ERRATA SHEET FOR "DESCRIPTION OF TECHNICAL AREAS AND FACILITIES AT LOS ALAMOS NATIONAL LABORATORY – 1997", LA-UR-97-4275

This Errata Sheet identifies an error in conversion from square feet to square meters performed uniformly throughout the document during the editing process. Specifically, the conversion factor used was 0.3048 for converting feet to meters (i.e., ft x 0.3048 = meters) instead of 0.0929 for converting square feet to square meters (i.e., ft^2 x 0.0929 = m^2). To obtain the correct value for square meters, either multiply square feet by the correct conversion factor (i.e., ft^2 x 0.0929 = m^2) or multiply the wrong square meter value given in the document once more by 0.3048 (i.e., wrong square meter value x 0.3048 = correct square meter value).

LA-UR-97-4275

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Title: Description of Technical Areas and Facilities at Los Alamos National Laboratory—1997

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Los Alamos
NATIONAL LABORATORY

PREFACE

This guide focuses on the technical areas of the Los Alamos National Laboratory and the facilities and/or buildings at each technical area that have been assigned a hazard category. The document is a compilation of information from a variety of sources that go back to 1990. Although there has been an effort to update and add to the information that already existed, the reader should not consider this guide to be the final word on potentially hazardous operations at Los Alamos National Laboratory. Changes in operations at Los Alamos that can change the categorization of a facility occur frequently. The official sources of information used in this guide are the Facility Risk Management Group, the various facility managers who are responsible for the facilities discussed, and DOE-AL-STD 1001-95, Nuclear Facilities List, dated November 1995.

This guide is built upon a variety of Laboratory documents. The cornerstone is the Facility Hazard Classification for Los Alamos—Preliminary Report, 1991. Other building blocks for this effort were the Laboratory's As-Built Structure Location Maps, 1996; the 1990 Site Development Plan (LA-CP-90-45); the environmental surveillance reports for Los Alamos during 1993 and 1995; the Capital Asset Management Process, FY97 (LA-UR-95-1187); and the Laboratory's Institutional Plan FY1997-FY2002 (LALP-96-77).

ACKNOWLEDGMENTS

When Robert Hurdle (ESH-EIS) first proposed this effort, the concept was to briefly describe the technical areas and the moderate-hazard and nuclear facility categories. This work was carried out by a team led by David Seidel (ESH-3), which also included Emily Husted (ESH-EIS), Armando Cordova [Los Alamos Technical Associates, Inc. (LATA)], and Gail Terry (LATA), assisted by Pat McCurdy (Johnson Controls, Inc., of Northern New Mexico). The first draft of this document was issued in December 1995 for use by DOE.

As the guide went through internal reviews and editing, it evolved to the much larger current document. This effort has been carried out by Robert Hurdle with additional assistance from the individuals named above, plus important contributions from Andi Kron (cARTography) for the maps, Betsy Barnett (CIC-1) lead editor, Vivi Hriscu (CIC-1) editor, Harry Flaugh (Rogers & Associates), Chris Del Signore (LATA), Allen Valentine (LATA), Ann Pendergrass (ESH-3), Jim Hyder (LATA), Radon Tolman (ESH-EIS), and Doris Garvey (ESH-EIS). Ken Rea (EES-15) provided oversight of the final version of this document.

Without the combined contributions of all of these people, this effort would not have been possible. Many hours were spent gathering, organizing, and editing the information presented in this guide to create a document that is reasonably readable by those interested in knowing more about the Laboratory's specialized facilities and their location.

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1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) was established in 1943 as Project Y of the Manhattan Engineer District to develop the world's first nuclear weapons. In just 26 months, the wartime Laboratory produced the atomic bombs that had a major role in ending World War II. After the second world war, the ensuing Cold War and associated competition with the Soviet Union to develop nuclear weapons led to establishment of a permanent laboratory at Los Alamos.

The Laboratory's original mission—to design, develop, and test nuclear weapons—has broadened and evolved as technologies, US priorities, and the world community have changed. Today, the Laboratory supports its core mission—stewardship and management of nuclear weapons and reducing the global nuclear danger—with the technical competencies developed for national security and other programs. These competencies, in turn, allow the Laboratory to contribute to civilian and conventional defense needs (e.g., performing large-scale interdisciplinary research and development).

Today's Laboratory is a multidisciplinary research facility engaged in a variety of programs for the Department of Energy (DOE) and other government agencies. The scientists and engineers at Los Alamos conduct research and development (R&D) in the basic sciences, mathematics, and computing to develop applications that support stockpile stewardship and management and a broad range of other programs, including non-nuclear defense and nonproliferation; nuclear and non-nuclear energy; atmospheric, space, and geology sciences; bioscience and biotechnology; and the environment.

Although the purpose of this guide is to focus on the various technical areas (TAs) and their specialized facilities, it is important that the reader be somewhat familiar with the work that is done at the various locations before they are discussed. Therefore, the information provided in this introductory section is intended to acquaint the reader with the broad range of R&D activities carried out at Los Alamos. More detailed information on the Laboratory's R&D activities may be found in the most recent version of the Laboratory's institutional plan.

Typically, DOE and other federal agencies ask the Laboratory to undertake projects having some or all of the following characteristics:

- be large in scale of time, space, size, or complexity;
- require a strong science base;
- require engineering, teamwork, and special facilities;
- benefit from a multidisciplinary approach and continuity of effort; and/or
- serve a public purpose.

The Laboratory is currently charged with addressing problems in the following areas:

- scientific and engineering support of national nuclear defense activities, including R&D activities for
  - nuclear weapons stewardship and management (ensuring the safety, reliability, and performance of the US nuclear stockpile);
  - safe and efficient dismantlement of weapons;
  - international arms control, nonproliferation, detection, and verification;
  - nuclear material processing, storage, recycling, and disposal;
  - accelerator production of tritium; and
  - preservation of core competencies related to nuclear weapons technology;

- R&D activities for non-nuclear defense. Specific activities evolve according to the needs of the Department of Defense (DoD); however, ongoing activities include investigations in

  - advanced munitions and energetic materials,
  - materials science and armor/antiarmor applications,
  - analysis and computer simulation, and
  - non-nuclear strategic defense initiatives;

- nondefense R&D in support of federal research in areas such as

  - high-performance computing, including national and industrial applications;
  - advanced materials processing;
  - operation of large facilities for the R&D activities of universities and other collaborators ("user" facilities, such as the Los Alamos Neutron Science Center (LANSCE) and the Materials Science Center);
  - nuclear and high-energy physics, such as research into neutrino oscillations;
  - basic energy science, such as development of advanced materials;
  - fusion energy, as an alternate source of electrical power;
  - biological and environmental research, including human genome studies;
  - environmental remediation, restoration, and preservation, including waste management technology;
  - energy and renewable energy research, such as high-temperature superconductivity, proton-exchange membrane for fuel cells, and advanced computer programs for designing cleaner combustion systems;
  - energy technologies, such as simulation of transportation systems, air quality, nuclear waste management, and medical isotope production; and
  - support to science and math education.

Generally, the Laboratory's R&D efforts focus on areas in which the Laboratory has developed a high degree of competency and the specialized facilities required for the type of work to be done. The following are some of the areas on which the Laboratory currently focuses its R&D activities:

- Nuclear and Advanced Materials—The Laboratory synthesizes, processes, and develops applications for nuclear and advanced materials through its capabilities in metals, ceramics, polymers, and electronic materials of many types in both bulk and thin-film forms. It also has the ability to cast, forge, extrude, draw, form, and machine such materials into complex shapes over a range of sizes from microscopic to massive.

- Nuclear Weapons Science and Technology—For 50 years, Los Alamos has provided scientific and engineering leadership in support of the US nuclear deterrent.

- Earth and Environmental Systems—The Laboratory integrates research in the earth, environmental, space, chemical, biological, physical, and engineering sciences with skills in theory, modeling, and measurement. The intent is to further strengthen the Laboratory's ability to provide new scientific information and to create new technologies that will help DOE and other federal agencies solve the environmental, energy, and national security problems facing the nation.

- Bioscience and Biotechnology—The Laboratory conducts R&D in areas from human genome studies to biomedical research.

- Nuclear Science, Plasmas, and Beams—Laboratory research encompasses nuclear and particle physics, astrophysics, nuclear chemistry, plasma physics, accelerator technology, laser science, and beam physics, as well as a wide range of applications such as neutron scattering, transmutation technologies, plasma processing, radiography, microlithography, inertial fusion, and defense applications.

The following section describes where R&D efforts are physically carried out and associated potential hazards.

1.1 The Laboratory

The Laboratory occupies 43 mi^2 (111 km^2) of land owned by the DOE, which is divided into 47 separate, currently active TAs. TA-3 is the main technical area, where almost half of the Laboratory's personnel are located. TA-0, the townsite, contains leased facilities located on Los Alamos County land. Only one TA—TA-57, the Fenton Hill Site, which lies approximately 28 mi (45 km) west of Los Alamos—is noncontiguous.

The Laboratory currently consists of approximately 2,043 structures. Of these, 1,835 are buildings, which contain 7.3 million square feet (2.225 million square meters). The other structures consist of meteorological towers, water tanks, manholes, small storage sheds, electrical transformers, etc. As explained above, part of the Laboratory's resources are the specialized facilities that have been built and maintained at Los Alamos over the last 50 years. Most of these facilities have been designed and built to handle hazardous energy sources. The following section discusses how the Laboratory categorizes the levels of potential hazard that a facility is allowed to house.

1.2 Hazards and Risk Management

The Laboratory's role in supporting the nation's nuclear weapons program often overshadows the other work done at Los Alamos. The Laboratory's operations are a mixture of many work processes that call upon the skills of a variety of people and specialized facilities. Some of these processes involve unusual energy sources, which, if uncontrolled, have the potential to harm workers, the general public, or the environment. However, most processes involve energy sources that may also be encountered by members of the general public as they go about their daily routines.

Given the diversity of the R&D activities at Los Alamos, it is reasonable for a person who is not knowledgeable about the risks associated with an activity to believe that these risks are greater or smaller than in fact they are. The information contained in this guide should aid in developing a better understanding of the risks associated with the work performed at the Laboratory.

The task of communicating risk is not easy. For DOE, this effort is complicated by a common perception of the public that radioactive materials are inherently more dangerous than other types of hazardous materials or hazardous energy sources. This perception could lead one to miss the fact that other risks need to be evaluated and appropriately controlled.

Over the years, a risk management approach has evolved that the DOE and the Laboratory use to categorize the risks associated with work processes having the potential to adversely impact Laboratory workers, the public, the environment, and/or the Laboratory's capability to carry out its assigned missions. Unfortunately the approach, as it has evolved and continues to evolve, is not easily explained to someone not associated with its evolution or application.

The difficulty in explaining the approach begins with DOE jargon. Words can have different meanings for different people; for example, when talking about a building where work is carried out, the Laboratory normally calls it a facility. (An example of a building referred to as a facility is the Plutonium-Processing Facility located at TA-55.) The word "facility," however, can have a number of meanings. As used in the DOE complex, the word facility is used to denote systems, buildings, utilities, services, and related activities whose use is directed to a common purpose at a single location. Examples of facilities include accelerators, storage areas, test loops, nuclear reactors, coal conversion plants, magnetohydrodynamics experiments, windmills, radioactive waste disposal systems and burial grounds, testing laboratories, research laboratories, and accommodations for analytical examinations or irradiated and unirradiated components. For the purposes of this guide, the term facility is used to indicate some specific location where a particular type of work process is carried out.

To identify and control those work processes with the greatest potential risks, the Laboratory uses a grouping and screening methodology. The first step divides the various facilities into groups based on the type of work processes (or operations) carried out in the facility. These groups are defined below:

Administrative/Technical—facilities used for Laboratory support functions that include the Director's Office; Comptroller; Human Resources; Business; Facilities, Security, and Safeguards Division (FSS); Environment, Safety, and Health Division (ESH); and communications.

Public/Corporate Access—facilities, both restricted and unrestricted, that allow public and corporate access and use, including such facilities as the Oppenheimer Study Center and Library building, Bradbury Science Museum, and special research centers.

Theoretical/Computational—facilities such as computer centers used for theoretical and computational functions, for both classified and unclassified work.

Experimental Science—facilities used for such experimental functions as accelerator, fusion, and laser research and development and testing, and multiuse experiments.

Waste Management (WM)—facilities used for WM activities such as storage, treatment, and/or disposal of low-level, transuranic, hazardous, and mixed wastes.

Special Nuclear Materials (SNM)—facilities used for SNM functions, including storage and research and development involving SNM. For the purposes of this document, the term SNM also covers tritium.

High Explosives (HE)—facilities used for HE functions, including storage and research and development.

Physical Support—facilities such as warehouses, general storage buildings, utilities, and waste water treatment.

Vacant/Unoccupied—facilities currently vacant or unoccupied that could be rendered suitable for certain operations.

Decontamination and Decommissioning (D&D)—facilities that are currently in or are scheduled for decontamination and/or decommissioning.

Abandoned/Closed—facilities that are unoccupied and have been abandoned or closed and will not be occupied in the future.

Environmental Restoration—facilities or areas that are being restored under the Resource Conservation and Recovery Act, including landfills and burn pits.

Facilities that do not involve unusual hazards (i.e., hazards not routinely encountered by the general public) are eliminated from further consideration. Such facilities include facilities categorized as entirely administrative/technical, public/corporate access, theoretical/computational, vacant/unoccupied, and abandoned/closed.

The next step is to screen facilities in the remaining categories that contain a source of danger (i.e., a hazardous material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to a facility or to the environment (without regard for the likelihood or credibility of accident scenarios or consequence mitigation). DOE has identified two major hazards—those with a potential nuclear (radiation) hazard (called nuclear facilities) and those with non-nuclear hazard potential (called non-nuclear facilities). Once a facility has been categorized as either nuclear or non-nuclear, it is further categorized as to the consequences of an unmitigated accident or release. Additional information on this categorization is provided later in this guide.

Once a decision has been made on the hazard potential, the process of controlling the perceived risk is begun to ensure comprehensive, integrated, and balanced risk management of all safety and environmental hazards posed by these facilities and operations. This task is accomplished by providing engineering controls, administrative controls, and skilled workers. When possible, potentially unacceptable risks are eliminated altogether. In the case of a highly toxic chemical, eliminating risk may simply require substituting a less toxic chemical.

2.0 ORGANIZATION OF INFORMATION

This guide is limited to identifying the various specialized facilities where potentially hazardous operations are located at the Laboratory. For those facilities with greater hazard potentials, the reader will also find a brief description of the facility. The intent is to present a picture of the Laboratory that will allow the reader to have a better understanding of where the Laboratory's work processes are conducted and to identify which work processes have been determined to have a potential to adversely affect workers, the general public, or the environment. The intent is not to describe the details of how the analyses are done. For those readers who need this type of information, the following references are provided as a starting point:

- DOE Order 5480.23, "Nuclear Safety Analysis Reports" (DOE 1992a);
- DOE Order 5481.1B, "Safety Analysis and Review System" (DOE 1986a);
- DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23—Nuclear Safety Analysis Reports" (DOE 1992b); and
- DOE-STD-EM-5502, "Hazard Baseline Documentation" (DOE 1994b).

The fact that something is categorized as having the *potential* to cause an adverse effect does not mean that the adverse effect will occur. In categorizing work processes, the various safety systems, administrative controls, or emergency response associated with the work were not considered in determining whether the accident could occur. To fully understand whether the worst-case consequences of an accident *could* occur requires a much more involved analysis that brings into play the probability of occurrence and the severity of the consequence.

This guide describes the general operations (i.e., work processes) carried out at all active TAs (Figure 2-1) at the Laboratory. Additionally, it identifies facilities at each TA where work processes exist that have been categorized as potentially hazardous according to the criteria outlined in various DOE orders and standards.

Maps of each TA show the locations of the various facilities categorized as having potentially hazardous work processes. These maps can be used for evaluating how new or proposed facilities or new processes would impact existing processes at a TA.

Descriptions are provided of the more significant facilities in which potentially hazardous work occurs. The descriptions of these facilities include foreseeable expanded work or proposed work that has a probability of occurring in the next 5 to 10 years.

All facilities (proposed, under construction, preoperational, operational or idle, DOE-owned or leased, temporary or permanent, occupied or unoccupied) at the Laboratory have been categorized according to hazards intrinsic to their actual work processes or planned use. Laboratory operations and activities not directly associated with a structure have also been categorized.

To use the maps, the reader needs to have some further definition of what the two categories of facilities (i.e., nuclear and non-nuclear) are and what their subcategories mean. The following discussion is provided to assist the reader in understanding the categorizations.

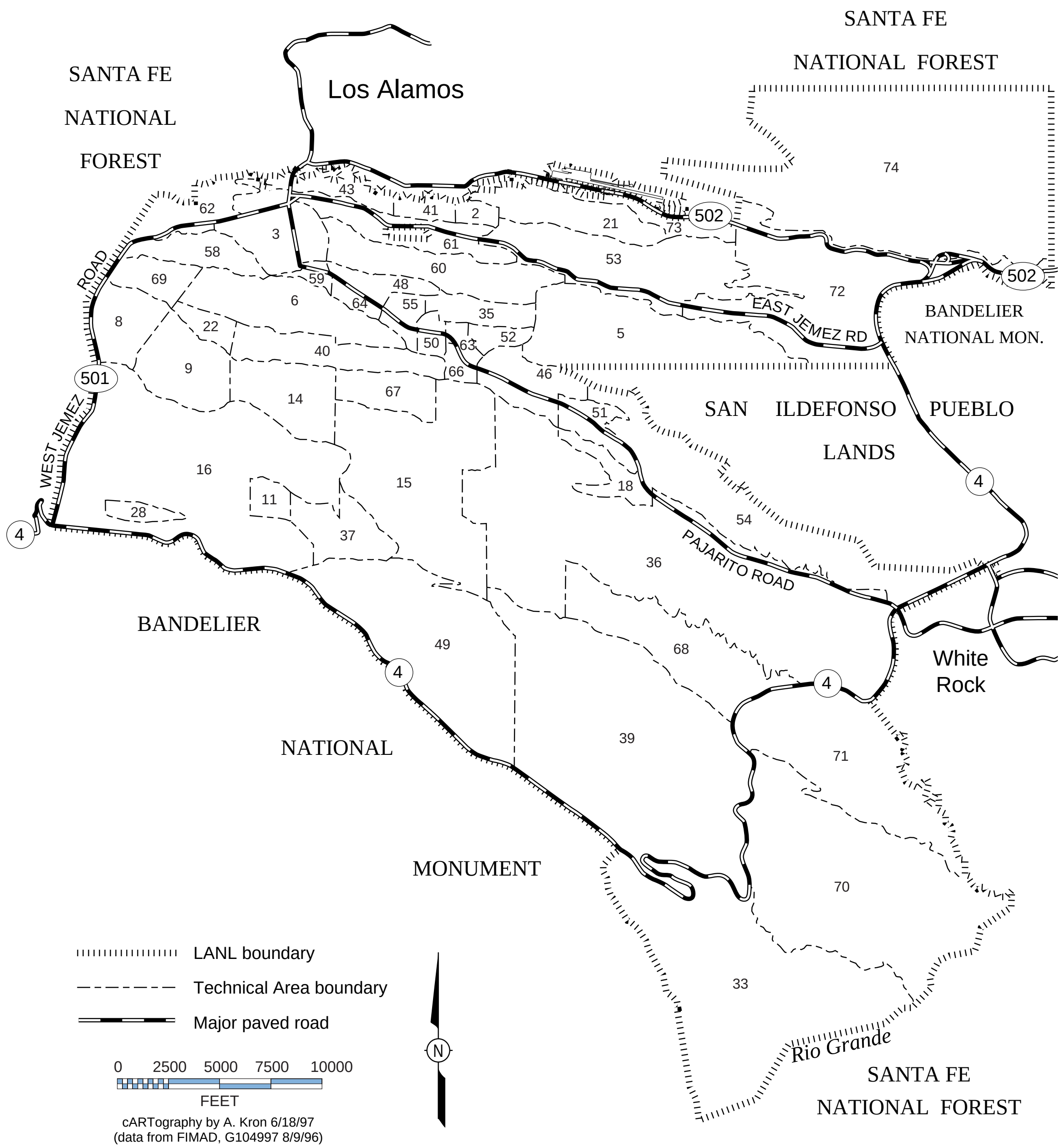


Figure 2-1. Active technical areas at Los Alamos National Laboratory.

3.0 HAZARD CATEGORIES

3.1 Categories of Nuclear Facility Hazards

DOE Order 5480.23 (DOE 1992a) categorizes nuclear hazards as Category 1, Category 2, or Category 3, which are defined as follows:

The analysis for a Category 1 hazard is based on the potential for significant offsite consequences. Based on total curie content, potential material forms, and maximum energy for dispersion available, one class of DOE facilities that possesses this hazard potential is DOE Class A nuclear reactors as defined by DOE Order 5480.6 (DOE 1986b). In addition, DOE may designate other facilities as Category 1 if it is determined that there exists the potential for significant offsite consequences. There are currently no Category 1 nuclear facilities or operations at the Laboratory.

The analysis for a Category 2 hazard is based on the potential for significant onsite consequences. DOE constructed the approach for designating Category 2 hazards from existing regulations that define minimum thresholds for many radionuclides based on the consequences of these hazards in the immediate vicinity of a facility. DOE-STD-1027-92 (DOE 1992b) provides the resulting threshold quantities for radioactive materials that define a Category 2 facility. Such an approach is consistent with the intent of DOE Order 5480.23 to categorize at the second level those facilities with the potential for significant onsite consequences.

The analysis for a Category 3 hazard is based on the potential for only significant, localized consequences. Category 3 is designed to capture facilities that largely include lab operations, low-level-waste-handling facilities, and research machines that possess less than Category 2 quantities of material and are considered to represent a low hazard. DOE Order 5480.23 states that facilities should be categorized as Level 3 if there is only the potential for "significant localized consequences." Essentially all industrial facilities have a potential for significant localized consequences because the potential for worker injuries from typical industrial accidents is always present. However, Category 3 facilities pose additional hazards resulting from the presence of radionuclides. DOE-STD-1027-92 provides the Category 3 thresholds for radionuclides.

Facilities that do not meet or exceed the Category 3 threshold criteria discussed above but that still contain some amount of radioactive material are called radiological facilities. These facilities have administrative controls in place to ensure that the minimum threshold values are not exceeded through the introduction of new radiological materials. Radiological facilities may be categorized under the non-nuclear facility categories, which are low-hazard radioactive (L/RAD) or moderate hazard radioactive (M/RAD).

3.2 Non-Nuclear Facility Hazard Categories

DOE Order 5481.1B categorizes non-nuclear hazards as low (L), moderate (M), or high (H). The order defines these categories as follows:

- low hazards are those hazards that present minor onsite and negligible offsite impacts on people or the environment;
- moderate hazards are those hazards that present considerable potential onsite impacts on people or the environment but, at most, result in only minor offsite impacts; and
- high hazards are those hazards that have the potential for onsite or offsite impacts on large numbers of persons or major impacts on the environment.

3.3 Groupings of Non-Nuclear Facility Hazard Sources

The Laboratory has further categorized hazards as fitting into the following groupings: hazardous energy sources (ENS), hazardous chemical sources (CHEM), hazardous radiation sources (RAD), and hazardous environmental sources (ENV). A fourth grouping, identified as "no hazards," includes activities that involve only hazards normally encountered by the public in day-to-day activities, such as those typically encountered in a machine shop.

3.3.1 Hazardous Energy Sources

The following hazardous energy sources are found at the Laboratory:

- High Explosives—Any facility that processes, handles, or stores more than 2.2 lb (1 kg) of HE is categorized as a low-hazard facility (Section 3.2) because of the localized consequences of detonation events. All HE for which a credible direct or sympathetic detonation could be postulated are included as possible sources of hazard. Low-order detonation or deflagration of HE or insensitive HE is evaluated on a case-by-case basis. ("Deflagration" refers to the situation in which part of the HE detonates and the remainder is scattered.)

- Lasers—Facilities containing lasers that have the capability of causing harm beyond a distance similar to the normal warning area described in the requirements for American National Standards Institute (ANSI) Class IV lasers (LANL 1997; ANSI, current version) have been categorized as low hazard. Other ANSI class lasers are categorized as no hazard.

- Other Energy Sources—A facility containing electrical, motion, gravity-mass, pressure, chemical, heat/fire, cold, or radiant energy sources capable of causing irreversible health effects for more than two operating personnel or causing any injury to onsite personnel outside the facility, or any injury to a person offsite, are categorized as low hazard.

3.3.2 Nonradiological Material Hazards

Facilities that store, process, or handle significant quantities of nonradiological hazardous materials (chemicals and biohazards) are categorized according to criteria developed by the Laboratory that use guidance outlined in several DOE documents and professional guides, including DOE Order 6430.1A (DOE 1989), the American Industrial Hygiene Association's emergency response planning guides (AIHA 1997), and DOE's Subcommittee on Consequence Assessment & Protective Actions (DOE 1997b). The materials include toxic chemicals, harmful biological agents, carcinogens, and other materials that might expose workers, members of the public, or the environment to an unusual hazard if the materials were to be released from primary confinement by any credible means.

3.3.3 Hazardous Radiation Sources

Hazardous radiation sources are described in the last paragraph of Section 3.1.

3.3.4 Description of Technical Areas and Facilities

Each TA description in this guide includes maps that show existing potentially hazardous facilities. Each of the hazard categories for the facilities is conveyed by a different shading, as indicated in the key on each map.

The subsections below, one for each active TA at the Laboratory, describe the potentially hazardous facilities located in the individual TAs according to hazard category, beginning with Category 2 nuclear facilities and continuing through the non-nuclear hazard facilities. Generally, the higher the hazard categorization, the more information is provided in the text.

The text descriptions of low-hazard facilities contain varying amounts of detail. The material presented here was gathered from an assortment of documents prepared between 1990 and 1996. In some cases, the descriptive information available was limited and in other cases fairly extensive. The authors decided to include as much information as is available, even though some low-hazard facilities are described in more detail than others.

In some cases, buildings have more than one hazard category. In these cases, the table and map show the building under the more significant hazard category. For example, if a building is a low-hazard chemical facility and also a Category 3 nuclear facility, it is shown as a Category 3 nuclear facility.

In most cases, the text provides some information regarding the types of nonhazardous activities located in a TA. For the purposes of this document, nonhazardous activities involve only hazards routinely encountered by the public involved in similar activities. For example, the hazards associated with operating a small public airport are no different from the hazards associated with the DOE's airport at TA-73. Another example is a small electronics repair shop at the Laboratory, which does not necessarily have hazards that are different from those at the local computer or small-appliance repair shop.

Each of the TAs is accompanied by an index map that shows the complete TA and the location of the TA in relationship to the rest of the Laboratory. If necessary, the index map is accompanied by more detailed maps of the TA, and, in those cases, the index map also shows the boundaries of the more detailed maps. The key in the maps shows the texture used to indicate the hazard category of potentially hazardous facilities (Figure 3-1). Each TA is also accompanied by a table that indicates the hazard category of each potentially hazardous building and the type of operation or activity the hazardous facility supports. In some cases, building numbers appear in the table that do not appear on the map. These facilities are usually underground passageways.

