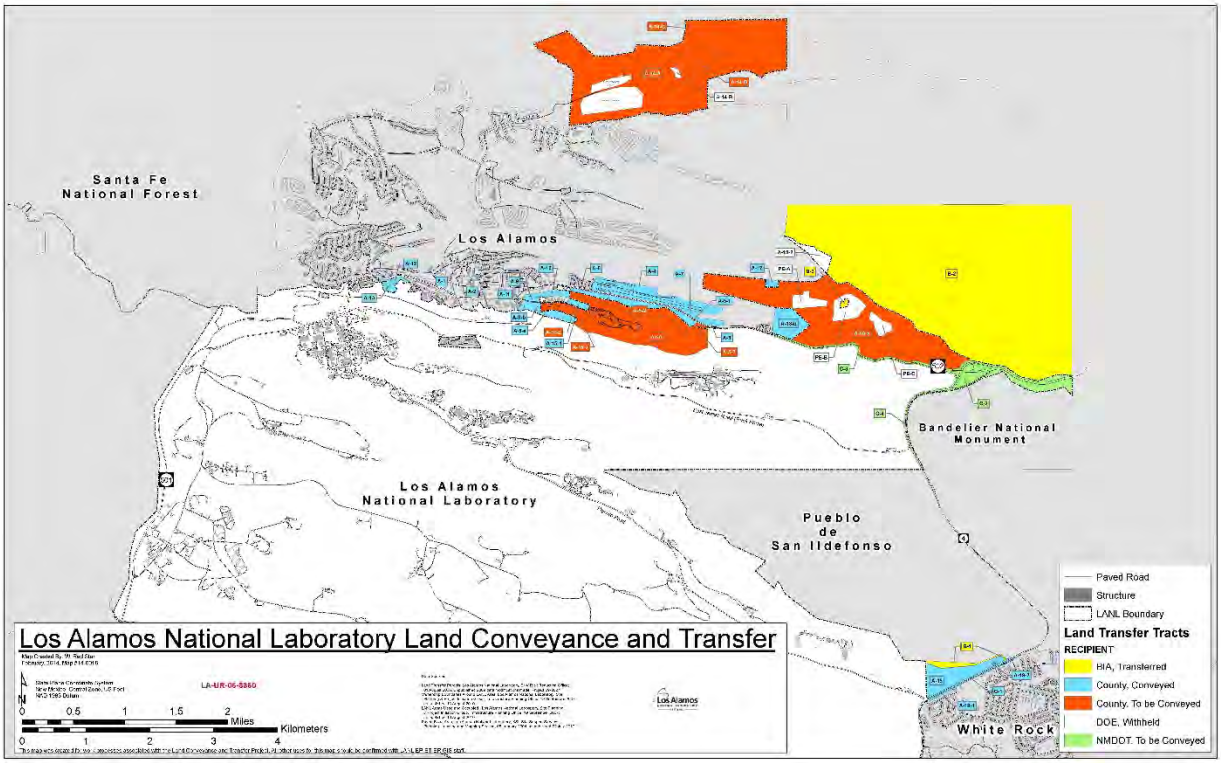


Figure 7.1 Locations of Land Tracts

The four-year data recovery program resulted in the excavation of 39 sites and the collection of approximately 150,000 artifacts. Limited site eligibility testing was also conducted at nine archaeological sites. The excavations included 2 Archaic lithic scatters; 3 Coalition-period roomblock habitation sites, one of which also had extensive Archaic lithic materials and a grid garden in the vicinity; 25 Coalition- to Classic-period one- to three-room structures (identified as fieldhouses based on the excavation data); 2 sets of Classic-period grid gardens; 4 multicomponent lithic and ceramic scatters; 2 late nineteenth century Apache tipi ring sites; and a historic homestead.

Land Conveyance and Transfer Project and the CRMP

With the significant amount of detailed site information obtained from the excavations and subsequent artifact and sample analyses, the associated baseline studies, the various specialized studies, and the assessment of research questions, the Land Conveyance and Transfer Project data recovery program is, and will continue to be, an invaluable asset for identifying, refining, and answering research issues that are essential for making historic property eligibility assessments and for the long-term management of LANL's cultural resources. The project findings have directly contributed to the understanding and refinement of Pajarito Plateau culture history (Section 5), the types of historic properties present at LANL (Section 6), archaeological site significance and eligibility standards (Appendix B), and other substantive aspects of the CRMP.

Part II. Section 106 Compliance

Section 8. Overview of Section 106

The Regulatory Section 106 Process Requirements

Section 106 requires federal agencies to take into account the potential effects of their undertakings on historic properties and affords the SHPO, THPO, tribes, local government representatives, and the public reasonable opportunities to comment. Where an undertaking will result in an adverse effect, the ACHP will also be afforded the opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in federal regulations at 36 CFR Part 800, and are summarized below.

Initiate Section 106 Process

The responsible federal agency, which at LANL is the DOE/NNSA Field Office, first determines whether it has an undertaking that could adversely affect historic properties. For this evaluation, historic properties are properties that are either included in the Register, that meet the criteria for the Register, or that await Register eligibility determinations. If the federal agency does have an undertaking, it must identify the appropriate SHPO/THPO, along with other appropriate tribal entities if there is no THPO, with whom to consult during the process. The federal agency should also plan to involve the public, local government officials, and identify other potential consulting parties. If the federal agency determines that it has no undertaking with the potential to adversely affect historic properties, the agency has no further Section 106 obligations.

Area of Potential Effects

The area of potential effects is the geographic area or areas that an undertaking may directly or indirectly effect the integrity, character, or use of historic properties. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. For example, at LANL, the introduction of physical, visual, or audible elements has the potential to adversely affect properties of religious and cultural significance to Indian tribes and cumulative effects can be an indirect effect.

Identify Historic Properties

If the federal agency's undertaking could adversely affect historic properties, the agency determines the scope of appropriate identification efforts and then proceeds to identify historic properties in the area of potential effects. The agency reviews background information, consults with the appropriate parties, seeks information from knowledgeable parties, and conducts additional studies as necessary. Districts, sites, buildings, structures, and objects listed in the Register are considered. Unlisted properties are evaluated against National Park Service published criteria at 36 CFR 60.4 (Listing Criteria), in consultation with the SHPO/THPO and any Indian tribe that may attach religious or cultural importance to those properties. The Listing Criteria are:

- **Criterion A** – Properties associated with events that have made a significant contribution to the broad patterns of history.

- **Criterion B** – Properties that are associated with the lives of persons significant in the past.
- **Criterion C** – Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- **Criterion D** – Properties that have yielded, or may be likely to yield, information important in prehistory or history.

In addition to these four Listing Criteria, there are seven criteria considerations that are taken into account in the evaluation of Register eligibility.

- **Criteria Consideration A –** A religious property is eligible if it derives its primary significance from architectural or artistic distinction or historical importance.
- **Criteria Consideration B** – A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event.
- **Criteria Consideration C** – A birthplace or grave of a historical figure is eligible if the person is of outstanding importance and if there is no other appropriate site or building directly associated with his or her productive life.
- **Criteria Consideration D** – A cemetery is eligible if it derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events.
- **Criteria Consideration E** – A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived.
- **Criteria Consideration F** – A property primarily commemorative in intent can be eligible if design, age, tradition, or symbolic value has invested it with its own historical significance.
- **Criteria Consideration G** – A property achieving significance within the past 50 years if it is of exceptional importance.

All historic properties identified within the area of potential effects need to be evaluated for Register eligibility. Additionally, where incomplete or prior evaluations, a new evaluation may be needed.

If the federal agency finds that no historic properties are present or affected, it provides documentation to the SHPO/THPO. Concurrently, the agency official must notify all consulting parties, including Indian tribes, and make the documentation available for public inspection prior to approving the undertaking. If the SHPO/THPO does not object to the agency finding within 30 days, the agency official's Section 106 obligations are fulfilled. However, if there is an

objection, the agency must consult with the objecting party to resolve the issue or the issue may be forwarded to the ACHP for a determination.

If the Listing Criteria are met, then there is a determination that a historic property may be effected by the undertaking and the agency official must notify all consulting parties, invite their views on the effects, and assess adverse effects pursuant to federal regulatory requirements.

Assess Adverse Effects

The federal agency, in consultation with the SHPO/THPO, makes an assessment of adverse effects on the identified historic properties based on criteria found in federal regulations at 36 CFR 800.5.

The federal agency, in consultation with the SHPO/THPO, may propose a finding of no adverse effect when the undertaking's effects do not meet the criteria at 36 CFR 800.5, or if the undertaking is conditioned or modified to avoid adverse effects.

If the consulting parties find that there is an adverse effect, or if the parties cannot agree and the ACHP determines within 30 days that there is an adverse effect, the federal agency begins consultation to seek ways to avoid, minimize, or resolve the adverse effects.

Resolve Adverse Effects and Implementation of MOA

The federal agency consults to resolve adverse effects with the SHPO/THPO and others, who may include Indian tribes, local governments, permit or license applicants, and members of the public. ACHP may participate in consultation when there are substantial impacts to important historic properties, when a case presents important questions of policy or interpretation, when there is a potential for procedural problems, or when there are issues of concern to Indian tribes.

Consultation usually results in an MOA or data recovery plan, which outlines agreed-upon measures that the federal agency will take—or cause the M&O contractor to take—to avoid, minimize, or resolve the adverse effects (see Section 9 below). In some cases, the consulting parties may agree that no such measures are possible, but that the adverse effects must be accepted in the public interest. If a MOA is executed, the federal agency, or at LANL the M&O contractor, proceeds with the undertaking pursuant to the terms and conditions of the MOA.

Failure to Resolve Adverse Effects

If consultation proves unproductive, the federal agency or the SHPO/THPO, or ACHP itself, may terminate consultation. If a SHPO terminates consultation, the federal agency and ACHP may conclude a MOA without SHPO involvement. However, if a THPO terminates consultation and the undertaking is on or affecting historic properties on tribal lands, ACHP shall comment as stipulated in 36 CFR Part 800. If the federal agency terminates consultation, it must submit appropriate documentation to ACHP and the head of the federal agency or an Assistant Secretary (or other officer with major agency-wide responsibilities) must request ACHP's written comments. The federal agency head must take into account ACHP's written comments in deciding how to proceed, and the process is non-delegable and must be documented by the agency head.

Tribes and the Public

Public involvement is a necessary component in Section 106 consultation, and the views of the public should be solicited and considered throughout the process. Federal regulations places major emphasis on consultation with Indian tribes and Native Hawaiian organizations. Consultation with an Indian tribe must respect tribal sovereignty and the government-to-government relationship between the federal government and Indian tribes. Even if an Indian tribe has not been certified by the National Park Service to have a THPO who can act for the SHPO on its lands, it must be consulted about undertakings on or affecting its lands on the same basis as and in addition to the SHPO. Because of LANL's specific location, tribal consultation is frequently required in Section 106 compliance.

Section 9. Section 106 Compliance Review Process at LANL

The LANL M&O contractor integrates cultural resource concerns/reviews into program and project planning in order to protect significant cultural resources and to avoid unnecessary delays, conflicts, and costs for its undertakings. The Field Office provides compliance oversight.

Through the Integrated Review Tool PR-ID and EX-ID project review system, LANL conducts approximately 700 to 800 reviews of proposed Laboratory projects each year. These projects range in size and complexity, from routine to specific activities like constructing new buildings, power lines, and utility corridors; repairing and replacing existing signs, paving, utility lines, fencing, and lightning protection; maintaining dirt and paved roadways; installing storm-water gauging stations; relocating sheds and trailers; performing environmental sampling and cleanup at specified areas; and designating pertinent facilities as excess property for eventual demolition.

Compliance reviews and all other work conducted in support of Section 106 at LANL must be, and are, performed by individuals meeting the professional qualification standards set forth in the Secretary of the Interior's Standards and Guidelines for Archaeology and Preservation (48 Federal Register 44716, and 44737).

How LANL Cultural Resources Personnel Receive Undertakings for Section 106 Compliance Reviews

PR-ID reviews are required for all new or modified projects. DOE and LANL cultural resources subject-matter experts receive notification of projects, or undertakings, in several ways. Project notification occurs most commonly through LANL's Integrated Review Tool process. Notifications are also occasionally received through phone calls and email messages. LANL cultural resources subject-matter experts review all areas of potential effect for each of these projects—first for accuracy of the location of the project area and then for potential impacts to both archaeological and historical resources, including historic buildings.

The PR-ID process is an institutional tool used to identify and manage potential impacts and compliance issues from proposed or ongoing projects. Among these projects are new construction, programs, and processes; environmental cleanup; experiments; road blading; maintenance and upgrading facilities; and the decontamination, decommissioning, demolition, or shutdown of facilities. Project personnel complete a PR-ID form, which is then posted on a website for designated LANL subject-matter experts to review and comment. Subject-matter experts review the PR-IDs for numerous potential impacts, including impacts to the environment,

cultural resources, threatened and endangered species, wetlands, created outfalls, potential release sites, and solid waste management units. They also review the PR-IDs for the generation of airborne emissions, new waste streams, and impacts to water quality.

The EX-ID review process is another component of the LANL work-control program. EX-ID permit requests are required for all Laboratory ground-disturbing activities and are reviewed for potential impacts to worker health and safety, the environment, cultural resources, utilities, potential release sites, and solid waste management units, or for impacts that would result in unpermitted disposal of hazardous waste. These requests go through a review process by subject-matter experts similar to that defined above for the PR-ID process.

Identification, Inventory, and Evaluation

LANL cultural resource staff identifies historic structures and properties during field surveys and records site and building information using standardized forms. Historic properties include archaeological sites, traditional cultural properties, buildings, structures, experimental areas, and discrete groupings of buildings or archaeological sites. LANL cultural resource staff evaluate these properties for Register eligibility employing the criteria for listing in the Register as well as LANL-specific contexts and themes. The Field Office Cultural Resources Program Manager provides the SHPO with documentation for properties which have been determined eligible and ineligible for the Register and requests the SHPO's concurrence. Given the national significance of LANL's Cold War history, cultural resources less than 50 years of age (i.e., constructed between 1967 and 1990 [the end of the Cold War]) may be eligible as exceptionally significant as defined in 36 CFR Part 60, Criterion A, Consideration G.

LANL-Specific Section 106 Procedures

Federal law allows for developing a programmatic agreement for agency program and for complex or multiple undertakings. In April 2000, a Programmatic Agreement (MOU DE-GM32-00AL77152) was executed between the Field Office, the ACHP, and the New Mexico SHPO for the purpose of specifying and streamlining the management of historic properties at LANL under Section 106 and Section 110. The 2000 Programmatic Agreement was effective for five years. In June 2005, the 2000 Programmatic Agreement was extended for one additional year by agreement of the signatory parties. In 2006, the LANL M&O contractor completed, and the Field Office accepted, LANL's first CRMP LA-UR-04-8964 (2006 CRMP). The Field Office, SHPO, and ACHP entered into a new 2006 Programmatic Agreement (LA-UR-06-1975) that replaced the 2000 Programmatic Agreement to allow the M&O contractor to self-administer some aspects of cultural resource compliance pursuant to the process outlined in the 2006 CRMP. The duration of the 2006 Programmatic Agreement was for five years, with a five-year extension option. In 2012, the SHPO, the Field Office, and the ACHP extended the 2006 Programmatic Agreement. In 2015, a new programmatic agreement was signed by the Field Office, SHPO, and ACHP. This programmatic agreement expired after one year, but was extended by amendment to July 31, 2017. In 2017, the Field Office, ACHP, and SHPO entered into a new PA with a duration of five years. The core LANL-specific Section 106 procedures are summarized in Charts 9.1 and 9.2.

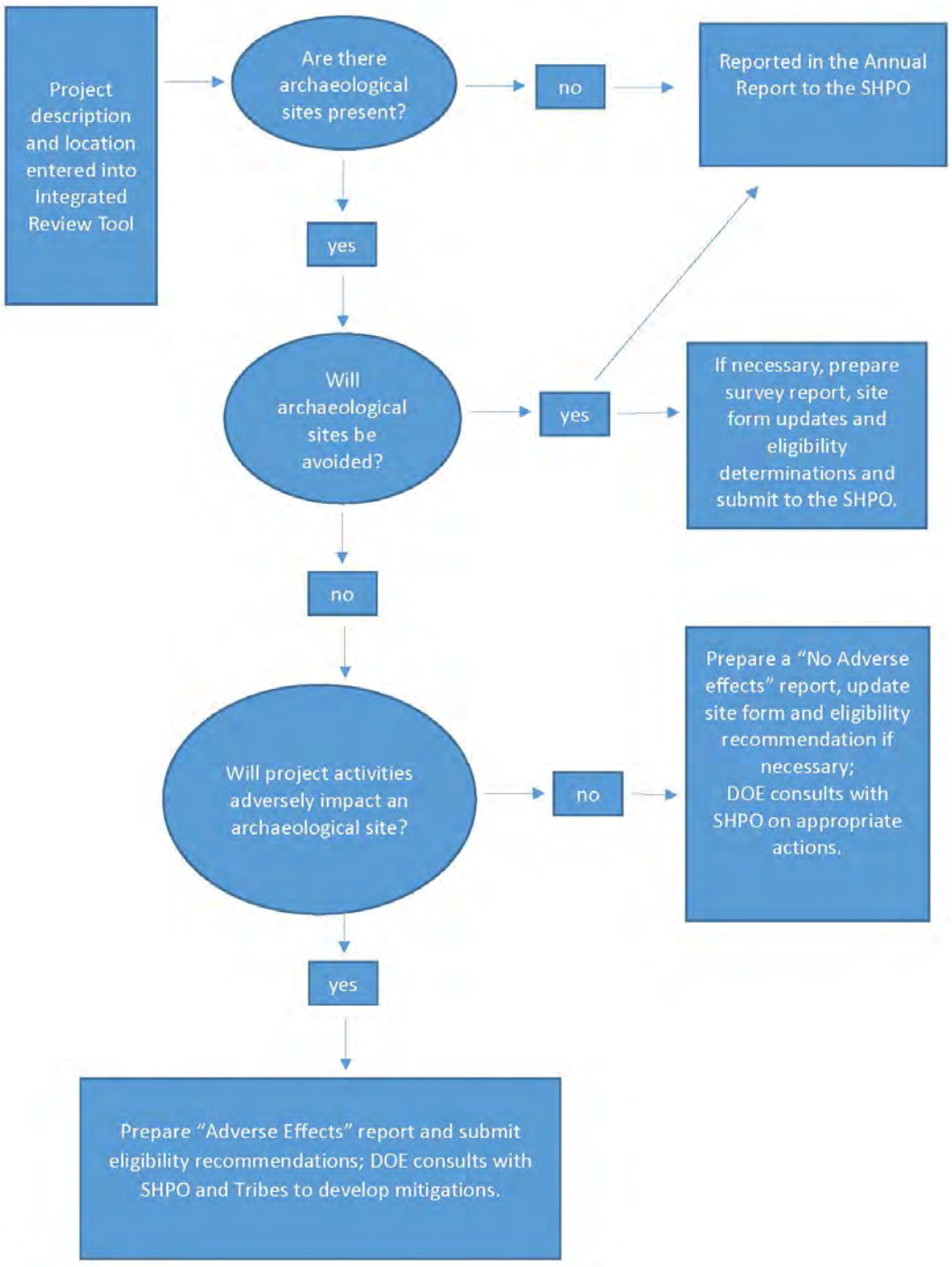


Chart 9.1 LANL-specific Section 106 process for archaeological sites

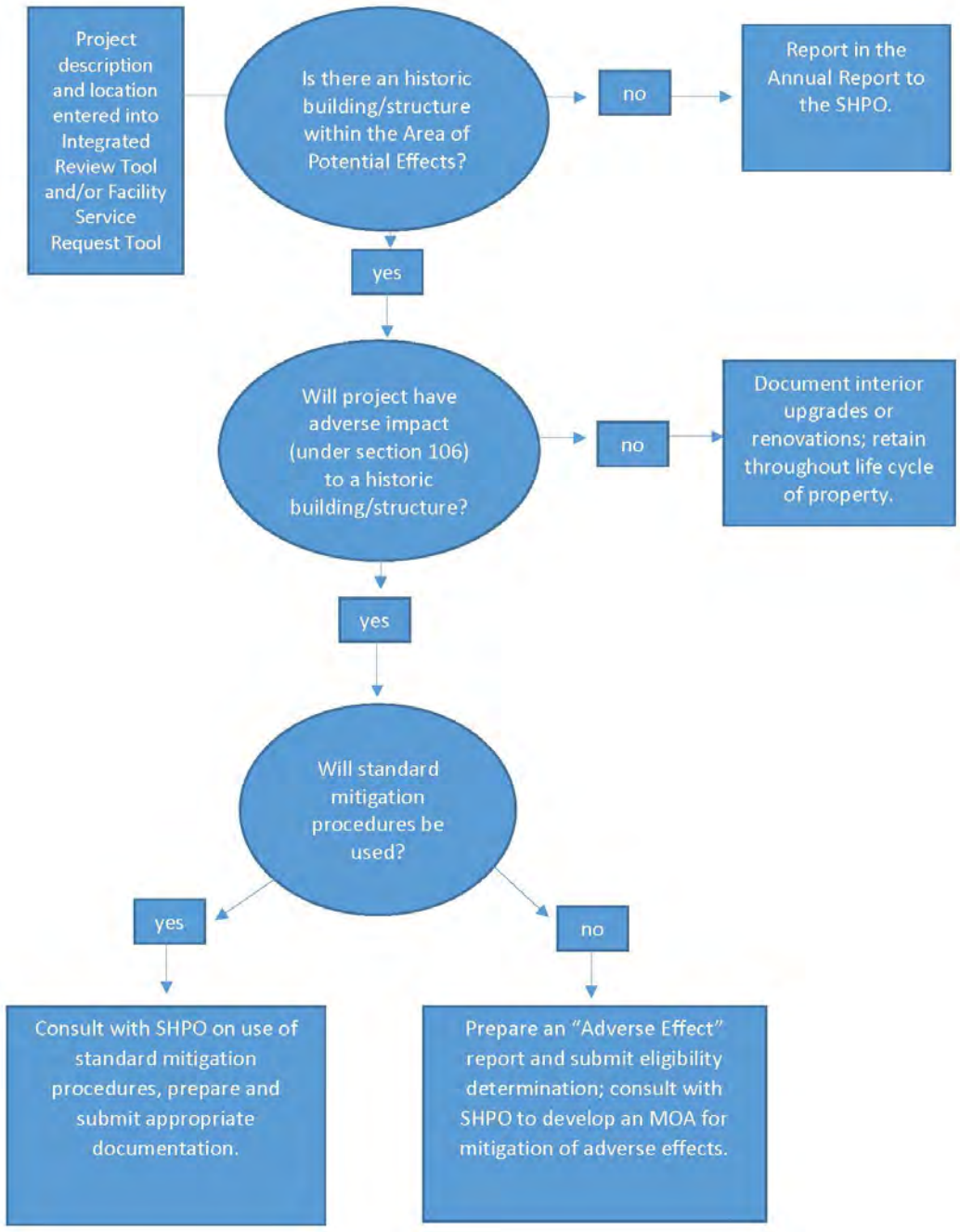


Chart 9.2 LANL-specific Section 106 process for historic buildings

The CRMP for LANL allows qualified M&O contractor staff to make internal assessments, when there may be an adverse effect under a proposed project, rather than requiring an immediate full Section 106 process, and exempts certain types of undertakings, property types, and archaeological sites from the Section 106 process. A key component of M&O contractor staff early involvement in project planning is to facilitate project plans so that they can avoid creating impacts to cultural resources. The M&O contractor makes recommendations that are reviewed by the Field Office. The Field Office then makes the determination of eligibility. The Field Office submits this determination to the SHPO for concurrence. Where an adverse effect is found and cannot be avoided, the programmatic agreement and CRMP provides for some standard mitigations to the adverse impacts. However, for most adverse effects, the Section 106 process described in Section 8 above must be followed.

Ineligible Archaeological Site Categories

The following archaeological site categories at LANL are deemed ineligible for inclusion in the Register provided they have been potentially eligible under Criterion D only and that the archaeological data (i.e., 100-percent collected) are either inaccessible or lost: previously completely excavated sites, destroyed sites, and 100-percent collected artifact scatter sites, or artifact scatter sites that have been substantially collected (i.e., early archaeological research and sites collected by the Pajarito Archaeological Research Project). Eligibility for sites that have been substantially collected will be evaluated on a case-by-case basis.

Undertakings Not Requiring Further Section 106 Review

All undertakings, including undertakings not requiring additional Section 106 review, are initially reviewed through the Integrated Review Tool or the Facility Service Request system by LANL M&O contractor cultural resource staff. However, certain activities or undertakings are exempt from further cultural resource management review, provided that: (a) they do not affect or have the potential to affect those qualities or setting that make a historic property eligible for the Register, and (b) that they do not involve ground-disturbing activities. Ground disturbance is defined as any activity that compacts or disturbs the ground within an area that has not been previously disturbed and contains no cultural deposits. If the activities do not meet these provisions, the Field Office will consult with the SHPO. Upon initial review by qualified cultural resources staff, the following may be excluded from further review:

- Pavement milling, overlay, chip seal, or rehabilitation on existing roads when the typical section is not increased to include new shoulders or travel lanes
- Routine maintenance on existing fire roads and fire breaks that were historically bladed through historic properties where no intact cultural deposits remain or in areas that have had gravel/base course placed over remaining cultural deposits
- Replacement or removal of general equipment of facility components
- Installation, maintenance, repair, storage, relocation, removal, or replacement of process or laboratory equipment and associated systems
- Siting, installation, maintenance, repair, removal, and operation of plant water systems

- Siting, installation, maintenance, repair, removal, or replacement of plant and building electrical systems
- Siting, installation, maintenance, repair, removal, or replacement of communications and computer systems
- Routine service activities such as mowing and trimming grass, shrubs, or trees; moving furniture and equipment; snow removal; erosion control; housekeeping services; small-scale road, sidewalk, and parking-lot repair; maintenance and repair of vehicles and equipment, non-historic fencing and signs; maintenance of safe/vaults and locks; and routine decontamination of tools, surfaces, and equipment
- Operation and maintenance of waste treatment, storage, and disposal facilities
- Maintenance or repairs of structures or buildings
- Installation, maintenance, repair, or replacement of equipment used in current operations designed to maintain compliance with permits and Occupational Safety and Health Act regulations and Americans with Disabilities Act regulations
- Installation and maintenance of features for hazard prevention of equipment, buildings, and structures
- Installation, maintenance, removal, and repair of security systems
- Installation, maintenance, removal, repair, or replacement of heating and air conditioning systems (when the system will be replaced in-kind)
- Modifications to steam condensate systems and chemical treatment systems
- Routine upgrades and modifications to fire protection systems
- Removal of asbestos-containing materials from existing buildings and structures
- Removal of polychlorinated-biphenyl-contaminated items
- Installation or modification of personnel safety systems

Property Types Requiring No Formal Documentation

The following property types are exempt from Register evaluation. However, all undertakings that include these property types are reviewed through the Integrated Review Tool by LANL M&O contractor cultural resource staff meeting federal qualification standards. If any of these property types exhibit significant architectural or engineering features, or are associated with a National Register-eligible site or district the Field Office will document and consult with the SHPO on the undertaking.

- Structures with minimal or no visible surface manifestations (i.e., pits; underground storage tanks; buried material disposal areas; septic tanks; underground pipelines; sewer lines; and steam, storm-water, acid, or electrical manholes)

- Aboveground fuel and water tanks
- Wells and boreholes
- Road-block barriers
- Transformer and pressure-relief-valve stations
- Mobile trailers and modular buildings and enclosures—these structures are used either as mobile trailers that are moved on-site, or pre-manufactured sides and roofs typically resting on poured concrete pads. They serve as temporary administrative support office space or storage facilities.