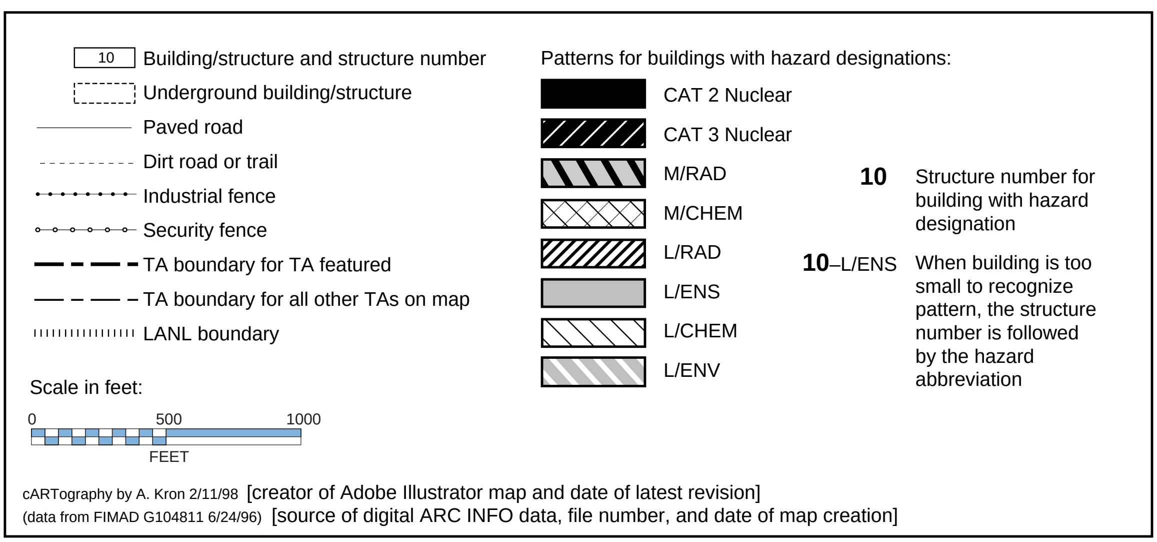


Figure 3-1. Key to maps of technical areas and facilities.

4.0 DESCRIPTION OF TECHNICAL AREAS AND IDENTIFICATION OF FACILITIES THAT FALL INTO A HAZARD CATEGORY

4.1 TA-0, Offsite Facilities

4.1.1 Site Description

TA-0 [Table 4-1 and Figure 4-1 (index map for TA-0)] is the Laboratory's designator for facilities owned or leased by the DOE that are not located inside the Laboratory's boundaries. These facilities, which accommodate a variety of physical support, public access, and administrative/ technical activities, are either owned by the DOE or leased from private property owners.

4.1.2 Facilities Description

TA-0 encompasses approximately 58 Laboratory facilities, owned or leased, which contain around 235,000 ft^2 (71,628 m^2) of space. Examples of the types of facilities leased by the Laboratory are the local office of the University of California/Community Reading Room; the Bradbury Science Museum; the White Rock ES&H Training Center; the Protective Force Training Center; and various office areas in White Rock and the Los Alamos townsite. Examples of DOE-owned facilities located in TA-0 are water wells in Guaje and Rendija canyons, various water tanks and pump houses throughout Los Alamos County, and the radio tower on Pajarito Mountain.

4.1.2.1 Facility Hazard Categories

Table 4-1 identifies the facilities in TA-0 that fall into a facility hazard category because of the type of operations performed in the facility.

4.1.2.1.1 Nuclear Facility Hazard Categories

No buildings located in TA-0 are categorized as nuclear facilities.

4.1.2.1.2 Non-Nuclear Facility Hazard Categories

Four physical support facilities at TA-0—Buildings 1109, 1110, 1113, and 1114—are categorized M/CHEM. These buildings house equipment that chlorinates the water supply for the County of Los Alamos and the Laboratory (Figure 4-1, Sheets 1, 2, 3, and 4). The DOE is currently negotiating turning the water system over to the County of Los Alamos. These facilities would then be owned and operated by the county.

4.1.2.2 Nonhazardous Facilities

Sixteen of the 58 buildings at TA-0, representing approximately 169,000 ft^2 (51,511 m^2), are used for administration or public access and are not considered to contain any unusual hazards that are not routinely encountered by the general public involved in similar activities. Most of these buildings are leased. They include the local office of the University of California/Community Reading Room, the Bradbury Science Museum, and the ES&H Training Center.

Support facilities contain utilities such as water, gas, electric, and sewer. They include pump houses that bring potable water up to the townsite from wells in nearby canyons, pump houses that pump sewage to the treatment plant in TA-46, metering stations, and transmitters. Most of this support space is managed for the Laboratory by the Laboratory's support contractor [currently, Johnson Controls, Inc., of Northern New Mexico (JCINNM)].

TABLE 4-1

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-0, OFFSITE FACILITIES

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
1109	Chlorination Station	Physical Support				X				
1110	Chlorination Station	Physical Support				X				
1113	Chlorination Station	Physical Support				X				
1114	Chlorination Station	Physical Support				X				

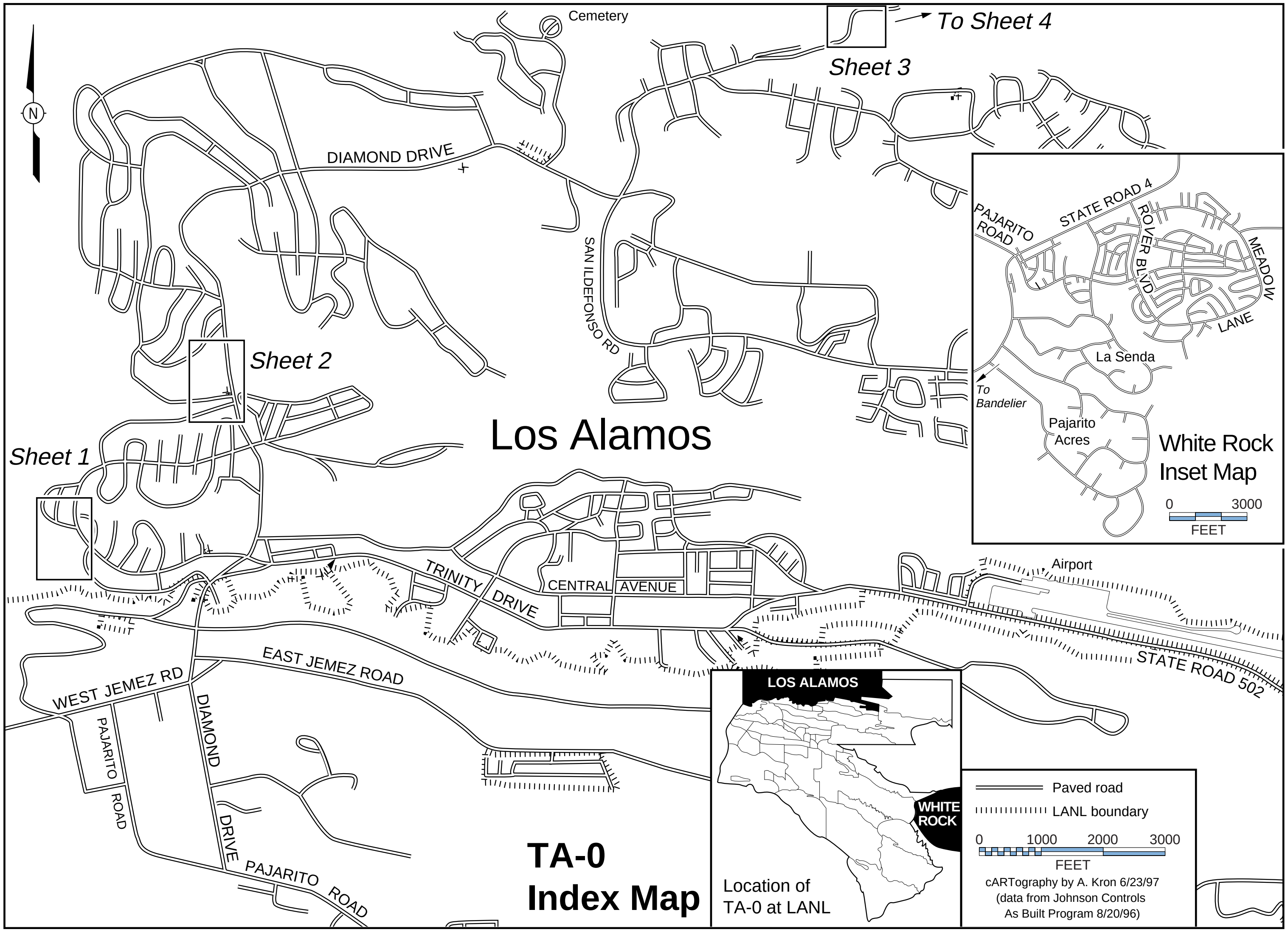


Figure 4-1 Map of TA-0, Offsite Facilities—Index Map.

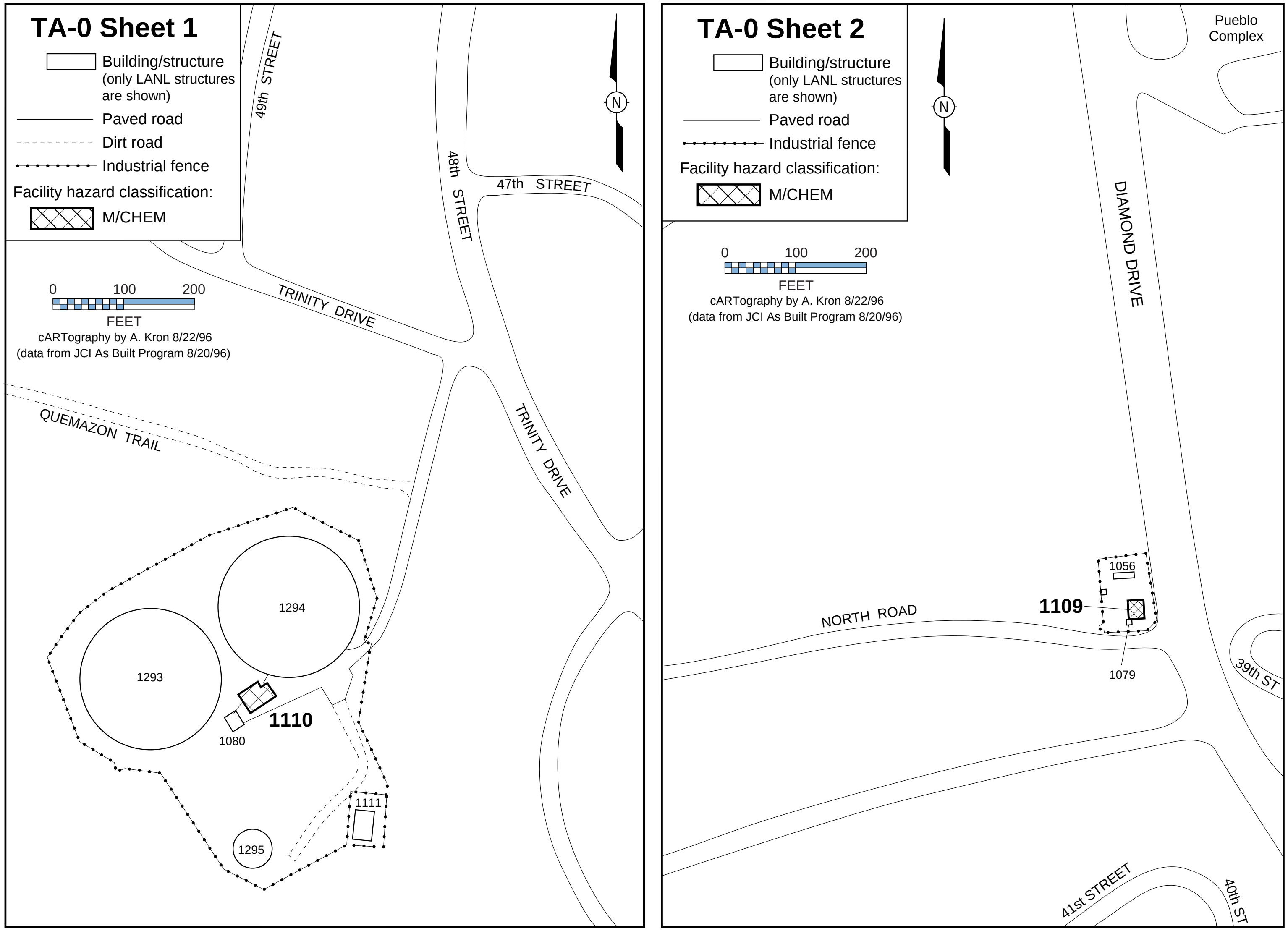
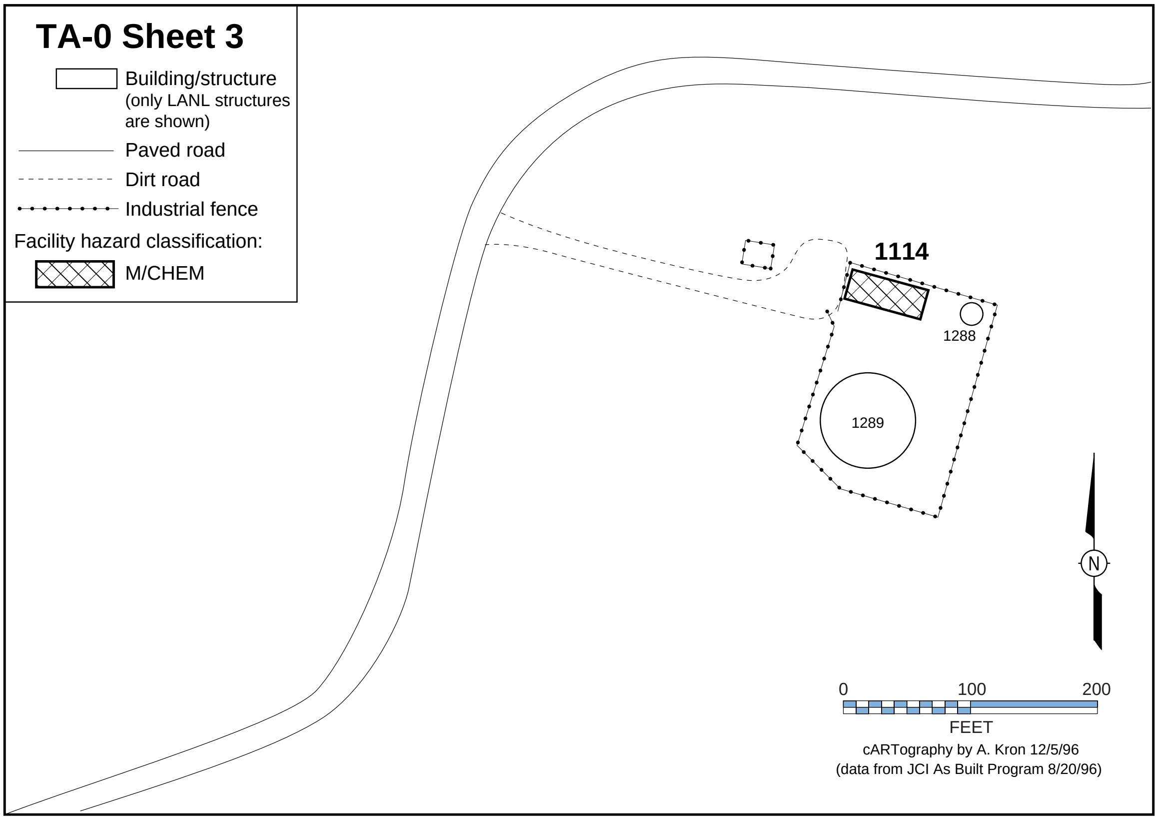


Figure 4-1. Map of TA-0, Offsite Facilities—Sheets 1 and 2.



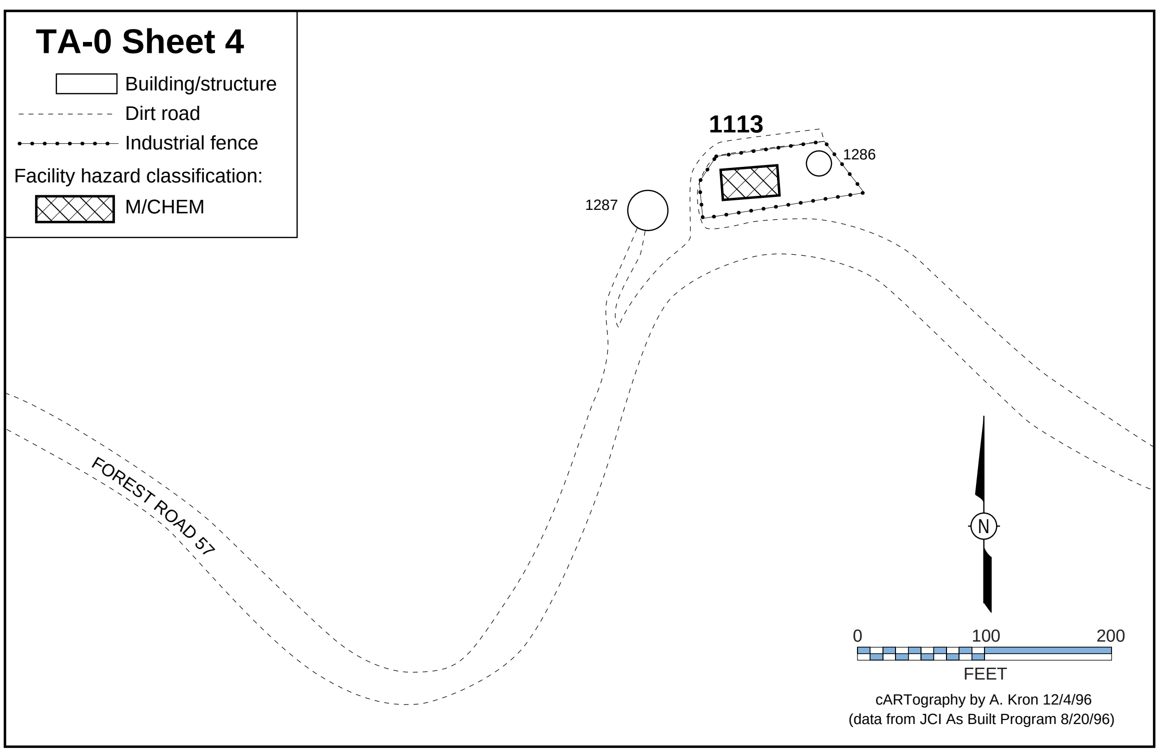


Figure 4-1. Map of TA-0, Offsite Facilities—Sheets 3 and 4.

4.2 TA-2, Omega West Reactor

4.2.1 Site Description

TA-2 [Table 4-2 and Figure 4-2 (index map for TA-2)] is a relatively small site that encompasses approximately 4 acres (1.62 ha) in Los Alamos Canyon and contains 8 buildings. An 8-MW nuclear research reactor, which is awaiting D&D, is located at this site.

4.2.2 Facilities Description

Completed in 1956, the Omega West Reactor (Building 1) operated until 1992, producing radioisotopes for experimental uses at the Laboratory. The reactor is currently in safe-shutdown mode, awaiting final D&D. The decommissioning process will produce contaminated and uncontaminated concrete, steel, and asbestos, as well as contaminated wood and other materials.

All of the other structures at TA-2 supported reactor operations. Except for the office, none of the structures is currently in use. Three underground storage tanks were used for storing radioactive liquid waste, which was periodically pumped via pipeline or shipped in trucks to the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. In 1992, a leak was detected in an underground cooling line, the defective portion of the line was removed, and the ends were sealed.

4.2.2.1 Facility Hazard Categories

Table 4-2 identifies the facilities in TA-2 that fall into a facility hazard category because of the type of operations performed in the facility.

4.2.2.1.1 Nuclear Facility Hazard Categories

No buildings at TA-2 are currently categorized as nuclear. Part of the process of putting the reactor into safe shutdown was removing the fuel elements from the reactor. These elements were moved to the Chemistry and Metallurgy Research (CMR) Building, Wing 9 (TA-3-29), to await shipment to a long-term storage facility.

4.2.2.1.2 Non-Nuclear Facility Hazard Categories

Since 1994 when all of the fuel elements were removed, the reactor has been downgraded from a Hazard Category 3 nuclear facility to L/RAD (Figure 4-2, Sheet 1). Although all nuclear materials have been removed, the facility is categorized as L/RAD because of the possibility that radioactive contamination remains. Buildings 4, 44, and 50 (two storage buildings and a cooling system building, respectively) are also categorized L/RAD.

4.2.2.2 Nonhazardous Facilities

Support facilities at the site include a guard tower (Building 69) and equipment buildings (Buildings 21, 57, and 63). These facilities are not considered to contain any unusual hazards.

TABLE 4-2

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-2, OMEGA WEST REACTOR

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
1	Omega West Reactor	D&D					X			
4	Laboratory Building	D&D					X			
44	Equipment Building	D&D					X			
50	Storage Building	D&D					X			

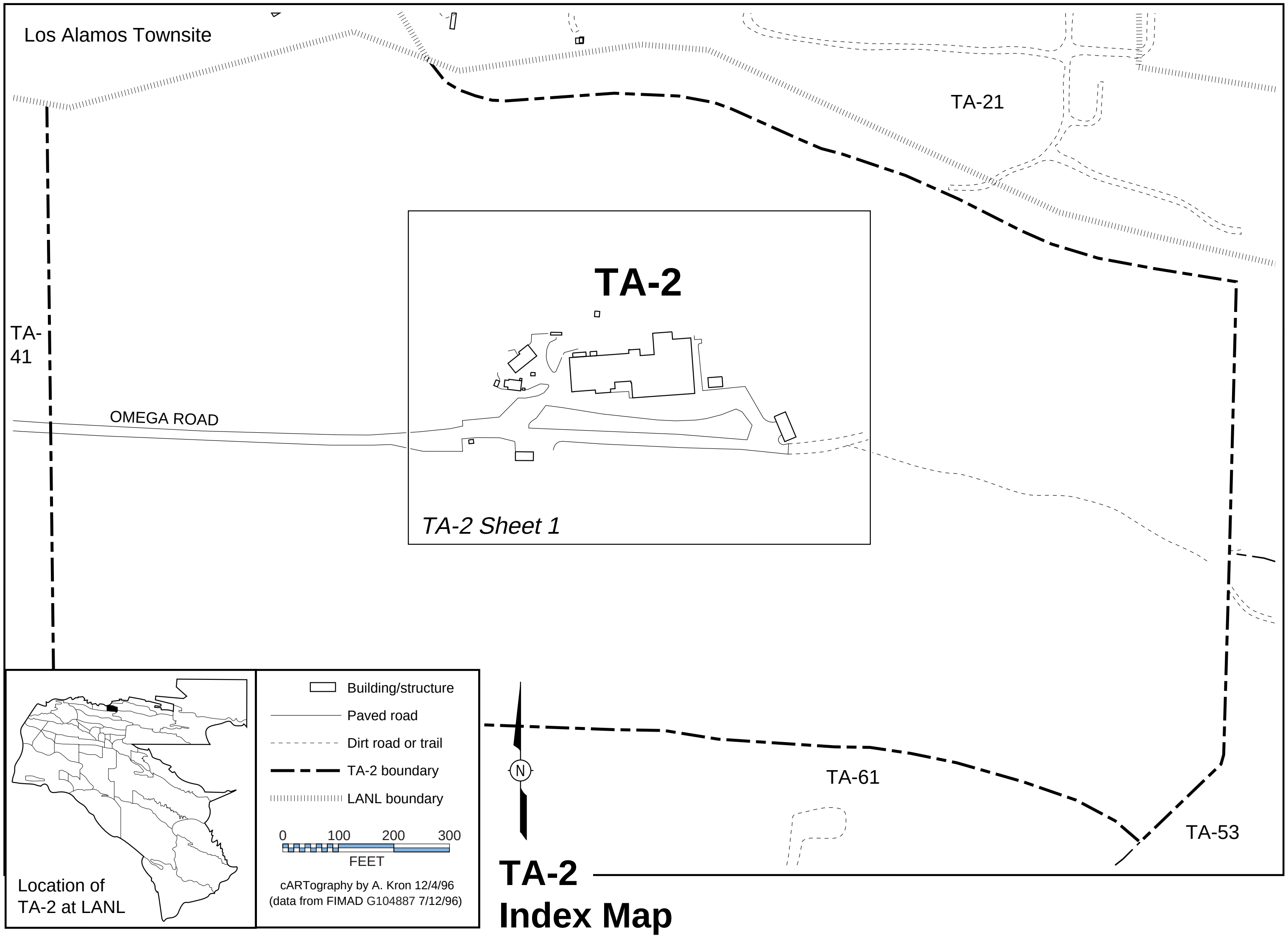


Figure 4-2. Map of TA-2, Omega West Reactor—Index Map.

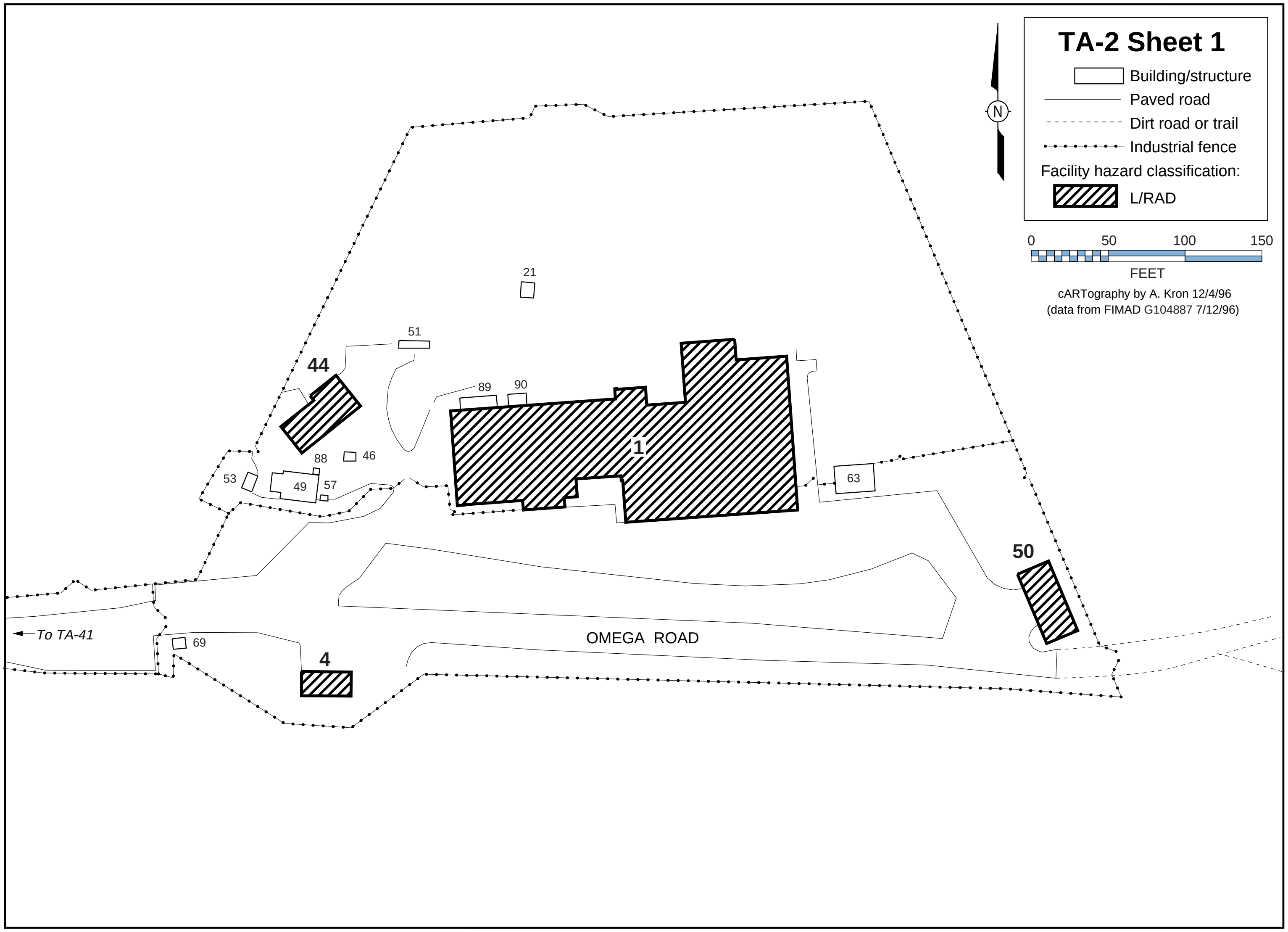


Figure 4-2. Map of TA-2, Omega West Reactor—Sheet 1.

4.3 TA-3, South Mesa Site

4.3.1 Site Description

TA-3 is the Laboratory's main technical area [Table 4-3 and Figure 4-3 (index map for TA-3)], which houses approximately half of the Laboratory's employees and contains about half of the total Laboratory floor space. It is the entry point to the Laboratory, and most of the administrative and public-access activities are located within its boundaries. The site also contains a mixture of the Laboratory's activities, which include experimental sciences, SNM, administrative, public and corporate access, theoretical/computations, and physical support operations. Security requirements at TA-3 range from buildings open to the general public to buildings that have the strictest security. The latter buildings are provided with fences, guards, electronic surveillance, and other security measures, as necessary, and personnel must have appropriate security clearances to enter.