No Historic Properties Affected

Those undertakings determined to have no direct or indirect effect on historic properties because no eligible and/or potentially eligible (unevaluated) properties are present in the area of potential effects will be allowed to proceed. These will be reported on an annual basis to the SHPO with the survey report available for review and comment. The report will be submitted to the SHPO within six (6) months of the survey for review and comment.

Undertakings that have no direct or indirect effect because eligible and/or potentially eligible (unevaluated) properties within the area of potential effects will be avoided by project activities, will also be allowed to proceed. Previously unevaluated properties will be reported to the SHPO with the documentation available for review and comment. A survey report and associated forms for archaeological sites and/or historic structures will be submitted if the area of potential effects has been previously unsurveyed. Documentation will be entered into the New Mexico Cultural Resource Information System (NMCRIS) and submitted to the SHPO within six (6) months of the survey. If the process exceeds six (6) months, the Field Office will notify the SHPO to consult on and determine a new deadline.

If SHPO has questions or concerns about the documentation or the findings of eligibility and effect, the SHPO will provide comments to the Field Office. The Field Office will take these comments into consideration on future similar cultural resources and/or projects.

No Adverse Effect Undertakings

Archaeological Sites

If an undertaking has no adverse effect, the Field Office will consult with the SHPO and notify Indian tribes and consulting parties pursuant to 36 CFR 800.5(c).

Historic Buildings and Structures

The interior remodeling or renovation of Register-eligible properties are subject to review through the Integrated Review Tool. The modifications or renovations that support the continued LANL mission will be considered to have no adverse effect providing the renovations do not have the potential to effect those qualities that make the property eligible. Interior remodeling or renovations of Register-eligible properties will be subject to Secretary of the Interior-qualified cultural resource staff review (through the Integrated Review Tool process). Archival-quality digital photographs will be taken of the interior of the property prior to commencement of work.

Upgrades, remodeling, or renovation to the exterior of Register-eligible buildings will be subject to Secretary of the Interior-qualified cultural resource staff review and will be allowed to proceed provided that the modifications do not affect or have the potential to affect those qualities that make a historic property eligible for the Register. The Field Office will consult with the SHPO on these undertakings.

Upgrades, remodeling, or renovation will require archival quality photographic documentation of the present condition, review of historic photographs, and the collection of architectural plans and drawings. These documents and photographs will be compiled and maintained at LANL throughout the life cycle of the property.

Adverse Effect Undertakings

For all undertakings determined to have an adverse effect to an eligible property, the Field Office will develop a plan to resolve the adverse effect. This plan may include but is not limited to: (1) modifying the undertaking to avoid the property, (2) modifying the undertaking to minimize the adverse effect, (3) completely documenting the property if the property is a building or structure, and/or (4) partially or completely excavating an archaeological site for data recovery. If standard procedures are not used, an MOA will be developed between the Field Office and the SHPO to resolve the adverse effects.

For undertakings that may affect Register-eligible historic and/or prehistoric archaeological sites, the Field Office will follow the Section 106 process and the procedures contained in 36 CFR 800.5–800.6, with the following exceptions: (1) adverse effects to surface historic trash scatters and (2) prehistoric artifact scatters and rock features on bedrock and/or secondary contexts. These two cases will be reviewed and resolved in consultation with the SHPO and as outlined below, with the following data-recovery procedures carried out in lieu of procedures set forth in 36 CFR Part 800.

Isolated trash scatters are historic sites that are temporally associated with the Homestead to Cold War periods (1890 to 1990), but are not physically associated with any homestead feature, patented homestead site, or Manhattan or Cold War facility and may have limited research information potential. Isolated trash scatters typically represent remote dumping activities and may even compose a single dumping event. Data recovery will include a detailed recording of the site (if not already done) and the analysis of surface artifacts (carried out in the field unless additional information would be gained through subsequent laboratory analysis). Results of any data-recovery project carried out under this provision will be reported to the SHPO.

Prehistoric artifact scatters represent activity areas that on the Pajarito Plateau are primarily associated with the Archaic period (5500 BC to 600 AD lithic scatters) or the Ancestral Pueblo period (AD 600 to 1600 AD lithic and/or ceramic scatters). Isolated rock features are frequently of unknown cultural affiliation. Prehistoric artifact scatters and isolated rock features situated on bedrock will be mitigated through in-field data recovery. With the limited data potential resulting from the proximity to bedrock and/or secondary context, the information content of these sites will be exhausted through in-field analysis and site recordation. Data recovery will include site recording and an in-field analysis of artifacts. Should there be potential for additional information to be gained through subsequent laboratory analysis, limited numbers of artifacts may be collected. Data recovery of rock features will consist of a precise description of the

feature, a site sketch, photographs, and in-field analysis of any associated artifacts. Collection and subsequent laboratory analysis may be conducted for artifacts with the potential to yield additional information. Native American organizations will be consulted concerning the potential of these sites to be traditional cultural properties. Results of any data-recovery project carried out under this provision will be reported to the SHPO.

Adverse effects to Register-eligible buildings and structures will be resolved through consultation with the SHPO and according to the procedures listed below, except for those historic buildings and structures deemed Candidates for Preservation and discussed in Section 10. Notification of the intent to implement the following standard procedures resolving adverse effects will be sent to the SHPO and the ACHP, and will include information related to the nature of the adverse effect and the building or structure's historic function and level of significance.

Demolition or Major Remodeling

The following documentation will be conducted before demolition or major remodeling begins:

1. The interior and exterior of the building or structure will be photographed. Archival-quality digital photographs will be produced.
2. Historically significant equipment and artifacts associated with historic properties will be identified and fully documented before removal or demolition, and curation of these items will be coordinated with Bradbury Science Museum staff. The Bradbury Science Museum is a Field Office-owned facility. These artifacts may have interpretive or educational value as exhibits within local, state, or national museums and will be curated, as appropriate, at LANL. The identification and archiving of extant historical records will be coordinated with LANL archives or records management personnel, as appropriate.
3. A listing of all LANL drawings for the property will be compiled, and an 11 ×17 copy of the selected reduced-scale key drawings will be submitted to the SHPO. If available, drawings and technical schematic plans depicting any significant instrumentation or equipment historically housed in the property will be submitted (note: significant experiments or engineering systems may be candidates for additional documentation). Documentation will include a map showing the location of the property relative to the entire LANL property. Additionally, the general site area will be documented so that there will be a permanent archival record of the history and appearance of the technical area where the property is located. A LANL technical area is a geographically-defined administrative unit within LANL. A site map will also be generated depicting, at a sufficient scale, the footprint of each eligible and non-eligible building or structure within the associated technical area. A series of historic site maps, representing the technical area's construction history, will also be included.
4. A written history will be prepared and will include a use history of the eligible property supplemented with information from oral interviews. This use history will include a discussion of the associated technical area's role at LANL, its historical significance, and a comparison of its mission with similar missions historically conducted at Los Alamos or at other DOE Manhattan Project or Cold War facilities, as applicable. LANL historic

building survey forms, with representative drawings and photographs, will also be included.

5. A final report with all associated documentation will be submitted to the SHPO within twelve (12) months after the undertaking is complete. Archival photographic prints will be retained at LANL and digital photo files will be stored on a LANL server.

Mission Changes / Building Closure

Mission change is defined as a new use not related to the original historic function of the building.

Closure undertakings involving buildings are typically known as Cold & Dark or Cool & Dim projects and often include the relocation of personnel, the abandonment of records, and the removal or salvaging of equipment, experiments, and other interior fixtures. Cold & Dark projects usually involve permanently disconnecting power and other utilities. Neglect of a Register-eligible or potentially eligible (unevaluated) property which causes its deterioration is an adverse effect under federal law, per 36 CFR 800.5(2)(vi). Properties that are Cold & Dark or Cool & Dim are especially susceptible to demolition by neglect. To avoid an Adverse Effect, monitoring, sustained maintenance and repair of these properties is necessary.

The following documentation will be compiled and maintained by DOE throughout the life cycle of the property:

1. Before significant mission changes or building closure activities, the interior and other affected areas of the building or structure will be photographed. Archival-quality digital photographs will be produced.

2. Historically significant equipment and artifacts associated with historic properties will be identified before the shutdown, and curation of these items will be coordinated with Bradbury Science Museum staff. These artifacts may have interpretive or educational value as exhibits within local, state, or national museums and will be curated, as appropriate, at LANL. The identification and archiving of any extant historical records will be coordinated with LANL archives or records management personnel, as appropriate.

3. A list of former workers will be compiled, especially those individuals with institutional knowledge of historical facility operations. Oral interviews will be conducted as appropriate.

Negative Archaeological Surveys

Archaeological surveys conducted in a previously unsurveyed portion of the Laboratory may result in a negative finding. LANL maintains spatial and tabular site and survey data in its corporate database of LANL sites. Data will be entered into NMCRIS upon completion of the survey and LANL will provide information documenting negative surveys to the SHPO within six (6) months of survey completion.

LANL-Specific Section 106 Reporting and Communication

Email Communication

Formal consultations between the SHPO and the Field Office will be completed by a letter on Field Office letterhead and may be sent electronically to nm.shpo@state.nm.us with a copy sent to the appropriate SHPO staff reviewer. Larger files will be sent via regular mail, or will be hand delivered to the SHPO office. The purpose of formal consultation is to afford the SHPO the opportunity to comment and for the Field Office to make informed decisions while building their records for the undertaking.

Annual Report to SHPO

The Field Office will prepare and submit an annual report to the SHPO by January 15 each calendar year. The report will include succinct information on:

- List of No Historic Properties Affected and reason for the determination
- No Adverse Effect undertakings involving mission-related upgrades to buildings and structures.
- List of legacy reports completed and number of reports remaining

The annual report will be in table format and will include the following types of information as appropriate:

- Review date or date of action
- Project title with brief description of the project technical area
- LA (Laboratory of Anthropology) number or LANL building number
- Site type/building type
- Site affiliation/date built
- Site/building location

Section 10. Management of Historic Buildings and Structures at LANL

The CRMP defines a number of steps and goals for evaluating and managing the post-1942 historic built environment at LANL in compliance with Section 106 and Section 110. Key elements include development of historic contexts, an oral history program, public outreach and interpretation, and the continuation of a LANL-wide historic properties identification and evaluation effort, prioritized by the risk to historic properties from mission-related activities.

Management of post-1942 historic built environment through this CRMP is intended to be flexible and subject to periodic review and revision. The CRMP functions as a framework for both short- and long-term management actions related to historic properties.

Historic Buildings and Structures Assessment Process at LANL

As discussed above in Section 9, there are several types of buildings and structures that are exempt from evaluation requirements. Nonexempt buildings and structures at LANL, dating from 1942 to 1990 are currently being identified and evaluated for effects from proposed Laboratory undertakings. Because of the national significance of LANL's Cold War activities, properties less than 50 years of age may be identified and evaluated for their exceptional significance as defined in Criteria Consideration G. These include the most significant operating facilities at LANL, some of which are key facilities identified in the 2008 LANL SWEIS (DOE 2008). The historic built environment at LANL includes, but is not limited to, buildings, structures, experimental areas, and discrete groupings of built environment features considered together as historic districts.

Register Eligibility Assessments

To date, not all LANL buildings constructed during the Manhattan Project and Cold War years listed in the CRMP (1942 to 1990) have been evaluated for inclusion in the Register. Until evaluations are made, these buildings and structures must, under federal law, be treated as if they are eligible.

Evaluation efforts are based on the application of the federal criteria for eligibility provided in 36 CFR 60.4. In general, buildings and structures must be 50 years old or older and meet at least one of the four criteria of eligibility to be eligible for inclusion in the Register. Occasionally, a property, although less than 50 years old, is associated with an event of exceptional significance and can be eligible for the Register under Criteria Consideration G, "exceptionally important properties that have achieved significance within the last fifty years."

Initial eligibility assessments include both historical background information and property descriptions. The assessment reports also include location maps, photographs, and current floor plans of properties. The documentation of historic properties and associated equipment is conducted in two stages: field visits and historical research. During the initial field visit, resources management staff document each property's architectural and engineering elements as well as the property's setting. The exterior and interior of the properties are described, the relationship between the property and the physical environment is documented and included on the LANL historic building survey form. Representative views of the properties are digitally photographed, significant equipment is noted, and overall physical integrity is determined.

In addition to the field visits, LANL M&O contractor staff conducts research regarding the history of operations at each property. Research sources include as-built and historic engineering records, information provided by current and former site workers, documents housed at the LANL records center and archives, and historic LANL photographs. Photographic resources may include general facility photographs, aerials, and photographs of experiments.

The Field Office completes eligibility assessment reports for transmittal to the SHPO for review and concurrence.

Integrity

Integrity is the ability of a property to convey its significance. Eligibility assessment reports will include evaluation of the property's integrity, as described in National Register Bulletin 15 (NPS 2002).

The Role of Historical Contexts in Eligibility Assessments

LANL cultural resources managers are currently conducting Multiple Property evaluations of Manhattan Project and Cold War-era facilities in support of the Field Office's Section 106 and 110 compliance process. Short- and long-term planning decisions at LANL—coupled with the scheduled decontamination, decommissioning, and demolition of aging and obsolete facilities—are key factors in the decision to evaluate LANL's historic properties as a contextually related grouping of buildings and structures and not, as has been carried out in the past, on an individual basis.

A key element of Multiple Property documentation is the development of a historical context. Contexts provide information about historical patterns and trends and identify themes, geographical areas, and chronological periods. In order to determine Register significance, LANL properties are viewed in light of their associated historical contexts and themes. The Multiple Property documentation and its contextual emphasis is an even more important evaluation tool when a determination of exceptional significance is being considered for a property built in the last 50 years (Criteria Consideration G). LANL has developed site-wide contexts covering the Manhattan Project era (1942–1946) and the Cold War (1947–1990) (McGehee et al. 2003a, Machen et al. 2010). Other LANL Multiple Property assessment reports contain historical context information specific to World War II and Cold War technical areas and facilities.

DOE site-wide contexts that have strong associations with LANL's Cold War mission include Nuclear Weapon Components and Assembly; Nuclear Weapon Design and Testing; Nuclear Propulsion; Peaceful Uses: Plowshare, Nuclear Medicine, Nuclear Energy, and Nuclear Science; and Energy and Environment. Because of the complexity of subthemes associated with LANL's primary Cold War context (Nuclear Weapons Research and Development), this context statement is being completed in two phases. The first phase, an umbrella context document, was completed in 2011 (Machen et al. 2010). The umbrella context presents general chronological and geographical information, identifies historical trends, and places local activities in a broader national context. The umbrella document also lists properties that are potentially associated with the overall context statement and, most importantly, identifies the key LANL themes. The second phase will consist of specific thematic documents. Two examples of thematic documents are related to the LANL themes and subthemes of Weapons Research, Development, Testing, and Stockpile Support-Security; and Biomedical/Health Physics-Radiation Effects on Humans/Animals (Garcia et al. 2015a, Garcia et al. 2015b). Thematic documents are more in-depth historical discussions of identified themes, emphasizing local historical patterns, trends, and interrelationships. Ultimately, local themes will also be placed within the broader history of LANL, the DOE, the nation, and the world.

Identified LANL themes and subthemes, many spanning both the Manhattan Project and Cold War periods, are listed below.

- **Weapons Research, Development, Testing, and Stockpile Support:** Atomic Bomb, Hydrogen Bomb, Technical Development (HE, Initiators, Detonators, Limited Production), Pacific Testing, Nevada Test Site Testing, Treaty Verification, and Nuclear Safety and Security
- **Supercomputing:** ENIAC, Monte Carlo, MANIAC, Stretch
- **Reactor Technology:** Clementine, LOPO, SUPO, HYPO, Omega West, LAMPRE, UHTREX, KIVA, Godiva, Rover/Nuclear Propulsion
- **Biomedical/Health Physics:** Radiation Effects on Humans/Animals, Fatalities, Standards, Exposure Limits, Shielding, Bioassay, Remote Handling, Medical Isotopes
- **Strategic and Supporting Research:** Nuclear Science, Pioneering Physics, Energy Research
- **Environment / Waste Management*:*** Material Disposal Practices, Waste Management, Cleanup, Demolition and Decommissioning
- **Administrative and Social History:** General Administration of Facility, Social Organization of Laboratory and Town, Security Practices, Civil Defense
- **Architectural History:** Construction and Demolition History, Architectural Styles

Detailed Procedure for Documenting the Historic Built Environment

Property Databases and LANL Facility Management Information
Various Field Office and LANL databases are used to gain information about a building. Available information usually includes construction dates, names of properties, original and current functions, and lists of schematic drawings for each property. LANL facility databases also have information about the original name and number of a property (if it has changed through time), the builder, construction type and material, and additions and their construction dates.

Engineering Drawings
If available, drawings showing plot plans, elevations, floor plans, structural sections, roof details, and additions are used. Drawings undergo a classification review before inclusion in written compliance documentation.

Initial Background Research
Environmental Restoration Project Recovery Act Facility Investigation (RFI) work plans are consulted for information pertaining to the original function of a property, including any potential release sites in the area that are also indicators of the operations in the building or structure. During the 1990s, the Environmental Restoration Project conducted historical research on the operations taking place at different outdoor experimental areas as well as buildings. The RFI work plans and associated references are used as initial sources for historical background information.

Field Visits

Once initial background information is gathered, a walk-through of the facility is conducted. If possible, the walk-through is done in the company of a person knowledgeable of the history of the facility, such as a current or former site worker, as well as someone representing the proposed project. Digital photographs of the facility's exterior and interior are taken and reviewed by a LANL M&O contractor derivative classifier. The digital photographs are used in the initial historic building eligibility assessment report. Occasionally, photography is not allowed for security reasons.

An assessment of existing original equipment is conducted during the field visit. In the event that historically significant project equipment exists in a building, a walk-through of the facility is scheduled with representatives from the Bradbury Science Museum to see if there is anything that should be retained for future exhibits. Such equipment is stored at LANL's cultural resources facilities or the museum's warehouse. Classification reviewers evaluate items of interest for public display or loan to other institutions. Items removed from facilities are screened for contamination in accordance with the policies of the current facility management.

LANL Historic Building Survey Forms

The information from field visits, historical research, and engineering drawings are used to complete a historic building survey form (Figures 10.1, 10.2, and 10.3).

Historic Photographs

The Laboratory's photographic archives are searched for historic building photographs. These photographs are used in the eligibility assessment reports and in the final documentation reports.

Geographic Information System Maps

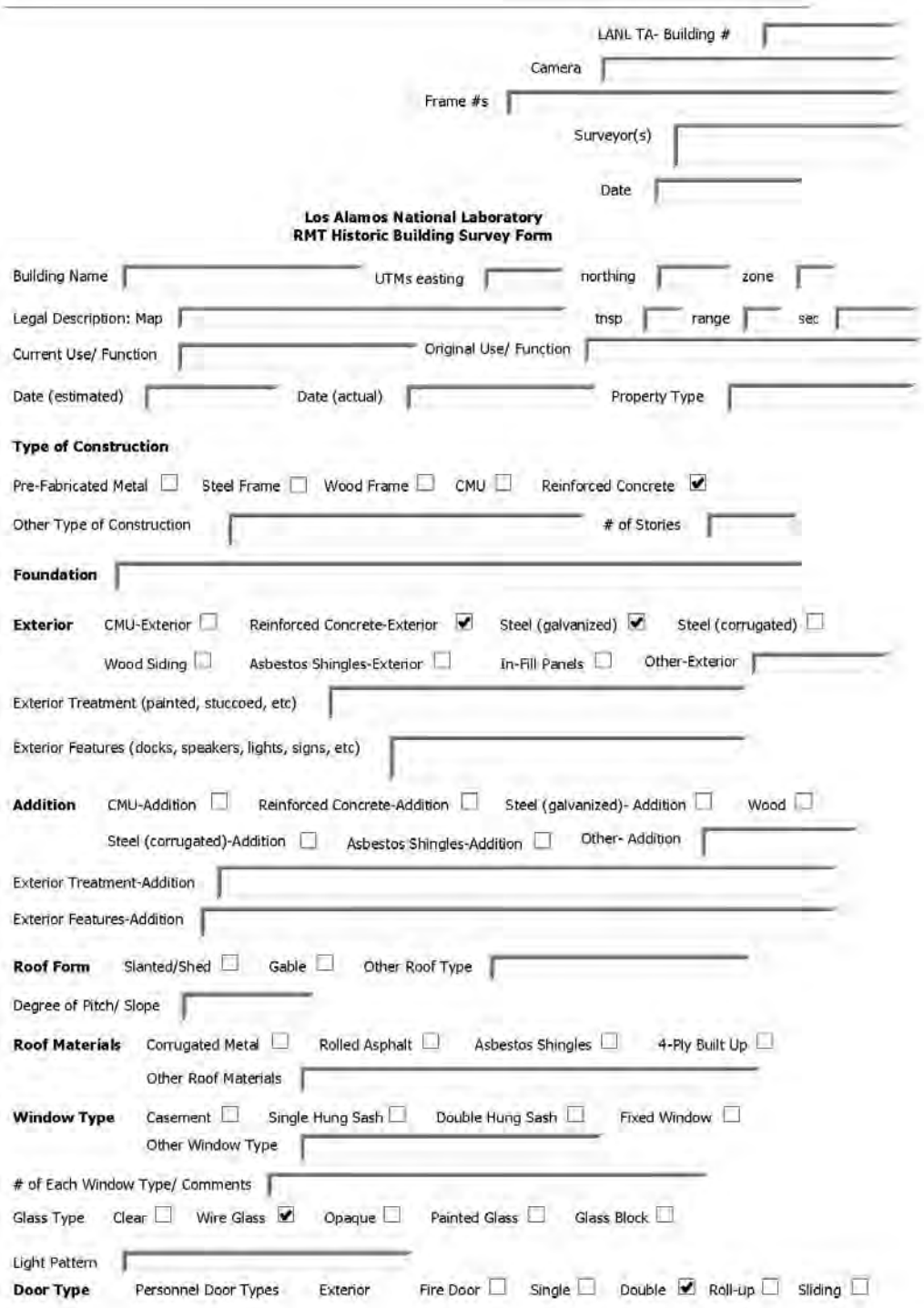
Cultural resources managers prepare Geographic Information System (GIS) maps as part of the building documentation process. These maps show the location of the building(s) within their specific LANL technical area and in relationship to the rest of the Laboratory.

Oral History Program

Whenever feasible, oral history interviews are conducted to supplement the historical documents, drawings, and photographs associated with the activities carried out in a historic property. Oral interviews of current and former site workers are conducted according to LANL security protocols and following professional oral history standards. Unless otherwise requested by the participant, interviews are recorded and notes are also taken. The recorded interviews are retained and archived at LANL, and interviews may be transcribed. Some of the information contained in the interviews may not be available for public dissemination. If appropriate, verbatim transcripts or interview notes are included in the appendixes of the final documentation reports. In most cases, information from the interview is also incorporated into the text of the report.

Historical Significance

In evaluating the historical significance and integrity of LANL properties, the Field Office examines (1) the use history (the original and current function), (2) the building's architecture, (3) the presence of any additions or modifications, and (4) the building's physical integrity. Oral interviews are conducted with site workers to evaluate historical significance and integrity. Information gathered through oral interviews conducted with site workers is also used in the evaluation of historical significance and integrity.