4.3.2 Facilities Description

The facilities at TA-3 are as varied as the activities. The Administration Building (Building 43) contains the Director's Office, many of the offices of the Laboratory's program directors, and the main auditorium (where classified and unclassified meetings are held). The Otowi Building (Building 261) contains the Human Resources Division offices, most Business Operations Division offices, and the main cafeteria. Other major office buildings located in this TA are the Sherwood Building (Building 105), the Syllac Building (Building 287, which contains a very large high-bay area that has been used as an experimental research area), the JCINNM Facilities Building (Building 38), and Buildings 28, 123, and 200. The main library, part of which is open to the public, is located in the J. Robert Oppenheimer Study Center (Building 207). The Laboratory's major computing and data communications centers are located in Buildings 132 and 1498, respectively. These two facilities house some of the world's largest and fastest computers, which are critical tools in meeting the scientific goals of the Laboratory's assigned missions.

Many of the Laboratory's major facilities for providing physical support in the form of utilities and maintenance are located in TA-3. Much like a university campus, research facilities are scattered throughout the area. These range from small laboratories with bench-scale operations to activities involving radioactive materials carried out in the CMR Facility (Building 29). Many of the TA-3 research facilities are described below.

4.3.2.1 Facility Hazard Categories

Table 4-3 identifies the facilities in TA-3 that fall into a facility hazard category because of the type of operations performed in the facility.

4.3.2.1.1 Nuclear Facility Hazard Categories

Within the boundaries of TA-3, six facilities are currently categorized as nuclear facilities; two are categorized as Hazard Category 2, and four are categorized as Hazard Category 3.

4.3.2.1.1.1 Hazard Category 2 Nuclear Facilities

4.3.2.1.1.1.1 Chemistry and Metallurgy Research Facility

The CMR Building (Building 29, Figure 4-3, Sheet 2) was completed in the early 1950s to house research and experimental facilities for analytical chemistry, plutonium and uranium chemistry, and metallurgy, as well as some engineering design and support functions. In 1960, an addition (Wing 9) was constructed to support programs requiring hot-cell facilities.

The building is a three-story, reinforced-concrete structure that contains approximately 550,000 ft^2 (167,640 m^2) of floor space. The building has seven laboratory wings and one administration wing, all connected to a central (spinal) corridor. Each wing is designed to operate independently, and each has its own electrical power substation and ventilation system. The first floor of each laboratory wing contains approximately 48,000 ft^2 (14,630 m^2) of laboratory space and an equal amount of office space. The basement and second-floor spaces were designed to provide utility services for the first-floor laboratories and offices.

Wings 2, 3, 4, 5, and 7 extend from the spinal corridor and are identical in design and construction. Wings 6 and 8 were planned but never constructed. The main floor of each wing has change rooms at the entrance and offices along the outside walls. Two corridors separate the offices from laboratories. At the end of each wing are filter towers, which house the filter plenums and other large mechanical equipment for the exhaust ventilation system. Nuclear materials storage vaults are located on the main floors in Wings 2, 3, 4, 5, and 7. The basements of some wings house laboratory and office areas; the second floors of the wings are large, open areas with some building support equipment and storage areas.

Wings 1, 9, and the Administration Wing are unique. Wing 1 contains offices and inactive laboratories and does not have a filter tower. Wing 9 is a large bay area containing hot cells with remote handling capabilities and other support laboratories; men's and women's change rooms are located at the interior access to the wing. The Administration Wing houses offices and conference rooms.

The CMR Building was constructed to comply with the 1949 Uniform Building Code. The DOE has upgraded and maintained the facility over the years to ensure safe operation in support of programmatic missions. A major project is currently under way to further upgrade the facility. Additional information regarding the upgrade project can be found in the Final Environmental Assessment for the Proposed CMR Building upgrades (DOE 1997a). The R&D tasks and other operations carried out in the building are varied; the types and numbers of projects change frequently and may involve nuclear materials. Projects take advantage of the special capabilities of the facility, including those involving safety, security, ventilation, and special processes. User organizations and specific tasks typically differ between from wing to wing and within wings.

The facility has housed analytical chemistry functions since it was constructed. Process chemistry and metallurgy R&D operations involving plutonium and other actinides have been performed continuously. These activities support many LANL and other DOE programs conducted primarily at other facilities, such as plutonium-processing and uranium-related activities.

Because many activities conducted in the building are potentially hazardous, controls and procedures have been adopted to protect workers from chemical, electrical, mechanical, and radioactive hazards. Hoods and gloveboxes are used in laboratories where chemical and radioactive materials are handled, and personnel are trained to use them safely. Other safety measures include restricted entry, hazard warning signs, protective clothing, and containerization of hazardous materials. Laboratory criticality safety personnel review areas that contain significant quantities of nuclear materials to identify safe operating limits.

CMR's main vault is one of three Category 1 SNM storage vaults at the Laboratory available for nuclear material storage. This vault currently contains a variety of enriched-uranium materials, uranium feed material for manufacturing operations that occur in the Sigma Building, and samples from analytical chemistry operations. The use of the vault is not expected to change significantly in the future.

The term "Category 1 SNM storage vault" as used here does not refer to the hazard categorization process but to DOE's designation of how much SNM a storage vault is authorized to hold based on its design and its ability to meet specific security requirements. Further information on this subject is provided in DOE Order 5633.3B, "Control & Accountability of Nuclear Materials" (DOE 1994a).

4.3.2.1.1.1.2 Sealed Source Building

The Sealed Source Building (Building 65, Figure 4-3, Sheet 2) is categorized as a Hazard Category 2 nuclear facility because it contains encapsulated radioactive materials and SNM used in health physics measurements research. This building is located inside a fenced area on the south side of Pajarito Road and Diamond Drive. The radioactive sources and SNM are sealed in steel containers, which are kept in a vault equipped with a steel door and combination lock. Only source custodians have access to the vault. The materials are used only inside appropriate shielding.

The term "encapsulated" refers to radioactive material that is totally encased by a container. Encapsulation greatly reduces the likelihood that normal use will result in loss of radioactive material or dispersal. The emissions of the radioactive material are typically intended for continued or repetitive use as a known source of radiation for health physics measurements.

4.3.2.1.1.2 Hazard Category 3 Nuclear Facilities

4.3.2.1.1.2.1 Health Physics Instrumentation Calibration Facility

The Laboratory's Health Physics Instrumentation Calibration Facility (West Wing, Building 40, Figure 4-3, Sheet 1), a controlled-access area, is located in the west wing of the Physics Building, which is the only part of this building designated as a Hazard Category 3 nuclear facility. The rest of the building is considered to have only hazards routinely encountered by members of the public involved in activities similar to those conducted in the Physics Building outside the west wing. The functions conducted in the calibration facility are calibrating and evaluating all types of radiation detection instrumentation used throughout the Laboratory. This instrumentation includes alpha, beta-gamma, neutron, and tritium gas detectors.

Calibrating the various radiation detection instruments requires using sources of radiation appropriate to the instrument. An instrument that measures alpha radiation needs to be calibrated against a source whose level of alpha radiation is known. In the descriptions that follow, the sources referred to are these sources of known radiation.

Three operating laboratories (W-4, W-120/120-A, and W-10) and two radioactive material source storage vaults (W-133 and W-8B) in the west wing support this activity. Two of the laboratories are used for calibrating and evaluating radiation detection instruments and detectors. The third laboratory is used to determine neutron emission rates from neutron sources. Only one of the storage vaults (W-133) is authorized to store sources containing SNM.

W-120/120A and W-133 are located on the first floor of the west wing. W-120 is approximately 200 ft^2 (61 m^2) and is constructed of both reinforced concrete and concrete block. W-120A is a metal-fabricated structure in W-120 that contains the actual calibration range. The range consists of tubes constructed of steel encased in concrete, which are used to house the various radioactive calibration sources.

W-133, a storage vault of approximately 160 ft^2 (49 m^2), is constructed of reinforced concrete and contains radioactive material transfer containers and metal cabinets. Steel tubes inserted in the concrete floor of the vault for source storage occupy most of the floor space.

W-4, W-8B, and W-10 are located in the basement of the west wing. Access to these rooms is by elevator or stairwell. All of the rooms are constructed of reinforced concrete. W-4 is a laboratory used primarily for calibrating neutron-emitting sources for determining neutron emissions. W-8B, the other vault, is a secondary radioactive materials storage vault in which radioactive materials used in W-4 and W-10 are stored. No SNM storage is authorized for this vault. W-10 is used for calibrating tritium instrumentation. This room is equipped with a laboratory fume hood in case tritium is released during calibration.

4.3.2.1.1.2.2 Sigma Complex

The Sigma Building (Building 66, Figure 4-3, Sheet 2) and three other main buildings [Building 35 (Press Building), Building 141 (Rolling Mill Building), and Building 159 (Thorium Storage Building)] make up the Sigma Complex, which is enclosed by a security fence and to which access is controlled by a guard station. The complex, which encompasses over 200,000 ft^2 (60,960 m^2), was constructed in increments during the 1950s and 1960s and has been used for a variety of nuclear materials missions. Today, the facility is primarily used for synthesizing materials and for processing, characterizing, and fabricating metallic and ceramic items, including items made of depleted uranium (DU). In the past, Sigma Complex processed all isotopes of uranium; therefore, much of the equipment is radioactively contaminated at very low levels. Nonradioactive hazardous materials used included a number of chemicals and metals such as beryllium.

The Sigma Building is categorized as a Hazard Category 3 nuclear facility. Constructed in 1958 and 1959, the building has approximately 168,200 ft^2 (51,267 m^2) of floor space spread over 4 levels. Most of the space is occupied by laboratories for metallurgical and ceramics projects, offices and administrative space, and storage areas for hazardous chemicals (such as concentrated acids and caustic solutions). The rest of the space, about 55,000 ft^2 (16,764 m^2), is devoted to various mechanical systems that provide for ventilation and other equipment required for protecting the facility and workers. Building and process air is exhausted from the building through five major stacks and numerous small roof stacks.

Today, the Sigma Building is primarily used for materials synthesis and for processing and characterizing and fabricating metallic and ceramic items, including DU items used in the Stockpile Stewardship and Management Program. Bulk DU is stored in the Sigma Building as supply and feed stock. Current activities in the Sigma Building focus on test hardware, prototype fabrication, and materials research for the DOE's Nuclear Weapons Program, but they also include activities related to energy, environment, industrial competitiveness, and strategic research.

Information on the rest of the Sigma Complex can be found in Section 4.3.2.1.2.2.2, Press Building; Section 4.3.2.1.2.4.5, The Rolling Mill Building; and Section 4.3.2.1.1.2.4, Thorium Storage Building.

4.3.2.1.1.2.3 Calibration Building

The Calibration Building (Building 130, Figure 4-3, Sheet 2) is categorized as a Hazard Category 3 nuclear facility because it contains radioactive sources. The sources are used to calibrate instruments for evaluating the response of various detectors to x-ray, gamma, beta, and neutron emissions. The building is made up of two structures—the main building and an annex attached to its southeast end. It is located inside the same fenced area as the Sealed Source Building (Section 4.3.2.1.1.1.2).

To prevent contamination of facility workers under normal operating conditions, all radioactive sources and SNM are encapsulated or sealed in containers, including during the time they are being used for instrument evaluations. (No processing of nuclear material takes place in the Calibration Building.) Only Laboratory research staff and designated custodians handle the radioactive sources and SNM.

4.3.2.1.1.2.4 Thorium Storage Building

The Thorium Storage Building (Building 159, Figure 4-3, Sheet 2), part of the Sigma Complex (Section 4.3.2.1.1.2.2), is a Hazard Category 3 nuclear facility because it is used for storing thorium in both ingot and oxide forms. To ensure material accountability and to limit radiation doses to personnel, Building 159 is surrounded by fencing and has its own controlled access.

4.3.2.1.2 Non-Nuclear Facility Hazard Categories

Within the boundaries of TA-3 are one M/CHEM facility, four L/RAD facilities, one L/ENS facility, and eight L/CHEM facilities.

4.3.2.1.2.1 Building Categorized M/CHEM

The Liquid and Compressed Gas Facility (Building 170, Figure 4-3, Sheet 2) is the Laboratory's receiving and distribution point for bulk quantities of specialized gases used in R&D activities. Cylinders of various sizes, as well as trailers, are staged at this facility.

4.3.2.1.2.2 Buildings Categorized L/RAD

4.3.2.1.2.2.1 Ion Beam Building

The Ion Beam Building (Building 16, Figure 4-3, Sheet 1) consists of approximately 58,000 ft^2 (17, 678 m^2) of usable space. The building houses an accelerator capable of energies from 250 keV to 150 MeV, which can provide pulsed ion beams to 0.5 ns. The accelerator is capable of accelerating microparticles at >62 mi/s (>100 km/s). The facility is currently in safe-shutdown mode. All sources have been removed. Current plans are to convert the entire building to office space.

4.3.2.1.2.2.2 Press Building

The Press Building (Building 35, Figure 4-3, Sheet 2), built in 1953, is part of the Sigma Complex. It contains approximately 9,860 ft^2 (3,005 m^2) of space on one floor and a partial basement. The only activity there is the operation of a 5,000-ton (4,536,000-kg) hydraulic press used for work with DU.

4.3.2.1.2.2.3 The Tech Shops Addition

The Tech Shops Addition, also called the Uranium Shop (Building 102, Figure 4-3, Sheet 1), was constructed in 1957 and consists of approximately 23,000 ft^2 (7,010 m^2), including a 125-ft- (38-m-) long corridor that connects it with the main shops (Section 4.3.2.1.2.4.4). Its construction is similar to that of the main shops. The building houses the uranium shop, which is ventilated through a portable high-efficiency particulate air (HEPA) filtration system. This facility, like the main shops, contains a variety of metal-forming machines. Although DU represents the bulk of the materials used in parts fabrication, many other potentially hazardous materials are used in this facility.

4.3.2.1.2.2.4 High-Voltage-Test Facility

Physics research is conducted in the High-Voltage-Test Facility (Building 316, Figure 4-3, Sheet 2). Current activities at this facility are below threshold levels for the L/RAD category. Past activities at the facility exceeded the threshold.

4.3.2.1.2.3 Building Categorized L/ENS

4.3.2.1.2.3.1 The Weapons Test Support Facility

The Weapons Test Support Facility (Building 216, Figure 4-3, Sheets 1 and 2) is a physics research and design facility. All research using lasers and x-rays is conducted in shielded areas in accordance with standard operating procedures.

4.3.2.1.2.4 Buildings Categorized L/CHEM

Several of the buildings below categorized as L/CHEM represent significant Laboratory resources and are therefore described in some detail.

4.3.2.1.2.4.1 Water Treatment House

The Water Treatment House (Building 24, Figure 4-3, Sheet 2) contains a gas chlorination unit. It is used to treat cooling tower water during the production of steam at the TA-3 Steam Plant (Building 22).

4.3.2.1.2.4.2 Warehouses

The Laboratory's main general warehouse (Building 30) and chemical warehouse (Building 31, Figure 4-3, Sheet 1), both of which can store limited quantities of hazardous chemicals, are categorized L/CHEM. The chemical warehouse is managed by a subcontractor.

4.3.2.1.2.4.3 Laboratories

Building 32, the Center for Material Science (also called the Cryogenics Building A), and Building 34, the Cryogenics Building B (also called the Condensed Matter and Thermal Physics Laboratory) (Figure 4-3, Sheet 2), are used for materials research. Although Building 32 is known as the Center for Material Science (Figure 4-3, Sheet 2), the building is one of several that serve a Laboratory program focusing on material sciences [e.g., Buildings 32 and 34, and the Materials Science Laboratory (MSL) (Building 1698, Section 4.3.2.1.2.4.6)]. Scientists at the center are involved in developing and bringing material science work to the Laboratory. Building 32, used for cryogenics research, uses liquid nitrogen. Building 34's ground-floor laboratories are used for condensed matter and thermal physics research. Downstairs is the Ion Beam Materials Laboratory. Although the rest of Building 34 is categorized L/CHEM, the Ion Beam Materials Laboratory is categorized L/ENS.

4.3.2.1.2.4.4 The Tech Shops

LANL's main shops (Building 39, Figure 4-3, Sheet 1) are located in the southwestern quadrant of TA-3. The shops consist of two buildings—the main shops in Building 39 and the Tech Shops Addition (also called the Uranium Shop) in Building 102. Building 39 is constructed of poured concrete and cinder block and has a flat tar/gravel roof. The approximately 138,000-ft^2 (42,062-m^2) building, including a 13,500-ft^2 (4,115-m^2) administrative office area, was constructed in 1953. The building contains a variety of lathes, mills, and other metal-forming equipment.

Building 39 also houses the beryllium shop (not limited to beryllium), which is ventilated through a HEPA filtration system. Although small, selected areas of the building are air-conditioned to provide an environment that allows parts to be fabricated accurately, most of the building space is not air-conditioned. Other small areas with special ventilation include painting, welding, and grinding areas.

4.3.2.1.2.4.5 The Rolling Mill Building

The Rolling Mill Building (Building 141, Figure 4-3, Sheet 2), which was built in the early 1960s and is part of the Sigma Complex, is categorized as L/CHEM. Its three levels encompass approximately 20,213 ft^2 (6,161 m^2) of space that houses powder metallurgy activities, filament welding, ceramics research and development, rapid-solidification research, and work with beryllium and uranium/graphite fuels. The beryllium area has a permitted, monitored stack equipped with a HEPA filter. Rooms 142, 148, 150, and 144 are vented through a bag-filtered exhaust system designed to remove carbon and graphite dust. The other parts of the building are vented through unfiltered vents and stacks.

4.3.2.1.2.4.6 The Materials Science Laboratory

The Materials Science Laboratory (Building 1698, Figure 4-3, Sheet 2) is used for processing materials, studying mechanical behavior in extreme environments, developing advanced materials, and characterizing materials. The MSL is bounded on the west by Diamond Drive, on the north by Buildings 32 and 34 (Section 4.2.3.1.2.4.3), on the east by the security fencing that surrounds the Sigma Complex (Section 4.3.2.1.1.2.2), and on the south by Pajarito Road. The MSL building and its corresponding access roads, parking lots, and landscape areas cover a site of approximately 7 acres (2.8 ha).

This facility is a two-story laboratory of approximately 55,360 ft^2 (16,874 m^2) arranged in the shape of an H. The MSL is constructed of precast concrete panels sealed to a structural steel framework, concrete floors, drywall interior, casework, hoods, and a utility infrastructure. Safety controls throughout the building include a wet-pipe sprinkler system; automatic fire alarms; chemical fume hoods; gloveboxes; HEPA-filtered heating, ventilation, and air conditioning (HVAC); and safety showers.

MSL contains 27 laboratories and 21 distinct materials research areas, which can be categorized as 4 major materials science experimental areas: materials processing, mechanical behavior in extreme environments, advanced materials development, and materials characterization. These 4 areas contain over 20 operational capabilities that support materials research activities related to energy, environment, nuclear weapons, and industrial competitiveness. In addition, the facility contains 60 offices; 15 support rooms; and conference rooms used by technical staff, visiting scientists and engineers, administrative staff, and building support personnel.

The first floor contains a high bay and materials characterization and processing laboratories in the east wing; materials synthesis, characterization, and processing laboratories in the west wing; and administrative and personnel interaction areas in the center. The second floor contains computer rooms in the east wing; additional materials synthesis, characterization, and processing laboratories in the west wing; and building services and additional personnel interaction areas in the center. Small offices are located along the exterior walls throughout most of the building.

Appropriate safety systems are designed into the building for those laboratories in which potentially hazardous activities occur. These systems include detection systems, warning lights, physical barriers, and appropriate exhaust ventilation systems. The building is configured so that service corridors connect the laboratories, allowing materials to be transported, stored, and used in a ventilation zone separated from pedestrian corridors and staff offices. Some of the laboratories are provided with special features such as vibration isolation, electromagnetic shielding, and HEPA filters. All laboratories contain a variable-air-volume ventilation system, as well as process cooling water, large-capacity electrical circuits, and vacuum pump exhaust systems. The exhaust ventilation system is provided with an automated alarm system to indicate offnormal conditions.

The MSL was designed to accommodate a wide variety of chemicals used in small amounts that are typical of many university and industrial materials research facilities. Some of these chemicals are hazardous, toxic, and/or radioactive. The various laboratories in MSL produce four liquid wastes: (1) sanitary, (2) acid/caustic, (3) nonflammable organic, and (4) flammable organic.

The MSL is located in an unsecured area adjacent to secured facilities that house most of the Laboratory's materials scientists and engineers. The building is not a production facility but a facility dedicated to the types of materials research conducted in a university and in industry.

4.3.2.2 Nonhazardous Facilities

Three hundred sixty-six administrative, technical, physical support, and other buildings and structures at TA-3 (Figure 4-3) contain operations that are not considered to involve unusual hazards.

Some of the major nonhazardous facilities contained in TA-3 are the Laboratory's main office building (Building 43), which contains the Director's Office, most of the offices of the Laboratory's program directors, and the main auditorium. The Otowi Building (Building 261) houses the Human Resources (HR) Division offices, as well as the main cafeteria. Other major office buildings located in this area are the Sherwood Building (Building 105), the Syllac Building (Building 287), the Laboratory Support Contractor Building (Building 38), and Buildings 28, 123, 200, and 410. The Laboratory's major computing and data communications centers are located in Buildings 132 and 1498, respectively. The main library is located in the J. Robert Oppenheimer Study Center (Building 207). The Wellness Center (Building 1663), Fire Station #1 (Building 41), and the Occupational Medicine Facility (Building 409) are also located at TA-3.

Several of the Laboratory's major facilities for utilities and general grounds upkeep are located in TA-3. Steam required for operations is provided by the steam plant (Building 22). The Laboratory's utility control center and main substation are located in Buildings 223 and 233, respectively. The Parks and Refuse Office is located in Building 70. Other important structures located at TA-3 include switch-gear stations (Buildings 23 and 1682), cooling towers (Buildings 25 and 58), and the asphalt concrete plant (Building 173).

TABLE 4-3

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES TA-3, SOUTH MESA SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
16	Ion Beam Building	Experimental Science					X			
24	Water Treatment House	Physical Support							X	
29	CMR	SNM	X							
30	General Warehouse	Physical Support							X	
31	Chemical Warehouse	Physical Support							X	
32	Center for Material Science	Experimental Science							X	
34	Cryogenics Building B	Experimental Science							X	
35	Press Building	Experimental Science					X			
39	Tech Shops	Experimental Science							X	
40	Physics Building	SNM		X						
65	Source Storage	SNM	X							
66	Sigma Building	SNM		X						
102	Tech Shops Addition	Experimental Science					X			
130	Calibration Building	SNM		X						
141	Rolling Mill	Experimental Science							X	
159	Thorium Storage	SNM		X						
170	Liquid and Compressed Gas Facility	Physical Support				X				
216	Weapons Test Support	Experimental Science						X		
316	High-Voltage Test Facility	Experimental Science					X			
1698	Materials Science Lab	Experimental Science							X	

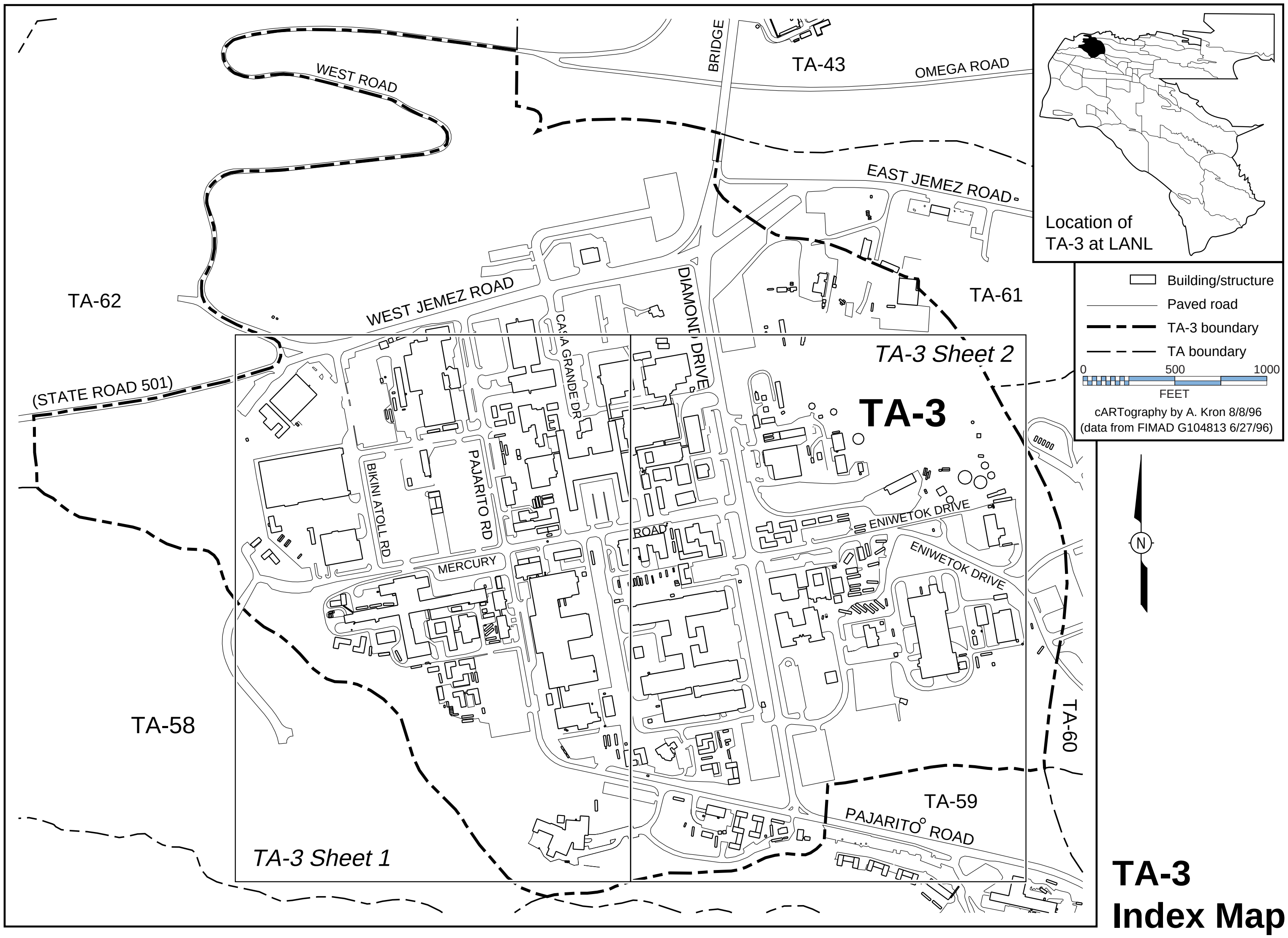


Figure 4-3. Map of TA-3, South Mesa Site—Index Map.