LANL TA- Building #

Camera

Frame #s

Surveyor(s)

Date

Los Alamos National Laboratory
RMT Historic Building Survey Form

Building Name | UTMs easting | northing | zone

Legal Description: Map | tnsp | range | sec

Current Use/ Function | Original Use/ Function

Date (estimated) | Date (actual) | Property Type

Type of Construction

Pre-Fabricated Metal ☐ Steel Frame ☐ Wood Frame ☐ CMU ☐ Reinforced Concrete ☑

Other Type of Construction | # of Stories

Foundation

Exterior CMU-Exterior ☐ Reinforced Concrete-Exterior ☑ Steel (galvanized) ☑ Steel (corrugated) ☐

Wood Siding ☐ Asbestos Shingles-Exterior ☐ In-Fill Panels ☐ Other-Exterior

Exterior Treatment (painted, stuccoed, etc)

Exterior Features (docks, speakers, lights, signs, etc)

Addition CMU-Addition ☐ Reinforced Concrete-Addition ☐ Steel (galvanized)- Addition ☐ Wood ☐

Steel (corrugated)-Addition ☐ Asbestos Shingles-Addition ☐ Other- Addition

Exterior Treatment-Addition

Exterior Features-Addition

Roof Form Slanted/Shed ☐ Gable ☐ Other Roof Type

Degree of Pitch/ Slope

Roof Materials Corrugated Metal ☐ Rolled Asphalt ☐ Asbestos Shingles ☐ 4-Ply Built Up ☐

Other Roof Materials

Window Type Casement ☐ Single Hung Sash ☐ Double Hung Sash ☐ Fixed Window ☐

Other Window Type

# of Each Window Type/ Comments

Glass Type Clear ☐ Wire Glass ☑ Opaque ☐ Painted Glass ☐ Glass Block ☐

Light Pattern

Door Type Personnel Door Types Exterior Fire Door ☐ Single ☐ Double ☑ Roll-up ☐ Sliding ☐

Figure 10.1 Historic building site form example

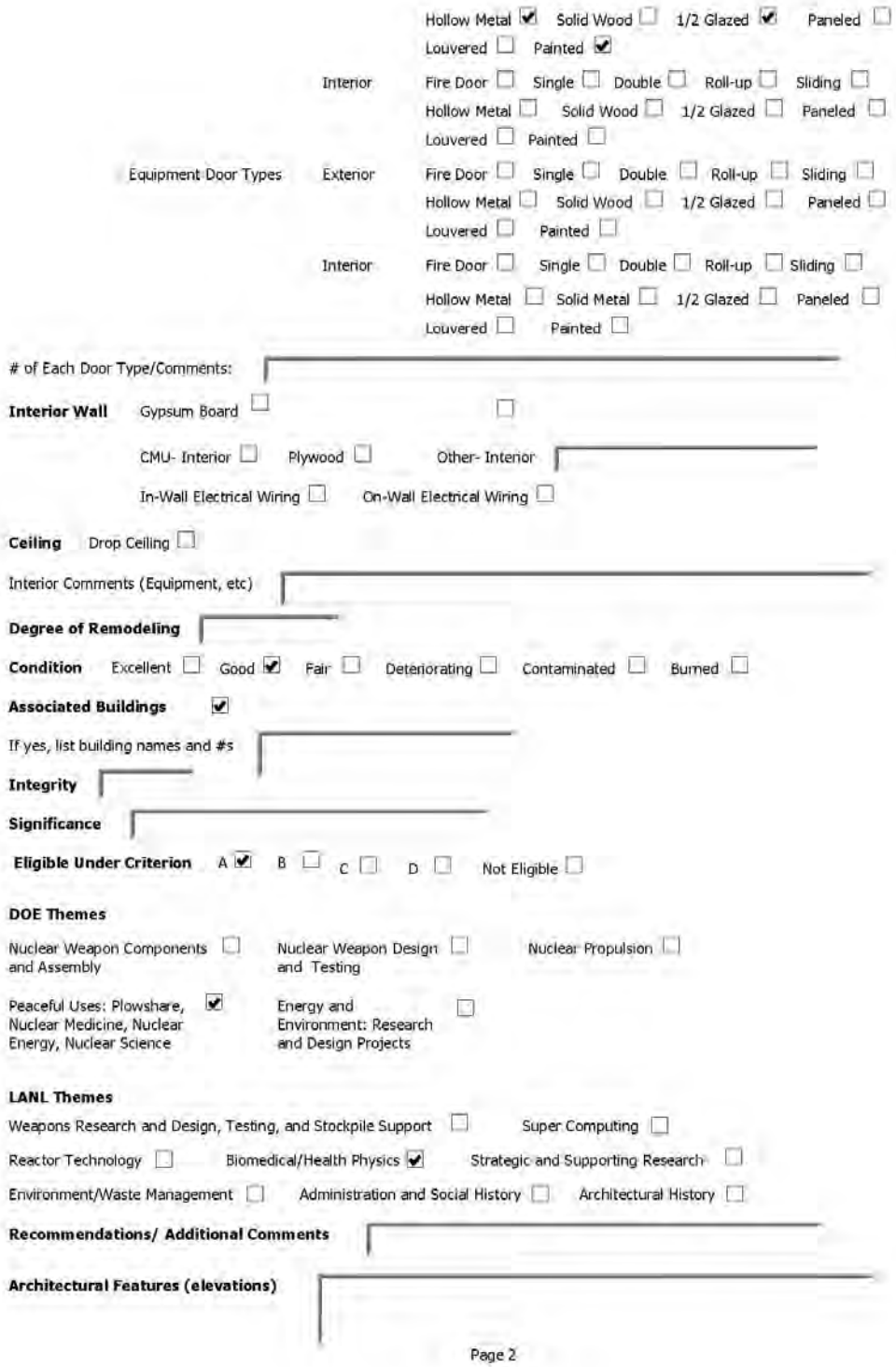


Figure 10.2 Historic building site form example

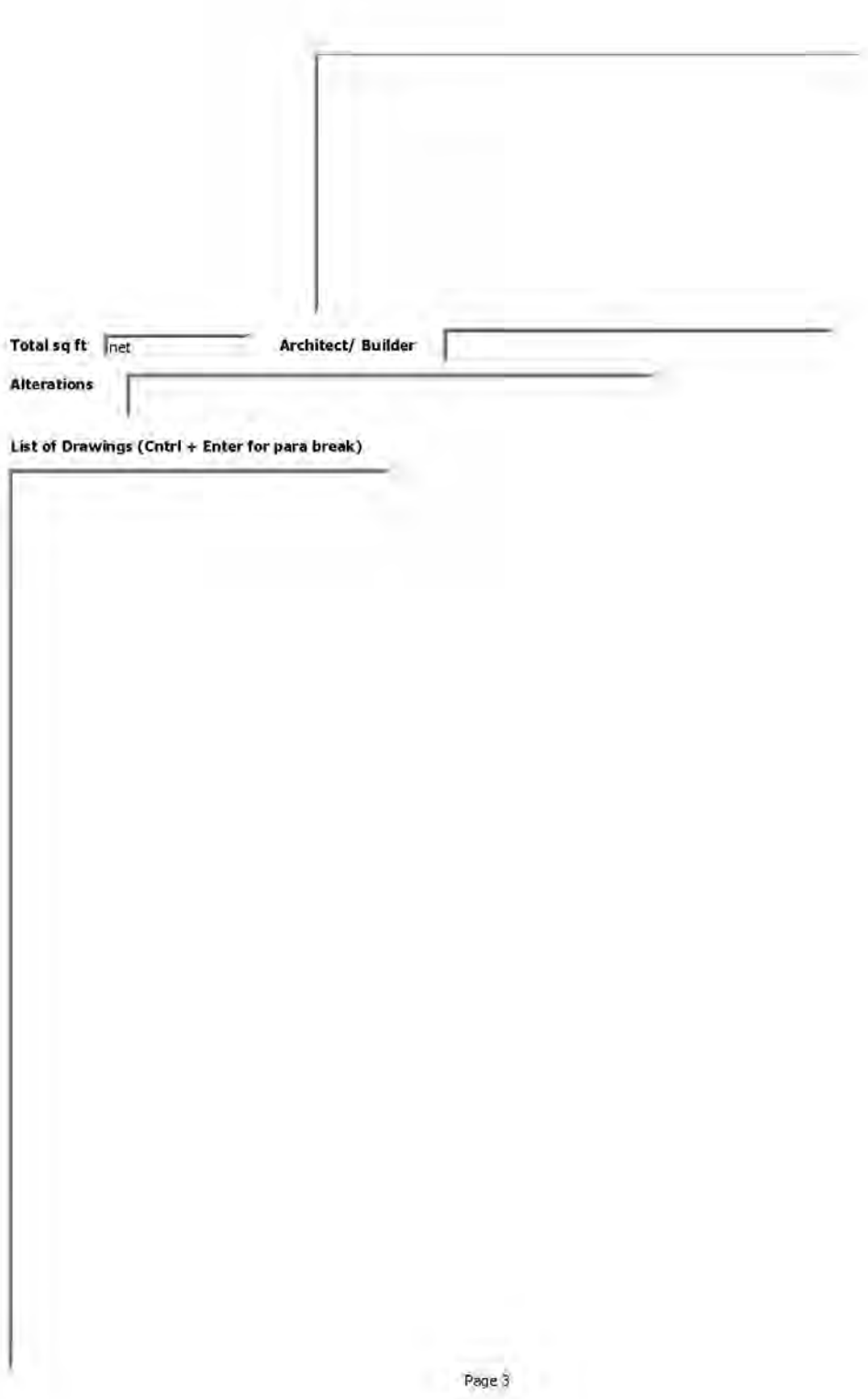


Figure 10.3 Historic building site form example

Eligibility Criteria

Evaluation efforts are based on the application of the criteria for eligibility established in 36 CFR 60.4. Additional evaluation guidance with special relevance to the LANL M&O contractor cultural resources program is included in the ACHP's *Balancing Historic Preservation Needs with the Operation of Highly Technical or Scientific Facilities* (ACHP 1991). These criteria are detailed in Section 8. The National Park Service has written several publications that list the criteria for eligibility and provide guidance for the assessment of historic properties. National Register Bulletin 15 explains how to apply the Register Criteria for Evaluation. Selection criteria for recent properties are given in National Register Bulletin 22, *Guidelines for Evaluating and Nominating Properties that Have Achieved Significance within the Last Fifty Years* (NPS 1979).

There are four general property types associated with LANL's historical themes:

1. **Laboratory-Processing Buildings** such as HE and tritium processing and research facilities.
2. **Administration Buildings** such as office buildings and facilities housing cafeterias and health and safety offices (change rooms and offices for radiological monitoring staff).
3. **Security Buildings and Structures** such as guard stations, security lights, and fencing.
4. **Support Buildings and Structures** such as warehouses, water tanks, utilities, and waste treatment facilities.

Integrity Review for Buildings

Integrity is the ability of a property to convey its significance. Eligibility assessment reports will include evaluation of the property's integrity, as described in National Register Bulletin 15 (NPS 2002).

Curation of Artifacts, Records, and Photographs

In accordance with 36 CFR Part 79, Curation of Federally Owned and Administered Archaeological Collections, significant historical artifacts and architectural elements, if not contaminated, are retained and curated at an appropriate LANL facility. Although LANL's prehistoric collections are curated at the Museum of Indian Arts and Culture under formal agreement with the Field Office, historic artifacts, including scientific equipment and building fixtures, are managed by the DOE-owned Bradbury Science Museum in Los Alamos and at storage facilities at the Bradbury and at other areas across LANL because of the size and industrial nature of the artifacts. In September 2014, the Environmental Research and Monitoring Exhibit opened at the Bradbury Science Museum. Several Ancestral Pueblo period artifacts are displayed in this permanent outreach and education exhibit. These scientific artifacts may also have interpretive or educational value as exhibits within local, state, or national museums.

LANL drawings are archived on microfiche cards and stored at the LANL archive and records center. Some of the drawing records have been scanned and are available to LANL M&O contractor employees electronically. LANL photographs, including original negatives, are archived at both the main photographic facility and at the LANL archives and records center. Digital photo files are archived on LANL servers (at the archives and records center and on M&O contractor servers). The largest single repository for historic LANL documents is the

archives and records center; however, pertinent historical documents are sometimes retained by individual LANL M&O contractor organizations and at other DOE facilities, federal records repositories, and at the National Archives II in College Park, Maryland.

Exceptionally Significant Historic Buildings and Structures

Modification, restoration, or demolition undertakings with the potential to adversely affect exceptionally significant buildings and structures will require the development of formal MOAs between the SHPO and the Field Office. The SHPO will be consulted on creative mitigation measures intended to augment traditional measures for minimizing adverse effects to exceptionally significant properties on a case-by-case basis.

Preservation Plans for Manhattan Project National Historical Park and Candidates for Preservation Buildings and Structures

Thirty-seven historic buildings and structures at LANL have currently been identified as candidates for long-term retention and management. Additional significant buildings may be added as candidates for preservation as they are identified. Seventeen properties listed below (and marked with an asterisk) are located within the Manhattan Project National Historical Park or were identified in Congressional park legislation as eligible for inclusion in the National Historical Park (see Section 15). The other 17 buildings have Cold War-Era significance.

- TA-6-37, Concrete Bowl*
- TA-8-1, Gun Site Laboratory and Shop,* along with TA-8-2, Shop and Storage,* and TA-8-3, Laboratory*
- TA-8-172, Portable Guard Shack*
- TA-11-1, Control Building*
- TA-11-2, Betatron Building*
- TA-11-3, Cloud Chamber Building*
- TA-12-4, Hexagonal Firing Pit*
- TA-14-6, Shop/Darkroom Building*
- TA-16-54, Grinding Building/Instrumentation/Testing*
- TA-16-58, HE Magazine*
- TA-16-430, -435, and -437, Press Building Complex
- TA-16-516, V-Site Assembly Building*
- TA-16-517, V-Site Equipment Building*
- TA-16-1451, Back Gate Guard Station
- TA-18-1, Slotin Building*
- TA-18-2, Battleship Bunker/Control Building*

- TA-18-5, Battleship Bunker/Control Building*
- TA-18-23, Critical Assembly Building, Casa #1
- TA-18-26, Hillside Vault
- TA-18-29, Pond Cabin*
- TA-18-186, Guard Tower
- TA-22-1, Fat Man Assembly Building / Quonset Hut*
- TA-33-27, Guard House
- TA-33-28, Water Tower
- TA-41-1, -2, - 3, -6, Underground Vault, Guard Station, Blower House, Covered Passageway Complex
- TA-60-17, -19, Assembly Building and Rack Tower Complex
- TA-60-45, High Frequency Radio Facility
- TA-72-8, East Jemez Guard Station – Sandia Gate
- TA-73-15, East Gate Guard Tower

Preservation plans for identified properties will be developed by DOE and M&O contractor, and reviewed by the SHPO. These plans will identify regular inspection and maintenance schedules, funding sources, property managers, and acceptable reuse functions. While repairing or maintaining the properties, LANL personnel will follow guidance published by the Department of the Interior in The Secretary of the Interior's Standards for the Treatment of Historic Properties. In order to avoid inadvertent impacts, signs will be posted at each exceptionally significant building and structure that clearly indicate the historic nature of the facility and state that maintenance work is subject to historic preservation requirements.

Strategies for Adaptive Reuse

In accordance with Section 110, other uses for historically significant, uncontaminated properties should be developed as an alternative to demolition to the maximum extent possible. Alternate uses could include office space, storage, and interpretative areas. Adaptive reuse plans will incorporate best practices and follow relevant guidelines.

Long-Term Maintenance Requirements for Manhattan Project National Historical Park and Candidates for Preservation Buildings and Structures

Under the 2015 NDAA legislation, 17 Manhattan Project-period properties in 8 technical areas were identified as eligible for inclusion in the Manhattan Project National Historical Park. The MOA between the Department of the Interior and the DOE, signed in 2015, included nine DOE properties located within the National Historical Park boundary. Buildings and structures at LANL eligible for inclusion in the Manhattan Project National Historical Park and Cold War-era Candidates for Preservation will each be maintained in accordance with individual preservation plans as described above.

Section 11. Archaeological Resources Management at LANL

All archaeological work conducted at LANL is accomplished within a rigorous set of standards, procedures, and goals. This includes fieldwork (survey, excavation, field checks, the monitoring of project activities, and the use of the Global Positioning System [GPS]), laboratory work (washing, labeling, analysis, and long-term storage of artifacts), compliance review, the preparation of archaeological reports, and other aspects of cultural resources management involving the use of archaeological skills and personnel.

Archaeological Site Significance Standards at LANL

The criteria for listing in the Register, as well as LANL-specific contexts and research themes, are used to evaluate archaeological sites for Register eligibility. Archaeological sites are generally determined eligible under Criterion D. However, Criteria A, B, and C are appropriate in limited situations. Under Criterion A, a property must have well-preserved features, organization, and artifacts that illustrate an event or pattern of events. Under Criterion B, a site must be illustrative of a person's life. Criterion C may apply to sites that illustrate important concepts in precontact community design or are important representatives of the aesthetic values of the area cultures (i.e., rock art sites are generally eligible under Criterion C).

Under Criterion D, a property is eligible if it has been used as a source of data and contains more as-yet retrieved data or if through testing or research it has been determined to be a likely source of data. Under this latter requirement, the information must be evaluated within an appropriate context to determine its importance. Information is considered important when it is shown to have a significant bearing on a research design derived from historic contexts that contains three primary elements (1) a theme or research topic, (2) a time period to which the research topic relates, and (3) a geographic area for which the research theme is applicable.

A general research design (significance standards) for the conduct of archaeological work at LANL was developed in association with excavations and laboratory analyses as part of the DOE Land Conveyance and Transfer Project (Vierra and Schmidt 2008). This overarching research design was reviewed by the SHPO and the ACHP and was provided to culturally affiliated Native American tribes. These standards were revised in 2015 and are included in Appendix B.

Register Eligibility Assessments

Property types link the ideas incorporated in the theoretical historic context with actual historic properties that illustrate those ideas. Site types are a grouping of individual properties based on shared physical or associative characteristics. The process of assessing Register eligibility of archaeological properties begins with defining site types and characterizing the locational patterns, current condition, inherent characteristics, and aspects of the social and natural environment that might affect the preservation of the property type. There are currently 20 archaeological site types identified at LANL including Archaic lithic scatters, Coalition-period roomblocks, and Homestead-era structures.

There are three potential outcomes of an archaeological property eligibility assessment: eligible, undetermined, or not eligible. A property or site is eligible if it has been used as a source of data and contains more, as-yet unrecorded data, or if it has not yet yielded information but, through testing or research, is determined a likely source of data. Sites that require additional

investigation, such as archaeological testing, to determine their potential for containing research information are assessed to have an undetermined eligibility. All sites that have an undetermined eligibility assessment are considered and evaluated as a Register-eligible property until such time as additional investigative measures are completed and the site is reevaluated. Sites that have no additional research potential are assessed as not eligible for the Register. All sites that have yet to be evaluated for Register eligibility are treated as eligible under Section 106 and 110 guidelines (53 Federal Register 4735) until definitive determinations can be made (see Appendix B for more in-depth site eligibility discussion).

Archaeological properties at LANL are evaluated for Register eligibility as part of the site documentation process. The first step in the evaluation process is to determine the site type and associated time period, which establishes the context from which to assess the site's relevance for addressing LANL and Pajarito Plateau research issues. This first step involves documenting the site location, setting, and extent and nature of the cultural materials including architecture, features, and artifacts. The second step is to determine whether the site has the integrity such that it can address applicable research issues. Determining site integrity primarily involves establishing the presence of intact architecture and features and undisturbed subsurface deposits. Factors assessed include topographic location, depositional/erosional environment, depth and nature of soil deposits, evidence of bioturbation, and evidence of human impacts from previous excavations, land development, or vandalism.

The above site information, including the site eligibility evaluation derived from it, is collected on a Laboratory of Anthropology site record and entered into a NMCRIS site form. Additional site information collected in support of the NMCRIS site form includes a GPS-derived site boundary, site and feature sketch map(s) or GPS-derived map(s), photographs, and in-field artifact analysis data. The site documentation and associated eligibility assessment report is submitted to the Field Office for transmittal to the SHPO for review and concurrence and subsequent submittal to the State of New Mexico Archaeological Records Management Section. Archaeological site compliance documents are reviewed by LANL classification reviewers and are assigned a Los Alamos limited (controlled) distribution release publication (LA-CP) number intended to protect archaeological site location and other potentially sensitive information that is protected by law. Documents with this designation are treated as official use only and should not be released to the public.

Integrity

According to National Register Bulletins 15 and 36 (NPS 2000, NPS 2002), to be listed in the National Register of Historic Places, a property must not only be shown to be significant under the National Register criteria, but it also must have integrity. Historic properties either retain integrity or they do not. Within the concept of integrity, the National Register criteria recognize aspects or qualities that, in various combinations, define integrity. These include location, design, setting, materials, workmanship, feeling and association. To retain historic integrity, a property will always possess several of the aspects. Archaeological site integrity is commonly defined by several factors, including the presence of undisturbed (in situ) surface and subsurface deposits, intact architecture, and features. Site assessments for integrity must include a determination of which aspect of the site can provide information that is relevant to answering specific research questions. Integrity is most easily assessed at archaeological sites that contain obvious surface evidence of architecture (e.g., roomblocks). Assessment becomes somewhat

more difficult for those sites with minimal architecture or features (e.g., one- to three-room structures, agricultural features, or rock features). Finally, assessment can be difficult at surface artifact scatters that exhibit no obvious surface features and for which the nature of subsurface cultural deposits is difficult to discern.

Surface artifact scatters reflect the ephemeral remains of temporary campsites or limited-activity locations and are often difficult to evaluate for potential significance. Criterion D provides three general contexts that are commonly used to evaluate data potential from subsurface artifact scatters: chronology, technology, and geomorphology. Chronology refers to the presence of datable materials, which can be used to temporally place the site. Technology refers to the composition of the assemblage, including the number and variety of artifact types represented. Lastly, geomorphology refers to the geologic context of the site and whether the cultural material is in situ, has been redeposited, or has been affected by facility operations.

LANL-Specific Excavation-Project Research Designs, Data Recovery Plans, and Associated Comprehensive Agreements

In addition to the general archaeological research design described above, each individual excavation project will have a research design and data recovery plan that addresses those issues and questions pertinent to the sites and features being excavated. These research designs and data recovery plans are reviewed by the SHPO.

Along with the archaeological research designs and data recovery plans, comprehensive agreement(s) for intentional excavation under NAGPRA will be prepared for all culturally affiliated tribes.

Archaeological Baseline Studies

A series of baseline and specialized studies were prepared as part of the DOE Land Conveyance and Transfer Project final archaeological report (see Section 7). These studies will be used to develop general and specific archaeological research designs for future projects.

Homestead Context

LANL cultural resources staff prepared a context study focusing on the history of homesteading on the Pajarito Plateau in 2011 (Machen et al. 2011). This study presents homesteading on the Plateau within its national and regional contexts and describes the homestead families that successfully patented lands in the Los Alamos area under the terms of the Homestead Act and related federal land legislation. A map showing patented homestead locations in Los Alamos County is depicted in Figure 11.1. This context study, prepared in part to manage homesteading resources damaged during the May 2000 Cerro Grande fire (Nisengard et al. 2002), will be used to evaluate the significance of, and management recommendations for, the remaining homestead-era sites at LANL and will also be used to develop research designs for future projects related to these types of sites.

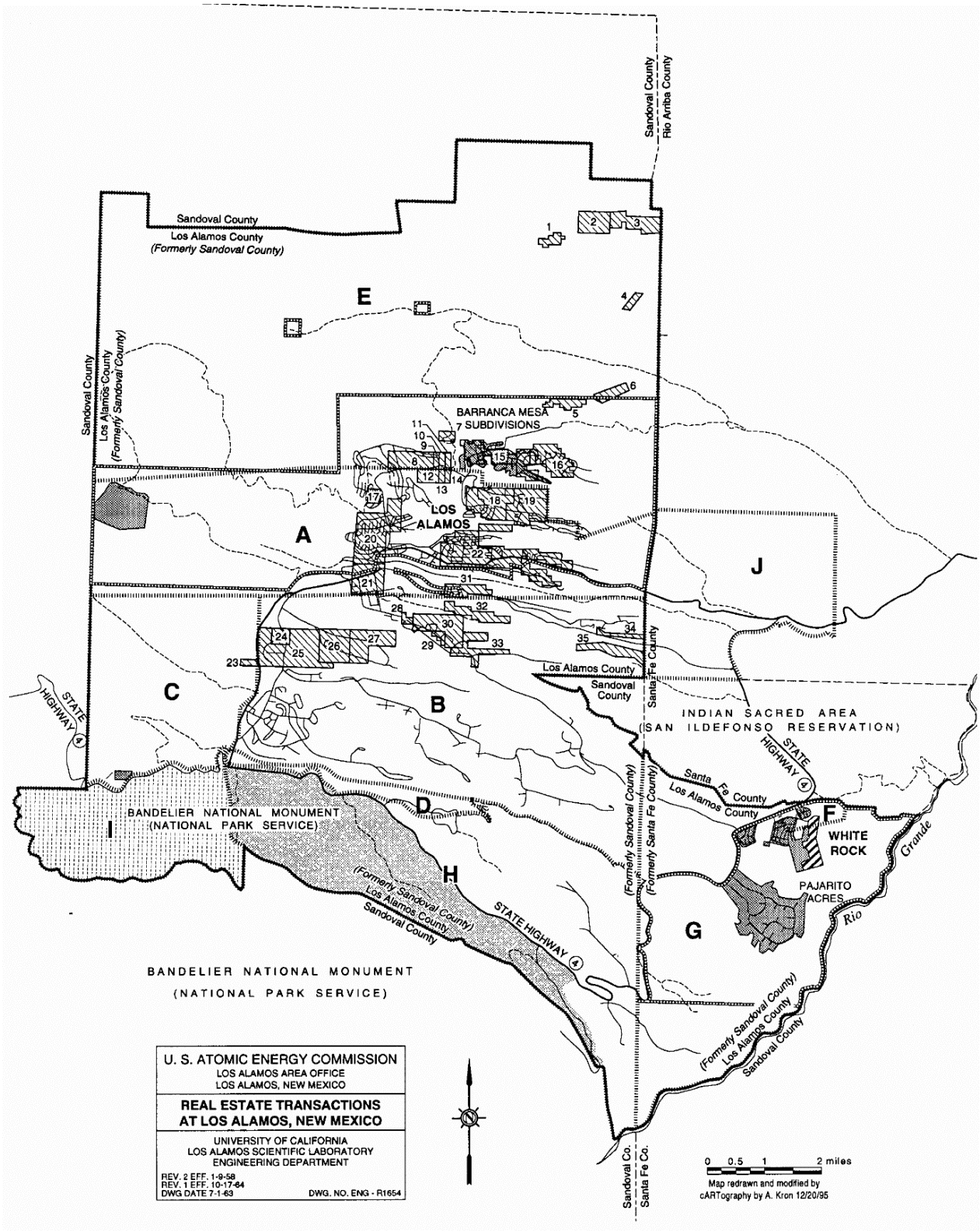


Figure 11.1 The County of Los Alamos and homestead patent locations (numbered and hatched areas indicate homestead patents)

Archaeological Field-Survey and Site Recording Procedure (ENV-ES-QP-401, R3)

A procedure has been prepared to guide the conduct of archaeological survey and site recording at LANL, similar in scope and purpose to the building assessment process described in Section 10. The procedure covers both archaeological survey and site recording work and general safety considerations, and includes the following sections:

- Field Survey
  - Prefield Review
- Field Operations
- Survey Methods
- Cultural Resource Identification
  - Cultural Site
  - Isolated Occurrence
  - Initial Response and Notification - human remains
- Site Recording
  - Documentation
  - Eligibility Assessment
  - GIS Data
  - Sketch Maps
  - Infield Artifact Analysis
  - Photography
  - Records

Archaeological Excavation and Laboratory Processing Procedure (ENV-ES-QP-405.3)

Pre-fieldwork procedures include evaluations to assess geomorphic context and integrity; a series of recording forms used at LANL includes the following:

- Area definition form
- Area log
- Auger form
- Burial form
- Daily field journal
- Field specimen catalog

- Feature form
- Feature log
- GPS form
- Grid-level excavation form
- Instrument mapping form
- Room summary form
- Sample log
- Shovel test unit form
- Stratigraphy log
- Stratigraphy unit summary form

Field procedures explain the purpose and proper use of these forms. In addition, the field procedures manual describes techniques specific to each of the four main site types: artifact scatters, roomblocks, one- to three-room structures, and agricultural sites. The manual concludes with a statement on the Native American monitors who may be present during an excavation and refers the reader to the potential requirement to prepare an intentional excavation comprehensive agreement to satisfy NAGPRA.

General Laboratory Procedures

Laboratory procedures include the following elements:

- Checking in artifacts
- Washing
- Field specimen catalogs
- Computer databases
- Rebagging and creating new bags
- Photographs
- Flotation samples processing
- Human remains and NAGPRA items

As with the fieldwork, and as part of the general duties of laboratory personnel, a number of record logs are necessary for data tracking and for quality control. These include logs for processed flotation samples, a log listing bags or samples created in the laboratory (as opposed to field bags and samples), a daily log listing data conflicts and questions requiring consultation and resolution with field personnel, and logs to track human remains and NAGPRA-related grave associations and objects. An inventory and tracking system for all notebooks and accompanying paperwork that comes in from the field is also required.

Once artifact analyses and data recording are completed—including sketches and photographs as appropriate—artifacts are placed into appropriate containers for long-term curation at the Museum of Indian Arts and Culture, the designated DOE repository located in Santa Fe, New Mexico. Other duties performed by laboratory staff include the maintenance of field vehicle logs and the maintenance and updating of lists of vendors from which to purchase necessary field and laboratory supplies.

Human remains and other NAGPRA-related items are sometimes encountered during excavation projects at LANL and are initially processed in the laboratory. Under the terms of the NAGPRA intentional excavation comprehensive agreement for the Land Conveyance and Transfer Project, culturally affiliated tribes had the right to request a laboratory or in-field review of NAGPRA remains and objects at any time. Actual analyses of the human remains were performed by a qualified professional, and the human remains and other NAGPRA items were stored in a safe, clean, and secure area. NAGPRA remains and objects were repatriated to the culturally affiliated tribe after publication of a notice to repatriate was published in the Federal Register. Future intentional excavation comprehensive agreements will include similar provisions.

Part III. Section 110 Compliance Process

Section 12. Overview of Section 110

Section 110 sets out the broad historic preservation responsibilities of federal agencies and is intended to ensure that historic preservation is fully integrated into the ongoing programs of all federal agencies. Section 110 also charges each federal agency with the responsibility for considering projects and programs that further the purposes of cultural resource preservation, and it declares that the costs of preservation activities are eligible project costs in all undertakings conducted or assisted by a federal agency.

Section 110 sets out specific benchmarks for federal agency preservation programs:

- Historic properties under the jurisdiction or control of the agency are to be managed and maintained in a way that considers the preservation of their historic, archaeological, architectural, and cultural values.
- Historic properties not under agency jurisdiction or control but potentially affected by agency actions are to be fully considered in agency planning.
- Agency preservation-related activities are to be carried out in consultation with other federal, state, and local agencies, Indian tribes, and the private sector.
- Agency procedures for compliance with Section 106 of the Act are to be consistent with regulations issued by the ACHP.
- An agency may not grant assistance or a license or permit to an applicant who damages or destroys historic property with the intent of avoiding the requirements of Section 106, unless specific circumstances warrant such assistance.