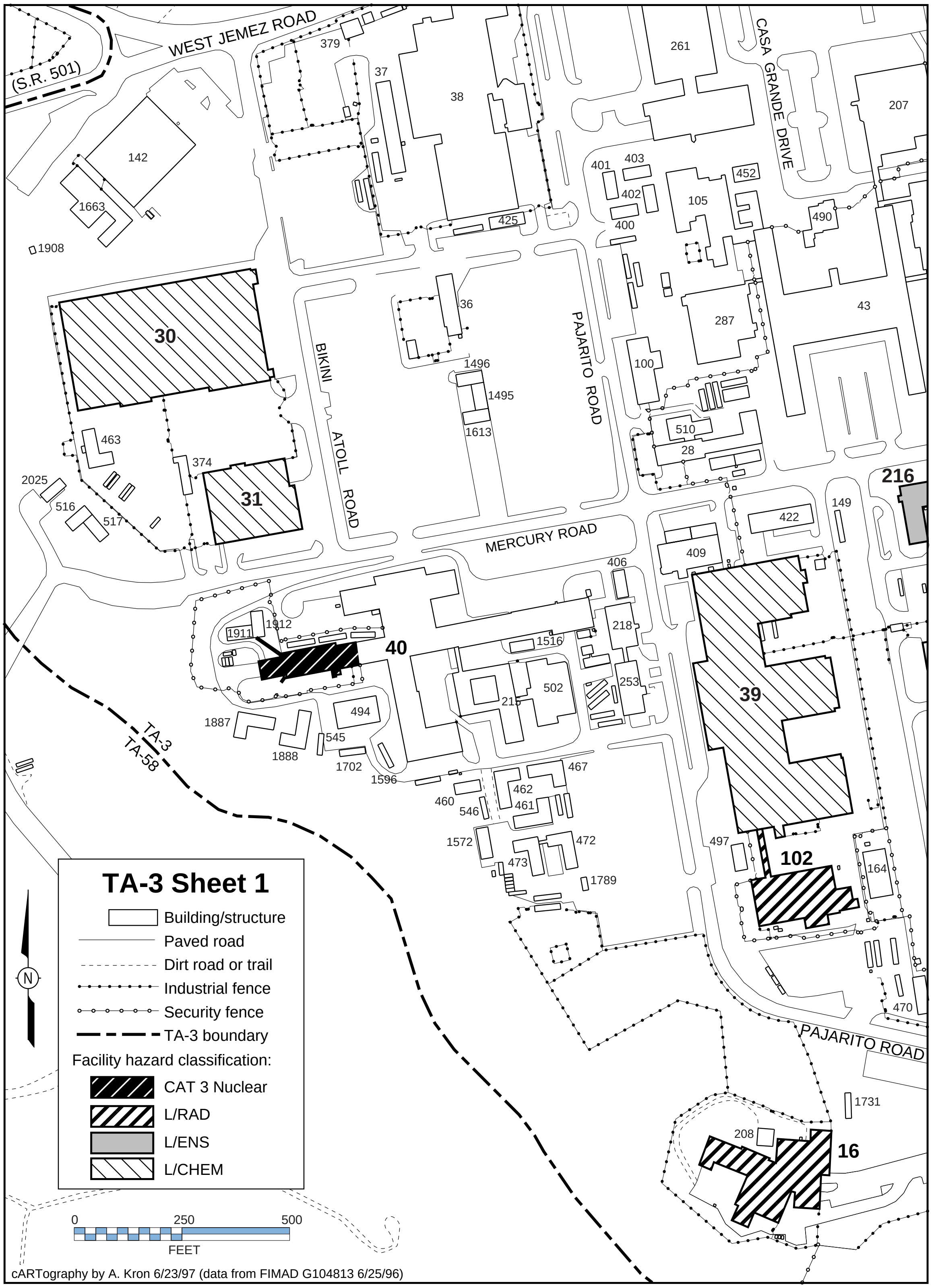


Figure 4-3. Map of TA-3, South Mesa Site—Sheet 1.

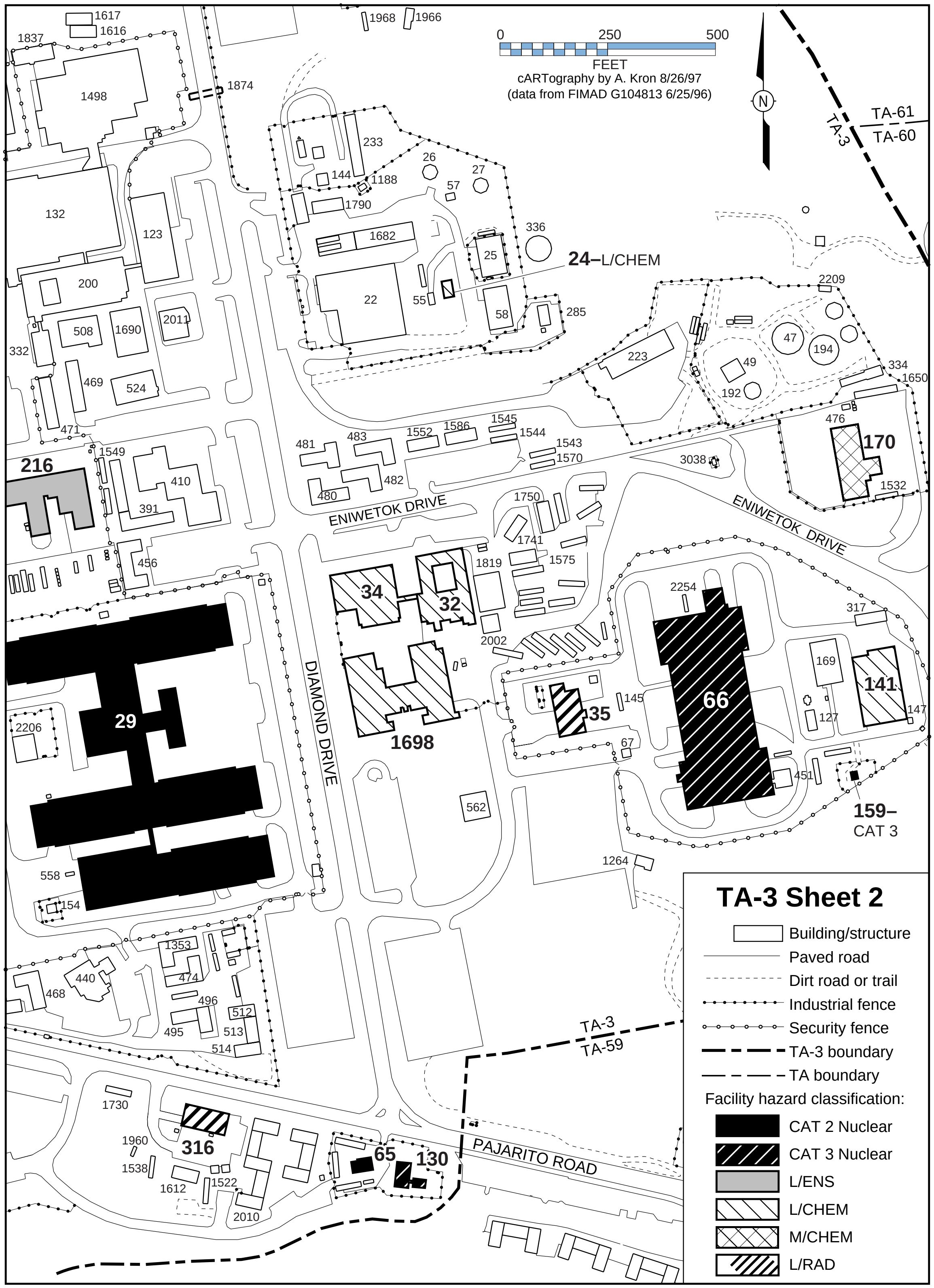


Figure 4-3. Map of TA-3, South Mesa Site—Sheet 2.

4.4 TA-5, Beta Site

4.4.1 Site Description

TA-5 [Figure 4-4 (index map for TA-5)] is located between East Jemez Road and the San Ildefonso Indian Reservation. The site contains three physical support facilities such as an electrical substation, test wells, several archaeological sites, and environmental monitoring and buffer areas.

4.4.2 Facilities Description

4.4.2.1 Facility Hazard Categories

4.4.2.1.1 Nuclear Facility Hazard Categories

No buildings at TA-5 are categorized as nuclear facilities.

4.4.2.1.2 Non-Nuclear Facility Hazard Categories

No buildings at TA-5 are categorized as non-nuclear facilities.

4.4.2.2 Nonhazardous Facilities

Figure 4-4, Sheet 1, shows six structures (Buildings 23, 24, 25, 26, 39, and 40) located at TA-5. All are physical support facilities that house operations that are not considered to involve unusual hazards.

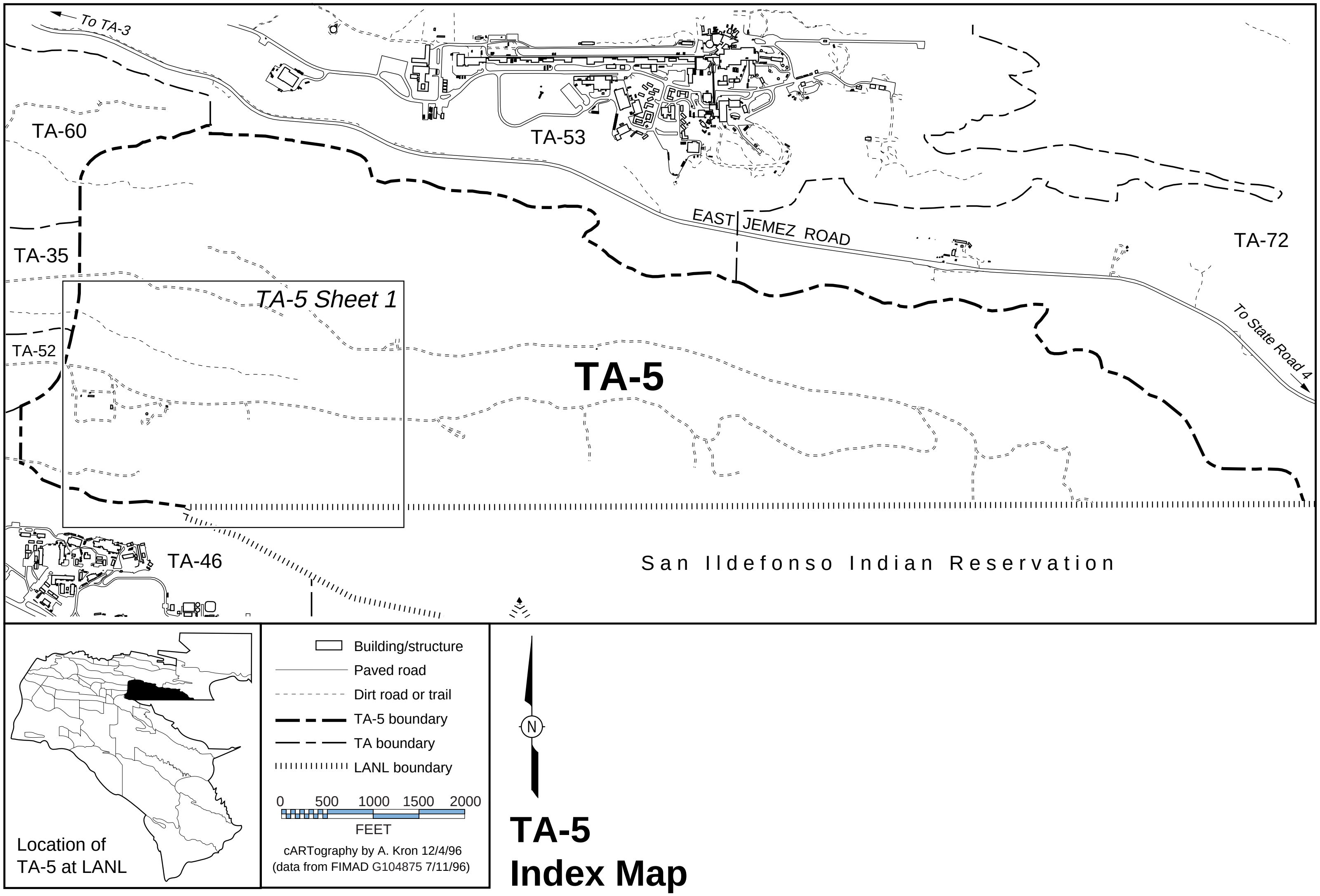


Figure 4-4. Map of TA-5, Beta Site—Index Map.

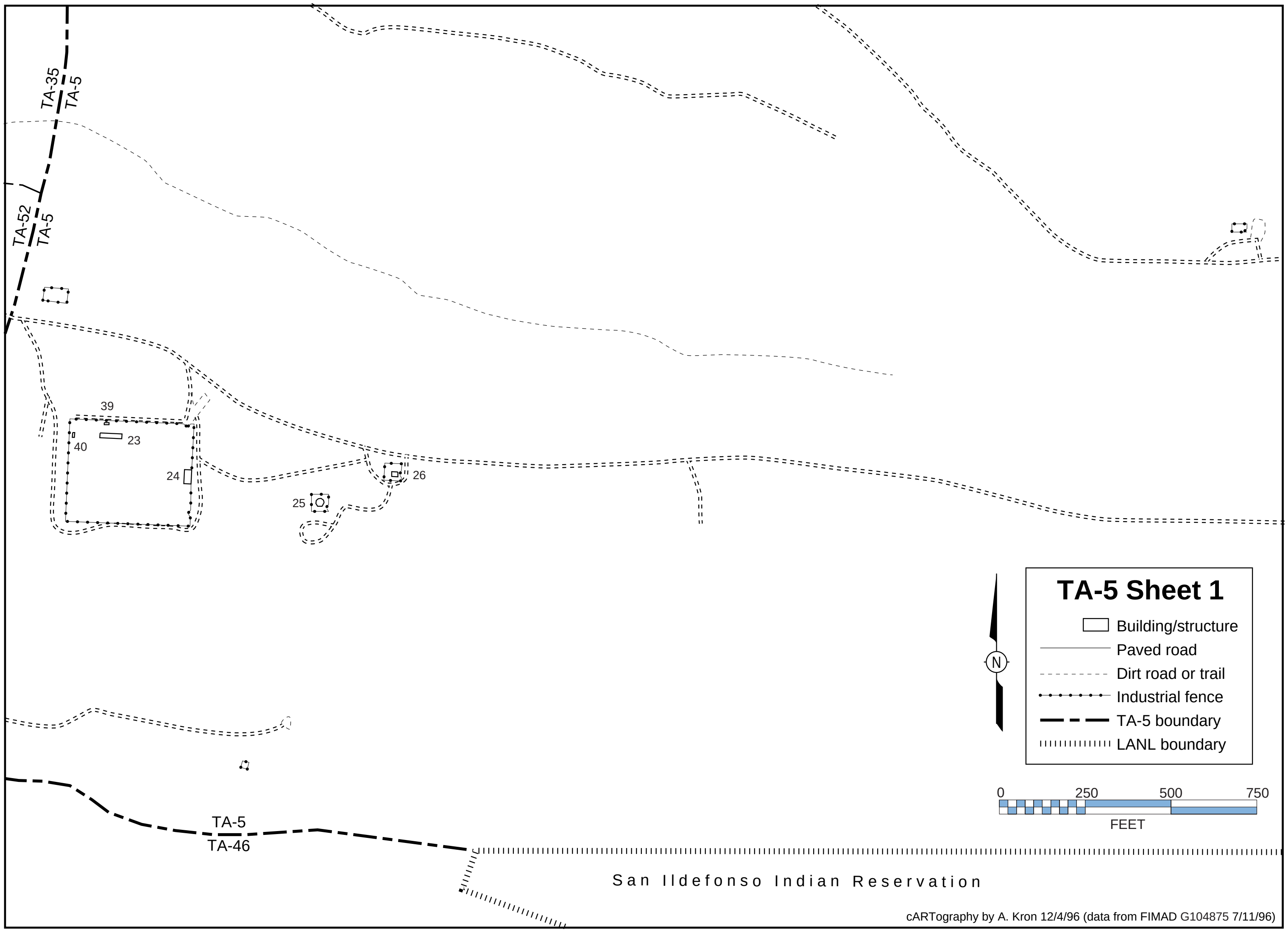


Figure 4-4. Map of TA-5, Beta Site—Sheet 1.

4.5 TA-6, Two Mile Mesa Site

4.5.1 Site Description

TA-6 [Figure 4-5 (index map of TA-6)] is mostly undeveloped and contains gas-cylinder-staging and vacant buildings pending authorization for disposal.

4.5.2 Facilities Description

4.5.2.1 Facility Hazard Categories

4.5.2.1.1 Nuclear Facility Hazard Categories

No buildings at TA-6 are categorized as nuclear facilities.

4.5.2.1.2 Non-Nuclear Facility Hazard Categories

No buildings at TA-6 are categorized as non-nuclear facilities.

4.5.2.2 Nonhazardous Facilities

The approximately 20 structures at the site include shops, laboratories, sheds, and transportainers (Figure 4-5, Sheets 1 and 2). None of these buildings contains operations that are considered to involve unusual hazards.

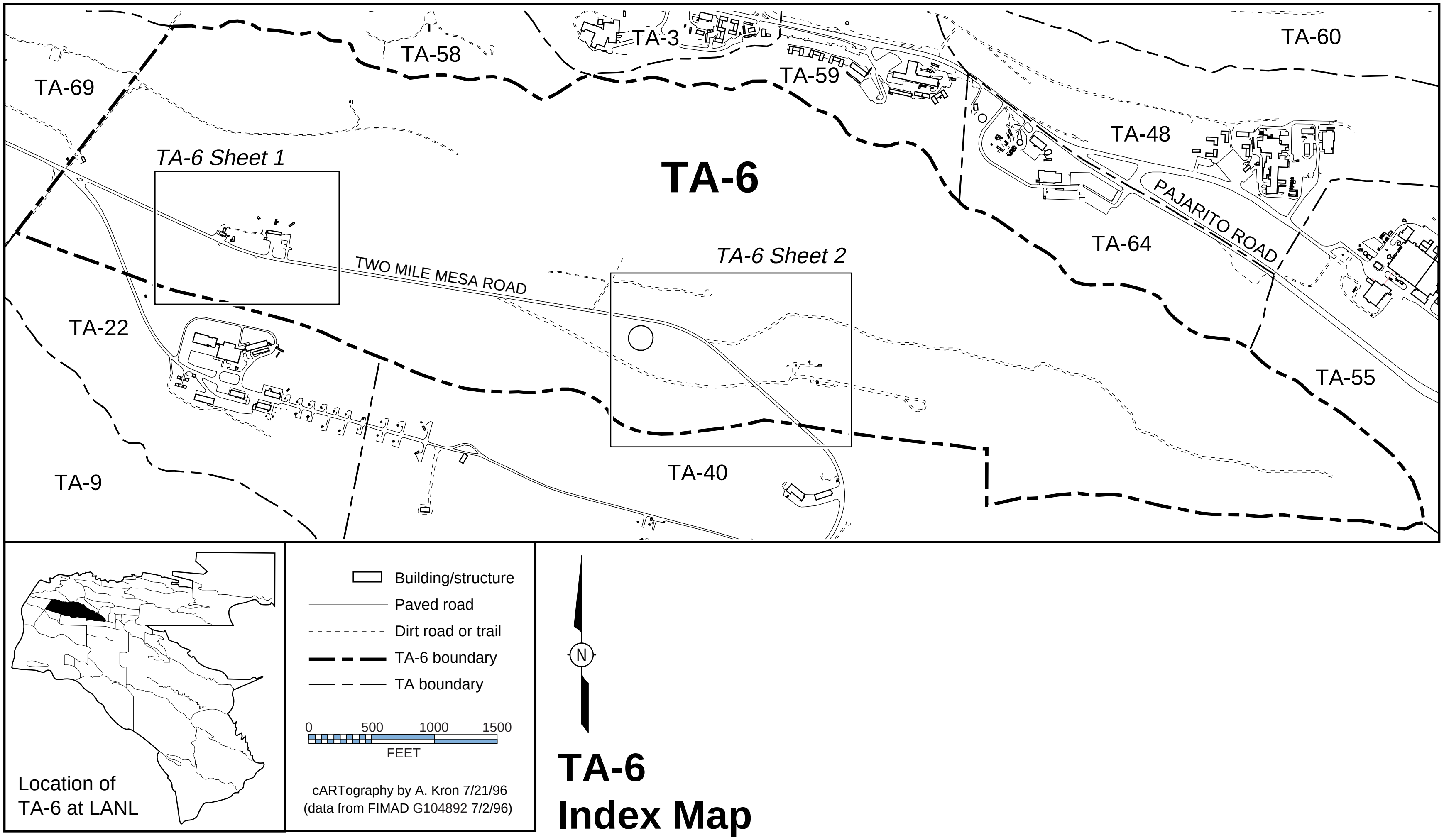


Figure 4-5. Map of TA-6, Two Mile Mesa Site—Index Map.

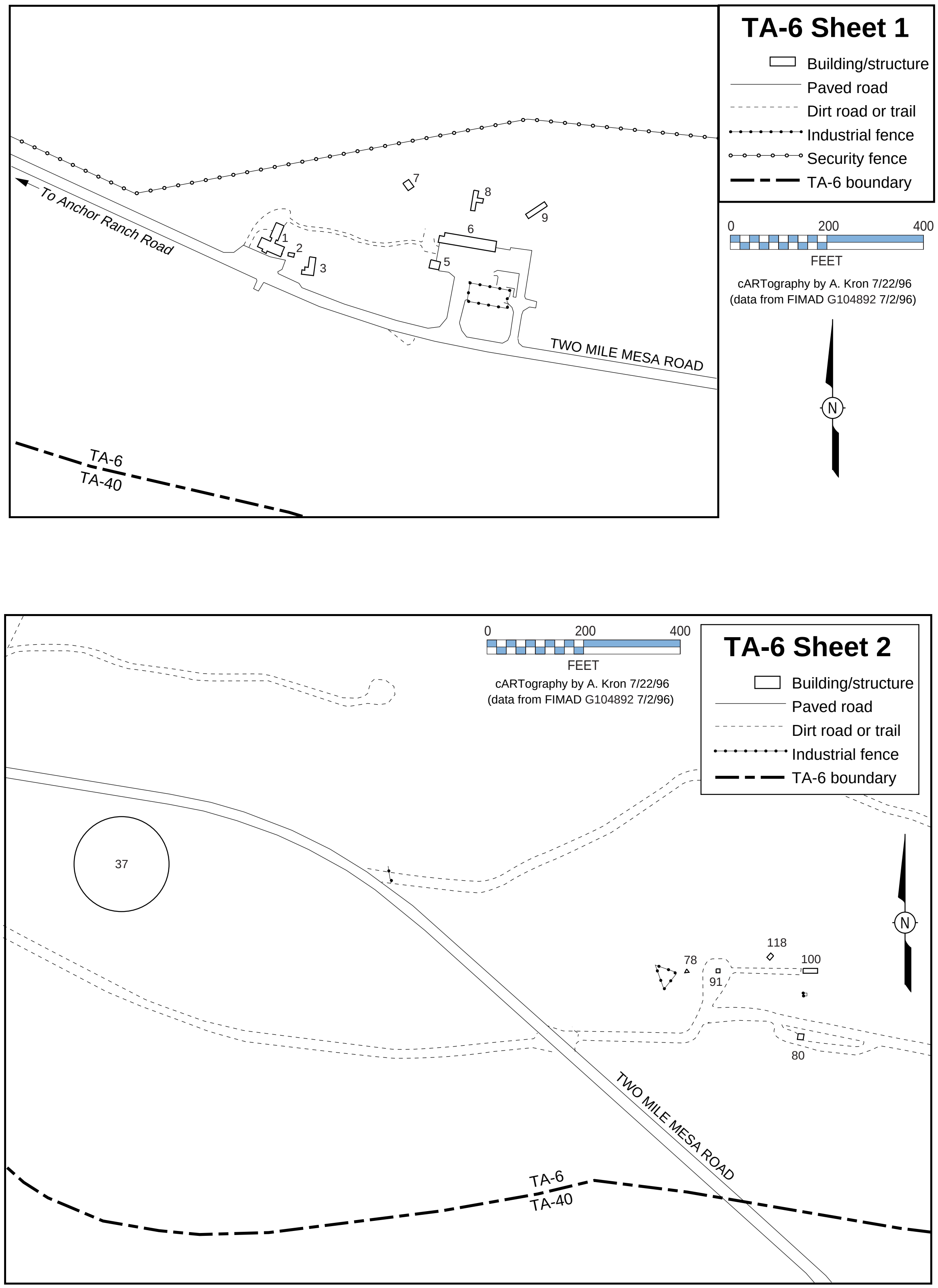


Figure 4-5. Map of TA-6, Two Mile Mesa Site—Sheets 1 and 2.

4.6 TA-8, GT Site (Anchor Site West)

4.6.1 Site Description

TA-8, also known as GT Site or Anchor Site West [Table 4-4 and Figure 4-6 (index map for TA-8)], is a dynamic testing site that serves the entire Laboratory. Capability is maintained in all modern nondestructive testing techniques for ensuring the quality of material in items ranging from test weapons components to high-pressure dies and molds. The principal techniques used at this site include radiographic techniques (x-ray machines with potential up to 1,000,000 V and a 24-MeV betatron), radioisotope techniques, ultrasonic and penetrant testing, and electromagnetic test methods.

4.6.2 Facilities Description

4.6.2.1 Facility Hazard Categories

Table 4-4 identifies the facilities in TA-8 that fall into a facility hazard category because of the type of operations performed in the facility.

4.6.2.1.1 Nuclear Facility Hazard Categories

The Radiographic Testing Facility (consisting of Buildings 22, 23, 24, and 70; Figure 4-6, Sheet 1) is categorized as a Hazard Category 2 nuclear facility because these buildings occasionally house nuclear materials in sufficient quantities to qualify it as a Category 2 nuclear facilities. Based on safety analyses, the necessary controls are in place when nuclear materials are being handled. For all other operations, these buildings are considered non-nuclear. The facility has transient radiological hazards presented by high-energy x-ray generators, a ^{60}Co source, and a portable linear accelerator. The facility offers nondestructive radiography as a Laboratory-wide service, which is used to inspect weapons components (mainly HE parts for high- and low-density inclusions, cracks and voids, improper assembly, uneven density, and various other flaws).

The buildings' protection systems include shielding, double containment for radioactive components, and interlocking radiation machines and doors to the radiation cells so that the cells are tightly closed before the machinery can be operated. When equipment is operating, warning signals and warning lights are activated. In addition, scram buttons are activated by unusual occurrences. Workers use dosimeters and portable gamma-measuring instruments to monitor radiation levels. Fences control access to exterior areas that may have elevated radiation levels during operations. Administrative safeguards include routine inspection and maintenance schedules, personnel training, required knowledge of relevant standard operating procedures, and safety training.

4.6.2.1.2 Non-Nuclear Facility Hazard Categories

Five buildings (Buildings 1, 2, 3, 31, and 32; Figure 4-6, Sheet 1) are categorized L/ENS because of the presence of HE and high-voltage equipment. Buildings 1, 2, and 3 are nonoperational or abandoned, and all three are contaminated by HE. Buildings 31 and 32 are magazines.

4.6.2.2 Nonhazardous Facilities

TA-8 encompasses 13 administrative, technical, laboratory, and physical support buildings and structures, which contain operations that are not considered to involve unusual hazards.

TABLE 4-4

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-8, GT SITE (ANCHOR SITE WEST)

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
1	Laboratory and Shop	Abandoned/Closed						X		
2	Shop and Storage	Abandoned/Closed						X		
3	Laboratory	Abandoned/Closed						X		
22*	X-Ray Building	Experimental Science	X							
23*	Betatron Building	Experimental Science	X							
24*	Isotope Building	Experimental Science	X							
31	Magazine	High Explosives						X		
32	Magazine	High Explosives						X		
70*	Nondestructive Test Facility	Experimental Science	X							

*These facilities occasionally house nuclear materials in sufficient quantities to qualify them as Category 2 nuclear facilities. Based on safety analyses, the necessary controls are in place when nuclear materials are being handled. For all other operations, these facilities are considered non-nuclear.