These guidelines are intended to assist federal agency personnel and the agency head in carrying out their policies, programs, and projects in a manner consistent with the requirements and purposes of 54 USC Chapter 3061, related statutory authorities, and existing regulations and guidance.

An agency should use these standards and guidelines, and consultation with the Secretary of the Interior and others, to ensure that the basic individual components of a preservation program called for in Section 110 are in place. The preservation program should also be fully integrated into both the general and specific operating procedures of the agency. The agency's preservation program should interact with the agency's management systems to ensure that historic preservation issues are considered in decision-making. One objective of the program is to ensure that the agency's officials, employees, contractors, and other responsible parties have sufficient budgetary and personnel resources to identify, evaluate, nominate, manage, and use the historic properties under agency care or affected by agency actions.

These standards are listed below:

Standard 1. Each federal agency establishes and maintains a historic preservation program that is coordinated by a qualified Preservation Officer and that is consistent with and seeks to advance the purposes of cultural resource preservation. The head of each

federal agency is responsible for the preservation of historic properties owned or controlled by the agency.

Standard 2. An agency provides for the timely identification and evaluation of historic properties under agency jurisdiction or control and/or subject to effect by agency actions.

Standard 3. An agency nominates historic properties under the agency's jurisdiction or control to the Register.

Standard 4. An agency gives historic properties full consideration when planning or considering approval of any action that might affect such properties.

Standard 5. An agency consults with knowledgeable and concerned parties outside the agency about its historic preservation-related activities.

Standard 6. An agency manages and maintains historic properties under its jurisdiction or control in a manner that considers the preservation of their historic, architectural, archaeological, and cultural values.

Standard 7. An agency gives priority to the use of historic properties to carry out agency missions.

Section 13. Cultural Resources Surveys at LANL

Approximately 90 percent of LANL property has been systematically surveyed for archaeological resources. Figure 13.1 depicts the unsurveyed areas and divides them into nine separate parcels. In descending acreage these include a TA-70 parcel (1161 acres); a TA-33 parcel (784 acres); areas in and around TA-53 (320 acres); a parcel of Sandia and Mortandad canyons (276 acres); a TA-68 parcel (222 acres); a parcel including portions of Pajarito and Two Mile canyons along with Mesita del Buey (172 acres); a TA-71 parcel (142 acres); a combined TA-58 and TA-62 parcel (42 acres); and a TA-39 parcel (19 acres). Occasionally LANL cultural resource staff conduct archaeological surveys on adjacent federal, state, municipal, or tribal lands to support LANL initiatives. An example is a survey on lands belonging to the Pueblo de San Ildefonso for the placement of characterization wells. The 2014 MOA between the Field Office and the Pueblo de San Ildefonso defines the protocol for conducting work on San Ildefonso land. In 2015, the MOA was re-signed by the Pueblo de San Ildefonso.

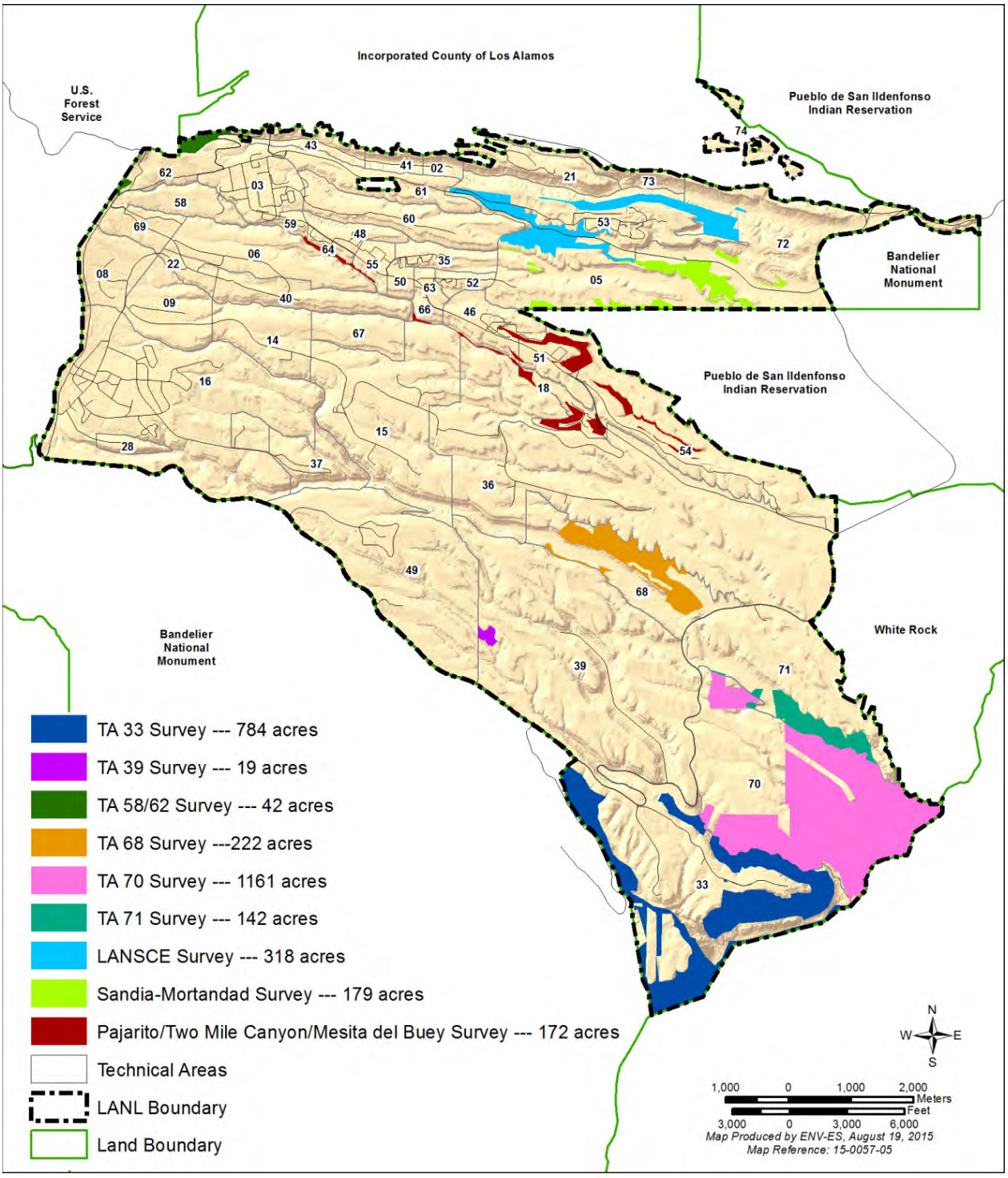


Figure 13.1 Unsurveyed areas at LANL

Section 14. Archaeological Collections and Laboratory-Era Equipment and Artifacts

In accordance with 36 CFR Part 79, *Curation of Federally Owned and Administered Archaeological Collections*, artifacts, if not contaminated, are retained and curated at an appropriate facility, such as a museum. Currently, archaeological collections are curated at the Museum of Indian Arts and Culture, the Laboratory of Anthropology at the Museum of New Mexico. Scientific equipment and building fixtures are managed by the DOE-owned Bradbury Science Museum.

With five exceptions, all archaeological collections from LANL are curated at the Museum of Indian Arts and Culture.

The first exception includes collections made before the creation of the wartime Laboratory in 1943, which are housed at the Smithsonian Institution and other repositories. These earlier collections are outside of the federal legal mandate of DOE. The second exception is collections collected from federal land at LANL by the University of California at Los Angeles Pajarito Archaeological Research Project between 1977 and 1985. These collections are still housed at the University of California and the University of Arizona. The third exception includes field survey forms, maps, and other actively used records created during cultural resources management activities on LANL property since the 1950s. These and a small number of exhibited artifacts and unprovenienced artifacts and other materials serving as teaching and comparative collections have been retained at LANL for use by members of the M&O contractor staff. The fourth exception includes artifacts on display as part of the Environmental Research and Monitoring Exhibit at the Bradbury Science Museum in Los Alamos.

The fifth exception concerns post-1942 Laboratory artifacts. Scientific equipment and other artifacts associated with historically significant buildings and structures at LANL are identified, recorded, and occasionally removed before the demolition of a property (see Section 9). Such artifacts and equipment are typically evaluated and collected in conjunction with the DOE-owned Bradbury Science Museum and are curated at LANL facilities managed by either the science museum or the M&O contractor.

Section 15. Manhattan Project National Historical Park

In 2004, Congress directed the National Park Service to make recommendations concerning the possibility of establishing a new national park (Public Law 108-340). The National Park Service issued its special resource study in November 2009 (DOI 2012). Under 2014 legislation, 17 Manhattan Project-period properties in 8 technical areas were identified as eligible for inclusion in the Manhattan Project National Historical Park (Figure 15.1). The park-eligible properties represent key events in the timeline of the Manhattan Project's scientific and engineering history and directly supported the design, assembly, testing, and use of the world's first atomic weapons, including the Trinity test device, the Little Boy device detonated over Hiroshima, and the Fat Man weapon detonated over Nagasaki.

The park legislation became law December 19, 2014, in the NDAA for Fiscal Year (FY) 2015 (Section 3039 of the *Carl Levin and Howard P. ''Buck'' McKeon National Defense Authorization Act for Fiscal Year 2015* P.L. 113-291). An MOA was signed November 10, 2015,

by the Secretaries of Interior and Energy and included nine DOE properties located within the National Historical Park boundary.

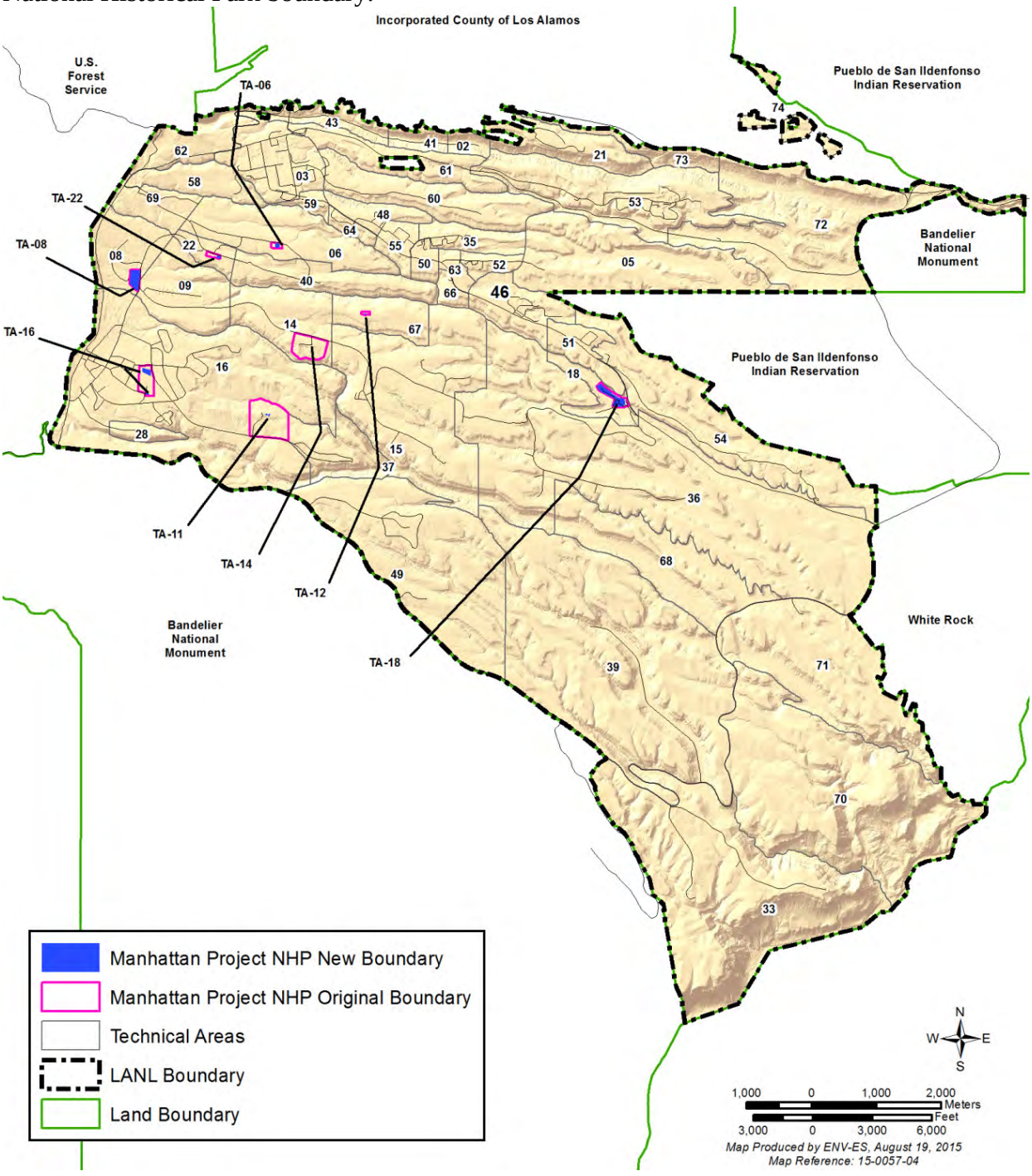


Figure 15.1 Manhattan Project National Historical Park boundaries

Manhattan Project National Historical Park–Eligible Properties at LANL

The Manhattan Project National Historical Park legislation stipulates that eligible park properties may be added to the official park boundaries over time. Initial park properties and associated boundaries on land owned by the DOE were defined on a map published in the Federal Register after the signing of the MOA between the United States Department of the Interior and the DOE. Initial properties include nine individual buildings located at TA-8, TA-16 and TA-18. At LANL, eight properties are park-eligible since they are listed in the final park legislation. Because of the potential for park-eligible properties to be included in the park in the future, all park-eligible properties will be maintained and managed to the same standards as those LANL properties that are officially part of the Manhattan Project National Historical Park. Public access considerations and park-related infrastructure improvements, however, will be planned and implemented only for LANL properties that are formally part of the Park as indicated on the published park map available on the National Park Service's official park webpage.

The Uranium Gun Bomb

The following buildings on Laboratory property represent the effort to design and develop the uranium gun bomb: TA-8-1 (laboratory and shop), TA-8-2 (shop and storage), TA-8-3 (laboratory), and TA-8-172 (portable guard shack).

TA-8-1

Original Function: Laboratory and Shop **Date Constructed:** 1943

Current Function: Vacant **Associated Theme:** Gun Device (Atomic Bomb)

Historical Significance: Gun Device development and testing in support of Little Boy bomb.

Eligible: Yes – A and C

Description: TA-8-1 is the central structure of a group of three buildings located in the historic Anchor West or Gun Site area of TA-8. It is a cast-in-place, board-formed, concrete building with the south elevation earth sheltered into a modest hillside and berm. The roof structure is earth-covered concrete. The building is long and narrow with a covered dock and an enclosed dock area on the exposed north side. The finished floor level is elevated 3 feet above the driveway area. The enclosed dock area is wood framed with asbestos shingles and a sloped roof coincidental with the dock roof. The exterior doors are raised wood panel with two-over-two window lights. The only windows to the outside are the glass panes in the doors.

TA-8-2

Original Function: Shop and Storage **Date Constructed:** 1943

Current Function: Vacant **Associated Theme:** Gun Device (Atomic Bomb)

Historical Significance: Gun Device development and testing in support of Little Boy bomb.

Eligible: Yes – A and C

Description: TA-8-2 is at the west end of the Gun Site complex. It is a cast-in-place, board-formed, concrete building. It is earth bermed on the southwest elevation, and the roof structure is earth covered with vegetation. A concrete retaining wall to the west connects to the building and creates the end of the drive pad in front of the group of buildings. Two double metal doors enter the building at ground level. The building is windowless. An exhaust ventilation duct is attached to the outside of the building. A unique feature of this building is the boat-tail (rounded) east elevation wall creating a robust appearance.

TA-8-3

Original Function: Laboratory **Date Constructed:** 1943

Current Function: Vacant **Associated Theme:** Gun Device (Atomic Bomb)

Historical Significance: Gun Device development and testing in support of Little Boy bomb.

Eligible: Yes – A and C

Description: TA-8-3 is physically attached to the east end of building 8-1; an interior wall partitions the structures. The building is cast-in-place concrete with the original board formwork visible. It is earth sheltered on the south elevation, and the earth continues up onto the structure and creates an earthen roof, topped with vegetation. Entry into the building is on the north side through a wood-framed vestibule attached to the concrete structure. A massive timber and earth-filled blast wall stands outside the entry. There are no windows except the light panel in the exterior door. A wood-framed stair leads up the east end of the building onto the dirt roof and provides access to steam utility manholes.

TA-8-172

Original Function: Guard Shack **Date Constructed:** unknown (circa 1943 to 1950s)

Current Function: Vacant **Associated Theme**: Security

Historical Significance: Representative of portable security facilities used at Gun Site in support of the development and testing of the Little Boy bomb.

Eligible: Undergoing evaluated

Description: TA-8-172 was designed to be a portable guard shack constructed in 1944. It was located at TA-19 until 1956 when sold at auction. It was purchased and moved to the Denver Steel neighborhood in Los Alamos where it served as a garden shed. The building is representative of the type of portable security facilities that were commonly used during the Manhattan Project at Los Alamos. Wooden guard shacks built during the wartime years were moved from site to site depending on the security needs of the Laboratory. They were built on skids and did not have permanent utilities. The shacks were small, typically measuring 6-feet wide by 6-feet deep by 8-feet high, had heating stoves, and were often connected to nearby phone and electrical lines. Based on the few surviving drawings and historical photographs, there were several basic designs that included pitched-roof, flat- roof, and shed-roof styles. The shacks were typically clad with wood siding or asbestos shingles and were roofed with roll roofing.

Laboratory security guards used the shacks while stationed at designated security checkpoints. Portable guard shacks were in use at all technical areas of the Laboratory during the 1940s and 1950s; some guard shacks were moved and renumbered during their period of use. As permanent guard facilities were built after the war, the portable guard shacks were demolished or sent to salvage where they were purchased by the general public. Some guard shacks, like TA-8-172, were moved to private residences and reused as tool sheds. Others were converted for storage, like building TA-18-111, which was used by Bandelier National Monument to store horse tack. In March 2004, TA-8-172 was donated back to the Laboratory. It was moved to TA-21 until September 2006 when it was moved to Gun Site.

The Plutonium Implosion Bomb

The following 13 resources on Laboratory property represent the effort to design and develop an implosion bomb:

Assembly of the implosion device, the Gadget, tested at Trinity Site:

TA-16-58 HE Magazine

TA-16-516 V-Site Assembly Building

TA-16-517 V-Site

Development and testing of the first Fat Man bomb and related implosion and criticality research:

TA-6-37 Concrete Bowl

TA-11-1 Control Building

TA-11-2 Betatron Building

TA-11-3 Cloud Chamber Building

TA-12-4 Hexagonal Firing Pit

TA-14-6 Shop/Darkroom Building

TA-18-1 Slotin Building

TA-18-2 Battleship/Control Building

TA-18-29 Pond Cabin

TA-22-1 Assembly Building/Quonset Hut

TA-16-58

Original Function: Magazine **Date Constructed:** 1944

Current Function: Vacant **Associated Theme:** High Explosives

Historical Significance: Explosives process storage building in support of TA-16 activities.

Eligible: Yes – A

Description: Building TA-16-58 is a one-story, single-room structure measuring 13 feet by 23 feet with an interior floor area of 210 square feet. The structure was constructed with a reinforced concrete foundation, floor, and walls. The concrete walls were left exposed to approximately three-quarters of the height of the wall and then were covered with asbestos shingles over wood framing. A medium-pitched wood-framed gable roof with exposed rafter ends and rolled roofing covers the structure. Both gable ends contain metal louvers with screen transoms for ventilation. A grounded lightning rod is located on the roof.

An earthen berm to three-quarters of the height of the walls surrounds the magazine on the south, west, and north sides. The east side was left exposed and contains double steel doors, the only access into the building. Square wooden posts and wood-plank wing walls extend out from the face of the east wall and are used as retaining walls for the earthen berm surrounding the building.

TA-16-516 and TA-16-517

Original Function: Processing/Inspection **Date Constructed:** 1944

Current Function: Vacant **Associated Themes:** Implosion / Gun Device / Trinity Test

Historical Significance: Supported implosion gun, and Trinity device assembly and shake tests.

Eligible: Yes – A

Description: TA-16-516 is a wood-framed building with a concrete foundation and a flat roof. The building has a 16-foot ceiling with an overhead hoist mounted on an I-beam track. TA-16-516 is fairly small, approximately 570 square feet in size. A kettle platform and scale pit were added in the early 1950s. TA-16-517 is located next to TA-16-516. Like its adjacent building, TA-16-517 is of wood-framed construction with a concrete foundation and a flat roof. TA-16-517 is much smaller than TA-16-516, with an approximate floor area of 318 square feet. An earthen barricade containing tie rods, cables, and log deadmen encloses the triangular-shaped building on two of three sides.

Building TA-16-517 was originally used as a processing/inspection building. It was later used as an equipment room for TA-16-516. The HE components for the Trinity device were assembled in TA-16-516 in the summer of 1945. Building TA-16-516 was later used for inert storage.

In 1999, the Laboratory submitted a Save America's Treasures grant proposal, which was approved in early 2000. In May 2000, the Cerro Grande fire destroyed the majority of the historic buildings at V-Site. To restore the buildings that remained, the Laboratory worked with Benchmark Consulting Group to develop a stabilization and restoration plan. In 2005, the contract for restoration work was awarded to JB Henderson, with Crocker Ltd. as the preservation consultant. Restoration work began in December 2005 and major restoration activities were completed by June 2006 (Isaacson and McGehee 2007).

TA-6-37

Original Function: Concrete Bowl **Date Constructed:** 1944 Experimental Area

Current Function: Not in Use **Associated Theme:** Implosion (Atomic Bomb)

Historical Significance: Plutonium recovery experiment in support of first implosion device.

Eligible: Yes – A and C

Description: TA-6-37 is a large concrete bowl constructed during the Manhattan Project for use as a scaled-down experimentation platform. The bowl consists of a sloping, ground-level concrete pad with a drain in the center of the structure. The concrete bowl is 200 feet in diameter; it was poured in 16 pie-shaped wedges. The center of the bowl has a raised dome with a metal cover on top. Near the north side of the bowl is a wood-framed and gravel-filled ramp (Figure 15.2).

Figure 15.2 Concrete bowl

The Manhattan Project scientists toyed with the idea of using a water-recovery method in which the bomb, surrounded by air space, would be suspended in a tank of water and fragments would be stopped by a 50 to 1 ratio of water to high-explosive mass. The feature was constructed for water-recovery tests in late 1944. The water-recovery shots used depleted uranium, and testing

continued until the spring of 1945. Shake tests, probably of explosive assemblies, were also conducted in this structure in 1945. These included the jumbinos, or smaller versions of Jumbo (a huge steel containment vessel), within which the bomb would be exploded.

TA-11-1

Original Function: Control Laboratory **Date Constructed:** 1944

Current Function: Storage Building **Associated Theme:** Implosion

Historical Significance: Betatron diagnostic studies in support of spherical implosion research.

Eligible: Yes – A

Description: Building TA-11-1 is one story in height and rectangular in plan. The structure measures 19 feet by 32 feet, 6 inches, excluding the protruding wing walls. The single-room interior contains 480 square feet of floor space. The structure was constructed with board-formed heavily reinforced concrete walls and flat roof and isolated floor. A compacted earth berm covers the north, east, and south sides and the roof of the building for added protection. A concrete entrance pad, an entry door, and an exhaust vent are located on the exposed west side of the building. The entry door is a steel-frame wood-plank door with heavy-duty strap hinges and a steel lever door handle. Reinforced concrete retaining walls with aluminum flashing, constructed perpendicular to the entry wall, angle down from the roof level of the structure to grade level.

The control room floor was constructed with reinforced concrete footings and a 10-inch reinforced concrete slab over a layer of sawdust, sand, and compacted earth. The walls and roof were also constructed of reinforced concrete and finished with two coats of dust-proof enamel. Floor trenches, measuring 8 inches by 12 inches, were constructed into the concrete floor and lined with galvanized sheet metal. An isolated concrete pad, located in the northeast corner of the control room, supported the transformer.

TA-11-2 and TA-11-3

Original Function: Betatron and Cloud Chamber **Date Constructed:** 1944

Current Function: Vacant **Associated Theme:** Implosion

Historical Significance: Betatron diagnostic studies in support of spherical implosion research.

Eligible: Yes – A and C

Description: TA-11-2 and TA-11-3 are two former laboratory buildings located back-to-back at K-Site. Both structures are one story in height and rectangular in plan, with a pointed end at the back of the building. The structures were constructed with a heavily reinforced concrete foundation over sawdust and sand layers, concrete walls, and a flat concrete roof. The sidewalls of both structures thicken from 1 foot to 3 feet along the length until they terminate at a point. A 16-inch outside-diameter steel pipe, located at the point, connects the two buildings together. Both the east and west sides and the roofs of the buildings are covered with compacted earth and a layer of asphalt, giving the appearance of a single reinforced structure. The interior of both

buildings consists of a single open room constructed with a reinforced concrete floor, walls, and ceiling. Both rooms are equipped with surface-mounted conduit; heating, ventilation, and air conditioning ductwork; and light fixtures. A cable tray was used to house the numerous mechanical, electrical, and communication cables that spanned between the two structures.

Building TA-11-2 (Betatron): The entrance into the building is from the north side. The original steel-frame wood-plank entry door was set into the exposed concrete wall flanked by two reinforced concrete angled wing walls. In 1947, the entrance and wing walls into building TA-11-2 were enclosed and equipped with chain-link partitions. A new concrete floor was installed along with 2-inch by 4-inch stud walls and ½-inch gypsum board on the interior. A shed roof was constructed with 2-inch by 6-inch rafters and roofing concrete. The entrance was renovated and the exterior covered with square seam metal siding, and the roof was covered with rolled asphalt roofing material. The new entry door consists of a pair of metal doors set flush within the steel frame wall.

Building TA-11-3 (Cloud Chamber): Entry into the building is from the south side. The entrance consists of a steel-frame wood-plank entry door, with strap hinges and lever latch, set into the exposed concrete wall and flanked by two reinforced concrete angled wing walls. A small toilet room is located adjacent to the entrance door on the exterior of the structure. A concrete roof extends over the entry area and is equipped with a steel observation tower accessed by steps on the southwest side. A 1-ton crane is suspended from a steel crossbeam.

TA-12-4

Original Function: Firing Pit **Date Constructed:** 1945

Current Function: Not in Use **Associated Theme:** Implosion/Recovery

Historical Significance: HE testing in support of implosion (atomic bomb) research.

Eligible: Yes – A

Description: TA-12-4 is a hexagonal firing pit that was constructed of heavy timber for use in explosives testing and recovery experiments. The structure has 8-foot-wide sides and is 12 feet deep. The sides and top of the firing structure are lined with ¾-inch steel plate. The structure stands alone with no supporting buildings and is situated on a human-made earthen mound. TA-12-4 was abandoned in 1953.

TA-14-6

Original Function: Shop and Dark Room **Date Constructed:** 1944

Current Function: Break Room / Storage **Associated Theme:** Implosion

Historical Significance: Small-scale implosion studies in support of implosion bomb development (Fat Man).

Eligible: Yes – A

Description: TA-14-6 is a small, wood-frame building built on a concrete foundation and slab. The wood structure incorporates asphalt-impregnated paper with wood sleepers and asbestos shingles. The roof is wood frame, low slope with numerous layers of rolled roofing material. The north elevation shows three wood-framed, hopper-style windows with four-over-four window lights. The entry door is raised panel wood in a wood frame. Two double doors, which are modern replacements, are seen on two other elevations.