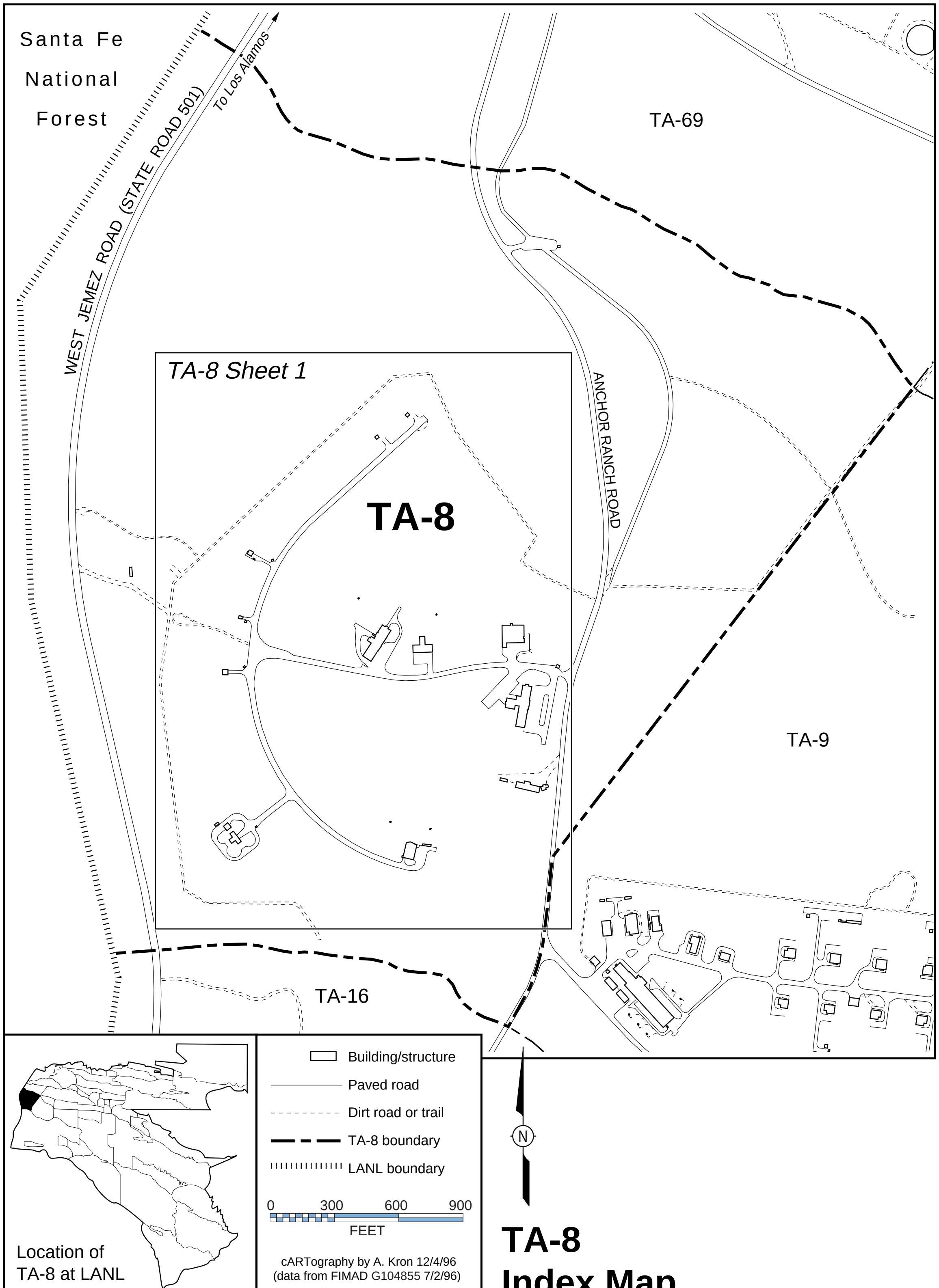


Figure 4-6. Map of TA-8, GT Site (Anchor West Site)—Index Map.

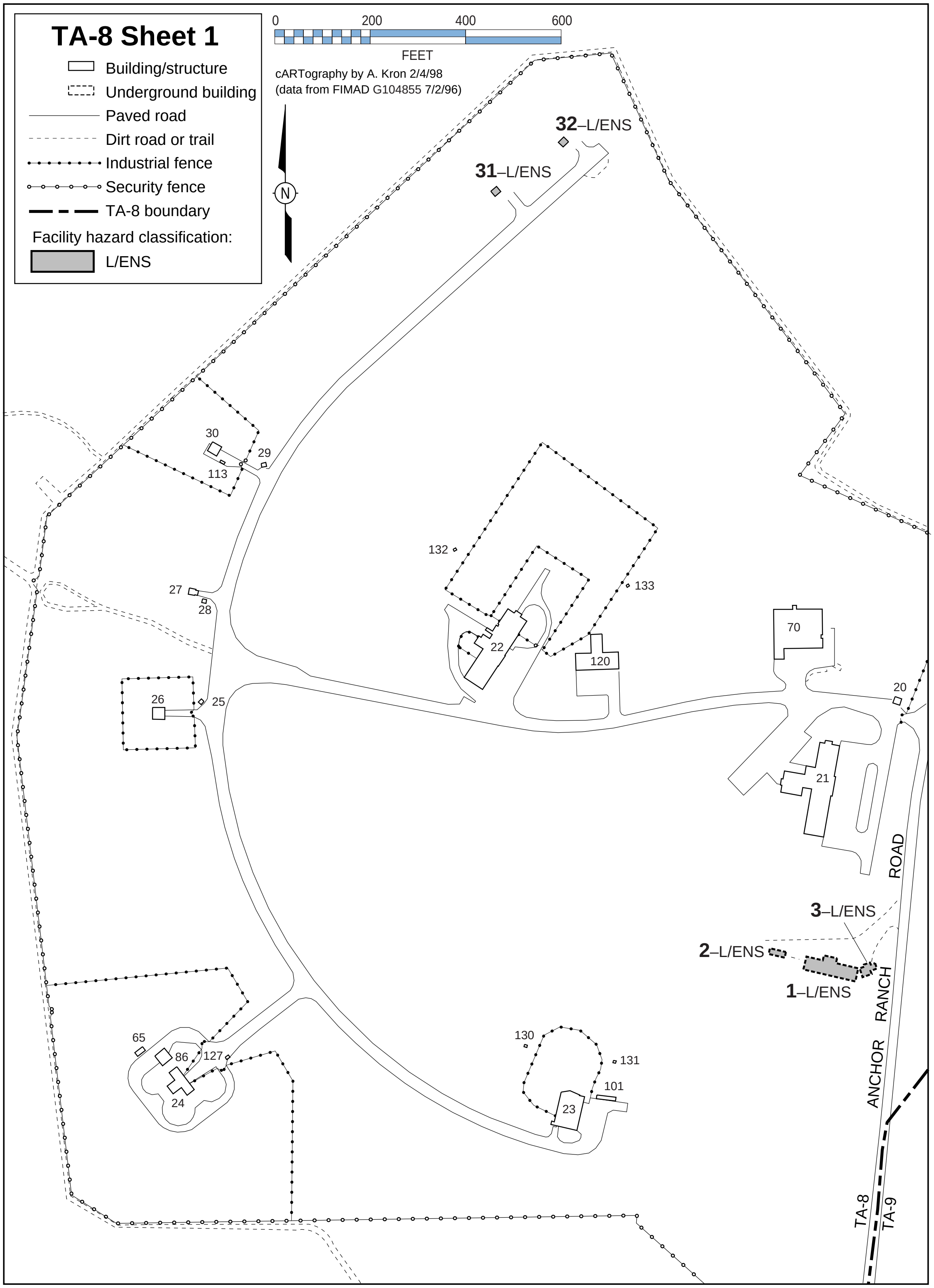


Figure 4-6. Map of TA-8, GT Site (Anchor West Site)—Sheet 1.

4.7 TA-9, Anchor Site East

4.7.1 Site Description

TA-9, Anchor Site East [Table 4-5 and Figure 4-7 (index map of TA-9)], is located on the western edge of the Laboratory. Access to the site is controlled. Scientists at this site explore fabrication feasibility and the physical properties of explosives and investigate new organic compounds for possible use as explosives. Storage and stability problems are also studied.

4.7.2 Facilities Description

TA-9 has 45 structures, whose total area is 62,166 ft^2 (18,948 m^2). Although the buildings are designed for explosives research, no explosives testing occurs at TA-9.

4.7.2.1 Facility Hazard Categories

Table 4-5 identifies the facilities at TA-9 that fall into a facility hazard category because of the type of operations performed in the facility.

4.7.2.1.1 Nuclear Facility Hazard Categories

No facilities at TA-9 are categorized as nuclear facilities.

4.7.2.1.2 Non-Nuclear Facility Hazard Categories

4.7.2.1.2.1 Facilities Categorized L/ENS

Thirty-two of the 45 structures at TA-9 (Figure 4-7, Sheet 1)—magazines, lab buildings, and process labs—are categorized L/ENS. Some of the laboratories are equipped with hoods, and some hoods are specially equipped for handling radioactive materials. Building 21 contains offices, laboratories, and space for storing chemicals. Six buildings (Buildings 22-27) are small, reinforced-concrete structures used to store small, frequently used samples. Building 32 contains two laboratories and a mass spectrometer used to analyze gas samples. Its laboratories drain into an HE sump outside the building. Ten buildings (Buildings 34, 35, 37, 38, 40, 42, 43, 45, 46, and 48) are reinforced-concrete structures with process rooms and bays that have blow-out walls designed to release pressure in the event of an explosion. Building 40 is partially underground to provide extra protection in the event of an accidental explosion. Building 42 is located near the road but is separated from the road by an earthen barricade. The remaining buildings are miscellaneous storage buildings, shops, and shelters.

HE waste from the sump is pumped out and flash-burned at burn pads located at TA-16, and the residues are disposed at Area J. Supernatant water from the sump is discharged to the environment.

4.7.2.1.2.2 Facilities Categorized L/CHEM

Two buildings (Figure 4-7, Sheet 1), a gas storage building and a stock and equipment building (Buildings 29 and 31), are categorized L/CHEM.

4.7.2.2 Nonhazardous Facilities

The remaining buildings contain operations that are not considered to involve unusual hazards. Building 20 is an office building.

TABLE 4-5

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-9, ANCHOR SITE EAST

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
21	Lab and Office Building	High Explosives						X		
22	Magazine	High Explosives						X		
23	Magazine	High Explosives						X		
24	Magazine	High Explosives						X		
25	Magazine	High Explosives						X		
26	Magazine	High Explosives						X		
27	Magazine	High Explosives						X		
29	Stock and Equipment Building	High Explosives							X	
31	Solvent Storage	High Explosives							X	
32	Lab Building	High Explosives						X		
33	Lab Building	High Explosives						X		
34	Process Lab	High Explosives						X		
35	Process Lab	High Explosives						X		
36	Magazine	High Explosives						X		
37	Process Lab	High Explosives						X		
38	Process Lab	High Explosives						X		
39	Magazine	High Explosives						X		
40	Environmental Chambers	High Explosives						X		
42	Process Lab	High Explosives						X		
43	Process Lab	High Explosives						X		
44	Magazine	High Explosives						X		
45	Process Lab	High Explosives						X		

TABLE 4-5 (Concluded)

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-9, ANCHOR SITE EAST

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
46	Process Lab	High Explosives						X		
47	Magazine	High Explosives						X		
48	Machining Building	High Explosives						X		
49	Magazine	High Explosives						X		
50	Receiving and Shipping	High Explosives						X		
51	Environmental Test Chamber	High Explosives						X		
52	Magazine	High Explosives						X		
53	Magazine	High Explosives						X		
54	Magazine	High Explosives						X		
55	Magazine	High Explosives						X		
204	Refrigerator Shelter	High Explosives						X		
208	Day Magazine	High Explosives						X		

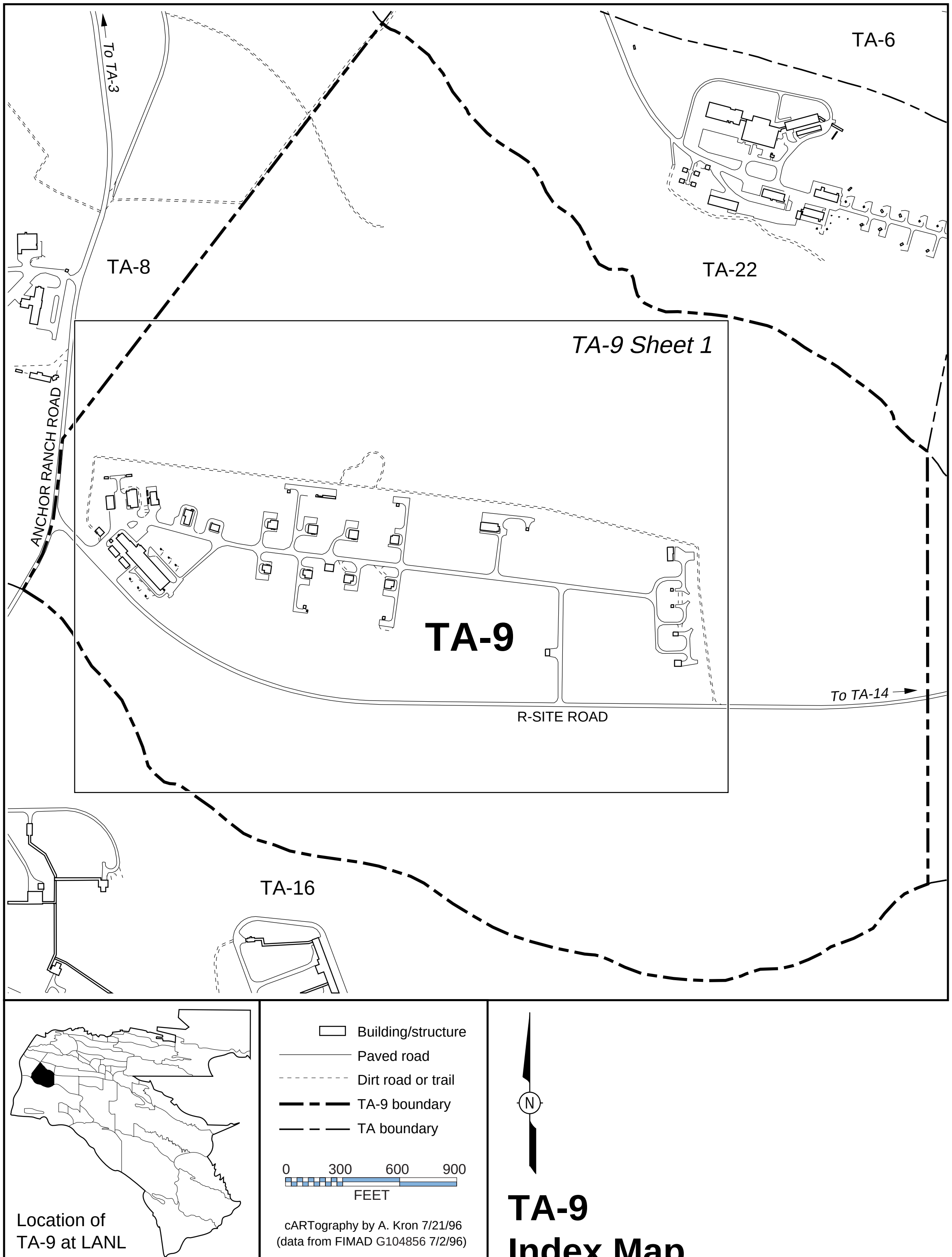


Figure 4-7. Map of TA-9, Anchor Site East—Index Map.

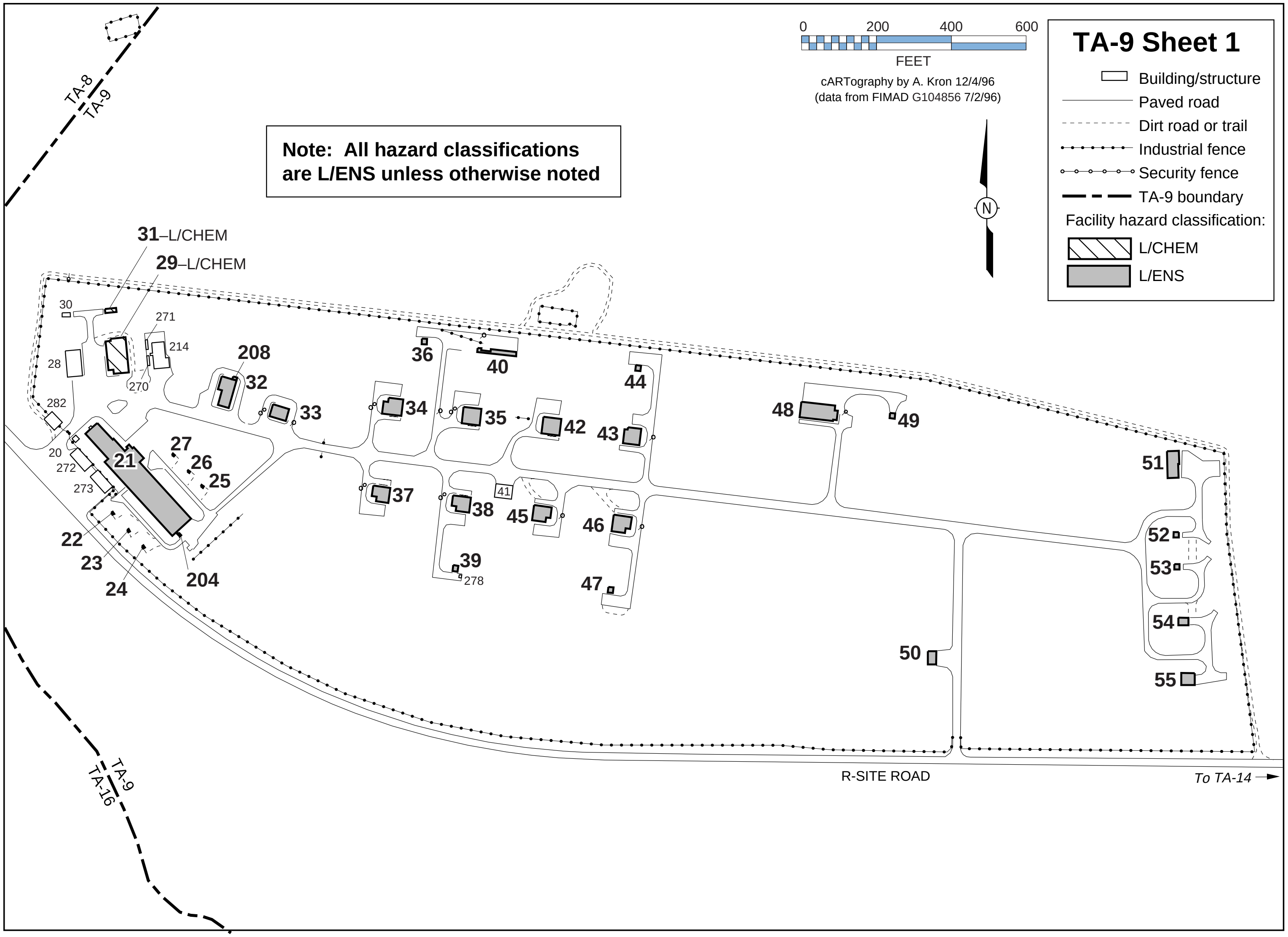


Figure 4-7. Map of TA-9, Anchor Site East—Sheet 1.

4.8 TA-11, K Site

4.8.1 Site Description

TA-11 [Table 4-6 and Figure 4-8 (index map of TA-11)] is the location of the Laboratory's environmental testing facilities. TA-11 is a remote site accessed only through the HE area at TA-16 (S Site) via the K Site Road. Access to TA-16, and hence to TA-11, is controlled for security and safety purposes.

4.8.2 Facilities Description

Activities at TA-11 involve testing explosives and other material components and systems, which includes vibration analysis and drop testing under a variety of extreme physical environments. The facilities are arranged so that testing may be controlled and observed remotely, allowing devices that contain explosives, radioactive materials, and nonhazardous materials to be tested and observed safely. Components and assemblies undergo vibration, shock, and thermal testing in these facilities, the only such facilities available at Los Alamos. The facilities contain two electrodynamics shakers; the hangar has a 36,000-lb force capacity. Tests can be done vertically and horizontally. Data acquisition equipment for up to 100 channels of accelerometer signals is available, as well as equipment for performing model tests. Drop impact testing machines and an outdoor 150-ft- (46-m-) high drop tower are used in shock tests. A burn pit (tank) is available for fuel fire tests.

4.8.2.1 Facility Hazard Categories

Table 4-6 identifies the facilities in TA-11 that fall into a facility hazard category because of the type of operations performed in the facility.

4.8.2.1.1 Nuclear Facility Hazard Categories

No facilities at TA-11 are categorized as nuclear facilities.

4.8.2.1.2 Non-Nuclear Facility Hazard Categories

TA-11 has four facilities (Buildings 0, 25, 30, and 36; Figure 4-8, Sheet 1) categorized as L/ENS. The primary hazard from operations at TA-11 is the accidental detonation of one or more of the test specimens. No unexpected events or detonations have occurred during any testing conducted during the past 30 years. Industrial hazards associated with hydraulic systems, cryogenic cooling systems, and the incidental uses of solvents, adhesives, and other chemicals can occur.

4.8.2.1.2.1 Burn Pit

The burn pit or burn tank (Building 0) is used for tests to determine the effects of fire on a component or assembly.

4.8.2.1.2.2 Drop Tower

The drop tower (Building 25) is used for tests to determine the effects of dropping a component or assembly from a height of 150 ft (46 m).

4.8.2.1.2.3 Vibration Test Building

The Vibration Test Building (Building 30) houses equipment used to determine the effects of vibrations on a component or assembly under various conditions.

4.8.2.1.2.4 Magazine

The magazine (Building 36) is used for storing explosives.

4.8.2.2 Nonhazardous Facilities

The remaining 11 facilities are used for activities that are not considered to represent a hazard to the general public. These buildings are used for storing explosives components, explosives control, and general storage.

TABLE 4-6

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-11, K SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
0	Burn Pit	High Explosives and Experimental Science						X		
25	Drop Tower	High Explosives and Experimental Science						X		
30	Vibration Test Building	High Explosives and Experimental Science						X		
36	Magazine	High Explosives						X		

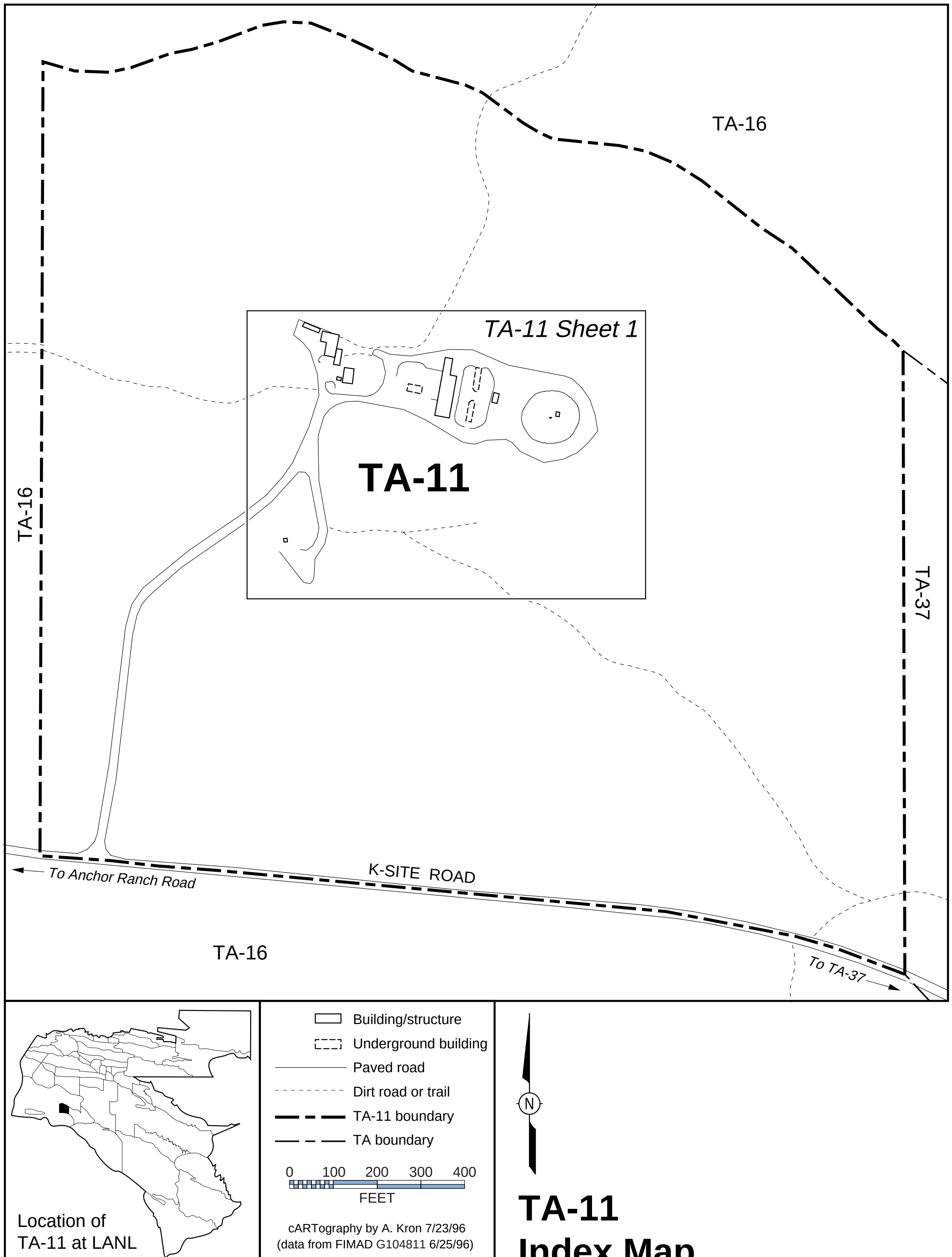


Figure 4-8. Map of TA-11, K Site—Index Map.

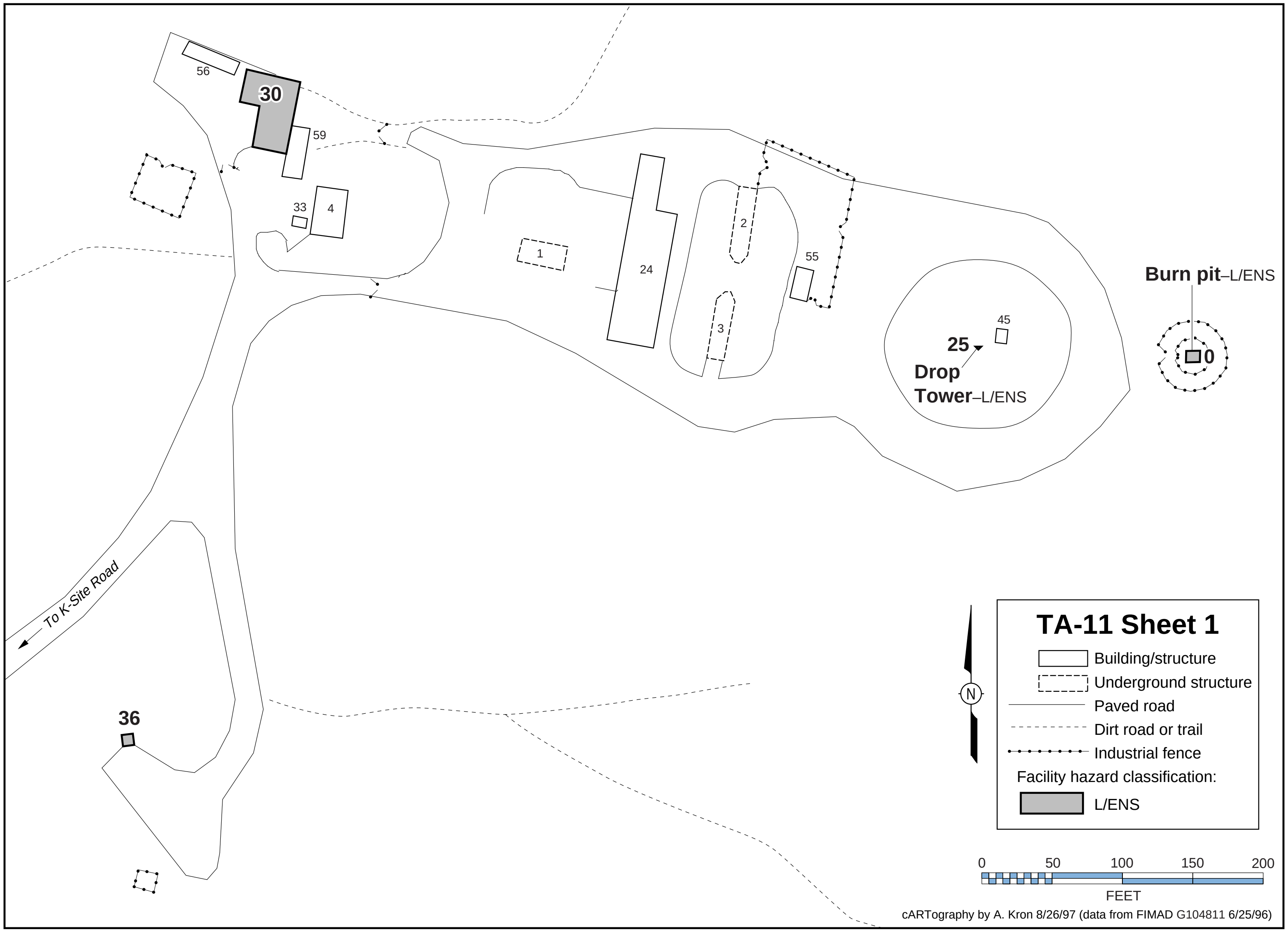


Figure 4-8. Map of TA-11, K Site—Sheet 1.