TA-18-1

Original Function: Laboratory/Staging Area

Date Constructed: 1946

Current Function: Vacant

Associated Theme: Implosion / Critical Assembly / Biomedical and Health Physics

Historical Significance: Laboratory work supported implosion testing and criticality research. The Slotin accident led to important safety changes.

Eligible: Yes – A

Description: TA-18-1 is one and a half stories tall on a small footprint and appears like a loft building (Figure 15.3). It is a wood-frame building with asphalt-impregnated paper and wood sleepers with asbestos shingles. The roof is a low pitched side gable. A portion of the north elevation is sheathed with corrugated metal siding over the asbestos shingles. The floor slab is elevated to dock height, about 3 feet above the surrounding grade. The concrete stem wall is visible above grade. A concrete dock with access stairs, a double sliding door, and frame and rail for an overhead crane are in place at the south elevation. The windows are wood sash, double hung with three-over-three lights and are situated on the east and west elevations only. The windows are set halfway up in the wall space.

Figure 15.3 Building 18-1, site of Louis Slotin criticality accident

TA-18-2

Original Function: Control Bunker / Battleship Bldg. **Date Constructed:** 1944

Current Function: Vacant **Associated Theme:** Implosion

Historical Significance: Supported tests of the magnetic method of studying implosions.

Eligible: Yes – A and C

Description: TA-18-2 is a robust cast-in-place concrete building. The bunker is semi-recessed into the ground, and there are no openings other than a blast-resistant steel door on the east elevation. The sunken door is accessed down a concrete stair and stairwell. The roof is exposed concrete and no roofing material is apparent. TA-18-2 is also referred to as a Battleship building: the west end of the building is bow shaped and shielded with steel plate.

TA-18-29

Original Function: Ranch Cabin **Date Constructed:** 1914

Current Function: Vacant **Associated Theme:** Early Los Alamos (Pre-Lab) and Plutonium and Implosion Research

Historical Significance: Ashley Pond's office and library. It also served as a support building for fission and early implosion research.

Eligible: Yes – A

Description: TA-18-29 is also known as the Pond Cabin. Built circa 1913 by Ashley Pond and first used as part of Pond's failed dude ranch, this building was later used to support early Manhattan Project research activities at Pajarito Site (TA-18). The cabin measures 16 feet by 24 feet with an 8-foot-high gable roof. The building occupies approximately 384 square feet. The cabin is rustic in appearance with log walls and a corrugated-metal pitched roof. It has three fixed, three-over-three wood windows and one wood door, all of which appear to be original. One of the original window openings is boarded up. There is one indigenous stone fireplace and chimney. A round metal flue for a wood stove protrudes from the interior through the roof. There are no utility connections to this structure. The condition of the structure is fair, with the roof appearing to be in poor condition (the building was stabilized in 1986−1987). Some of the metal roof panels have been replaced, but others are aged and rusted.

TA-22-1

Original Function: Assembly and Loading Building **Date Constructed:** 1945

Current Function: Vacant **Associated Theme:** Implosion

Historical Significance: Explosive components for the Fat Man bomb were tested and assembled in TA-22-1.

Eligible: Yes – A

Description: TA-22-1 is a Quonset hut, also referred to as a Pacific-style hutment facility. It sits on a concrete foundation, which is visible at the stem wall level just below the metal siding. The building is covered with heavy gauge, corrugated siding arching over the frame. The siding has several coats of aluminized silver paint. Numerous steel casement windows line each side of the building. Because of the arch shape of the building, the windows rest at a slight angle. The windows are three-over-three awning style. The east and west ends of the building have wood-frame additions, which serve as entrances to the building. The additions are covered with corrugated metal siding and have flat roofs.

During WWII, Los Alamos scientists assembled and tested explosive components for the world's second atomic implosion bomb in this building. The Fat Man bomb was detonated over Nagasaki, Japan, on August 9, 1945.

In 2011, LANL demolished two post-war additions located on the east and west ends of TA-22-1. This action was the first phase in restoring the Quonset hut to its original wartime appearance. The demolition project was undertaken in consultation with the New Mexico SHPO.

Section 16. Significant Archaeological and Historic Resources

Potential Archaeological National Register Resources

There are more than 1300 known Ancestral Pueblo archaeological sites at LANL, among the highest densities of such sites in the North American Southwest. While all are considered important by the modern Pueblo descendants of the people who made these sites, there are a small percentage of sites that, because of integrity of location and the nature of the resource, best serve to tell the story of the Ancestral Pueblo use of the Pajarito Plateau during the period of around AD 1250 to 1700.

These Ancestral Pueblo resources can be evaluated individually for the National Register, or as part of a larger Archaeological District.

Late Coalition Period and Classic Period Complex Plaza Pueblos: During the period of around AD 1150 to 1250, large numbers of small single-story roomblock pueblos, each averaging around two to three habitation rooms and four to five storerooms, were constructed on the Pajarito Plateau. This represented the first time in the archaeological record that large numbers of people were living part or all of the year on the Plateau. Subsequently, during the period of AD 1250 to 1300, the population began consolidating into larger pueblos. These pueblos appear to run from about 40 to more than 200 rooms and are characterized by two or more roomblocks being linked together around one or more partially or completely enclosed plazas. Most of these complex plaza pueblos contain one or more sections of roomblocks that were originally two stories in height, with the largest pueblos exhibiting evidence of three-story construction. Kiva ceremonial chambers, extensive midden areas, and cemeteries are also present. During the Classic period, after about AD 1325, the numerous complex plaza pueblos were consolidated into five immense pueblos, one of which is present at LANL (Tsirege).

Cavate Complexes: Associated primarily with late Coalition period and Classic period, cavate complexes include a number of rooms excavated by hand into the welded tuff cliff faces. These range from small isolated habitation rooms and storage rooms to clusters of habitation rooms and

associated storage rooms to clusters containing large square rooms that appear to have been used as kivas. The larger clusters almost invariably have one or more masonry rooms (talus rooms) constructed immediately in front of the cavate rooms. Most cavate complexes also contain exterior rock art panels. The majority of cavate habitation rooms and cavate kivas appear to have been prepared by first smoking the room to produce a layer of black soot and then covering the lower third to half with a smooth layer of light brown plaster. This produces a seemingly purposeful effect possibly representative of the earth (brown) and sky (black). In the kivas and larger habitation rooms, petroglyphs are commonly scratched through the black soot, revealing the natural white tuff underneath, and somewhat less frequently through the brown plaster. Particularly in the kiva-like rooms, these petroglyphs are complex with many human and animal figures in scenes possibly representing myths or other narrative stories. There are three examples of cavate complexes recommended for special status that include particularly rich examples of petroglyph narrative art and well-preserved room features.

Rock Art Panels: In many locations, the Pajarito Plateau canyon cliff faces exhibit petroglyphs that have been pecked into the welded tuff and basalt, most typically along southern and eastern exposures. There is a tendency for rock art panels to cluster near and within cavate complexes in the vicinity of complex plaza pueblos. The petroglyphs cover a wide range of styles and motifs, including human figures (such as masked and shield warriors), animals, plants, and geometric designs.

Masonry Circles with Upright Stones: Along the eastern tips of several mesa tops on the Pajarito Plateau, including at LANL, are isolated circles of shaped stone, including a number of elongated upright stones. The location of these features and informal discussion with individuals from the Pueblos of San Ildefonso and Santa Clara suggest these may have served as trail shrines.

Ancestral Pueblo Sites

Nake'muu Pueblo (30 acres): Nake'muu is a late Coalition period complex plaza pueblo and associated structures and trails situated on a narrow ridge between Water Canyon and Cañada del Buey. It is notable for its standing wall architecture, the only pueblo ruin at LANL with such walls, and the fact that it served as a refuge for people from the Pueblo de San Ildefonso during the late seventeenth century Pueblo Revolt. Photographs taken of the site in 1915 (Figure 16.1) reveal that there has been little change to the site during the past ten decades (Figure 16.2).

Figure 16.1 Nake'muu in 1915

Figure 16.2 Nake'muu in 2014

Tsirege Pueblo (57 acres): Tsirege is the only Classic period complex plaza pueblo at LANL and an ancestral village in the traditions of the Pueblo de San Ildefonso. Tsirege and Tsankawi were the last to be occupied on the Pajarito Plateau. It is one of the largest pueblo ruins on the Plateau and contains several hundred ground floor rooms and evidence of three-story architecture (Figures 16.3, 16.4, and 16.5). A long wall, approximately 10 kivas, a reservoir, and many significant rock art panels are also present. A major complex of associated cavate structures and talus rooms was constructed along the cliff face above the bottom of Pajarito Canyon. Tree-ring dates indicate use at least during the period of AD 1422 to 1580, with the later date coinciding with the final abandonment of the Pajarito Plateau by permanent Ancestral Pueblo populations because of prolonged drought.

Sandia Pueblo and Mortandad Cave Kiva complexes (43 acres): These complexes consist of complex pueblos associated with a series of rock art panels and cavates including several with petroglyph panels. These remains are included in the traditions of the Pueblo de San Ildefonso and may represent a place of special cultural and traditional value. Because of the large numbers of visitors to the site and concern over potential vandalism, the National Park Service assisted LANL in putting a protective steel grate around the entrance to the best-preserved and most elaborate cavate known as the Mortandad Cave Kiva (Figure 16.6), which remains locked except for periodic monitoring or official visits. This area was closed to the public in the 1970s because of concerns raised by the Pueblo de San Ildefonso.

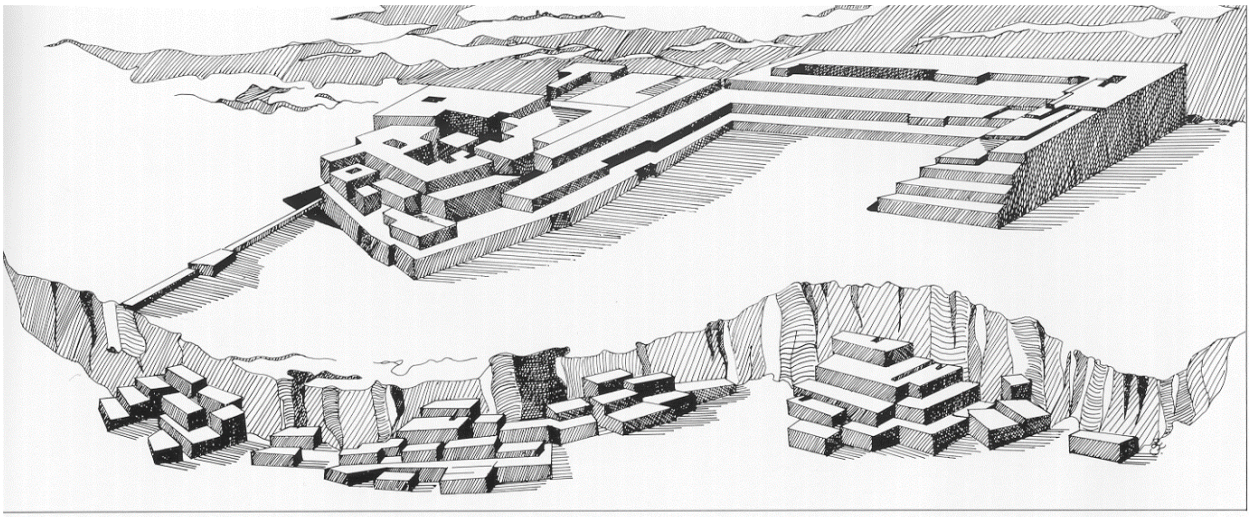


Figure 16.3 Artist rendering of Tsirege Pueblo (K.M. Chapman)

Figure 16.4 Aerial view of Tsirege Pueblo

Figure 16.5 Tsirege Pueblo

Figure 16.6 Steel grate in front of Mortandad Cave Kiva

Cold War–era Candidates for Preservation

The following Cold War era buildings and structures have currently been identified as Candidates for Preservation in Section 10 and were also listed in the 2011 update of *An Assessment of Historic Properties and Preservation Activities at the U.S. Department of Energy, in Response to Requirements of Executive Order 13287, Preserve America* (www.achp.gov/section3reports/2011/2011_Section 3_DOE.pdf). As additional significant Cold War-era buildings are identified, they may be added as Candidates for Preservation.

1. **TA-16-430, -435, -437:** HE Press Building Complex (main building, rest houses, and corridors)

   Significance: This pressing facility, built in 1953, supported LANL Cold War–era nuclear tests; it is an excellent example of HE processing facility architecture.

2. **TA-18-23:** Critical Assembly Building, Casa #1

   Significance: This building, built in 1948, is the first remotely operated critical assembly facility; it was built in response to the 1946 Slotin accident at TA-18 (Pajarito Site).

3. **TA-41-1:** Underground Vault

   Significance: This is the first nuclear materials vault (Q Area); it supported early United States stockpile activities and was built in 1949.

4. **TA-60-17, -19:** Assembly Building and Rack Tower Complex

Significance: This is the only remaining LANL rack facility (it includes a multifloor rack tower and associated rack-assembly / cable-testing building); the facility supported underground testing at the Nevada Test Site and was built in the mid-1980s.

5. Historic Guard Gates

Significance: These Cold War-era public security check point / guard posts were built in the late 1940s (the closed city of Los Alamos opened its gates in 1957):

TA-16-1451 Back Gate Guard Station

TA-72-8 East Jemez Guard Station – Sandia Gate

TA-73-15 East Gate Guard Tower

6. TA-18-26: Hillside Vault (early Cold War)

Significance: This vault, built in the late 1940s, stored special nuclear material in support of criticality experiments at TA-18 (Pajarito Site).

7. TA-33-27: Cold War-era Guard House

Significance: This guard station was built and used during the Cold War. It was constructed in 1951 to serve as security access into TA-33 from New Mexico State Road 4. This building is significant to a larger, discontiguous Laboratory historic guard-house district.

8. TA-33-28: Cold War-era Water Tower

Significance: This Cold War-era water tower was constructed between 1949 and 1950. It supplied water for fire protection and potable water to TA-33 and TA-39. The water tower serves as a visible landmark that represents local Cold War-era architecture and is the only remaining elevated water tower from this era at the Laboratory.

Section 17. Potential National Register of Historic Places Archaeological Districts

There are several archaeological site complexes and Cold War-era historic building complexes appropriate for designation as Register districts (Figure 17.1). These sites are described below.

A historic district possesses a significant concentration, linkage, or continuity of archaeological sites or buildings united historically or aesthetically by plan or physical development. A district can reflect one principal activity or can encompass several interrelated activities. It can also be defined by archaeological sites or buildings of similar style and design. A district must be significant, as well as being an identifiable entity, usually meeting Criterion C as well as Criterion A, Criterion B, or Criterion D. As such, a district must be a definable geographic area that can be distinguished from surrounding properties of different age, scale, or style. Finally, a historic district must comprise contributing properties, which can be archaeological sites, buildings, or structures within the district's boundaries that reflect its significance, either because of historic association, architectural qualities, or archaeological features. Contributing properties should also have significant historic integrity (NPS 2002).

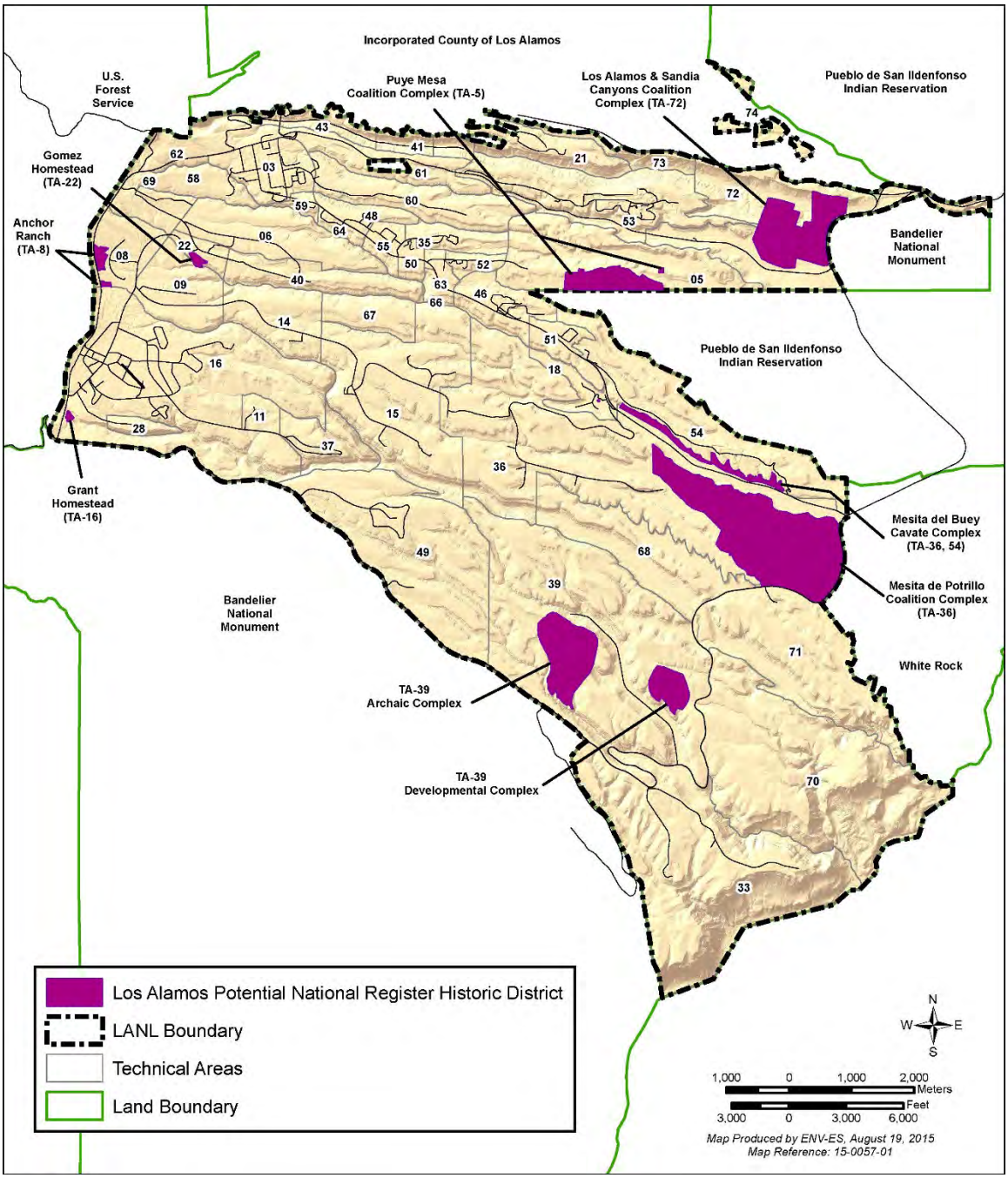


Figure 17.1 Potential archaeological national register historic district

Mesita del Potrillo Complex (727 acres): A large complex of approximately 134 archaeological sites between Pajarito Canyon and Potrillo Canyon, immediately west of White Rock and south of TA-54. These sites include 4 complex plaza pueblos, 31 pueblo roomblocks, 26 cavates and sets of cavates, 19 rock art panels, 6 sets of stairs and trails, 21 one- to three-room structures, 4 lithic scatters, 3 rock shelters, 1 rock ring, 11 rock features, 4 artifact scatters, 3 garden plots, and 1 miscellaneous site. This complex is one of the densest and most well-preserved groups of Ancestral Pueblo archaeological sites at LANL. In addition, there are several parallel sets of wagon ruts on top of Mesita del Potrillo that may have been part of the

transportation corridor servicing the timber-cutting activities of Henry Buckman, perhaps linking the Buckman sawmill to what was later to become S-Site (standing for sawmill site) at LANL.

Los Alamos and Sandia Canyons Complex (277 acres): This is a complex of approximately 34 sites on either side of Los Alamos Canyon and north of Sandia Canyon, immediately west and north of New Mexico State Road 4. This complex includes a large Coalition-period complex plaza pueblo consisting of a series of 4 interconnected two-story pueblo roomblocks surrounded by single-story rooms, 4 pueblo roomblocks including a rare small Classic period pueblo, 15 individual cavates or cavate complexes, 3 lithic scatters, 3 lithic and ceramic scatters, 5 one- to three-room structures, 2 rock art sites, and numerous segments of trails and associated steps. The trail system likely serviced the occupants of nearby Tsankawi Pueblo in terms of travel from the Pueblo to the Jemez Mountains and the Valles Caldera to the west.

Puye Mesa Complex (108 acres): This is a complex of about 30 archaeological sites situated on the mesa top immediately south of Mortandad Canyon and immediately north of San Ildefonso lands. An isolated cavate along the northern slopes of Puye Mesa and an associated set of stairs are also included with this complex. The mesa top contains a dense cluster of sites including 2 complex plaza pueblos, 14 pueblo roomblocks (Figure 17.2), 6 one- to three-room structures, 4 Archaic-period lithic scatters, 1 lithic and ceramic scatter, and a probable reservoir and associated agricultural terraces. A historic wagon road also transects the area. A survey has not yet been conducted along a portion of the south side of the mesa immediately adjacent to the boundary with the Pueblo de San Ildefonso. The area will likely contain cavates, trails, stairs, rock art, and other possible features.

Figure 17.2 Shaped tuff blocks from an Ancestral Pueblo roomblock on Puye Mesa

Mesita del Buey Cavate Complex (60 acres): This complex contains 21 sites, including outstanding examples of cavates and associated rock art situated along the southern cliff face of Mesita del Buey immediately north of the bottom of Pajarito Canyon (Figure 17.3). The area includes 13 cavate complexes, 5 rock art panels (Figure 17.4), and single examples each of a roomblock, rock shelter, and a lithic scatter.

Figure 17.3 General view of cavates along the southern cliff faces of Mesita del Buey

Figure 17.4 Petroglyphs on the southern cliff face of Mesita del Buey

TA-39 Archaic Complex (216 acres): This complex consists of approximately 19 archaeological sites situated on a mesa top between Water and Ancho canyons in TA-39. The complex is distinguished by the presence of three large Archaic-period lithic scatters, one lithic and ceramic scatter with a predominance of Archaic-period materials, and three lithic scatters of undetermined affiliation, potentially including Archaic-period materials. In addition, there are several Ancestral Pueblo roomblocks within this complex.

TA-39 Developmental Complex (80 acres): This small complex contains a total of six archaeological sites. Based on ceramic analysis, two Ancestral Pueblo roomblocks and one lithic and ceramic scatter likely date to the Developmental period and thus constitute the earliest known Ancestral Pueblo archaeological sites on the Pajarito Plateau. The other three sites, likely dating to the Coalition period, include a one- to three-room structure, a lithic and ceramic scatter, and a rock feature.

Grant Homestead (4 acres). The Grant Homestead is situated on a bench in Water Canyon immediately east of New Mexico State Road 501. The homestead was established in the 1920s by an Anglo cowboy, Ted Mather, and his Hispanic wife, Rosa Grant, and was used up until the time of the Manhattan Project. Mather served as a wrangler with the Los Alamos Ranch School. The homestead was partially damaged by the Cerro Grande fire and subsequent rehabilitation measures. However, a number of features are still present, including the house and privy foundations, trash scatters, and other definable activity areas.

Anchor Ranch (14 acres). Anchor Ranch was established as a homestead in 1901 by James Loomis, an employee of the lumberman Henry Buckman. The Ross family of New York State purchased the homestead in 1924 and turned it into a small commercial cattle ranch. Francis Smithwick was hired to manage the ranch and to care for the Ross family's handicapped son, Alex. While none of the original ranch buildings are still standing (flooding after the May 2000 Cerro Grande fire destroyed an ice house), there are a large number of visible features extant, including two ponds, irrigation ditches, pumping apparatus, building and structure foundations, and trash deposits. One of the log guest houses, since demolished, was used for making the first industrial-type radiograph during the Manhattan Project. The Anchor Ranch name was used for Manhattan Project operations at TA-8 (Anchor Ranch West) and TA-9 (Anchor Ranch East).

Gomez Homestead (9 acres). The Gomez homestead is in TA-22 on the mesa edge immediately north of Pajarito Canyon near its junction with Starmers Gulch. It was established by Donaciano Gomez in 1899. The homestead was occupied by members of the Gomez family up until the Manhattan Project. Wooden structural elements of several features of the homestead were damaged or destroyed by the Cerro Grande fire. The homestead is largely unique in that a number of structures, including a corral, a possible guest house, lambing pens, a horno (Figure 17.5), and other features (Figure 17.6), were constructed of stone masonry. The integrity of the nearby *Sanchez y Montoya* homestead was largely destroyed by the fire, but relatively little damage was sustained at the Gomez homestead because of the prevalence of the stone masonry.

Figure 17.5 Gomez homestead horno

Figure 17.6 Other features at the Gomez homestead

Pond Cabin (1 acre). The Pond Cabin is the one surviving standing log structure at LANL dating to the Homestead period (Figure 17.7) and is listed on the New Mexico State Register of Cultural Properties. It was built in 1914 by Ashley Pond to serve as the office for the Pajarito Ranch, a commercial ranch similar in nature to Anchor Ranch. After the Pajarito Ranch was taken over by the Manhattan Project, the Pond Cabin was used as sleeping quarters for various employees working at TA-18. Because of the increased potential for flooding in Pajarito Canyon immediately after the May 2000 Cerro Grande fire, a series of cement road barriers and sandbags was placed around the structure to protect it in the event of flooding. No floods reached the Pond Cabin, and the barriers have since been removed.

Figure 17.7 The Pond Cabin at TA-18

Cold War Historic Building Complexes. LANL has two areas identified as potential historic districts located in TA-9 (Anchor Ranch Site East) and TA-16 (S-Site) and one potential discontiguous historic district of Cold War−era guard stations. The potential district in TA-9 consists of approximately 36 buildings, while the potential district in TA-16 consists of approximately 48 buildings. All of these buildings were constructed during the early Cold War (the 1950s and 1960s) to support the Laboratory's nuclear weapons development program. The facilities at TA-9 include laboratory/office buildings, processing and development buildings, and a security building (McGehee et al. 2005). Facilities at TA-16 have a larger range of use, including laboratory/office buildings, processing and development buildings, security and safety buildings, and a cafeteria (McGehee et al. 2003b).

These two potential districts are also identifiable from their buildings' architectural features. Most of these buildings are constructed of concrete with unpainted surfaces; all have flat roofs; most have their doors still painted with the original green color; windows, if present, are glass brick or single pane; and exterior lights, if present, are either hanging lights or half-round, wall-mounted, incandescent light fixtures. Some buildings in the potential TA-16 district also have loading docks with safety bumpers and nonsparking dock flooring. These architectural features identify these buildings as industrial vernacular scientific facilities, common military and scientific facilities built during the early Cold War (Figure 17.8).

Figure 17.8 Representative Cold War-era building located within the potential TA-16 district

The potential discontiguous historic district at the Laboratory consists of the 12 remaining early Cold War-era guard stations, including the guard tower on New Mexico State Road 502 at the entrance into Los Alamos (Figures 17.9, 17.10, and 17.11). These buildings were all constructed between 1948 and 1959 and provided various levels of security. As with the other historic districts, these buildings are identifiable with distinct architectural features. The Field Office has identified a typology of these guard stations that summarizes the buildings as follows: generally symmetrical or slightly rectangular in construction; constructed of concrete, wood, or stone; having flat or slightly pitched roofs; providing panoramic views with large windows; and located in areas primarily concerned with guarding the nuclear weapons research and design and stockpile support being conducted at LANL, as well as other identified historical missions, and controlling access into the closed town of Los Alamos (Garcia et al. 2015a).

Figure 17.9 Potential Cold War-era guard-station discontiguous historic district

Figure 17.10 Representative Cold War-era guard station

Figure 17.11 Cold War-era front gate tower

Part IV. Native American Consultation and Outreach

Section 18. Native American Consultation

LANL has maintained an amicable and respectful relationship with its Native American neighbors at the Pueblos of Cochiti, Jemez, San Ildefonso, and Santa Clara and with other tribes throughout northern and central New Mexico.

Laboratory historical activities have damaged and destroyed a number of Ancestral Pueblo archaeological sites and traditional use areas, especially during the early decades of LANL's existence before the passage of historic preservation laws. Ongoing and planned future changes in DOE/NNSA missions and associated infrastructure upgrades will continue to have the potential to impact Ancestral Pueblo resources. Beginning in 1992, the Field Office and LANL made a concerted outreach effort on behalf of the Accord Pueblos. This effort resulted in a set of agreement documents with each pueblo that spelled out a series of issues and initiatives aimed at enhancing communication, supporting environmental monitoring, and providing for educational and employment opportunities.

One goal of this CRMP is to consider the concerns and wishes of the pueblos and other tribes while implementing LANL's national security mission. The 2014 *Memorandum of Agreement between the U.S. Department of Energy, National Nuclear Security Administration and the Pueblo de San Ildefonso* defines how LANL work is to be conducted on Pueblo land and how the Pueblo will be notified of such work. The MOA was re-signed in 2015 by the new Governor of the Pueblo de San Ildefonso.

Cultural Affiliation

Historic preservation law, executive orders, and DOE policy require consultation with Native American tribes that are culturally affiliated with LANL. The tribes most directly involved in this consultation include the Pueblos of San Ildefonso, Cochiti, Santa Clara, and Jemez. The Jicarilla Apache are likely culturally affiliated with two tipi rock ring sites in Rendija Canyon excavated in 2003, which are part of the lands designated to be conveyed to the County of Los Alamos. The Pueblo of Acoma, the Mescalero Apache, the Pueblo of Santa Ana, and the Hopi Tribe have expressed an interest in land-use issues at LANL. Based on oral traditions, Pawnee and Kiowa groups may have also made occasional forays into this general area but would not be considered culturally affiliated to the area.

Cultural affiliation as defined by historic preservation law, differs from that definition upheld through the federal courts in relation to the Indian Lands Commission Act of 1946. For example, although the Pueblo de San Ildefonso claims aboriginal rights to all of the lands presently occupied by LANL (with the exception of the Fenton Hill parcel), it may be possible for other tribes to satisfactorily demonstrate the presence of traditional cultural properties or to demonstrate cultural affiliation to sets of human remains found in various locations at LANL. This situation highlights the fact that the regulatory standard for establishing cultural affiliation is a lower standard than that used to establish ancestral land claims. In June 2005, the Pueblo de San Ildefonso settled their claim under the Indian Lands Commission Act, the last remaining tribe to reach settlement. However, this fact has not detracted from the clear understanding by

DOE that most, if not all, of LANL (excluding Fenton Hill) is situated within the aboriginal boundary of the Pueblo de San Ildefonso.

The general tenets of Native American cultural affiliation are discussed in a 2007 assessment, *Determination of Ownership and Cultural Affiliation for Human Remains and Culturally Sensitive Objects Pursuant to the Native American Graves Protection and Repatriation Act (NAGPRA) at Los Alamos National Laboratory, New Mexico* (LANL 2007a).

The Pueblo de San Ildefonso is a direct neighbor to LANL, with several kilometers of shared boundary. San Ildefonso views much of the Laboratory as belonging within their ancestral boundaries and as their aboriginal land. DOE has researched this assessment and considers the Pueblo de San Ildefonso to be culturally affiliated under NAGPRA with Ancestral Pueblo remains throughout the Laboratory.

The Pueblo de Cochiti views the southern edge of LANL, including Ancho Canyon and the mesa top to the south, as being part of their ancestral boundaries; this pueblo thus appears to share Ancestral Pueblo cultural affiliation under NAGPRA for this part of the Laboratory with the Pueblo de San Ildefonso, a position evident in the review of historical documents and ethnographies.

Santa Clara Pueblo (Figure 18.1) has stated a claim for cultural affiliation to Rendija Canyon, and possibly to other portions of the Laboratory, although the latter has not yet been formally presented to the Field Office as an actual claim. DOE has accepted the Rendija Canyon claim by the Santa Clara Pueblo. Therefore both Santa Clara and San Ildefonso are viewed as sharing cultural affiliation under NAGPRA to Ancestral Pueblo remains and objects in this particular location. DOE has not yet seen the evidence to support the notion that Santa Clara Pueblo is culturally affiliated to Ancestral Pueblo human remains elsewhere at LANL.

In addition to these three pueblos, DOE has determined that Jemez Pueblo has a cultural affiliation claim under NAGPRA for Ancestral Pueblo remains and objects at Fenton Hill. There is also the relationship of the Jicarilla Apache Nation to two historic tipi-ring sites excavated in 2003 in Rendija Canyon as part of the Land Conveyance and Transfer Project (Figure 18.2). The excavation evidence supports a connection with the Jicarilla Apache, but no human remains or NAGPRA-related items were recovered.

In the event that human remains or potential NAGPRA-related objects from an archaeological site dating to the Archaic period (before AD 600) are found at LANL, cultural affiliation is assumed by the Field Office to be shared between all New Mexico pueblos and the Hopi Tribe of Arizona. Initial consultation would be performed with all of these tribes. The consultation process may determine that some or most of these tribes would be willing to formally defer consultation to the Accord Pueblos.

Figure 18.1 Santa Clara tribal members visit an Ancestral Pueblo site at LANL

Figure 18.2 Tribal consultation with the Jicarilla Apache

Native American Sovereignty and Government-to-Government Consultation

EO 13175, historic preservation guidance, and DOE policy explicitly recognizes the sovereign status of federally recognized Native American tribes and acknowledges that formal historic preservation consultation should be carried out on a government-to-government basis (DOE Order 144.1: Department of Energy American Indian Tribal Government Interactions and Policy 2009). Formal consultation regarding NAGPRA, Section 106 and Section 110, and other laws and executive orders as may be appropriate, is conducted directly between the Manager or Cultural Resources Program Manager of the Field Office and the respective governors or presidents of pueblos and tribes. However, informal day-to-day conduct of cultural resources activities may also be carried out by appropriate staff, such as the Field Office Cultural Resources Program Manager, the LANL M&O contractor resources management staff, and various cultural resources and environmental program managers at the pueblos and tribes.

Section 106 Consultation

Consultation regarding Section 106 is carried out on a government-to-government basis between culturally affiliated tribes and DOE. Typically, evidence of this consultation will be in the form of a memo and attached report provided to the SHPO by the Field Office, with copies to the tribes.

Traditional Cultural Properties

As noted in Section 2, a traditional cultural property is defined as a place of special heritage value to contemporary communities (often, but not necessarily, Native American groups) because of its association with the cultural practices or beliefs that are rooted in the histories of those communities and which is important in maintaining the cultural identity of the communities.

Traditional cultural properties were first considered at LANL in the specific context of the 1993 then-proposed Bason Land Exchange in Rendija Canyon. Consultations by project staff with the Pueblo de San Ildefonso resulted in the identification and concurrence by the SHPO of seven traditional cultural properties associated with an ancient pilgrimage trail extending from the Rio Grande to a prominent peak in the Jemez Mountains.

The next set of traditional cultural property consultations occurred during the period of 1996 and 1997 during the preparation of an ethnographic study in conjunction with the 1999 SWEIS for LANL (DOE 1999). This undertaking resulted in contact with 16 tribes and members of nearby Hispanic communities.

The ethnographic study divided its classification of traditional cultural properties into five basic categories: ceremonial sites, natural features, ethnobotanical gathering sites, artisan material gathering sites, and traditional subsistence features. Tribes represented by the Pueblos of Acoma, Cochiti, Laguna, Picuris, Pojoaque, Sandia, San Ildefonso, Santa Clara, Zia, and Zuni indicated the use of traditional cultural properties from one or more of these categories on LANL land and/or with cultural affiliation to LANL land.

In 2000, the Field Office contacted 24 tribes as part of *A Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at Los Alamos National*

Laboratory (DOE 2000b) to identify whether they had potential or known traditional cultural properties on LANL land. Along with the four Accord Pueblos, the Pueblo of Acoma and the Hopi Tribe responded affirmatively, as did the Mescalero Apache Tribe.

EO 13007, Sacred Sites

EO 13007 concerns Indian sacred sites. In order to protect and preserve Indian religious practices, federal land managers must accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of sacred sites (Section 2). Tribes view confidentiality of sacred sites in much the same manner as that of traditional cultural properties, with cultural resources information typically being closely guarded.

Native American Graves Protection and Repatriation Act

Compliance with NAGPRA at LANL is divided into three fundamental components. The first component, Native American tribes establishing potential cultural affiliation with LANL lands, was discussed above. The second component involves the development and use of NAGPRA intentional excavation comprehensive agreements for planned excavation at LANL. The third component is implementation of the standard operating procedure for the inadvertent discovery of human remains or NAGPRA-related objects at LANL (LANL 2008). The standard operating procedure establishes a set of required procedures and time frames to be implemented in the event of an inadvertent discovery to ensure compliance with NAGPRA and all other applicable statutory and regulatory requirements.

If the remains are determined to be Native American, the Field Office Cultural Resources Program Manager is responsible for government-to-government notifications to culturally affiliated Indian tribe(s) as detailed in the NAGPRA cultural affiliation study (LANL 2007a). The government-to-government inadvertent discovery consultation process includes a determination of the feasibility and practicability of in situ reburial for the remains and/or cultural objects. In the event that in situ reburial is not possible, then established procedures for the intentional excavation of Native American human remains and cultural objects will be followed. Analysis of human remains conducted to facilitate identification of cultural affiliation is restricted to nondestructive methods and performed by a professional physical anthropologist. Unless otherwise agreed upon with the affiliated tribe(s), repatriation of the remains will take place. Project activities in the vicinity of the inadvertent discovery may resume if the planned site treatment is documented in written correspondence between the Field Office and the affiliated Indian tribe(s). This correspondence establishes a plan for either (1) stabilization and protection of the site with no removal of the human remains and cultural objects or (2) excavation or removal of the remains in accordance with 43 CFR 10.3 and their disposition to lineal descendants or Indian tribes with priority of custody as defined in 25 USC 3002(a) and 43 CFR 10.6. In consultation with Pueblo de San Ildefonso, the Field Office approved such a management plan in 2007 for a NAGPRA reburial site at LANL (LANL 2007b).

Part V. Strategic Planning and Long-Term Management Issues and Goals

Section 19. Cultural Resources Management and Strategic Planning

Cultural resources management at LANL is part of a larger set of planning activities that all have as their common goal the responsible use of the LANL built environment and landscape in support of the DOE/NNSA missions. With this in mind, it is imperative that this CRMP and its associated Ten-Year Road Map be closely integrated with all other planning initiatives and activities at LANL. Long-range planning initiatives at LANL are considered here. These include the Ten-Year Site Plan, the SWEIS, the Site Sustainability Plan, Long-Term Strategy for Environmental Stewardship and Sustainability, footprint reduction planning, and other facility strategic plans.

Comprehensive Site Plan

The Site Plan is a strategic planning document that is the foundation for the integration of real-property asset management. This document is updated annually and defines a path forward for the Laboratory to modernize, streamline, consolidate, and sustain its infrastructure to meet its national security mission (LANL 2016).

Goals of the plan include

- construction of new facilities and reinvesting in enduring facilities to support critical capabilities,
- projects to improve energy efficiency and long-term sustainability of resources,
- modernizing utility infrastructure to support future programmatic needs,
- legacy cleanup and implementation of Long-Term Strategy for Environmental Stewardship and Sustainability measures, and
- overall footprint reduction and consolidation of nuclear infrastructure.

Some of the goals and associated projects have the potential to affect and be affected by cultural resources. The LANL M&O contractor supports the Ten-Year Site Plan planning process by providing timely location assessments and site data to facilitate project planning and design. Additionally, the staff prioritizes archaeological site and historic building evaluations and reevaluations in alignment with the Ten-Year Site Plan path forward.

2008 Site-Wide Environmental Impact Statement

The 2008 SWEIS analyzed continued operations at LANL. The CRMP is part of the SWEIS Mitigation Action Plan and is implemented as part of that compliance commitment (DOE EIS 0380).

Long-Term Strategy for Environmental Stewardship and Sustainability Plan

In 2015, the Field Office published the Long-Term Strategy for Environmental Stewardship and Sustainability plan (LANL 2012). Over the next several decades, significant changes to the mission and operations at LANL are expected. The strategy commits to a progressively more sustainable site and a mission entwined with and accomplished by effective environmental stewardship. The plan provides a framework for thinking about the end states of current projects and programs and for envisioning what the Laboratory will look like in the long term.

Section 20. Prioritization Strategy for Register-Eligibility Evaluations of Archaeological Sites and Reevaluation of Sites

Many of the known archaeological sites at LANL have not been evaluated for eligibility to the Register. Approximately 90 percent of LANL property has been surveyed and approximately 45 percent of the sites have been assessed for eligibility. The Field Office is working to complete eligibility determinations. All unevaluated sites are considered eligible under Section 110 until determinations can be made.

LANL M&O contractor staff will work with strategic planners to identify areas subject to development. This process is facilitated by the Decision Support Application, an interactive web-based GIS tool, which allows users to view potential environmental factors. These include the location and a significance ranking of archaeological sites and historic buildings. The Decision Support Application supports informed land-use decision-making and streamlined cultural resource management by identifying potential issues in the initial stages of project planning.

LANL M&O contractor staff will identify archaeological sites and historic buildings and structures within high-priority land-use modification areas that have not yet been evaluated for listing in the Register. Field checks will be necessary for some of these sites.

Section 21. Site Monitoring and Protection

An important aspect of cultural resources management is the field monitoring of significant cultural resources most vulnerable to impacts by vandalism, natural erosion or decay, or mission activities. Typically, most cultural resources eligible for listing in the Register are periodically monitored. The timing and level of monitoring effort depends on the fragility and sensitivity of the resource. Some resources require annual monitoring, while other resources can be adequately monitored every few years (specific monitoring priorities will be identified in a formal monitoring plan). The LANL site monitoring program will concentrate its efforts on three general site categories. The first is yearly monitoring devoted to examining a percentage of those archaeological sites and historic buildings and structures included in the potential national register districts described in Sections 16 and 17. The second category consists of important resources known to be moderately or severely impacted and compromised by ongoing erosion, recreational trail use, or other actively damaging situations. The third category consists of sites potentially threatened by infrastructure activities at LANL.

Site monitoring would include visual inspection to detect vandalism that has occurred since the last inspection, photography in selected locations to document condition changes, completion of

a field monitoring form, and GPS recording of specific locations experiencing or subject to problems.

In addition to these general parameters for field monitoring at LANL, several significant monitoring efforts have been developed as the result of project-specific activities and programs. Examples are presented below.

Mortandad Cave Kiva Complex Condition Assessment

The Mortandad Cave Kiva Complex located within Mortandad Canyon consists of over 150 cavates or rock-cut rooms, as well as associated rock art, stairways, and ancient trails. The site dates to the Ancestral Pueblo Late Coalition and Early Classic period (AD 1225−1350). In 2009−2010, the Field Office conducted an assessment of cavates and associated features to establish a baseline from which to assess any changes in condition (Figure 21.1). A major focus of the assessment was to document the resources that could be susceptible to impacts from public site visitations (Johnson 2010).

The condition assessment generated a vulnerability ranking for the cavates (low, medium, high, critical). Of the cavates, 15 were categorized as critical, 15 as high, 19 as medium, and 50 as low (Johnson and Hoagland 2010). The assessment recommended that cavates ranked as critical be restricted from future public visitation and that cavates ranked as high be monitored (Figure 21.2). The vulnerability ranking restrictions have been implemented to eliminate public-visitation impacts to the fragile cavates and features and the site is regularly monitored. Additional assessment recommendations include limiting the number of tours, keeping tour groups small, and requiring the use of predetermined tour routes.

Figure 21.1 Archaeologist conducting the baseline condition assessment of cavates and related features at the Mortandad Cave Kiva Complex (2009)

Figure 21.2 High-priority cavate; note intact lintel, ventilation hole, and plaster (2009)

The goal of the Mortandad Cave Kiva Complex condition-assessment project is to monitor and potentially stabilize natural deterioration and to protect the resources from inadvertent human impacts while, at the same time, allowing the public an opportunity to learn about, appreciate, and enjoy one of the Pajarito Plateau's most unique and well-known cultural resources. To assist with this effort, a light detection and ranging (LIDAR) survey of the Mortandad Cave Kiva Complex was conducted in 2010.

Nake'muu Pueblo Condition Assessment and Monitoring

In 1997, LANL commissioned the Mesa Verde Architectural Documentation Team of the National Park Service to perform a detailed condition assessment of Nake'muu Pueblo (Nordby et al. 1998). The timing of the assessment was triggered by the proposed construction of the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility on the north side of Cañon de Valle opposite to Nake'muu. The assessment study documented the condition of 272 walls at Nake'muu (a room typically has four walls). These walls were divided into four categories (Figure 21.3), with Category 1, standing walls, being the most fragile and Category 3 being the most stable. Most walls at Nake'muu are Category 4, which refers to collapsed walls not standing above grade. Thirteen Category 1 standing walls were identified, along with 57 Category 2 walls and 32 Category 3 walls. The assessment results indicated that in 1998, 37.5 percent of the walls were standing to some degree. Of the 102 standing walls, approximately 13 percent were characterized as being in poor condition, 56 percent were in fair condition, and 31 percent were in good condition.

The LANL M&O contractor staff and pertinent LANL facility managers worked closely with the Pueblo de San Ildefonso to conduct a detailed annual inspection of Nake'muu Pueblo from 1998 to 2006 (Vierra and Schmidt 2006). The annual inspections systematically documented the loss of architectural chinking stones (small pebble-sized fragments of tuff used in adobe mortar to help stabilize walls) and the displacement of masonry blocks from the standing walls. The 1997 condition-assessment wall profiles served as the basis for the yearly monitoring of chinking stone and masonry block loss. During the nine-year monitoring program, the site demonstrated a 0.9 percent loss of chinking stones and 0.3 percent displacement of masonry blocks. Statistical analyses indicate that these displacement rates correlated with annual snowfall and not with annual rainfall or explosive testing at the DARHT facility. One section of wall fall was attributed to disturbance by local migratory elk, which periodically include Nake'muu in their migration routes.

In the years following the 1998−2006 study, the Field Office has monitored and photographed wall conditions at the site (Figure 21.4). Monitoring is typically performed before the annual site visit by the Pueblo de San Ildefonso. Since 2006, there has been occasional minor displacement of masonry blocks, seemingly correlated with the years of greatest snowfall and freeze/thaw patterns. Currently, more than a dozen walls of individual rooms exhibit characteristics suggesting the potential for collapse within the next few decades. The Field Office is in consultation with the Pueblo de San Ildefonso and Bandelier National Monument to determine an appropriate course of action for the long-term management of this resource.

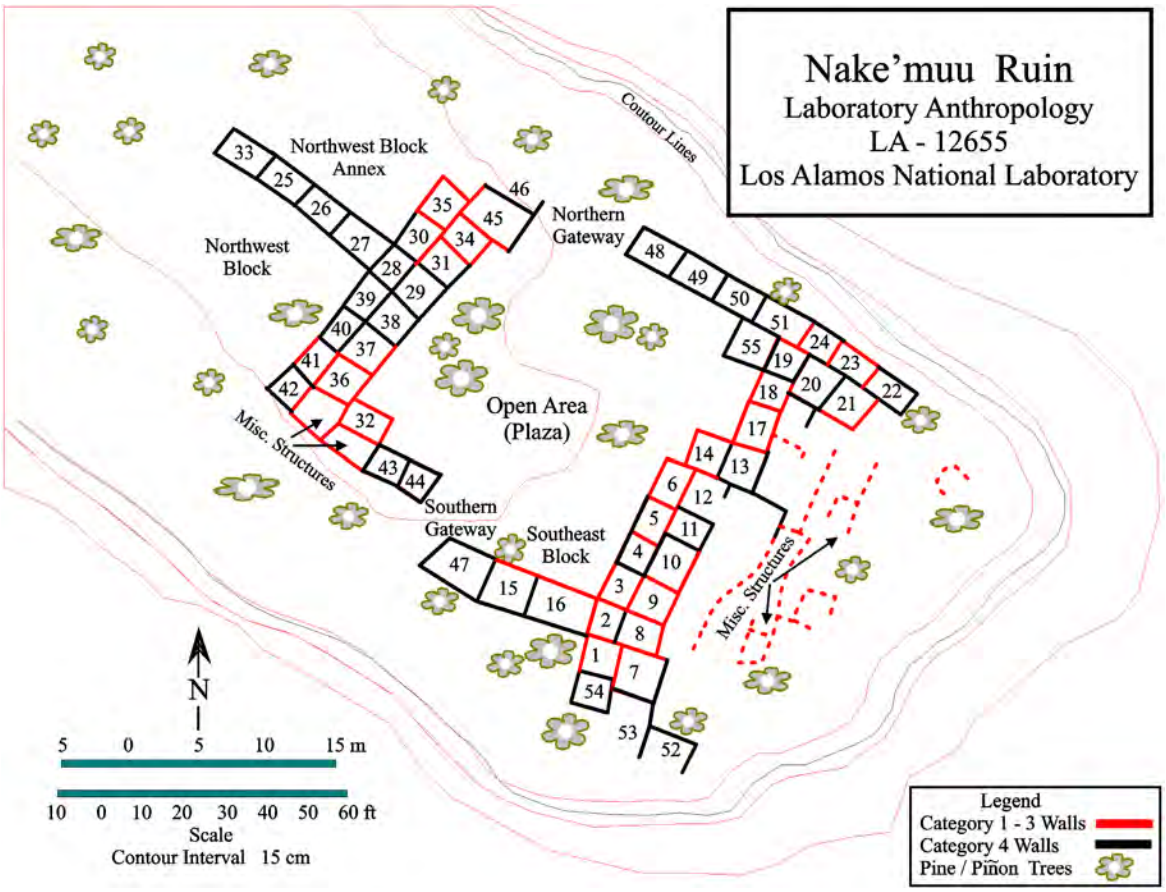


Figure 21.3 Map of Nake'muu prepared in 1997 by the condition assessment team

Figure 21.4 Annual assessment of Nake'muu walls by the Field Office staff (2015)

The most recent field check and photographic assessment was conducted in August 2015. Although eight tuff blocks in two locations of the pueblo were noted to have fallen between 2013 and 2014, no new wall fall or damage was identified during the FY 2015 condition assessment.

In 2014, the LANL M&O contractor and DOE worked to create a three-dimensional virtual model of Nake'muu that supports education, outreach, and preservation questions. In consultation with the Pueblo de San Ildefonso, this model was converted into an iPad application, which is available to the public at the Bradbury Science Museum. In addition, the site can now travel to the Pueblo de San Ildefonso, where residents can visit the site virtually.

Section 22. Outreach and Interpretation

Educational outreach is an important aspect of LANL's historic preservation program. The public is the ultimate beneficiary of cultural resource compliance documentation prepared by LANL personnel, and, at times, individuals and groups can play a role in the Section 106 compliance process as interested parties. Outreach and interpretation activities include public tours (Figures 22.1 and 22.2), lectures, and museum exhibits, including the permanent Environmental Research and Monitoring exhibit, which opened in 2014 at the Bradbury Science Museum. Additional outreach includes publications, video productions, and publicly accessible cultural-resources management web pages with links to online compliance reports. An important aspect of the outreach program is to work closely with neighboring federal and municipal agencies toward common goals. For example, LANL has integrated treatment of historic trails and Homestead-era roads on LANL property with the County of Los Alamos's trails initiative, the County of Los Alamos Open Space Program Trail Network Plan. In a similar vein, LANL cultural resource staff participation in the cultural resources subcommittee of the East Jemez Resource Council has benefited DOE and the cultural resources program at LANL. Planning efforts related to the recently established Manhattan Project National Historical Park unit in Los

Alamos has necessitated a close relationship between LANL historic buildings staff, the County of Los Alamos, and the Los Alamos Historical Society. The creation of the park has also led to LANL M&O contractor and DOE coordination with community organizations and DOE staff from the Hanford and Oak Ridge site offices and with DOE headquarters in Washington, D.C.

Figure 22.1 Tour of V-Site

Figure 22.2 Interpretive panels describing historical LANL land-use at TA-3

Section 23. Procedures for Emergency Situations

Federal cultural resource compliance law, at 54 USC 306112, states that normal Section 106 review can be suspended during emergency work or repair work to minimize hazards to human health or to the environment or during declared disasters, emergencies, or national security threats. Such emergency actions will be immediately reported to the SHPO as conditions permit, and in a timely manner—normally within 30 days after the termination of the emergency—and impacts to historic properties will be evaluated and reported to the SHPO.

The LANL Emergency Operations Center was established to deal with a variety of emergencies that may arise at or around LANL (Figures 23.1, 23.2, and 23.3). Cultural resource staff members are part of the LANL M&O contractor presence at the Emergency Operations Center to ensure that environmental issues, including cultural heritage, are taken into account to the extent practicable during all emergency management activities.

Figure 23.1 Archaeological site damaged by the Cerro Grande fire

Figure 23.2 Nake'muu after the Cerro Grande fire

Figure 23.3 The Pond Cabin was enclosed to protect it from possible flash flooding after the Cerro Grande fire

The Las Conchas fire started on June 26, 2011, and grew rapidly as a result of dry conditions and strong winds. In an effort to slow the progress of the fire and prevent it from entering Laboratory property and the townsite, LANL personnel conducted several fuels mitigation projects. The coordination between LANL's Emergency Management, Maintenance and Site Services, and the cultural resource staff was one of the success stories from the fire. Crews were deployed to several areas to complete fuels thinning and to improve existing fire roads and firebreaks. Crews used industrial-sized mowers and large-vegetation mulching machines known as masticators to reduce grasses, shrubs, and small trees to help prevent the spread of the fire (Figure 23.4). In consultation with the Field Office, LANL cultural resources staff were part of these crews. A cultural resources staff member was assigned to each crew and marked archaeological sites in areas scheduled for thinning so that they could be avoided and would not be impacted by these activities. Field assessments of the areas treated between June 26 and July 8, 2011, were conducted, and no impacts to cultural resources were identified.

Figure 23.4 Masticator clearing a fire break near an archaeological site during the Las Conchas fire

Part VI. Safety, Security, and Quality Assurance

Section 24. Cultural Resources Records Management

Cultural resources management records are managed by DOE. The records contain documentation of formal and some informal Native American consultation. Documentation of all correspondence with regulators, including the New Mexico SHPO and the ACHP area also managed. Select formal correspondence between the LANL M&O contractor and the Field Office is maintained by both DOE and the LANL M&O contractor. The LANL M&O contractor maintains records of public-outreach activities performed by cultural resources management staff. Records are maintained electronically and in hardcopy paper form. In addition, all site forms and eligibility determinations are submitted to the State of New Mexico Archaeological Records Management Section.

Section 25. Cultural Resources Management Quality Assurance Program

As a required aspect of LANL environmental programs, the cultural resources program operates under two quality assurance documents: the M&O contractor's Quality Management Plan and a Cultural Resources Management Technical Project Plan. These plans ensure that programs and associated projects are carried out effectively and responsibly, with clear guidance maintaining quality control throughout project performance.