4.9 TA-14, Q Site

4.9.1 Site Description

TA-14 [Table 4-7 and Figure 4-9 (index map of TA-14)], which is used for HE testing, is one of five major firing areas at the Laboratory. The site is used for remote operations involving detonation, certain types of HE machining, permitted incineration, and novel, potentially dangerous operations. The site's major use is testing HE in quantities that exceed safe limits for indoor laboratories. Standard operations consist of various tests on small explosives charges to investigate fragmentation impact, explosives sensitivity, thermal responses, and destruction of HE and HE-contaminated waste generated during these operations. The site is patrolled, and access to the site is controlled. No offices are located at the site, and personnel are present only during testing.

4.9.2 Facilities Description

TA-14 contains 14 structures and 5 firing mounds, most of which are part of what is known as the Outdoor Chemical Laboratory. Most operations conducted here consist of testing new high explosives for performance and sensitivity and include destroying HE and HE-contaminated waste generated during testing.

The laboratory contains 5 firing pits that support 5 firing mounds. These mounds are located at various distances from the Control Building (Building 23) and range from 30 ft (9 m) (Mound 1) to 360 ft (110 m) (Mound 5) away from the Control Building. Greater amounts of HE can be fired in the mounds farther from the Control Building. A protective barrier is located between Mound 1, where most of the firings occur, and the Control Building to prevent damage to the Control Building. HE waste is destroyed at Mound 3.

4.9.2.1 Facility Hazard Categories

Table 4-7 identifies the facilities in TA-14 that fall into a facility hazard category because of the type of operations performed in the facility.

4.9.2.1.1 Nuclear Facility Hazard Categories

No buildings at TA-14 are categorized as nuclear facilities.

4.9.2.1.2 Non-Nuclear Facility Hazard Categories

Seven of the facilities located at TA-14 are categorized L/ENS (Buildings 5, 6, 22, 23, 24, 34, 39; Figure 4-9, Sheet 1).

4.9.2.1.2.1 Toxic Gas Storage

The Toxic Gas Storage Building (Building 5) is a 375-ft^2 (114-m^2) structure used for storing toxic gases used in experiments. No other materials are stored in this facility.

4.9.2.1.2.2 Warehouse Building

The 666-ft^2 (203-m^2) warehouse building (Building 6) is a one-story frame structure in which materials necessary for setting up experiments are stored. No explosives are allowed in this building; however, it can store equipment that is contaminated by or suspected of being contaminated by HE.

4.9.2.1.2.3 Explosives Magazine

This 36-ft^2 (11-m^2) magazine (Building 22) is an earth-covered structure with thick walls constructed of reinforced concrete. Only high-explosives materials are stored in this magazine; no detonators are allowed to be stored at this location.

4.9.2.1.2.4 Control Building

The 5,755-ft^2 (1,754-m^2) Control Building (Building 23) is one story and has thick, reinforced-concrete exterior walls. It has four rooms: an instrument/control room, laboratory room, utility room, and a makeup room. Only the explosives and materials necessary to prepare the test to be conducted on a given day are permitted in Rooms 103 and 104, and no explosives are permitted in the other two rooms. Ventilation hoods in Room 103 allow work with explosives and toxic or hazardous materials.

4.9.2.1.2.5 Explosives Magazine

This 8-ft^2 (2.4-m^2) explosives magazine (Building 24) is a small building with thick reinforced-concrete walls, which is used primarily to store explosives, booster pellets, and detonators. A list of allowable materials, with maximum limits, is posted at this facility.

4.9.2.1.2.6 Bullet Test Facility

This facility (Building 34) is used for tests involving HE.

4.9.2.1.2.7 Steel Tube Facility

This facility (Building 39) is used for tests involving HE.

4.9.2.2 Nonhazardous Facilities

The seven remaining buildings are used for technical, instrumentation, physical support, and general storage purposes.

TABLE 4-7

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-14, Q SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
5	Toxic Gas Storage	High Explosives						X		
6	Storage Building	High Explosives						X		
22	Magazine	High Explosives						X		
23	Control Building	High Explosives						X		
24	Magazine	High Explosives						X		
34	Bullet Test Facility	High Explosives						X		
39	Steel Tube Facility	High Explosives						X		

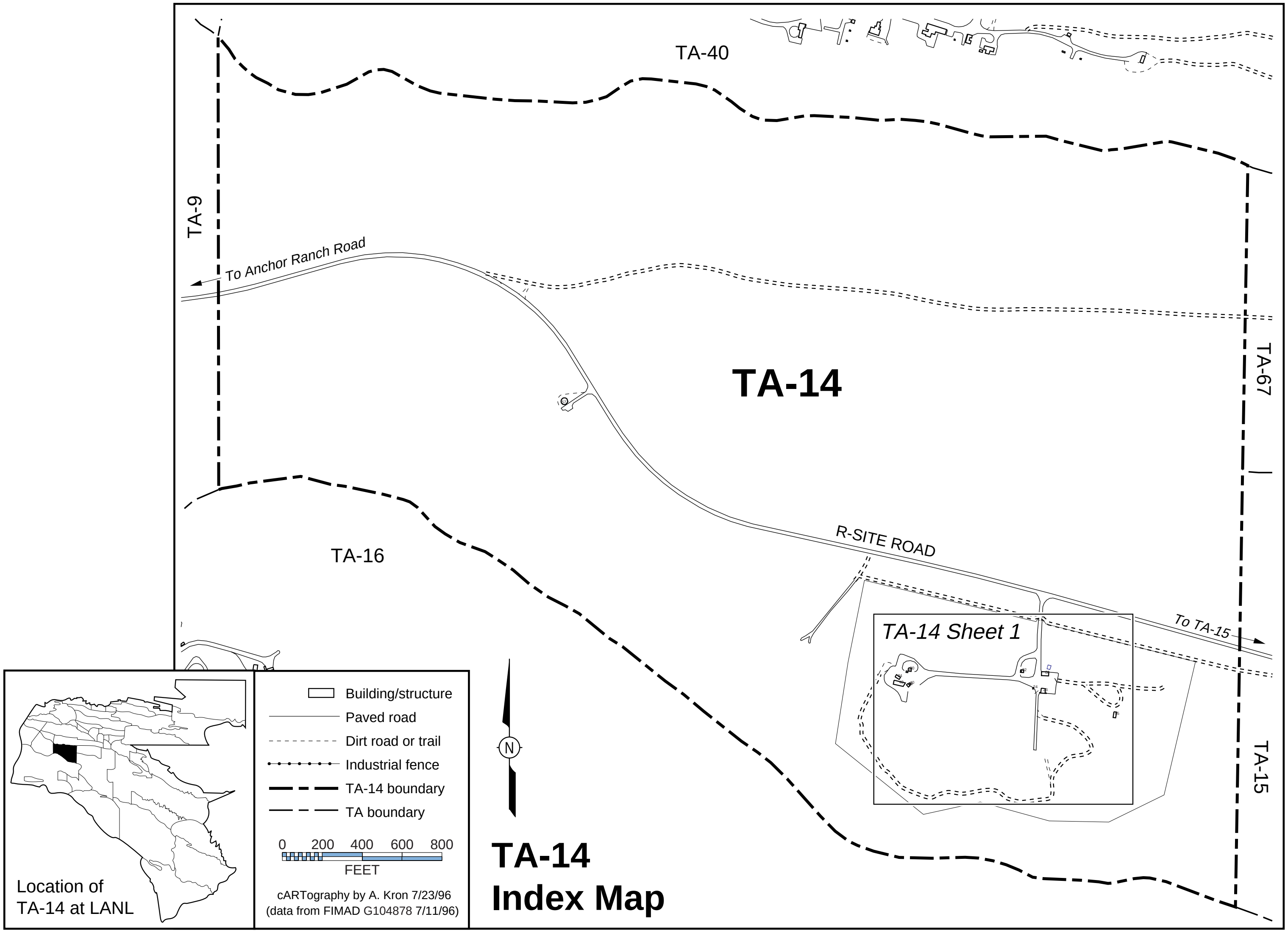


Figure 4-9. Map of TA-14, Q Site—Index Map.

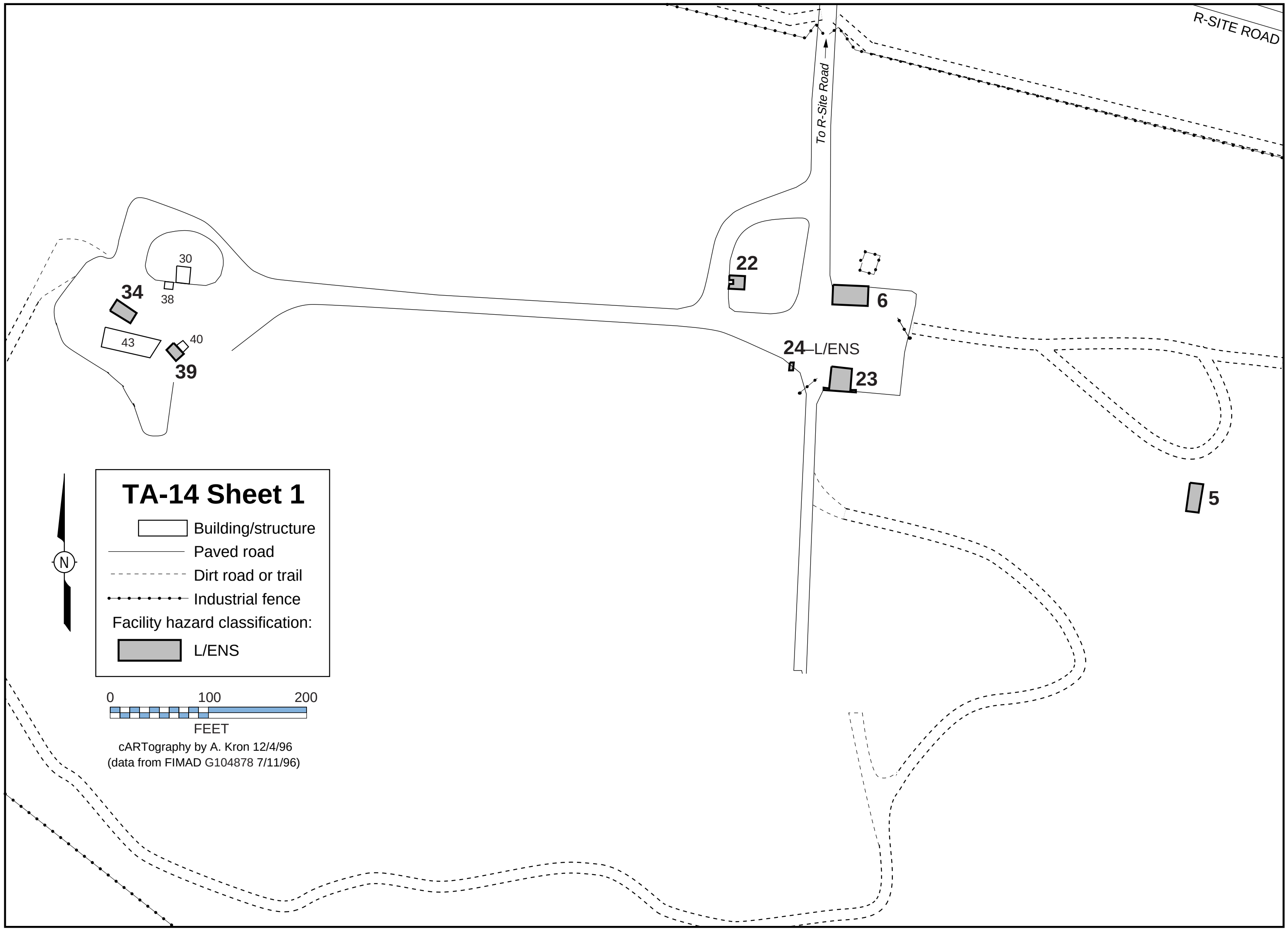


Figure 4-9. Map of TA-14, Q Site—Sheet 1.

4.10 TA-15, R Site

4.10.1 Site Description

Activities at TA-15 [Table 4-8 and Figure 4-10 (index map of TA-15)] consist of HE research, development, and testing, mainly through hydrodynamic testing and dynamic experimentation. TA-15 is the location of three firing sites, the Pulsed High-Energy Radiographic Machine Emitting X-Rays (PHERMEX), and the Dual-Axis Radiographic Hydrotest Facility (DARHT), all of which are used for testing weapons under development. Personnel at R Site also investigate weapons functioning and systems behavior in non-nuclear testing. TA-15 is a controlled-access area.

4.10.2 Facilities Description

4.10.2.1 Facility Hazard Categories

Table 4-8 identifies the facilities at TA-15 that fall into a facility hazard category because of the type of operations performed in the facility.

4.10.2.1.1 Nuclear Facility Hazard Categories

No buildings at TA-15 are categorized as nuclear facilities.

4.10.2.1.2 Non-Nuclear Facility Hazard Categories

4.10.2.1.2.1 Buildings Categorized L/RAD

TA-15 contains three facilities (Buildings 184, 203, and 313) categorized as L/RAD. When it becomes operational, the DARHT Facility (Building 312) will also fall into this category.

4.10.2.1.2.1.1 Pulsed High-Energy Radiographic Machine Emitting X-Rays

PHERMEX (Building 184, Figure 4-10, Sheet 4) is a multiple-cavity electron accelerator that provides the intense x-rays used for high-resolution flash radiography. The facility is capable of producing high-resolution x-ray pictures of very dense, fast-moving materials and is used primarily for studies to investigate weapons functions and systems behavior during non-nuclear tests. It is used both for full-scale, multidiagnostic hydrodynamic tests and for smaller-scale experiments, such as the study of high explosives or materials driven by high explosives that might require fast, high-resolution, high-intensity radiography.

The PHERMEX beam, which is produced by a radiofrequency linear accelerator, is the intense x-ray source of choice when high-resolution flash radiography is a principal diagnostic goal, especially when the test involves dense, fast-moving materials such as those in explosively collapsed pit mockups. The 30-MeV electron accelerator is housed in a blast-proof structure at Building 184 and is controlled from the adjacent two-story Building 185. As the primary weapons hydrotesting area at TA-15, the PHERMEX firing site can handle up to 154 lb (70 kg) of explosives on the firing runway in front of machines. A “bull nose” of blast-shielding material protects the x-ray converter target of tungsten at the output end of the accelerator. Charge masses up to 882 lb (400 kg) and more can be detonated at points east of the runway. Immediately to the south of the runway is the Multidiagnostic Operations Center (Building 310). This blast-proof structure offers protected space for a variety of fast diagnostics featuring signal-recording equipment, such as transient waveform digitizers and time interval meters, and serves as the timing and firing control room. During testing, only Buildings 185, 186, and 310 are occupied. All of the buildings adjacent to the firing site are constructed of heavily reinforced concrete.

4.10.2.1.2.1.2 Relativistic Electron Beam Experiment

Building 203 (Figure 4-10, Sheet 1) houses the Relativistic Electron Beam Experiment, which is conducted by means of an electron injector machine. The machine, which is the engineering model upon which DARHT's accelerators are based, is a radiation source surrounded by magnetite-loaded concrete blocks for shielding.

4.10.2.1.2.1.3 Dual-Axis Radiographic Hydrotest Facility

DARHT (Building 312, Figure 4-10, Sheet 5) is currently under construction near the PHERMEX firing site. The environmental impacts and alternatives have been addressed in a final environmental impact statement (DOE 1995). When completed, the DARHT Facility will provide dual-axis, multiple-exposure radiographs at state-of-the-art penetration and resolution for studying devices and materials under hydrodynamic conditions.

4.10.2.1.2.1.4 Radiographic Support Laboratory

The existing Radiographic Support Laboratory (Building 313, Figure 4-10, Sheet 3) is the initial stage of the DARHT Facility. The main functions performed here are developing, calibrating, testing, and repairing high-energy flash x-ray machines. In addition to supporting ongoing radiographic testing at PHERMEX, the laboratory is used for developing accelerator technology.

4.10.2.1.2.2 Buildings Categorized L/ENS

TA-15 contains 11 facilities (Buildings 41, 42, 43, 183, 241, 242, 243, 263, 285, 306, and 314; Figure 4-10, Sheets 2 and 3) categorized as L/ENS.

4.10.2.1.2.2.1 HE Magazines and Makeup Buildings

The HE magazines and makeup buildings (Buildings 41-43, Figure 4-10, Sheets 1 and 2) are small, reinforced-concrete facilities located in TA-15. The Makeup Building (Building 41) is used for power-loading operations and preparing propellants and ammunition. Buildings 42 and 43 are used for storing HE charges and assemblies.

4.10.2.1.2.2.2 Laboratory and Office Building

Building 183 (Figure 4-10, Sheet 3), the main office and laboratory structure for TA-15, contains an access control office, digitizer calibration lab, electronics lab and parts bin, pin fabrication area, SNM vault, optics lab, an x-ray-film-processing lab, and offices. The basement of this building houses a laser lab plus a large stock of optical supplies and accessories.

4.10.2.1.2.2.3 HE Magazines and Makeup Building

Buildings 241-243 (Figure 4-10, Sheet 3) are small, cinder block facilities located in Area III of TA-15. Building 242, a makeup building, can also be used for HE storage and short-term storage of finished assemblies. Buildings 241 and 243 are used for storing various charges and detonators.

4.10.2.1.2.2.4 Gas Gun Facility

Building 263 (Figure 4-10, Sheet 2), also known as the Gas Gun Facility, houses a high-pressure gas gun, a target chamber and catch tank, and a velocity interferometer. The high-pressure gun launches projectiles at stationary target samples, which are instrumented with pins or a velocity interferometer.

4.10.2.1.2.2.5 Power Control Building

Building 285 (Figure 4-10, Sheet 3) is the control facility for PHERMEX.

4.10.2.1.2.2.6 Ector Multidiagnostic Hydrotest Facility

The Ector device (Building 306, Figure 4-10, Sheet 2) is a 30-MeV diagnostic x-ray machine used when medium-resolution flash radiography is required. Building 306 is used as the weapons-testing backup facility for PHERMEX. The curved diagnostic room provides nearly a full quadrant of optical access to Ector's firing runway and houses microwave and laser interferometers, as well as fast cameras. The Ector device is scheduled to be relocated at the PHERMEX firing site.

4.10.2.1.2.2.7 Metal Shed

At the time hazard categories were assigned, Building 314 (Figure 4-10, Sheet 3) housed a laser.

4.10.2.2 Nonhazardous Facilities

Ninety-one other facilities at TA-15 listed as nonhazardous include administrative and technical facilities, experimental laboratories, HE storage, general warehouse, and general storage facilities.

TABLE 4-8

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-15, R SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
41	Makeup Building	High Explosives						X		
42	Magazine	High Explosives						X		
43	Magazine	High Explosives						X		
183	Lab and Office Building	High Explosives						X		
184	PHERMEX Chamber	High Explosives					X			
203	PHERMEX Cavity Shelter	High Explosives					X			
241	Ready Magazine	High Explosives						X		
242	Makeup Building	High Explosives						X		
243	Main Magazine	High Explosives						X		
263	Gas Gun Facility	High Explosives						X		
285	Control Facility	High Explosives						X		
306	Ector Multidiagnostic Hydrotest Facility	High Explosives						X		
312*	DARHT Facility	High Explosives					X			
313	Radiographic Support	High Explosives					X			
314	Metal Shed	High Explosives						X		

*The DAHRT facility is not yet operational.

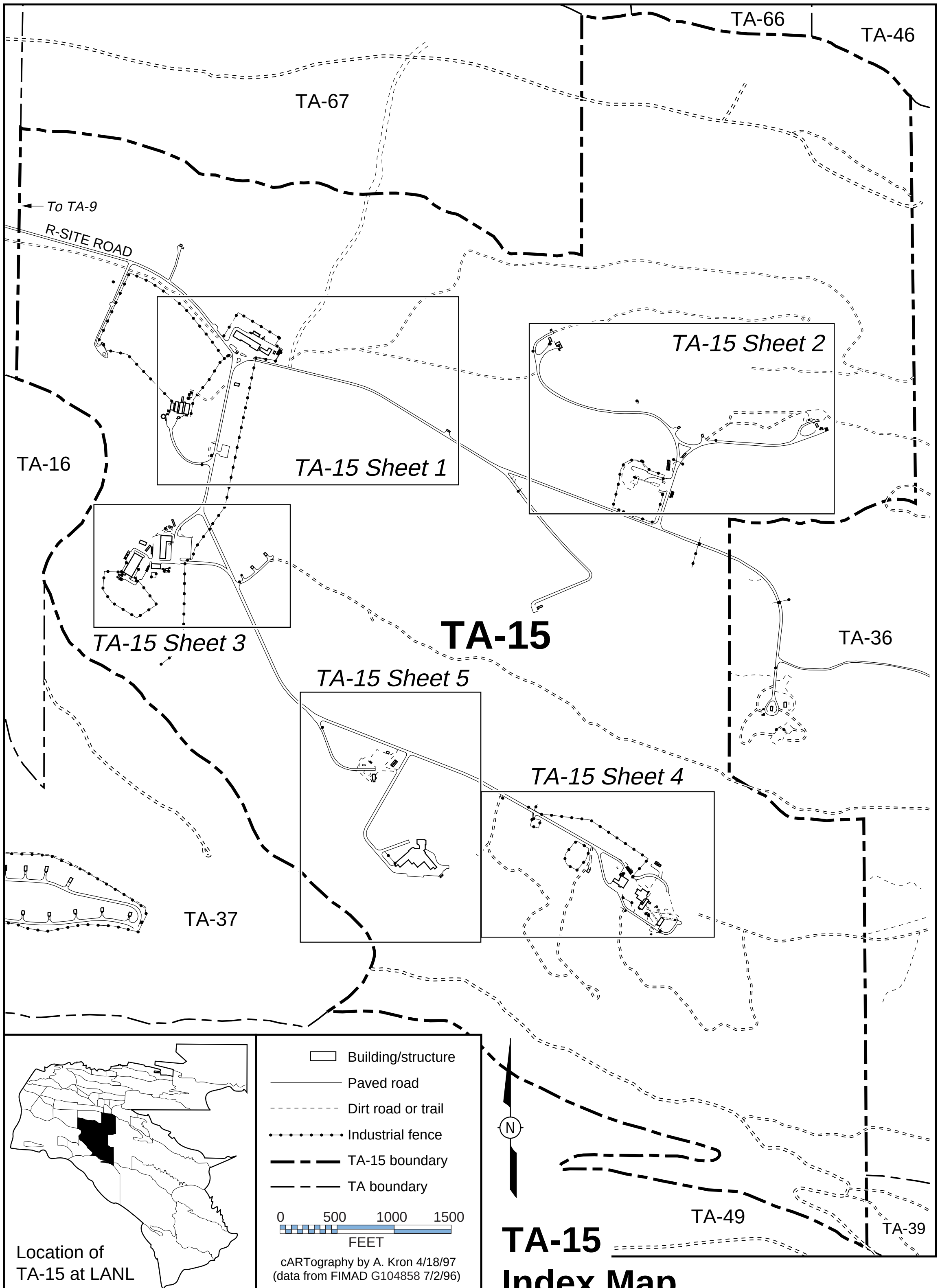
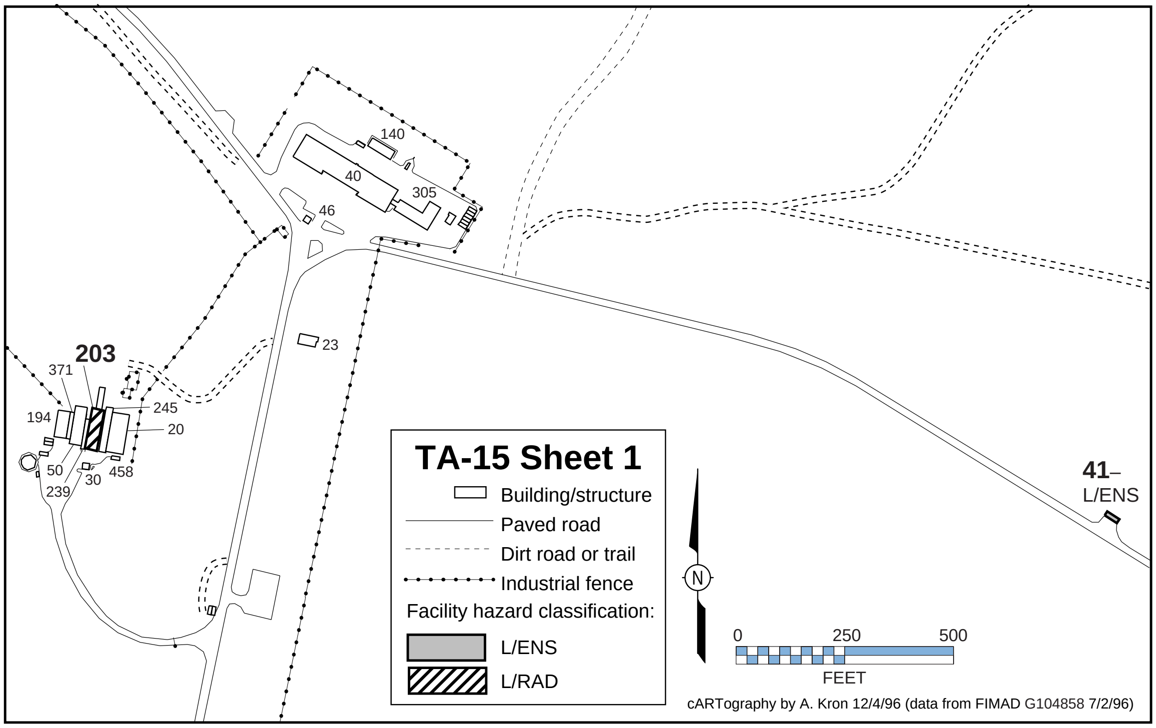


Figure 4-10. Map of TA-15, R Site—Index Map.