In addition to these two quality assurance documents, daily activities conducted by the cultural resources program are managed by several procedures. The procedures encompass multiple activities, including project review, archaeological survey, excavation, archaeological laboratory work, data analysis, geographical and geospatial data management, historic buildings / structures fieldwork and documentary research, and the application of cultural resource compliance integrity and significance standards.

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Appendix A

Ten-Year Road Map for the Cultural Resources Management Plan

This Ten-Year Road Map (Road Map) for the Cultural Resources Management Plan (CRMP) represents a prioritization of the efforts necessary to achieve the goals of the CRMP. These goals include cost-effective and efficient long-term management strategies for the protection of significant heritage resources at Los Alamos National Laboratory (LANL or the Laboratory). The Road Map also provides an aggressive approach to enhancing land-use flexibility at LANL. The Road Map will be reviewed annually and updated as necessary. The Road Map has identified tasks to be completed between fiscal years (FYs) 2017 and 2027.

Priority 1. Key Development Area Studies

The LANL management and operating (M&O) contractor can use institutional planning information and tools (e.g., Ten-Year Site Plan, and Long-Term Strategy for Environmental Stewardship and Sustainability) to identify areas of the Laboratory that will be developed and prepare a study with recommendations for cultural-resource-management actions to be taken in the next one to three years (e.g., identify unsurveyed areas, identify creative mitigation strategies).

Priority 2. Support the Manhattan Project National Historical Park

The LANL M&O contractor will support and implement the United States Department of Energy (DOE), National Nuclear Security Administration Los Alamos Field Office (Field Office) and the National Park Service on the implementation of the Manhattan Project National Historical Park. Restoration, repairs and stabilization of Manhattan Project National Historical Park properties are necessary.

Priority 3. The Field Office will implement a modified annual cultural resources monitoring plan, with a focus on the most significant archaeological resources at LANL.

Priority 4. Significance Evaluation Criteria for Archaeological Sites

The DOE will develop a set of criteria, in consultation with the State Historic Preservation Officer (SHPO), to standardize the process for evaluating the significance of archaeological sites throughout LANL in terms of the sites' eligibility for listing in the National Register of Historic Places (Register). Using research findings from LANL survey and excavation projects (e.g., the Land Conveyance and Transfer Project), the Field Office will determine archaeological site significance using a weighted scale, which will include site integrity and site significance. The intent of this task is to streamline part of the effort necessary to process the current backlog of archaeological sites that have not yet been evaluated for the Register.

Priority 5. Legacy Closeout Reporting

Complete archaeological survey reports and subsequent consultation with the SHPO for environmental compliance projects dating between 1991 and 1995. Complete recording of 447 archaeological sites discovered on previously unsurveyed lands at LANL during tree-thinning operations between FY 2001 and FY 2004 as part of the Cerro Grande Rehabilitation Project.

Priority 6. National Register Nominations (Ancestral Pueblo Sites)

Prepare National Register nominations for these Ancestral Pueblo properties:

- Mortandad−Sandia Complex (Mortandad Cave Kiva complex; Sandia Cave Kiva complex; Sandia Pueblo).
- Tsirege. Conduct baseline survey and boundary assessment, including associated grid gardens, reservoir, talus rooms (in addition to cavates), and nearby sites that might be included as part of the complex.
- Nake'muu. Complete the Pueblo consultation process. The consultation will be focused on Register nomination in light of potential development of a memorandum of agreement.

Priority 7. The Field Office will reach a path forward for Nake'muu.

Priority 8. The Field Office will reach a path forward for University House.

Priority 9. Modeling and Testing Artifact Scatters for Subsurface Integrity

The DOE will develop a set of geomorphic criteria, in consultation with the SHPO, to categorize the likely integrity of archaeological sites and thus their suitability for listing in the Register. Sites located on geomorphically unstable surfaces like alluvial fans or floodplains are probably the result of erosion and are not in their original primary context. The intent is to streamline part of the effort necessary to process the current backlog of archaeological sites that have not yet been evaluated for the Register. However, this task entails looking at a number of artifact scatters previously deemed eligible for the Register, but which likely now lack sufficient integrity to qualify for listing. This task will involve using aspects of the cultural resources program Graphic Information System to look at the spatial relationship between archaeological sites and certain geomorphic landforms as an aide to the assessment of site integrity.

Appendix B

Archaeological Site Significance and Eligibility Standards

Archaeological Site Significance and Eligibility Standards is a stand-alone document that is updated periodically.

Executive Summary

The Los Alamos National Laboratory (LANL) management and operating (M&O) contractor is responsible for supporting the United States Department of Energy (DOE), National Nuclear Security Administration (NNSA) Los Alamos Field Site Office (Field Office) in implementing and complying with federal law on cultural resource compliance. The Field Office and the LANL cultural resources staff developed a Cultural Resource Management Plan (CRMP), which outlines the manner in which the LANL M&O contractor and DOE/NNSA implement these requirements at LANL. The CRMP is a comprehensive plan for cultural resource management and includes eligibility determinations for archaeological sites across LANL. Eligibility assessments consist of identification and documentation of the resource and an assessment of significance. During an assessment, cultural resource managers gather information about the known or potential archaeological resources. This information also allows for an assessment of significance. The process for determining archaeological site significance and eligibility described in this document will help cultural resources managers at LANL to develop strategies to manage resources in an effective and consistent manner. Creative mitigations and LANL-specific eligibility assessments are also discussed.

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Introduction

The United States Department of Energy (DOE), National Nuclear Security Administration Field Office (Field Office) is responsible for implementing and complying with federal cultural resource compliance laws. The Field Office and the Los Alamos National Laboratory (LANL) management and operating (M&O) contractor cultural resources staff developed the Cultural Resources Management Plan (CRMP), which outlines how the LANL M&O contractor and the Field Office implement cultural resource compliance at LANL. The CRMP is a comprehensive plan that defines the responsibilities, requirements, and methods for cultural resource management. Approximately 11,500 years of human occupation are represented on the Pajarito Plateau ranging from the initial use of the area by Clovis hunter-gatherers to, most recently, the nuclear research conducted during the Manhattan Project and Cold War era. Archaeological resource sites range from the ephemeral campsites of ancient hunter-gatherers to the remains of large multi-story roomblocks of the Ancestral Pueblo people.

This document supplements the CRMP and provides the basis to evaluate the significance of the archaeological sites at LANL. It follows the model of the National Park Service, detailed in *The Secretary of the Interior's Standards and Guidelines* (NPS 1983), and employs National Register Bulletin 15 *How to Apply the National Register Criteria for Evaluation* (NPS 2002) and National Register Bulletin 36 *Guidelines for Evaluating and Registering Archaeological Properties* (NPS 2000).

Archaeological resources are organized into a series of types that encompass the full range of sites present at LANL. There are four specific criteria used to evaluate archaeological site significance for inclusion to the National Register of Historic Places (Register), which are detailed in the National Register Federal Program Regulations (36 Code of Federal Regulations Part 60). Under the regulation, archaeological site significance rests in the site's ability to possess integrity and one or more of the following four criteria:

A) Sites that are associated with events that have made a significant contribution to the broad patterns of our history; or

B) Sites that are associated with the lives of persons significant in our past; or

C) Sites that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D) Sites that have yielded, or may likely yield, information important in prehistory or history.

Archaeological sites are generally determined eligible under Criterion D, however, Criteria A, B, and C are appropriate in limited situations. Under Criterion A, a property must have well-preserved features, organization, and artifacts that illustrate the event or pattern of events. Under Criterion B, a site must be illustrative of the person's life. Criterion C applies to sites that illustrate important concepts in pre-contact community design or are important representatives of the aesthetic values of the area cultures (e.g., rock art sites are generally eligible under C).

Under Criterion D a property is eligible if it has been used as a source of data and contains more as yet retrieved data or, if through testing or research, is determined to be a likely source of data. Under this latter requirement, the information must be evaluated within an appropriate context to determine its importance. Information is considered important when it is shown to have a significant bearing on a research design derived from historic contexts that contain three primary elements (1) a theme or research topic, (2) a period to which the research topic relates, and (3) a geographic area for which the research theme is applicable. In this case, the latter includes the landscape encompassed by LANL. The idea behind historic contexts is that archaeological sites are significant for a reason; thus, important or significant sites will be those that contribute to our knowledge of a research topic.

As part of the Land Conveyance and Transfer Project, LANL cultural resources staff developed an archaeological significance standards plan, which provided a basis for evaluating the importance of archaeological sites (Vierra and Schmidt 2006). The plan included sections on research contexts and research themes. The context section detailed the natural environment and the local culture history. The research themes included chronometrics, geomorphic processes, paleoenvironment, settlement history and land use, subsistence and seasonality, technology, production and exchange, and archaeological site condition assessments (Vierra and Schmidt 2006). This document provided a framework for assessing site types and specific cultural periods during the Land Conveyance and Transfer Project. This current document updates the information based on what cultural resource managers learned from the Land Conveyance and Transfer excavations.

Previous Research on the Pajarito Plateau

Archaeologists have conducted research on the Pajarito Plateau since the early 1900s, beginning with the work of Edgar Lee Hewett. Overviews of the regional culture history are presented by Cordell and McBrinn (2012), Irwin-Williams (1973), Stuart and Gauthier (1981), Kohler (2004), and Powers (2005). The chronology for the northern Rio Grande (Table B.1) was developed by Wendorf (1954) and modified by Wendorf and Reed (1955). Detailed information about the cultural resources and culture history of the Pajarito Plateau is available in Vierra and Schmidt (2008) and McGehee et al. (2010).

Table B.1 Culture Historical Chronology for the Pajarito Plateau

Culture	Period	Dates
Paleoindian	Clovis	9500 to 9000 BC
	Folsom	9000 to 8000 BC
	Late Paleoindian	8000 to 5500 BC
Archaic	Jay	5500 to 4800 BC
	Bajada	4800 to 3200 BC
	San Jose	3200 to 1800 BC
	Armijo	1800 to 800 BC
	En Medio	800 BC to AD 400
	Trujillo	AD 400 to 600

Culture	Period	Dates
Ancestral Pueblo	Early Developmental	AD 600 to 900
	Late Developmental	AD 900 to 1150
	Coalition	AD 1150 to 1325
	Classic	AD 1325 to 1600
Native American, Hispanic, and Euro-American	Early Historic Pajarito Plateau	AD 1600 to 1890
	Homestead	AD 1890 to 1942
Federal Scientific Laboratory	Manhattan Project	AD 1942 to 1946
	Cold War (Early Cold War)	AD 1946 to 1990 (AD 1946 to 1956)

Archaeological Site Eligibility

Archaeological sites are evaluated for Register eligibility by employing the criteria for listing in the Register as well as using LANL-specific contexts and research themes. As noted above, archaeological sites are generally determined eligible under Criterion D. Under Criterion D, they must meet two requirements: the property must have, or have had, information to contribute to our understanding of human history or prehistory, and the information must be considered important. Criterion D most commonly applies to properties that contain or are likely to contain information bearing on an important archaeological research question.

There are three potential outcomes of an eligibility assessment: eligible, undetermined, or not eligible. A property is eligible if it has been used as a source of data and contains more, as yet unrecovered data, or is eligible if it has not yet yielded information but, through testing or research, is determined a likely source of data. Sites that require additional investigation to determine eligibility are assessed to have undetermined eligibility. All sites that have an undetermined eligibility assessment are treated and evaluated as a Register-eligible property until additional investigative measures are completed and the site is reevaluated. Sites lacking significance and integrity are not eligible.

Archaeological sites at LANL are evaluated for Register eligibility as part of site the documentation process. The first step in the evaluation process is to determine the site type, relative or absolute date, and context. The context evaluation involves documenting site location, setting, and extent and nature of the cultural materials. The second step is to determine whether the site has the integrity to address applicable research issues. This step involves establishing the presence of intact architecture, features, and undisturbed subsurface deposits. Factors assessed include topographic location, deposition/erosion, depth of soil deposits, evidence of bioturbation, and evidence of impacts from previous excavations, land development, or vandalism.

Archaeological Site Types

The physical location of a site may also provide information regarding past human activity. Prehistoric archaeological sites at LANL are those that date to the time before the establishment of a European presence in the upper Rio Grande Valley by the end of the sixteenth century. Historic sites at LANL include any archaeological resources dating after AD 1600 through the

Homestead period and the Manhattan Project and the Cold War. Isolated occurrences are single isolated features, an artifact, or artifact assemblage that contains less than 10 artifacts per 100 square meters, and are excluded as archaeological sites. These cultural remains, which represent a single activity, include isolated projectile points, groundstone artifacts, and pot drops.

As of January 2015, approximately 90 percent of LANL property has been subject to intensive survey in compliance with federal standards for complete survey coverage. There are approximately 1800 archaeological sites situated on LANL property (Tables B.2 and B.3).

Table B.2 Prehistoric Sites at Los Alamos National Laboratory*

Site Type	Temporal Affiliation									
	Undetermined	Und. Prehistoric	Archaic	Ancestral Pueblo	Developmental	Late Developmental/ Early Coalition	Coalition	Late Coalition/ Early Classic	Classic	Total
Lithic Scatter	24	58	91	0	0		0	0	0	**173**
Lithic and Ceramic Scatter	6	17	9	21	1		51	16	22	**143**
Pit structure	0	0	0	0	0		2	0	0	**2**
1- to 3-Room Structure	10	7	0	120	1		151	53	78	**420**
Talus House	1			1			1			**3**
Pueblo Roomblock	0	0	0	22	6	1	279	38	6	**352**
Complex Pueblo	0	0	0	2	0		33	9	2	**46**
Cavate	16	6	0	89	0		90	28	35	**264**
Rock Shelter	21	5	1	11	0		18	5	7	**68**
Kiva	0	0	0	0	0		1	0	0	**1**
Grid Garden	0	2	0	8	0		6	1	5	**22**
Water Control Feature	4	1	0	6	0		9	2	2	**24**
Thermal Feature	2	2								**4**
Bedrock or Boulder Feature	1	2	0	2	0		0	0	0	**5**
Rock Feature	35	8	0	6	0		6	0	8	**63**
Rock Ring	7	0	0	0	0		2	0	0	**9**
Rock/Wood Enclosure	3	0	0	0	0		1	0	0	**4**
Rock Art	9	3	0	62	0		6	2	2	**84**
Game Pit	1	1	0	10	0		0	1	0	**13**
Trail and/or Stairs	7	7	0	26	0		6	1	1	**48**
Total	**147**	**119**	**101**	**386**	**8**	**1**	**662**	**156**	**168**	**1748**

*Note: Table records the primary component for each site.

Table B.3 Historic Sites at Los Alamos National Laboratory*

Site Type	Temporal Affiliation					
	Undetermined Historic	**Early Historic**	**Homestead**	**Manhattan/ Cold War**	**Recent**	**Total**
Lithic and Ceramic Scatter	1	1	0			**2**
Cavate	1	0	0			**1**
Rock Shelter	1	0	0			**1**
Water Control Feature	1	0	4			**5**
Bedrock or Boulder Feature				1		**1**
Rock Feature	4	0	4	1		**9**
Rock Ring	2	1	0			**3**
Rock/Wood Enclosure	11	0	2	1		**14**
Inscriptions and Dendroglyphs	2	0	1	1		**4**
Trail/Stairs	2	0	4	3	1	**10**
Historic Infrastructure	2	0	4			**6**
Historic Structure	5	0	16	10		**31**
Historic Artifact Scatter	2	0	27	7		**36**
Road	4	0	13	2		**19**
Historic Other	1	0	2	0		**3**
Total	**39**	**2**	**77**	**26**	**1**	**145**

*Note: Table records only the primary component for each site.

Descriptions of archaeological site types used at LANL are included below. Following the description is an indication of the number of known sites of that type and the number currently assessed for eligibility to the Register. There is also a brief discussion of site type significance. The significance discussion relies heavily on Brown's (2011a) National Register of Historic Places Multiple Property Documentation Forms prepared in support of the Bandelier National Monument Archaeological and Historical District. As noted by Brown (2011b), the foundation for the Ancestral Pueblo and Archaic period resource sections were Santa Fe National Forest Multiple Property submission forms developed for the Pajarito Plateau (Elliott 1990) and for Jemez Mountain Archaic period sites (Peterson et al. 1993). The site type count reflects the number of sites for which the type is the primary site. There are instances where other site types are included as features associated with the primary site type.

Prehistoric Architectural Sites

Pueblo roomblocks, complex pueblos, pit structures, cavates, and one- to three-room structures are all sites that functioned, or a portion of the sites likely functioned, as habitation sites. For architectural sites such as pueblo roomblocks, complex pueblos, pit structures, cavates, and one- to three-room structures to have the data potential to answer research questions, the site must meet one or more of the following (Elliott 1990):

- A site must contain undisturbed deposits sufficient to demonstrate meaningful spatial relationships among artifacts, features, floral remains, and faunal remains.
- A site must contain structures, features, or artifacts that will permit inferences regarding human activities and site function.
- A site must contain structures, features, or artifacts that will permit inferences regarding settlement characteristics.
- A site must contain macrobotanical, microbotanical, or faunal remains indicative of subsistence practices.
- A site must contain datable ceramics, wood, charcoal, baked clay, or obsidian that will permit chronological placement.
- A site must contain intact architectural features that permit analysis of floor space, floor features, and other spatial organizational characteristics.

Pueblo Roomblocks

Pueblo roomblocks are contiguous, multiroom habitation structures (four or more rooms with no enclosed plaza) with walls constructed of adobe, jacal, or masonry. Roofs are usually flat and constructed by laying logs, used as roof beams, across the walls and laying small sticks or branches perpendicular to the logs, and these are overlaid with adobe or adobe plaster.

Approximately 350 Ancestral Pueblo roomblock sites have been located at LANL; 120 have been assessed for eligibility to the Register. Of these, 118 have been determined eligible, 1 is of undetermined eligibility, and 1 is not eligible to the Register. A majority of the pueblo roomblock sites (279) are affiliated with the Ancestral Pueblo Coalition period.

In general, pueblo sites at LANL have escaped pothunting and as the lower portion of rooms are generally encased by collapsed roofs and wall fall, the remains are well preserved. Subsurface contexts should accurately reflect natural site formation processes. Since pueblo roomblocks were occupied year-round and were places where people lived, worked, slept, worshiped, procreated, and died; they should contain a full range of material culture remains (Elliott 1990). Archaeological information from these sites can be used to address a wide range of research questions related to chronology, settlement patterns, subsistence, demography, social and political organization, architecture, economics, immigration, technology, trade, religion, land tenure, and ethnic identity. Three pueblo roomblocks were excavated during the Land Conveyance and Transfer Project (Vierra and Schmidt 2008).

Plaza or Complex Pueblos

Plaza or complex pueblos contain one pueblo roomblock that partially (three sides) or completely enclose a plaza and/or contain two or more roomblocks located close together (less than 200 meters apart). Plaza or complex pueblos typically are much larger (in both room numbers and site size) than pueblo roomblock sites, often representing structures originally two or three stories in height. There are 46 complex pueblo roomblocks at LANL; 18 have been assessed. Of these, 17 have been determined eligible and 1 has undetermined eligibility. Like the pueblo roomblocks, a majority of the plaza or complex pueblo sites (33) are affiliated with the Ancestral Pueblo Coalition period. The plaza or complex pueblo site definition was redefined at LANL and excludes smaller L-shaped pueblos. As a result, 20 sites previously included in this category have been reclassified as pueblo roomblocks. Unfortunately, site information from some of the older documented sites is too vague to allow a reclassification review. As field visits are conducted, the number of plaza or complex pueblos will likely decrease.

Plaza or complex pueblos associated with the Ancestral Pueblo Late Coalition and Classic periods are the largest prehistoric sites on the Pajarito Plateau. Subsurface contexts should accurately reflect natural site formation processes. Since these sites were occupied year-round and the full range of activities related to pueblo life was performed, material culture remains should provide important information concerning chronology, settlement patterns, subsistence, demography, social and political organization, architecture, economics, immigration, technology, trade, religion, land tenure, and ethnic identity (Elliott 1990). No plaza or complex pueblo sites were excavated as part of the Land Conveyance and Transfer Project.

Pit Structures

Pit structures are presumed habitation sites with evidence of one or more structures built entirely or partially underground. The two pit structures identified at LANL are affiliated with the Coalition period and are eligible to the Register. Because pit structures are often filled by natural erosional processes, there is good potential that remains will be well preserved. Since many of the activities related to pueblo life were generally performed in the contexts of structural sites, archaeological information could be used to address a very wide range of research questions related to chronology, settlement patterns, subsistence, demography, social and political organization, architecture, economics, immigration, technology, trade, religion, land tenure, and ethnic identity (Elliott 1990). No pit structures were excavated as part of the Land Conveyance and Transfer Project.

Cavates

Cavates are rooms carved into a cliff face within the Bandelier Tuff geological formation. The category includes isolated cavates, multiroomed contiguous cavates, and groups of adjacent cavates that together form a cluster or complex. Some cavates include attached masonry rooms (talus houses) built in front of a cavate. Cavates appear to have been used for habitation, storage, places to stay during hunting or agricultural endeavors, lookouts, religious practices, and other purposes. There are 265 cavate sites at LANL; 99 have been evaluated for Register eligibility. Of these, 71 are eligible, 21 are undetermined, and 7 are not eligible. In general, extremely eroded cavates are not eligible. The majority of the cavate sites are associated with the Ancestral Pueblo occupation. Of the remaining unevaluated cavate sites, 6 have an undetermined prehistoric

affiliation, 16 have an undetermined affiliation, and 1 site has an undetermined historic era affiliation.

The significance of cavates lies in their uniqueness; they are unique architecturally and the information they contain is often well preserved. The same classes of information are usually not well preserved in open sites. These classes of data include macrobotanical, microbotanical, and faunal specimens; human remains; and basketry, sandals, blankets, textiles, and artifacts made of wood. Perishable datable resources such as tree-ring samples and carboniferous materials are also usually well-preserved (Elliott 1990). Many activities related to pueblo life were performed at structural sites such as cavates. Archaeological information from these sites can be used to address a wide range of research questions related to chronology, settlement patterns, subsistence, demography, social and political organization, architecture, economics, immigration, technology, trade, religion, land tenure, and ethnic identity (Elliott 1990). In addition to their research information potential, cavates are also potentially eligible under Criterion C as embodying the distinctive characteristics of a type, period, or method of construction. No cavates were excavated as part of the Land Conveyance and Transfer Project.

One- to Three-Room Structures/Fieldhouses/Talus Houses

One- to three-room structures (also known as fieldhouses) are small surface structures constructed of adobe, jacal, or masonry. A fieldhouse typically consists of square to rectangular-shaped rock alignments, with individual units no more than 3 meters in length. One- to three-room structures are often associated with agricultural features but may also have been used for other temporary habitation purposes such as storage, places to stay during hunting or plant gathering, and lookouts. A talus house is a one- to –three-room structure located adjacent to a canyon cliff face. Typically, talus houses are constructed in front of cavates and are included as an associated feature under the cavate site type.

Approximately 400 one- to three-room structures and 3 talus houses have been located at LANL; 141 have been evaluated for eligibility to the Register. Of these, 96 are eligible, 31 are undetermined, and 14 are not eligible to the Register. The vast majority of one- to three-room structures are associated with the Ancestral Pueblo occupation of the Pajarito Plateau. Seven of the remaining unevaluated sites have an undetermined prehistoric affiliation, and 10 are assessed to have an undetermined affiliation.

These small structural sites likely served a variety of possible functions, including temporary habitation, storage, hunting lodges, lookouts, and probably other functions that are not immediately obvious. It seems most likely that the one- to three-room structures played an important role in subsistence by serving as short-term residences for a single individual or family during the planting and harvesting seasons. As the most common site type at LANL, one- to three-room structures were obviously an important element in the settlement system. Previously excavated one- to three-room structures have contained intact features such as hearths, storage pits, and floors. Such sites have yielded dateable chronometric samples and preserved macrobotanical and microbotanical remains.

One-to three-room structures were occupied for short periods and were associated with more specific tasks and activities than other living sites. Although there are fewer artifacts at these sites, they do provide information to address research questions related to settlement patterns,

subsistence, architecture, technology, economics, land use and tenure, labor investment, and chronology. Twenty-six one- to three-room structures were excavated during the Land Conveyance and Transfer Project (Vierra and Schmidt 2008).

Rock Shelters

Rock shelters are overhangs, indentations, or alcoves formed naturally in a rock face or large boulder, or alternatively, a partially enclosed area created by rock falls leaning against a rock face or large boulder and which exhibit evidence of human use. Low, dry-laid rock walls are the most common form of architectural elaboration. Rock shelters were used during prehistoric times and subject to early historic use or reuse. Sixty-nine rock shelter sites have been recorded at LANL; 37 have been evaluated for Register eligibility. Of these, 19 are eligible, 12 are undetermined, and 6 are not eligible to the Register. Most of these sites are affiliated with the Ancestral Pueblo period (41sites) or have an undetermined cultural affiliation (21 sites). Like one- to three-room structures, rock shelters were occupied for short periods and were associated with specific tasks and activities. They have potential to address a range of research questions related to settlement patterns, subsistence, technology, economics, land tenure, and chronology. No rock shelters were excavated as part of the Land Conveyance and Transfer Project.

Kivas

Kivas are Ancestral Pueblo ceremonial rooms, though they were used for weaving, housing and other kinds of activities as well. They are typically circular and subterranean; in some cases they were excavated into bedrock. Most kivas are associated with habitation sites, but some are found in isolation. Kivas are most likely associated with religious or ceremonial use of a particular locale. Archaeological information from these sites could be used to address research questions related to religion, ceremony, and worldviews, as well as political organization, ethnic identity, and cultural landscapes. One kiva, associated with a pueblo roomblock, was excavated as part of the Land Conveyance and Transfer Project (Vierra and Schmidt 2008).

Rock Rings / Rock Features

Rock rings are circular arrangements of rocks. Some of these represent the residue from a dismantled tipi or wickiup. Another category of rock rings includes circular arrangement of shaped or unshaped tuff blocks, sometimes with shaped stone uprights that may represent Ancestral Pueblo shrines. Rock features are typically isolated examples of rock piles, amorphous rock concentrations, and/or upright stones. The latter sometimes are in the shape of a ring several meters in diameter and are often referred to as rock rings. Some of these rock features may be identical to what researchers refer to as shrines and boundary markers.

The current database of LANL sites has 12 rock rings and 72 rock features. As the site type definitions have significant overlap, the two categories have been combined into one type for the purpose of this discussion. Twenty-seven of the sites have been evaluated for Register eligibility, with 12 assessed to be eligible, 9 undetermined, and 6 that are not eligible. Many of the rock ring / rock feature sites do not have a well-defined cultural affiliation with approximately half of the sites listed as undetermined (42 sites) and 8 sites having an undetermined prehistoric affiliation. Of the remaining sites, most are affiliated with the Ancestral Pueblo period (22 sites). One rock ring site appears to be the remains of an Athabaskan tipi ring. Two Apache tipi ring sites located

in the Rendija Canyon area were excavated as part of the Land Conveyance and Transfer Project (Vierra and Schmidt 2008).

Obscured within the rock ring and rock feature site types are sites that are assessed to be possible shrines. A shrine is a functional designation, whereas rock ring and rock feature are descriptive types with an unknown function. As there appears to be no objective basis for identifying a shrine from a rock ring and rock feature, the potential shrines have not been broken out of the latter site categories. The assumption that a rock ring and rock feature is a shrine appears to be dependent on the recorders' experience and their knowledge of the project area.