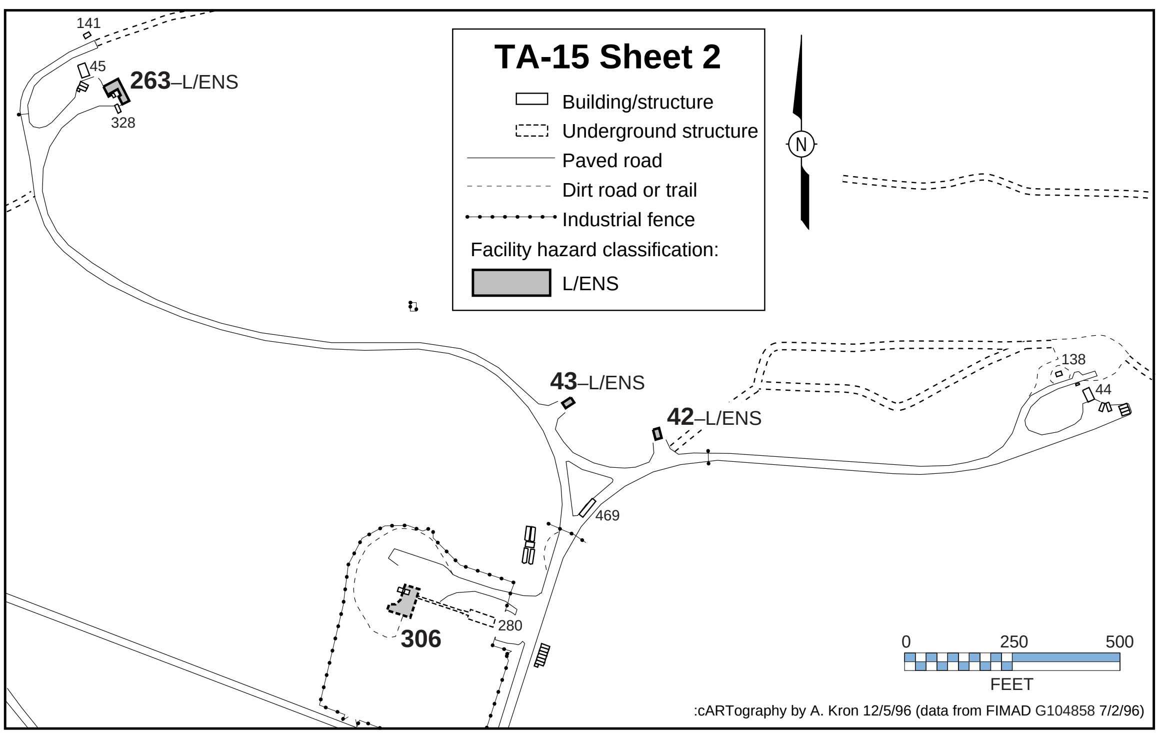
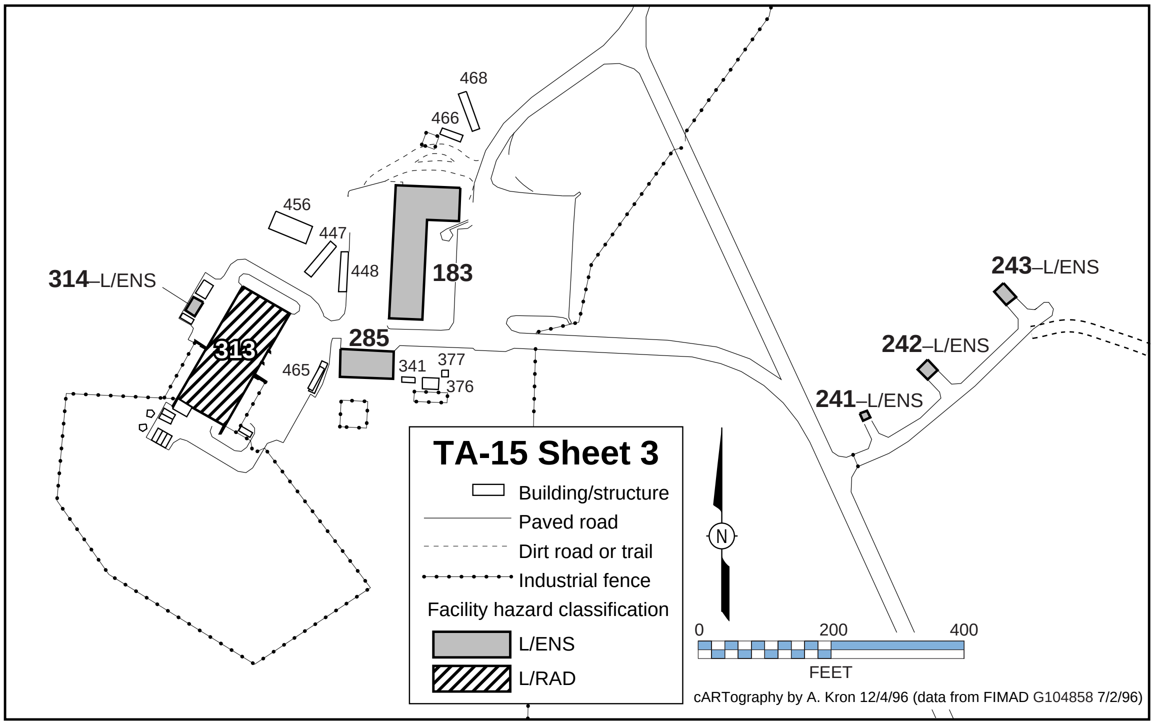


Figure 4-10. Map of TA-15, R Site—Sheets 1 and 2.



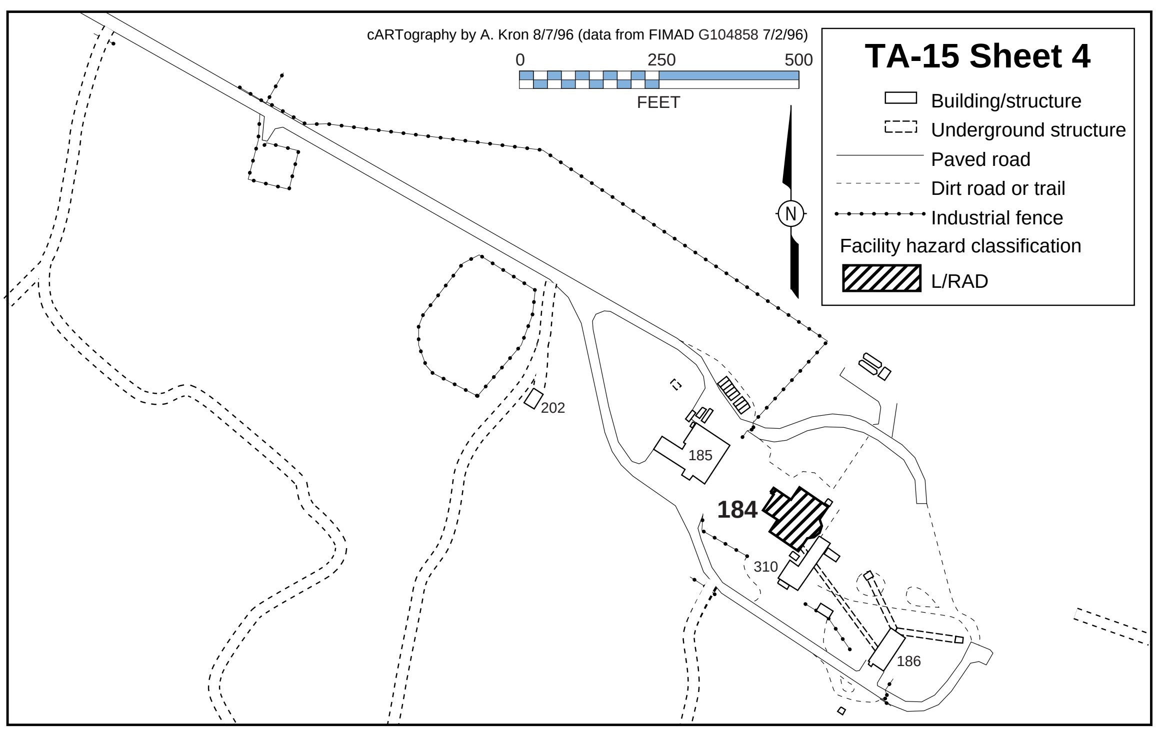


Figure 4-10. Map of TA-15, R Site—Sheets 3 and 4.

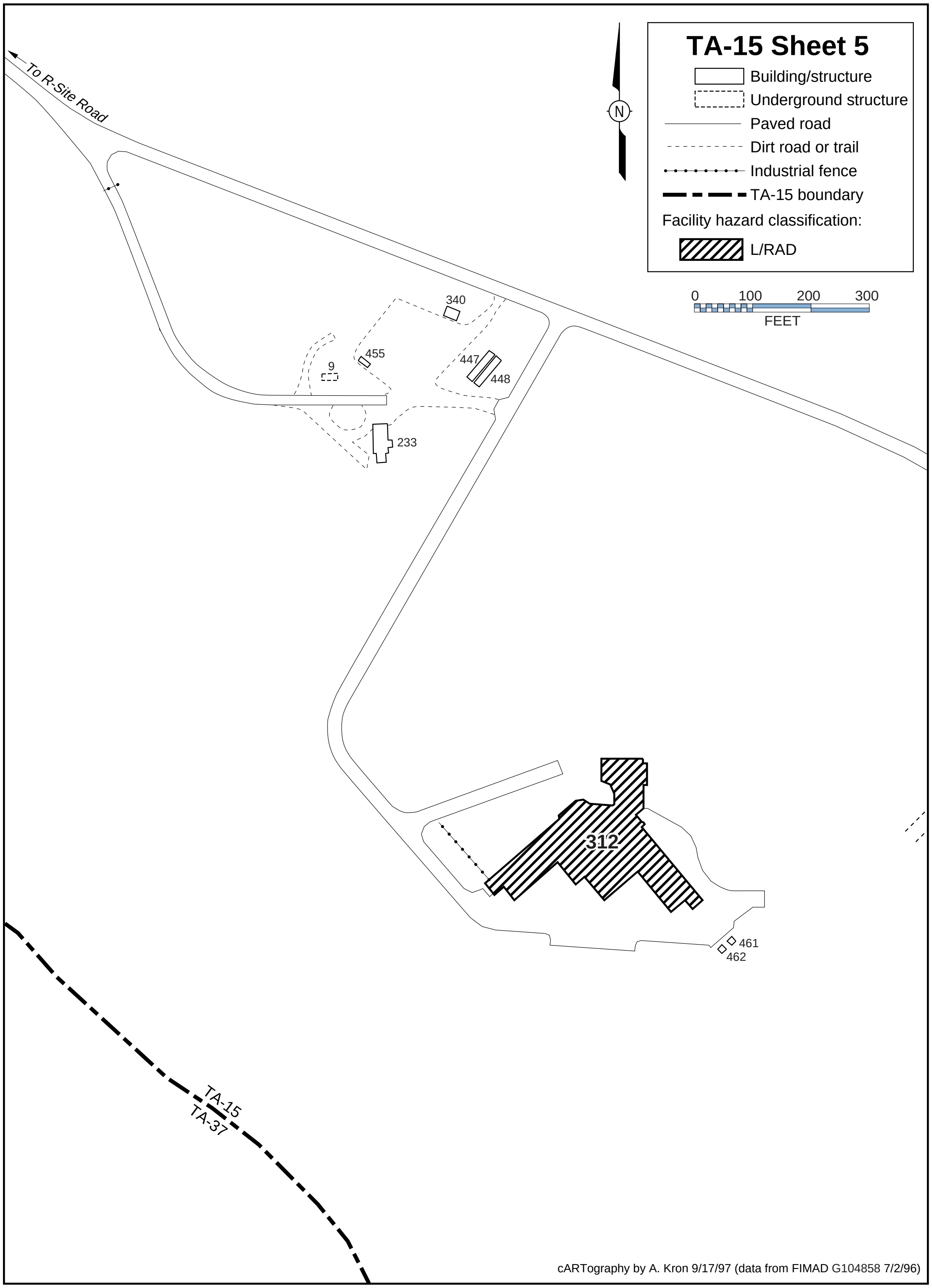


Figure 4-10. Map of TA-15, R Site—Sheet 5.

4.11 TA-16, S Site

4.11.1 Site Description

TA-16 [Table 4-9 and Figure 4-11 (index map of TA-16)] is the location of extensive HE facilities and the Laboratory's state-of-the-art tritium facility. HE activities that take place at TA-16 are developing and testing HE, plastics, and adhesives and conducting research in process development for manufacturing items that use these and other materials. Tritium activities include repackaging tritium, chemical purification of ^{3}He, mixing tritium with other gases, analyzing gas mixtures, repackaging tritium to user-specified pressures, reclaiming tritium, and conducting applied R&D for boost systems.

4.11.2 Facilities Description

Seventy-eight HE-processing buildings at TA-16 provide 280,000 ft^2 (85,344 m^2) of space. The research, development, and testing capabilities provided at these facilities include large-scale HE processing; manufacturing HE powders; casting, machining, and pressing HE components; inspection and radiography of HE components to guarantee integrity and ensure quality control for design intent; hydrotesting and assembling test devices; and chemical analysis of HE. Some of these buildings are used for storing SNM and for storing, treating, and disposing of HE. Two buildings are currently being used for tritium operations. An additional building is being modified for tritium work at TA-16.

4.11.2.1 Facility Hazard Categories

Table 4-9 identifies the facilities at TA-16 that fall into a facility hazard category because of the type of operations performed in the facility.

4.11.2.1.1 Nuclear Facility Hazard Categories

4.11.2.1.1.1 Hazard Category 2 Nuclear Facilities

TA-16 contains two Hazard Category 2 nuclear facilities: the Weapons Engineering Tritium Facility (WETF) (Buildings 205 and 205A; Figure 4-11, Sheet 2) and the Rest House (Building 411).

4.11.2.1.1.1.1 Weapons Engineering Tritium Facility

WETF is located in Buildings 205 and 205A in the southeast section of TA-16 outside the explosives area. WETF is in a secured area patrolled by armed guards.

Building 205 is specifically designed and built to process tritium safely and to meet user needs and specifications. Planning for WETF began in 1981 to replace an aging tritium-processing facility located at TA-33. Construction began in 1982 and was completed in 1984. The operational readiness review of WETF was performed by DOE-Albuquerque in three phases, which corresponded to various systems being ready for use. Phases I and II were completed in 1987, and Phase III was completed in 1988. WETF began operation in 1989.

Current DOE-approved operational safety requirements (OSRs) limit to 100 g the total "at-risk" tritium inventory in the facility at any given time. The OSRs define the at-risk inventory as that portion of the tritium inventory not in a secondary confinement vessel that would mitigate a release if the primary confinement vessel were compromised. The purpose of this limit is minimizing the source term for potential release during an event that could lead to a credible accident while providing the necessary flexibility for processing tritium. The quantity of tritium that can be stored in approved storage containers providing secondary confinement is unlimited; however, the area available for storing tritium containers is small.

Building 205 is a single-level structure except for a mezzanine area. The structure consists of reinforced, cemented, mortar unit walls set on reinforced-concrete footings. The walls are also reinforced at corners, joints, windows, and doors. The foundation is reinforced-concrete floor slab set on compacted fill. A precast, prestressed concrete, double T-beam roof is supported by reinforced concrete beams, columns, and cemented mortar unit walls.

An exterior steel stairway located at the west wall of Building 205A, an addition to Building 205, provides access to the roof. Effluents from the ventilation and cleanup systems in the tritium-handling areas are exhausted through a 60-ft- (18-m-) high steel stack mounted on a concrete base. WETF has six entrances/exits and three exterior windows located in the two offices of Building 205. The total floor area is approximately 7,885 ft^2 (2,403 m^2) and is divided into multiple areas that include the control room, the tritium-handling areas, and the support areas.

Wall partitions and doors divide the tritium-handling areas into five rooms that contain the equipment used to handle and process tritium. Tritium may also be stored in containers in these rooms. Tritium-handling areas are separated from the rest of the facility by walls, doors, windows, air locks, and a zoned ventilation system. Personnel access to the radiologically controlled area is controlled through an air lock entry located at the control room. There is a staging area for shipments entering or leaving the tritium-handling area. The exterior metal doors to this area can only be opened from the interior and are used to provide access to the exterior loading dock during shipping and receiving.

Shipments containing tritium are admitted to WETF through a staging room that functions as a shipping and receiving area. Once receiving activities are complete, an item is moved into the tritium-handling area, where it is unpackaged. Unpackaging involves removing shipping containers from their protective overpacks and checking for leaks. If the contents are destined for processing by the tritium-gas-handling system (TGHS), the container is connected to the TGHS, and the required tritium-processing manipulations are performed by the TGHS equipment. At the completion of the processing activity, the tritium is off-loaded into an appropriate container, sealed, and then disconnected from the TGHS. Tritium may also be temporarily stored in vessels connected to the TGHS or in a metal hydride bed, known as a getter bed.

These areas are monitored for tritium and are controlled to a slightly negative pressure relative to atmosphere by a dedicated once-through ventilation system that exhausts to a 60-ft (18-m) stack. A separate ventilation system maintains the control room, which is also monitored for tritium, at a positive pressure relative to atmosphere and within a temperature range for proper operation of electronic equipment in the room. The control room is the operations focus for activities that monitor, control, and operate the facility systems. The control room is entered from the main entry foyer and is separated from the tritium-handling areas by walls, windows, and an air lock.

Construction of Building 205A started in 1993 and was completed in 1994. The addition was designed and built to provide more space for the same type of activities performed in the original building.

The operations at WETF are divided into two categories: tritium processing and activities that support tritium processing. Operations at WETF are described briefly in the following paragraphs.

Tritium-processing operations include

- repackaging tritium into smaller quantities,
- removing the ^3He decay product and other contaminants,

- mixing tritium with other gases,
- analyzing gaseous tritium and gas mixtures,
- repackaging tritium and other gases to user-specified pressures,
- performing various user-defined experiments that use tritium,
- unloading containers of tritium,
- performing function tests of components and apparatus containing tritium,
- reacting tritium with other materials to form compounds,
- fusion target and neutron tube target loading, and
- analyzing the effects of tritium.

WETF is designed to process tritium in quantities consistent with present and anticipated future needs while providing reliability and protection for workers, the public, and the environment. The tritium-processing activities occur in the tritium-handling areas and are typically performed in a TGHS, which is enclosed in glove boxes. The TGHS contains a variety of components that users require for manipulating tritium. Gloveboxes may stand alone or be joined together to form a glovebox line.

An inert atmosphere (typically nitrogen gas) in the gloveboxes reduces the potential for fire and for formation of tritium oxide, should tritium be released to a glovebox. The oxygen concentration in the glovebox is monitored and controlled through the facility computer system. The oxygen and hydrogen content of the tritium waste treatment system low-pressure receiver is also monitored and controlled to prevent flammable concentrations from accumulating. Fire protection (suppression and detection) in the facility consists of a full-coverage wet-pipe sprinkler network, fire detection devices, alarms, and pull stations. The control room has the additional protection of a Halon system.

To reduce the potential for inadvertent release, most processes, experiments, and storage configurations involving tritium typically use double containment. Operations in the TGHS components that provide primary confinement are housed in gloveboxes that provide secondary confinement. TGHS piping outside of gloveboxes is enclosed in a large-diameter pipe that provides secondary confinement for the tritium. Most tritium storage configurations include both a primary and secondary confinement barrier. The facility building structure, along with the ventilation isolation, forms the outermost confinement barrier against any tritium releases.

Strategically located tritium monitors provide computer signals and alert workers of tritium release concentrations above alarm set-point values. Each glovebox has a tritium monitor that initiates tritium gas cleanup system (TGCS) actions when a set point is exceeded. Room tritium monitors in the tritium-handling areas and in the control room and a tritium stack monitor alert workers of released tritium through alarms and other indicators. The stack monitor provides backup for the room monitors in the tritium-handling areas and monitors process effluents that are routed directly to the stack. These effluents are also monitored in the emergency tritium cleanup system and tritium waste treatment system before being routed to the stack. When certain alarm set points are exceeded, the tritium room monitors and stack monitor also initiate signals that lead to isolating the ventilation systems of the tritium-handling areas and sound the evacuation alarm. Tritium released to the tritium-handling areas is either cleaned up by the emergency tritium cleanup system before discharge through the stack or is discharged directly to the atmosphere through the stack in a manner that allows for a controlled release so as not to exceed allowable limits, as appropriate.

4.11.2.1.1.1.2 Rest House

A number of buildings in TA-16 are referred to as rest houses. The term “rest house” basically refers to a safe place to temporarily store something until needed. Building 411 (Figure 4-11, Sheet 2), along with Building 410 (Section 4.11.2.1.3.8), is used for assembling devices. Building 411 is occasionally used to warehouse nuclear material and classified parts in sufficient quantities to qualify it as a Category 2 nuclear facility. On these occasions, the building is considered to be a Hazard Category 2 nuclear facility. Based on safety analyses, the necessary controls are in place when nuclear materials are being handled. For all other operations, the building is considered non-nuclear. Many of the remaining rest houses at TA-16 are used as explosives magazines.

4.11.2.1.2 Non-Nuclear Facility Hazard Categories

4.11.2.1.2.1 Building Categorized M/CHEM

Building 560 (Figure 4-11, Sheet 2) houses a drinking water chlorination station.

4.11.2.1.3 Buildings Categorized L/ENS

Sixty-one facilities located in TA-16 are categorized L/ENS. Eighteen of the buildings identified in Table 4-9 as L/ENS are passageways between facilities. These passageways are not shown on Figure 4-11, nor are they discussed below. The descriptions below identify some building numbers that do not show on the maps. These structures do not currently have a hazard category.

4.11.2.1.3.1 Large-Scale Explosives Formulation and Fabrication Plant

The Large-Scale Explosives Formulation and Fabrication Plant (Buildings 58, 340-343, and 345; Figure 4-11, Sheets 2 and 3) has large-scale, HE-processing capabilities for manufacturing and processing HE powders, micronizing HE powders, pressing formulated powders into structured pieces, performing strength-of-materials testing on HE components, and conducting loading operations for some specialty explosives. Some small, special-test devices are also assembled here.

4.11.2.1.3.2 High-Explosives Inspection and Component Radiography

In the high-explosives inspection and component radiography facilities (Buildings 220, 221, 223-226, 280, 281, 283, and 285; Figure 4-11, Sheets 2 and 3), HE is inspected and components undergo radiography as part of the quality control process to guarantee integrity for design intent. Quality assurance includes using coordinate-measuring equipment and industrial x-ray devices to obtain dimensional and density measurements of HE components and test devices. Radiography takes place in Building 220; however, radiography operations will be consolidated and relocated in Building 260.

4.11.2.1.3.3 High-Explosives Fabrication

The high-explosives fabrication facilities (Buildings 260, 261, 263, 265, 301, 302, 380, 430, 435, and 437; Figure 4-11, Sheets 2 and 3) house HE fabrication processes. Machined components needed for weapons research and development and full weapons test assemblies are fabricated to specifications. Casting operations provide cast HE components for testing, as well as mock HE to be used in weapons systems training and in tests that use mockups of components as substitutes for actual HE components. HE-pressing operations consolidate plastic-bonded explosives into solid charges and into stock pieces for machining components for hydrotests and other HE testing.

4.11.2.1.3.4 Rest House

The rest house (Building 303; Figure 4-11, Sheet 3) is used for HE environmental testing.

4.11.2.1.3.5 Plastics Operations

Buildings 307 and 308 (Figure 4-11, Sheet 3) house plastics operations.

4.11.2.1.3.6 High-Explosives Receiving and Storage

To comply with DoD and DOE regulations, all HE and energetic materials shipped to the Laboratory must be received at the HE-Receiving Facility (Building 280, Figure 4-11, Sheet 2). Buildings 281-285 (Figure 4-11, Sheets 2 and 3) are used as magazines that store bulk HE and some limited HE components until they are needed for future processing.

4.11.2.1.3.7 High-Explosives Disposal and Treatment

The High-Explosives Disposal and Treatment Facility (Buildings 388-389, 399, 401, and 406; Figure 4-11, Sheet 3) disposes of HE and HE-contaminated wastes generated at the Laboratory. Current disposal techniques include open-air burning for solid HE and incineration for combustible HE-contaminated waste. HE-contaminated water, solvents, and oil are also treated in this processing area. All treated effluent is sampled and analyzed to be sure that it meets regulatory requirements. Buildings 399, 401, and 406 are not really buildings—Building 399 is a burn pad for disposal of HE, and Buildings 401 and 406 are sand filter vessels.

4.11.2.1.3.8 Test Device Assembly

Local hydrotesting and pre-Nevada-Test-Site device assembly are performed in Buildings 410 (Figure 4-11, Sheet 3) and 411 (Figure 4-11, Sheet 2). The facility has two large walk-in vaults that sometimes warehouse nuclear material and classified parts. Building 411 can also be used for SNM storage when extra security is provided, and Building 410 can accommodate a safe secure transport overnight. Buildings 413-415 are used as staging magazines.

4.11.2.1.3.9 Explosives Analytical Chemistry

The explosives analytical chemistry buildings (Buildings 460, 462, and 463; Figure 4-11, Sheet 2) are currently being used by the Laboratory's biochemistry group rather than for explosives analytical chemistry. They are included here to identify their current use.

4.11.2.1.3.10 Laboratory Building/Rest House

This facility (Building 477, Figure 4-11, Sheet 3) is used for HE storage.

4.11.2.1.3.11 High-Speed Machine Shop

The high-speed machine shop (Building 478, Figure 4-11, Sheet 3) is used for remote HE machining.

4.11.2.1.4 Buildings Categorized L/CHEM

Three buildings in TA-16 are categorized as L/CHEM.

4.11.2.1.4.1 Casting Rest House

Building 88, also called the Casting Rest House (Figure 4-11, Sheet 2), currently houses a "museum" containing several previously tested mock weapons assemblies. Although no HE or HE operations are conducted in the building, it does contain depleted uranium, beryllium, and other weapons materials.

4.11.2.1.4.2 Storage Building

Flammable materials are stored in Building 339 (Figure 4-11, Sheet 3).

4.11.2.1.4.3 Drum Storage

Flammable materials are stored in Building 344 (Figure 4-11, Sheet 3).

4.11.2.2 Nonhazardous Facilities

A number of administrative/technical and physical support activities that do not involve any unusual hazards are located in various buildings at TA-16.

TABLE 4-9

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-16, S SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
58	Magazine	High Explosives						X		
88	Casting Rest House	High Explosives							X	
205	Weapons Engineering Tritium Facility (WETF)	SNM	X							
205A	WETF Addition	SNM	X							
220	X-Ray Building	High Explosives						X		
221	Rest House	High Explosives						X		
223	Rest House	High Explosives						X		
224	X-Ray Building	High Explosives						X		
225	Rest House	High Explosives						X		
226	X-Ray Building	High Explosives						X		
236[a]	Passageway	High Explosives						X		
260	Process Building	High Explosives						X		
261	Rest House	High Explosives						X		
263	Rest House	High Explosives						X		
265	Rest House	High Explosives						X		
280	HE-Receiving Facility	High Explosives						X		
281	Rest House	High Explosives						X		
282[a]	Passageway	High Explosives						X		
283	Rest House	High Explosives						X		
284[a]	Passageway	High Explosives						X		
285	Rest House	High Explosives						X		

TABLE 4-9 (Continued)

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-16, S SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
287[a]	Passageway	High Explosives						X		
288[a]	Passageway	High Explosives						X		
301	Rest House	High Explosives						X		
302	Process Building	High Explosives						X		
303	Rest House	High Explosives						X		
307	Plastics	High Explosives						X		
308	Process Building	High Explosives						X		
313[a]	Passageway	High Explosives						X		
339	Storage Building	High Explosives							X	
340	Explosives Synthesis	High Explosives						X		
341	Rest House	High Explosives						X		
342	Blending Building	High Explosives						X		
343	Rest House	High Explosives						X		
344	Drum Storage	High Explosives							X	
345	Rest House	High Explosives						X		
350[a]	Passageway	High Explosives						X		
351[a]	Passageway	High Explosives						X		
352[a]	Passageway	High Explosives						X		
353[a]	Passageway	High Explosives						X		
354[a]	Passageway	High Explosives						X		
360	Storage Building	High Explosives						X		
380	Process Building	High Explosives						X		
388	Burn Pad	High Explosives						X		
389	Control Shelter	High Explosives						X		
399	Burn Pad	High Explosives						X		

TABLE 4-9 (Concluded)

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES TA-16, S SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
401	Pressure Tank	High Explosives						X		
406	Pressure Tank	High Explosives						X		
410	Assembly Building	High Explosives						X		
411[b]	Rest House	High Explosives	X							
413	Rest House	High Explosives						X		
415	Rest House	High Explosives						X		
416[a]	Passageway	High Explosives						X		
418[a]	Passageway	High Explosives						X		
419[a]	Passageway	High Explosives						X		
430	HE Pressing Building	High Explosives						X		
435	Rest House	High Explosives						X		
437	Rest House	High Explosives						X		
442[a]	Passageway	High Explosives						X		
443[a]	Passageway	High Explosives						X		
444[a]	Passageway	High Explosives						X		
460	Laboratory Building	Experimental Science						X		
461[a]	Passageway	High Explosives						X		
462	Storage Building	Experimental Science						X		
463	Rest House	Experimental Science						X		
477	Rest House	High Explosives						X		
478	High-Speed Machine Shop	High Explosives						X		
560	Chlorination Station	Physical Support				X				

a. These facilities do not show up on the maps.
b. This facility occasionally houses nuclear materials in sufficient quantities to qualify it as a Category 2 nuclear facility. Based on safety analyses, the necessary controls are in place when nuclear materials are being handled. For all other operations, the facility is considered non-nuclear.