Rock ring and rock feature sites can contain information concerning settlement patterns, subsistence, technology, economics, land tenure, and chronology. Shrines can also contain information on ceremonial and religious practices, as well as specific reference to the landscape and particularly landmarks with cultural significance. Shrines continue to be of importance to members of affiliated tribes and have the additional element of being potentially eligible as traditional cultural properties in addition to their status as archaeological sites. There is one site listed as a shrine and five others listed as possible shrines within the rock ring site type. Eight of the rock feature sites are listed as traditional cultural properties and another 10 are listed as possible shrines.

Grid Gardens / Water-Control Features

Grid gardens are small, formal agricultural areas, often bounded with cobbles and containing gravel mulch (e.g., grid gardens and/or terraces). This site category typically consists of square- to rectangular-shaped rock alignments, with individual units being more than 3 meters in length (in contrast to one- to three-room structures that are no more than 3 meters in length). Water-control features are devices that control the flow of water, particularly runoff, and also trap silt from runoff, creating a small flat fertile area that can be utilized for planting.

The current database of LANL sites has 29 water-control features and 22 grid gardens. As the site types are similar in function, the two categories have been combined into one type for this document. Nineteen of the sites have been evaluated for Register eligibility, with 10 eligible, 7 potentially eligible, and 2 that are not eligible. Most of the water-control features and all but two of the garden plot sites have an Ancestral Pueblo cultural affiliation.

Grid gardens and water-control sites can provide microbotanical and macrobotanical information regarding the types of crops grown at a particular location and answer questions related to the adoption of agriculture, prehistoric farming techniques, diet, and land tenure, among others. Three grid gardens were excavated as part of the Land Conveyance and Transfer Project (Vierra and Schmidt 2008).

Game Pits

Game pits are cavities dug down into the tuff bedrock presumed to have been used as a passive hunting drop site for larger game animals (e.g., deer) or as concealment to lure and trap birds. Some game pits are excavated into the bedrock of promontories, while others were dug in the courses of prehistoric trails; the latter are assumed to post-date migration of Pueblo peoples off the Pajarito Plateau to their present pueblo locations (Steen 1977). Thirteen game pits are located

at LANL, of which only three have been evaluated for Register eligibility. One of these sites is eligible and two are undetermined. Twelve of the game pits are assessed to be prehistoric with 10 of them affiliated with the Ancestral Pueblo period.

Game pits contribute to our understanding of hunting techniques generally but also to the procurement of specific types of game, some of which may have religious and ceremonial significance. Traps that appear to post-date Ancestral Pueblo occupation also shed light on use of the Pajarito Plateau after people moved off and closer to the Rio Grande. No game pits were excavated as part of the Land Conveyance and Transfer Project.

Rock Art

Rock art includes several subtypes including petroglyphs, pictographs, and rock art panels. A petroglyph consists of a design or set of symbols scratched, pecked, or scraped into a rock or plastered surface, and which is distinguished from historic and modern graffiti. A pictograph consists of a design or set of symbols painted rather than pecked, scratched, or scraped. A rock art panel consists of a series of petroglyphs (and, rarely, pictographs inside rock shelters and cavates) grouped together on a cliff face or boulder. Of the 84 rock art sites documented at LANL, 31 have been evaluated for Register eligibility. Twenty-two of the assessed rock art sites are eligible to the Register, while nine sites have an undetermined status. Seventy-two of the rock art sites are affiliated with the Ancestral Pueblo period, with nine sites having undetermined affiliation and three sites having undetermined prehistoric affiliation.

Because of their depictive nature, rock art sites are often thought of as representing world views, culture, and religious thought. Through style and content, one can also analyze them from a perspective of ethnic identity, cultural territory, and broader religious affiliations. Rock art sites were analyzed as part of the Land Conveyance and Transfer Project (Vierra and Schmidt 2008).

Trail/Stairway

A trail is a prehistoric or historic path defined by use-wear or cutting into bedrock or soil surfaces, along with any revetments, embankments, or other structural components of the trail. A stairway is a set of two or more steps carved into a steep section of tuff bedrock, typically associated with trails or access to cavates. Fifty-eight trail/stairway sites have been identified at LANL; 24 of them have been assessed for Register eligibility. Of these, 6 are eligible, 13 are undetermined, and 5 are not eligible to the Register. Forty-one of the trail/stairway sites are assessed to be prehistoric, with 34 being affiliated with the Ancestral Pueblo period.

Trails and stairways can provide information concerning resource procurement, travel, settlement patterns, social networks, trade, engineering and construction techniques, and the relationship of all those elements to the landscape. As rock art is often associated with trails and related features, trails can be associated with research into cultural identity and territories. No trail and/or stairway sites were analyzed as part of the Land Conveyance and Transfer Project.

Artifact Scatters

Lithic Scatter

A lithic scatter is a cluster of chipped stone tools and/or pieces of chipped stone produced during the manufacturing of chipped stone tools. One hundred seventy-three lithic scatters have been located at LANL; 78 sites have been assessed for eligibility. Of these, 33 are eligible, 32 are potentially eligible, and 13 are not eligible to the Register. About 90 lithic scatters are associated with the Archaic period, with the remaining sites having an undetermined prehistoric (58 sites) or undetermined (24 sites) cultural affiliation.

Chipped stone artifacts have the potential to provide information on technology, chronology, raw material procurement, and trade. Snead (2008) has suggested that some artifact scatters on the Pajarito Plateau are indicative of field locations in the same way one- to three-room structures or fieldhouses are and can be analyzed to answer questions about seasonality, subsistence and diet, land and resource use, and labor investment. Four lithic scatters were excavated during the Land Conveyance and Transfer Project (Vierra and Schmidt 2008).

Lithic and Ceramic Scatter

Lithic and ceramic scatters contain a combination of ceramic sherds, chipped stone, and/or ground stone artifacts, but lack identifiable surface structural remains or evidence of pit structures. One hundred and forty-five lithic and ceramic scatters have been documented at LANL; 79 have been evaluated for Register eligibility. Of these, 25 are eligible, 20 are undetermined, and 34 are not eligible to the Register. Most of these artifact scatters have an Ancestral Pueblo cultural affiliation (111), and nine of the sites are multi-component, with one of the components being Ancestral Pueblo.

Artifact scatters have the potential to provide information on technology, chronology, raw material procurement, and trade. As with lithic scatters, some artifact scatters are indicative of field locations in the same way field houses are and can be analyzed to answer questions about seasonality, subsistence and diet, land and resource use, and labor investment (Snead 2008). Three lithic and ceramic scatters were excavated as part of the Land Conveyance and Transfer Project (Vierra and Schmidt 2008).

Bedrock/Boulder Features

Bedrock/boulder features are sites where cultural features have been excavated into bedrock or boulders that are not cavates or game pits. Examples include grinding slicks, mortars, water channeling grooves, and isolated holes excavated into horizontal rock surfaces. Grinding slicks, the most common bedrock modification on the Pajarito Plateau, are concave depressions in bedrock/boulders created by the sharpening of stone axes, the pulverizing and grinding of plants, or other related activities. There are six bedrock and boulder feature sites documented at LANL. The one Register-assessed site has an undetermined eligibility. Five of the sites have a prehistoric affiliation, and one appears to be related to the Cold War era.

Grinding features are indicative of the processing of food or other materials; they convey information on food procurement, processing technology, and diet, and may provide information

on resource locations if their location cannot be explained by affiliated habitation sites. Some bedrock features may be associated with Native American resource collection and process locations and may be Register-eligible as a traditional cultural property. No bedrock/boulder feature sites were analyzed as part of the Land Conveyance and Transfer Project.

Thermal Features

Thermal features are sites that contain a concentration of ash and/or charcoal (with or without burned rock) that indicate a hearth; alternatively, these features may be rock concentrations that are thermally discolored and/or broken into debris (fire-cracked) that indicate a roasting pit or hearth. Four thermal features are documented at LANL, two of which have been assessed for Register eligibility. One is eligible, and one has an undetermined Register eligibility.

Hearths and roasting pits located outside of habitation sites are most often indicative of a temporary campsite. These sites are indicative of short-term use for resource procurement and processing or seasonal agricultural work. They provide information concerning subsistence, resource procurement and processing, economics, land tenure, and chronology. No thermal features were excavated as part of the Land Conveyance and Transfer Project.

Historic Structures

Archaeologically, historic structures are buildings or other structures constructed after AD 1890. This site type does not include rock/wood enclosures, roads, or other infrastructure features. Thirty-one historic structures have been documented at LANL; 21 have been assessed for Register eligibility. Fifteen structures are eligible, one is undetermined, and five are not eligible to the Register. Of the 31 historic structures, 16 are affiliated with the Homestead era.

Historic structures provide information that could be used to address a wide range of research questions related to settlement patterns, subsistence, social and political organization, technology, economics, land tenure, and ethnic identity. One historic homestead structure was excavated as part of the Land Conveyance and Transfer Project (Vierra and Schmidt 2008).

Rock/Wood Enclosures

Rock and wood enclosures are small areas enclosed by loosely stacked rock or log alignments (e.g. corral or lambing pen). These are distinguished from one- to three-room structures by the nature of the stacking methods and often by the presence of historic artifacts in and around the enclosure. Eighteen rock or wood enclosures have been documented at LANL; nine have been evaluated for the Register. Four of the evaluated sites are eligible, four are undetermined, and one is not eligible to the Register. Fourteen of the enclosures have a historic period affiliation.

Through the early historic period the Pajarito Plateau was used for sheepherding and ranching, which increased exponentially at the end of the nineteenth century once the Navajos and Apaches were confined to reservations and the railroad came into the area. Sites related to small-scale herding have the potential to provide information on seasonal use of the Plateau, including subsistence and diet, land and resource use, and ethnic identity. Sites associated with the large-scale livestock industry are indicative of a significant change in the economy of the region and

an intensity of land use with long-term environmental consequences. No rock/wood enclosures were excavated as part of the Land Conveyance and Transfer Project.

Roads

Roads are formal routes used for the passage of vehicles, along with revetments, embankments, or other structural components of the road. Roads that exhibit rutted tracts in bedrock as a result of historic wagon use form the majority of sites included in this category. Nineteen roads have been documented at LANL; 12 have been evaluated for Register eligibility. Two of the road segments are eligible, four are undetermined, and six are not eligible. All of the wagon road segments are affiliated with the Pajarito Plateau Homestead era.

Livestock and logging roads were temporary and informal, mostly containing information on where the most intensive operations of these industries were located. The more formal roads were associated with longer-term use by homesteaders and by Manhattan Project and Cold war researchers and security personnel. Roads can provide information concerning settlement patterns, community organization, technology, economics, and communication. No roads were analyzed as part of the Land Conveyance and Transfer Project.

Historic Infrastructure

Historic infrastructure sites are the basic physical and organizational structures and installations needed to support a community such as transportation systems, water supply, sewers, electrical grids, telecommunications, etc. Some examples from LANL include historic water catchment devices, fence lines, and telephone lines. Water catchment devices are small structures for the collection of water. This category includes cisterns, reservoirs, stock ponds, and retention dams. Roads, trails, corrals (rock/wood enclosure), and water-control features are not included, as they are listed as separate site types. This archaeological site category should not be confused with the LANL Support Building and Structures site type, which is a historic building category.

There are currently six historic infrastructure sites documented at LANL, which include a telephone line, fence segments, and water catchment devices. One fence line and two catchment devices have been formally assessed and are not eligible to the Register. Four of the sites have a homestead era affiliation, and two have an undetermined historic affiliation. Infrastructure sites can provide information concerning settlement patterns, resource utilization, community organization, technology, economics, and communication. No historic infrastructure sites were excavated as part of the Land Conveyance and Transfer Project.

Historic Artifact Scatter / Trash Scatter

A historic artifact scatter is a concentration if items, including Euro-American artifacts, produced and deposited after AD 1600 (but most typically deposited after AD 1890). Thirty-six historic artifact scatters have been located at LANL; 13 have been evaluated for Register eligibility. Four of the evaluated sites are eligible and nine are not eligible to the Register. Twenty-seven of the artifact scatters are affiliated with the Homestead era. Artifacts have the potential to provide information on technology, period, trade, subsistence and diet, land tenure, and ethnic identity.

No historic artifact scatter / trash scatters were excavated as part of the Land Conveyance and Transfer Project.

Inscriptions and Dendroglyphs

Inscriptions and dendroglyphs are historic designs, letters, numbers, or symbols scratched, pecked, scraped, or carved in stone or tree bark. Many of the symbols provide information on the names, ethnicities, and gender of the people who made them; some also contain dates that provide a temporal affiliation. Currently there are three inscription sites and one dendroglyph site documented at LANL. One site has been formally assessed and has undetermined eligibility.

Sites that do not readily fit into one of site type categories above are listed as *prehistoric or historic other* sites. Currently there are no prehistoric other sites and only three historic other sites. These sites include a 1913 Ramon Vigil Grant brass cap, a 1938 section marker, and a wood harvesting area. Since they have been documented, the land grant and section markers have no additional potential to answer research questions, and are not eligible. The wood harvesting area has not been documented or assessed for Register eligibility. In general, these sites have or had potential to address research questions concerning land and resource utilization, economics, and intensity of land use with long-term environmental consequences. No inscriptions or dendroglyphs were analyzed as part of the Land Conveyance and Transfer Project.

Site Integrity

As discussed in the previous section, the Pajarito Plateau is a culturally rich area with sites that have the potential to address numerous research issues. There are sites from each site type and culture that are eligible to the Register for their research potential. Conversely, there are specific sites that are not eligible or no longer eligible due to lack of integrity or research information potential. National Register Bulletin 15 (NPS 2002) and National Register Bulletin 36 provide guidance on evaluating archaeological site significance and denote four criteria that should be used:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of significant persons in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in history or prehistory.

In addition, the quality of significance in American history, architecture, archeology, engineering and culture must be present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association (NPS 2000 and 2002).

Archaeological site integrity is commonly defined by several factors, including the presence of undisturbed (*in situ*) surface and subsurface deposits, intact architecture, and features. When assessing a site for integrity, it must be determined which aspect of the site can provide information that is relevant to answering specific research questions. Integrity is most easily assessed at archaeological sites that contain obvious surface evidence of architecture (e.g., roomblocks). Assessment becomes somewhat more difficult for those sites with minimal architecture or features (e.g., fieldhouses, agricultural features, or rock features). Finally, assessment can be difficult at surface artifact scatters that exhibit no obvious surface features and for which the nature of subsurface cultural deposits is difficult to discern.

Surface artifact scatters reflect the ephemeral remains of temporary campsites or limited activity locations and are often difficult to evaluate for potential significance. Three general contexts are commonly used to evaluate their data potential under Criterion D: chronology, technology, and geomorphology. Chronology refers to the presence of datable materials, which can be used to temporally place the site. Technology refers to the composition of the assemblage, including the number and variety of artifact types represented. Lastly, geomorphology refers to the geologic context of the site and whether the cultural material is in situ, has been redeposited, or affected by facility operations. Geomorphology and site integrity are closely linked.

Effects of the Natural Environment

The natural environment can have both a positive and negative effect on archaeological site integrity. Rapid deposition can often help to preserve cultural deposits, whereas the processes of erosion and deflation can have a detrimental effect. Deposition varies a great deal across the Pajarito Plateau with respect to mesa top, cliff/talus slope, and canyon bottom settings. The highest potential for site preservation exists on mesa tops in locations with little or no erosion, on alluvial fans, and in deep canyon bottom deposits. Conversely, settings with the lowest potential for site preservation occur along the margins of mesas due to runoff that has eroded soils and exposed bedrock (Reneau 2006). Widespread eolian and colluvial deposition during the latest Holocene has meant that Ancestral Pueblo sites are well preserved in a variety of settings. Conversely, with net erosion during the Holocene across most of the landscape, middle to late Holocene deposits are less extensively preserved with Archaic sites often found in secondary context (Drakos and Reneau 2008).

Perhaps the single greatest natural impact is ongoing erosion, ranging from sheet wash to actual gully formation. The effects of erosion range from displacement of artifacts and surface features to complete destruction of architectural remains and deeper archaeological deposits where gullies develop through sites. Even if a site is not directly affected by a gully, such drainages can cause undercutting of previously stable areas leading to collapse. Even cavates, as they are carved into soft and friable tuff, often exhibit erosion around the entrances and exhibit internal fissures resulting from water draining through the bedrock (Brown 2011).

Fires can cause damage to archaeological sites both directly and indirectly (Nisengard et al. 2002). Directly, they can consume perishable materials, including wood, bone, food remains, and so forth. If temperatures are high enough, they can drive the moisture from obsidian artifacts (destroying obsidian hydration dating potential), oxidize or carbonize sherds (obscuring the designs), and cause chert to fracture (skewing the proportion of debris versus flakes for lithic

reduction analysis). High heat in direct proximity to rock art panels can cause portions of the stone to spall, taking the images with them, and in the vicinity of open structures, high heat can cause exposed tuff building blocks to crack and spall. Indirectly, increased erosion resulting from the loss of vegetation during severe fires can also affect archaeological deposits (Brown 2011).

Traffic by large animals such as elk and deer can result in limited displacement of architectural elements and damage to archaeological deposits. Occupation of cavates by sheep and goats in historic times resulted in deposition of trampled mats of dung as well as damage to the archaeological deposits in and around the cavates. Animal burrowing can disturb archaeological remains by destroying stratigraphic layering and bringing artifacts to the surface that would otherwise remain buried (Brown 2011). In addition, drought and potentially related bark beetle manifestations can kill trees that can uproot archaeological deposits when they fall.

Effects of Facility Operations

Facility operations pose a potential threat to archaeological site integrity. This might consist of vehicular traffic, construction activities, vibrations from explosives testing, or contamination. The LANL project review process allows cultural resource managers to evaluate all undertakings that could have an adverse effect on cultural resources. LANL M&O contractor Policies 400 and 401 require all new or modified projects to be reviewed by a cultural resources manager to determine if the activity will occur in the vicinity of an archaeological site and whether the proposed activity could impact the site. LANL has been a nuclear research facility for over 70 years. Contamination from operations is a potential factor affecting archaeological site integrity. The Field Office has provided some limited guidance on managing cultural resources that may be located in contaminated areas. However, this guidance specifically deals with potential radioactively contaminated Native American human remains or sacred objects. The guidance specifically states that DOE sites should develop a testing program to identify contamination and set specific limits that would not cause an individual to receive a radiation dose in excess of the basic public dose limits (DOE 1999), and that this program should follow DOE Order 458.1, *Radiation Protection of the Public and Environment*. LANL will not conduct data recovery on sites where the activities have the documented potential to expose workers to radiation levels that would exceed the established public dose limit. Adverse effects to these sites will be resolved through another form of mitigation. There is currently one archaeological site at LANL where soil testing has been conducted to establish potential radioactive contamination.

Site Eligibility and Integrity

Sites that have no significance or integrity or have lost their significance or integrity, thus information potential, are not eligible to the Register. Examples of LANL sites that have lost their integrity and are not eligible include sites that have been destroyed or collected and sites significantly impacted by erosion.

Archaeological sites determined eligible or potentially eligible under Criterion D only, and have been 100 percent destroyed (complete archaeological excavation, historic building construction, extensive pothunting, etc.) are no longer eligible under Criterion D due to lack of research potential and site integrity. However, if a site is eligible under Criteria A, B, or C, excavation or other destruction/disturbance may not render the site ineligible.

Surface artifact scatters that have been completely collected are no longer capable of yielding important information and are not eligible to the Register. At LANL, several small lithic and ceramic and lithic scatters were 75 to 100 percent collected during the Pajarito Archaeological Research Project (1977 to 1985). These sites cannot be relocated to assess their research potential and are no longer eligible to the Register.

Natural disturbances includes sites severely damaged by erosion such as sheet washing or arroyo cutting. Redeposition and/or the mixing of soil deposits destroys the stratigraphic context of cultural remains. Examples include artifacts and features from a scatter site and/or structural remains from a one- to three-room structure, agricultural feature, or rock feature transported down a ridge slope into a secondary context. Bioturbation is another source of soil disturbance that can destroy the integrity of a site. A relevant example at LANL involves one- to three-room structures significantly damaged by the uprooting of trees that died due to drought and bark beetle damage. Another example involves archaeological sites (e.g., artifact scatters) that are deflated with the remaining artifacts lying on bedrock and lacking cultural context.

Erosion can also severely damage or destroy the integrity of sites that are carved or pecked into bedrock. Petroglyph sites are one example where the surface layer of a boulder or bedrock can spall, totally removing the image or enough of the image that it is no longer identifiable and lacks elements of design and cultural affiliation. Erosion can also destroy the integrity of cavates with fissures created from water flowing through the bedrock, which then breaches the cavate, destroys internal features and/or removes cultural fill. Eolian processes can also obliterate external features associated with cavates as well as scour out any cultural fill. The result is a cavate with no additional research potential.

At LANL, there is a potential for the presence of certain constituents to affect site integrity. Should a site have potential for contamination, a radiological control technician will survey the site and surrounding area to determine the nature and extent of the contamination. If the cultural remains or encompassing soils have constituents that pose a risk to human health, then the site could be assessed as not eligible. This assessment will only be employed if it is demonstrated that implementation of a data recovery program, including recovery of cultural materials, would pose an immediate health and safety concern. A not eligible assessment will facilitate the implementation of protective measures such as capping the site or removing the contaminated materials to an approved waste storage facility to ensure future public and environmental health and safety.

Site Eligibility and Information Potential

When assessing for Register eligibility, it must be determined which aspect of the site can provide information that is relevant to answering specific research questions. For some sites the research potential does not go beyond the information that has been collected during the site documentation phase. Such information includes site type, location, affiliation, and the surface material culture. Once the site has been thoroughly recorded, the site retains no further research information potential. Examples include sites that contain surface artifacts (historic trash scatter) or features (cairn) with no potential for subsurface remains, or sites such as artifact scatters that are located on bedrock or in areas where the soil deposits overlying bedrock are so shallow that there is no potential for intact subsurface deposits. Once these sites are thoroughly documented,

they retain no additional research information potential and are not eligible to the Register, provided they have been potentially eligible under Criterion D only and whose data potential has been realized through data recovery.

Block Site Type Eligibility Assessments

The data recovery program conducted for the Land Conveyance and Transfer Project provided invaluable information as to the topographic context as well as the nature and condition of many historic properties located at LANL (Vierra and Schmidt 2008). The data recovery program was developed and implemented by DOE in compliance with a Programmatic Agreement that was entered into by the DOE, the Advisory Council on Historic Preservation, the State Historic Preservation Officer (SHPO), and the County of Los Alamos. The Programmatic Agreement implemented mitigation measures to resolve adverse effects from the conveyance of properties to the County of Los Alamos for future development.

One- to Three-room Structures

As part of the Land Conveyance and Transfer data recovery program, intensive excavation and comprehensive artifact and sample analysis was conducted on 25 Coalition to Classic period Ancestral Pueblo one- to three-room structures or fieldhouses (Vierra and Schmidt 2008). Three of the structures were located in Cañada del Buey directly north of the community of White Rock, one on the mesa between Pueblo and DP canyons, and 21 in Rendija Canyon. Architectural analysis indicated that there were four types of structures. Artifact and sample analysis, however, indicated that they were not functionally different, although one- to three-room structures with hearths and perhaps those with larger interior space were more intensively occupied or utilized for a longer period. The data recovery program established that the function of the one- to three-room sites was related to agriculture and to a lesser degree wild plant gathering. For those one- to three-room structures in which an agricultural function could not be established, this function was not contraindicated by either the architecture or the artifact and samples analyses (Lockard 2009).

There are approximately 425 one- to three- room structures at LANL. As part a memorandum of agreement between the Field Office and the SHPO for mitigation of cultural resources impacts at the Technical Area 36 Minie Firing Site, the Field Office is preparing a fieldhouse context document to better describe these structures. The document will discuss the status of what is known and unknown about fieldhouses on the Pajarito Plateau, where they are located, how they fit into Ancestral Puebloan agricultural strategies during the Coalition and Classic periods (AD 1200–1600), and alternative uses of this class of sites. To provide a more holistic picture of one-to three-room structures on the Plateau, archaeological data from similar structures at Bandelier National Monument and the Valles Caldera are being incorporated. Once this context is complete, the Field Office will propose a strategy to mitigate this class of sites to the SHPO.

A major consideration in moving forward with a mature CRMP includes developing strategies to address historic properties situated in the developed areas of LANL where the vast majority of mission-related activities is undertaken. Proactive eligibility assessments of the historic properties located in these areas would be beneficial for future cultural resource management as well as project planning and development. For some sites, DOE will explore the potential to

develop alternative ways to resolve potential adverse effects. The goal is to develop mitigations that benefit historic properties and their management through collaboration. These creative mitigations could include programs to increase the public awareness of LANL cultural resources and the resource management program. Other potential mitigations could involve the stabilization or repair of sites and preparation of National Register nomination forms for sites or districts that are uniquely significant as cultural properties and traditional cultural properties. Development of creative mitigations require consultation with affiliated Native American groups, other stakeholders such as local communities and the general public, as well as with the SHPO and the Advisory Council on Historic Preservation.

Creative mitigations may involve investing in the more significant sites at LANL, where the benefits to the overall cultural resources management program outweigh the loss of information from these sites. These creative mitigations can facilitate the management of critical resources at LANL, advance the historic values of the alternative resources selected for investment, enhance the public-information component to cultural resources compliance, increase flexibility in land-use decisions, and satisfy the mutual interests of all active participants.

Canyon-Bottom Artifact Scatters

Geomorphic studies will be used as a tool when evaluating artifact scatters located in canyon bottoms. Geomorphic studies at LANL have established that settings with the lowest potential for archaeological site preservation occur along the margins of mesas or canyon bottoms because of runoff and erosion and the exposure of bedrock (Reneau 2006, LANL 2014). Widespread erosion during the middle to late Holocene period occurred across most of the LANL landscape (Drakos and Reneau 2008). This resulted in 1.5- to 2-meter-thick mixed Holocene deposits as observed in Cañada del Buey, Los Alamos Canyon, and Pueblo Canyon. Although these middle to late Holocene canyon-bottom deposits generally overlay late Pleistocene and early Holocene deposits that could contain intact Paleoindian or Archaic-period cultural remains, surface artifact scatters are in secondary context and have no potential to retain site structural properties, rendering them ineligible to the Register. Shovel testing and geomorphic analysis conducted within the bottom of Mortandad Canyon (LANL 2014) indicated that canyon-bottom sediments do not contain intact subsurface sediments and result from alluvial and colluvial sediment transport. Although some artifacts were observed during shovel testing, the small fragmentary nature of the artifacts, combined with the information obtained from the geomorphic analysis, indicates that the artifacts are in a secondary context (LANL 2014).

Los Alamos and Pueblo canyons are located along the northern portion and Cañada del Buey in the central portion of LANL, so it is likely that the middle to late Holocene depositional deposits will be found in canyon bottom settings across LANL. The expedient testing of scatter sites located in canyon bottom settings would establish their contextual setting. Testing could be in the form of backhoe trenches on large sites and 1 by 1 meter test units on smaller sites. A canyon soil assessment and testing program conducted by the cultural resources staff and geomorphologists could map the location of mixed Holocene canyon deposits to facilitate eligibility assessments for all LANL scatter sites located in this context.

Bedrock Artifact Scatters

Artifact scatters that have been deflated with the remaining artifacts lying on bedrock have no cultural context and are not eligible to the Register. Geomorphic assessments conducted in conjunction with field checks and Geographical Positioning System modeling could be conducted to identify mesa tops where significant erosion has exposed bedrock, streamlining eligibility assessments.

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