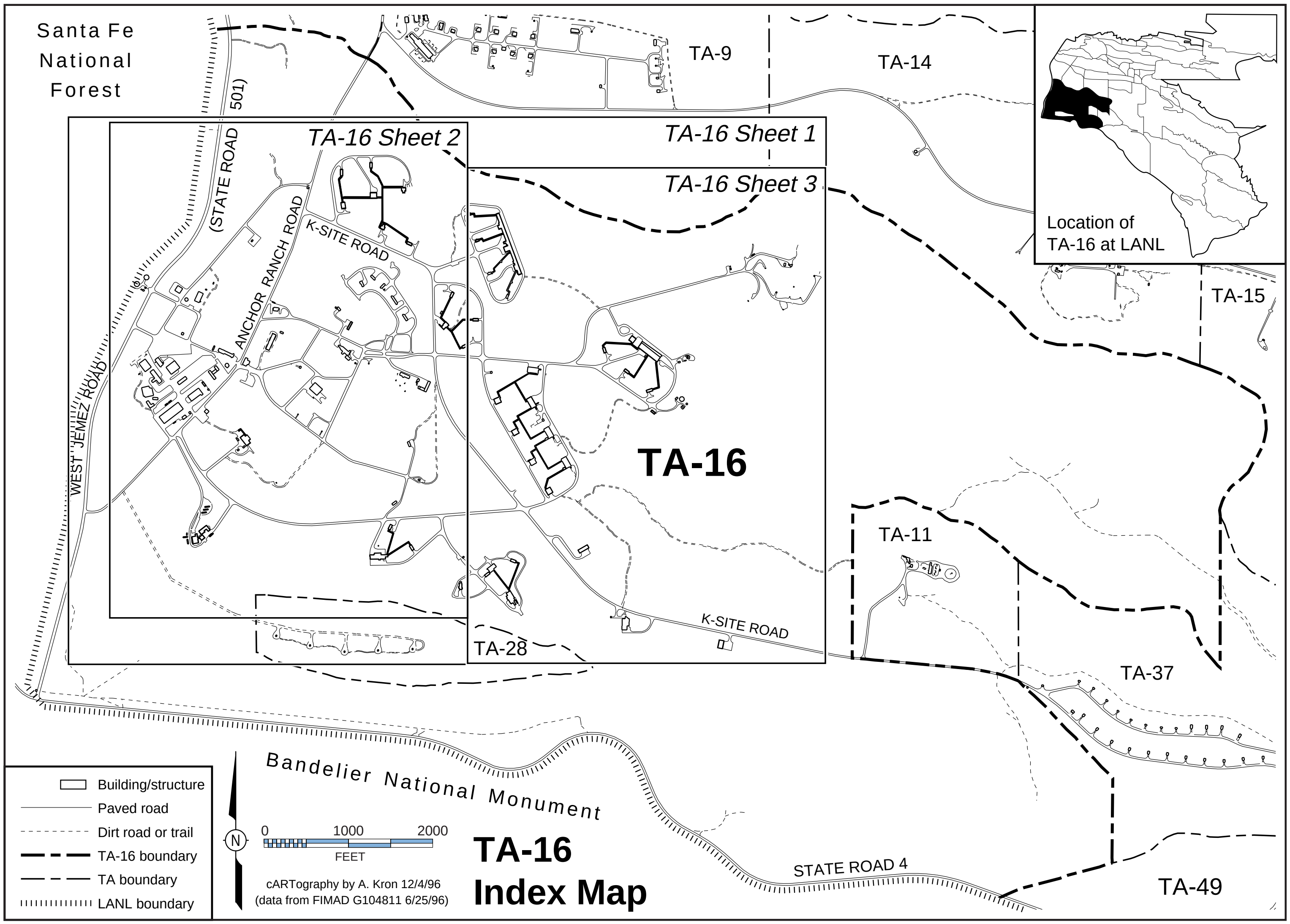


Figure 4-11. Map of TA-16, S Site—Index Map.

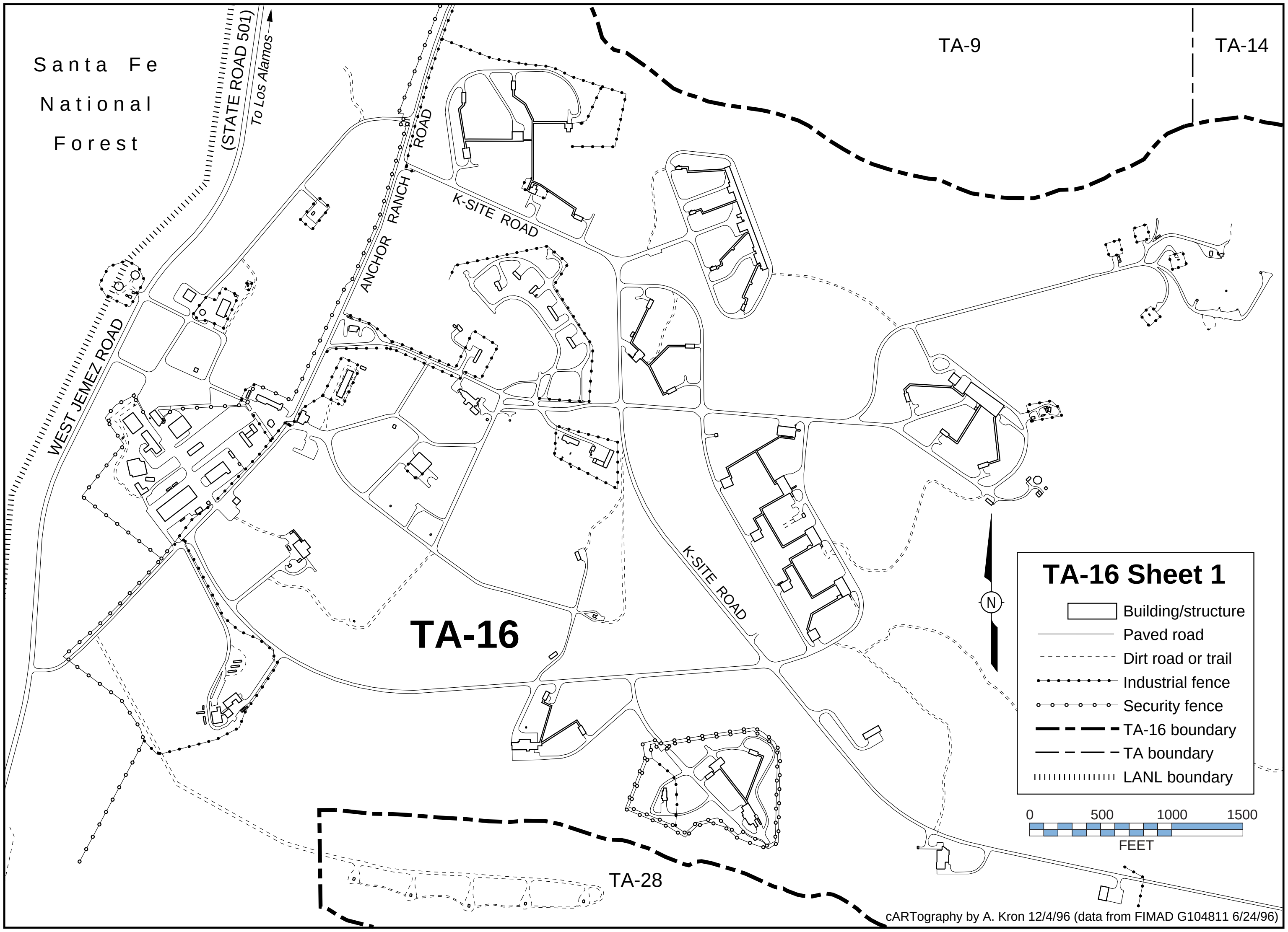


Figure 4-11. Map of TA-16, S Site—Sheet 1.

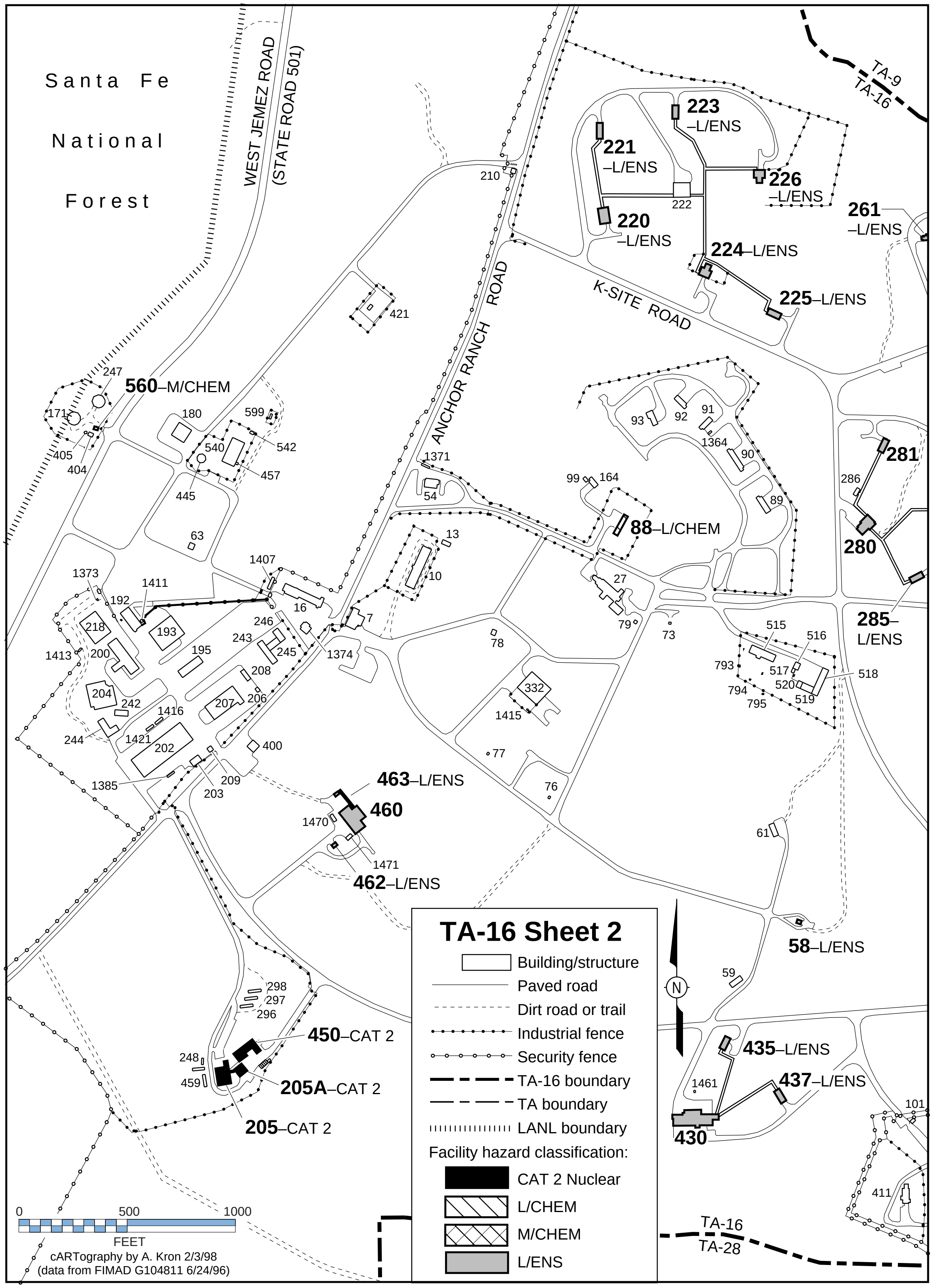


Figure 4-11. Map of TA-16, S Site—Sheet 2.

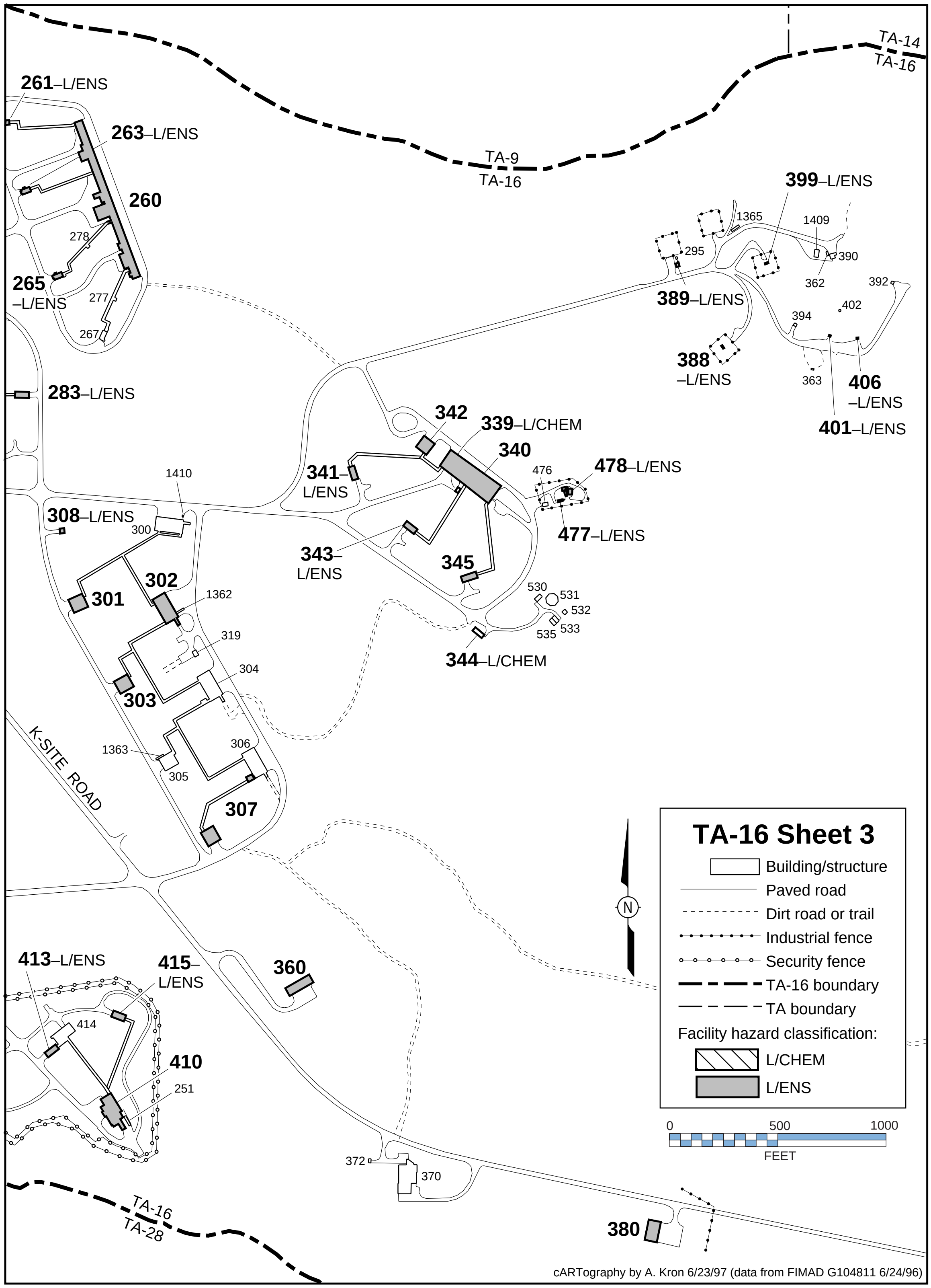


Figure 4-11. Map of TA-16, S Site—Sheet 3.

4.12 TA-18, Pajarito Laboratory

4.12.1 Site Description

TA-18 [Table 4-10 and Figure 4-12 (index map of TA-18)] is located in an arid canyon (Pajarito Canyon) about 4 mi (6.4 km) southeast of TA-3 on a DOE-owned and -controlled roadway (Pajarito Road). This roadway is normally open to the public but may be closed while hazardous materials are being moved or for other security or safety reasons. TA-18 is referred to as the Los Alamos Critical Experiments Facility (LACEF). It is also known as Pajarito Laboratory or Pajarito Site. The TA is a restricted area surrounded by a security fence with several additional layers of security and safeguards.

LACEF, which has operated since 1946, is the last general-purpose nuclear experiments facility in the US. It supports a variety of programs that range from national security programs, such as the Nuclear Emergency Search Team, Strategic Defense Initiative research, and Strategic Arms Reduction Treaty verification research, to development of instrumentation for nuclear waste assay and high-explosives detection. Currently, the primary purposes of LACEF are the design, construction, research, development, and application of critical experiments. In addition to criticality work, activities at LACEF include teaching and training related to criticality safety and applications of radiation detection and instrumentation.

4.12.2 Facilities Description

At present, the LACEF complex consists of 10 operating machines that fall into roughly five types of assemblies:

- benchmark critical assemblies,
- assembly machines used to remotely assemble critical experiments,
- solution assemblies in which the fuel is a fissile solution,
- prototype reactor assemblies that operate at low power without the need for heat rejection systems, and
- fast-burst assemblies for producing fast neutron pulses.

A significant feature of critical assemblies is that they are designed to operate at low power and at temperatures well below phase temperatures. This key feature sets critical assemblies apart from normal reactors. Critical assemblies therefore require no forced-convection cooling; thus, a potential source of stored energy is eliminated, as is the potential for the spread of fission products.

4.12.2.1 Facility Hazard Categories

Table 4-10 identifies the facilities at TA-18 that fall into a facility hazard category because of the type of operations performed in the facility.

4.12.2.1.1 Nuclear Facility Hazard Categories

Four buildings in TA-18 are categorized as Hazard Category 2 nuclear facilities (Figure 4-12, Sheet 1). These buildings are the Kiva 1 (Building 23), Kiva 2 (Building 32), and Kiva 3 (Building 116)—all of which are critical assembly buildings—and the Hillside Vault (Building 26). Each kiva is surrounded by a security fence, and entrance to the kivas is controlled by several layers of security and safeguards. Each kiva contains its own storage vault equipped with metal lockers for storing SNM containers. Permissible load limits are posted at the vaults. Because the vaults have no outside entrances, personnel must enter through the kiva building.

The kivas are constructed of reinforced concrete and masonry block and are designed to minimize fire risks. Each kiva is equipped with a traveling crane in the main assembly area. Gas-fired furnaces are used for heating, and the building is equipped with forced-draft ventilation. Each kiva has rooms for storing SNM, which are locked and show posted load limits. Fire-fighting equipment, consisting of an automatic sprinkler system and a fire alarm system, is provided in the control rooms.

Electrical power, water, and sewer are the only systems shared by the kivas. Loss of power to LACEF deenergizes all control circuits, aborting the operation and thereby preventing startup or shutdown of the reactor or experiment. Sharing common systems cannot result in a critical assembly incident. Because critical assemblies do not need to be cooled, no emergency power is needed to prevent exceeding fuel temperatures at which damage occurs.

Each kiva is surrounded by a physical security boundary. The area inside the security boundaries is evacuated before remote operation begins, and automatic signal alarms forewarn anyone who is overlooked.

4.12.2.1.1.1 Kiva 1

Kiva 1 (Building 23, Figure 4-12, Sheet 1) is approximately 1,440 ft^2 (439 m^2). Its primary safety feature is its remoteness from the nearest occupied facility. A control gate prevents access to the area when critical experiments are under way. The gate and the alarms are tied to a serial interlock safety system. Kiva 1 houses four general-purpose machines for remotely assembling critical experiments. These machines contain no permanently mounted nuclear fuel. Critical experiments involving enriched uranium solutions are routinely conducted in Kiva 1. The control system in Control Room 1 (located in Building 30) consists of a standardized interlock and protection system with a digital machine control system. Energizing the machine activates the control system. Power to the assembly is supplied when all inputs to the Kiva 1 serial interlock have been verified.

One additional critical assembly building, the Sheba Building (Building 168), is located inside the Kiva 1 security perimeter. Although the Sheba Building provides a weatherproof shelter for critical experiment assemblies, no radiation shielding is afforded by the structure. This allows radiation dose measurements to be taken and radiation instruments to be placed around the critical assemblies in the enclosure without the interference of shielding or building scatter.

4.12.2.1.1.2 Kiva 2

The floor space at Kiva 2 (Building 32, Figure 4-12, Sheet 1) is approximately 1,740 ft^2 (530 m^2). The construction and primary safety features at Kiva 2 are similar to those of Kiva 1. Kiva 2 houses two benchmark assemblies and one general-purpose assembly machine.

The three assemblies manipulated from Control Room 2 (located in Building 30) have similar but independent control systems. The control systems use conventional analog control technology with direct-wired electrical switches and panel indicators. Selection of a machine energizes the appropriate control system. Power to the assembly is supplied after verification of the Kiva 2 serial interlock.

4.12.2.1.1.3 Kiva 3

The floor space at Kiva 3 (Building 116, Figure 4-12, Sheet 1) is approximately 5,184 ft^2 (1,580 m^2). The construction of Kiva 3 is similar to that of Kivas 1 and 2, except that Kiva 3 has significant shielding because it is closer to the nearest occupied building than the other two kivas.

For producing fast-neutron pulses, Kiva 3 has two fast-burst assemblies operated from Control Room 3 (located in Building 30). The assemblies have control systems similar to those in Control Room 2. The control system is energized, and power is supplied to the assembly only after the proper settings of the Kiva 3 serial interlock have been verified.

4.12.2.1.1.4 Hillside Vault

The Hillside Vault at TA-18 (Building 26, Figure 4-12, Sheet 1) consists of two rooms whose overall floor space is 216 ft^2 (66 m^2). The vault, which is used to store SNM and fissile components of various assembly devices, is unheated and is usually unoccupied. The walls, floor, and ceiling are constructed of reinforced concrete, and the interior is lined with heavy steel shelves solidly anchored to the walls. The shelves are subdivided into storage locations, each of which holds a defined limit of SNM in sealed storage containers. Each container is stored in a designated location. The containers are transported to other locations at TA-18 for use in experiments and radiation measurements. The vault is equipped with heat and smoke detectors, which are connected to a central alarm station offsite. When locked, the vaults are monitored by alarm systems. The vaults are under the control of the Laboratory's protective force.

The Hillside Vault also stores fissile components of the various assembly devices. A wide range of assembly components is maintained at the site to ensure flexibility in conducting experiments. All fuels at LACEF have radiation levels that allow monitored handling. Only authorized personnel have routine access to this vault.

4.12.2.1.2 Non-Nuclear Facility Hazard Categories

Five facilities are categorized L/RAD (Figure 4-12, Sheet 1).

4.12.2.1.2.1 Pulsed Accelerator Building

The Pulsed Accelerator Building (Building 127), also known as the High Bay, is located next to the canyon wall at the north side of the site. It consists of a large room under which is a basement that contains an office complex. The experimental bay features a false floor and low-density walls to minimize radiation scatter. This feature has led to the use of the facility for measurements that require a “clean” radiation environment. A two-story-high shield wall separates the experimental bay from the rest of the site.

4.12.2.1.2.2 Reactor Subassembly Building

The Reactor Subassembly Building (Building 129) is located at the northeast end of the site. It consists of one large room and several compartmentalized office/laboratory spaces. Both neutron and gamma-ray sources are used for detector development and calibration procedures. “Reactor Subassembly Building” is the building’s historical name; nuclear reactors are not assembled in this building.

4.12.2.1.2.3 Accelerator Development Laboratory

The Accelerator Development Laboratory (Building 227) is located next to the canyon wall at the north side of the site. The building consists of one story and a basement. The walls and roof are constructed of prestressed concrete with a steel floor between the first floor and basement. The principal experimental area and control room are located in the basement, which is naturally shielded by the surrounding earth. The Accelerator Development Laboratory is a multipurpose experimental laboratory that accommodates such activities as radiography with isotopic sources, development of portable linear accelerators, and associated particle imaging. Other capabilities include further accelerator design and development, resonance adsorption imaging, and liner array imaging.

4.12.2.1.2.4 Transportainers

The transportainers (Buildings 247 and 249) are used for storing encapsulated radioactive sources.

4.12.2.2 Nonhazardous Facilities

Thirty-two other structures, consisting primarily of administrative, technical, laboratory, general storage, trailers, and guard towers and stations are listed as nonhazardous. The Central Office Building (Building 30) houses the main offices of several groups, as well as several counting laboratories, electronic assembly areas, the TA-18 machine shop, and the control rooms for the three kivas.

TABLE 4-10

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-18, PAJARITO LABORATORY

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
23	Critical Assembly Building (Kiva 1)	SNM	X							
26	Hillside Vault	SNM	X							
32	Critical Assembly Building (Kiva 2)	SNM	X							
116	Critical Assembly Building (Kiva 3)	SNM	X							
127	Pulsed Accelerator Building	SNM					X			
129	Reactor Subassembly Building	SNM					X			
227	Accelerator Development Lab	SNM					X			
247	Transportainer	SNM					X			
249	Transportainer	SNM					X			

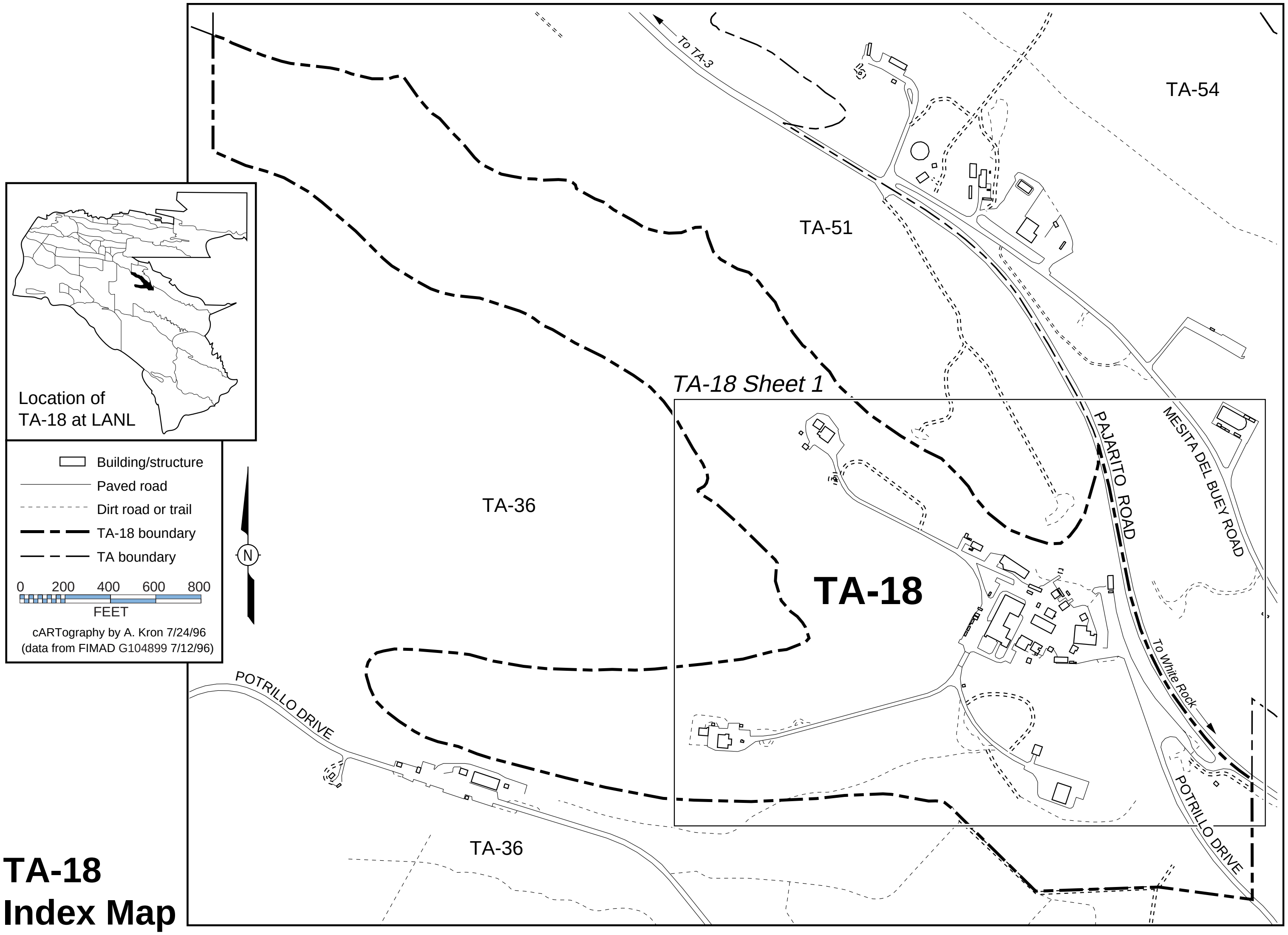


Figure 4-12. Map of TA-18, Pajarito Laboratory—Index Map.

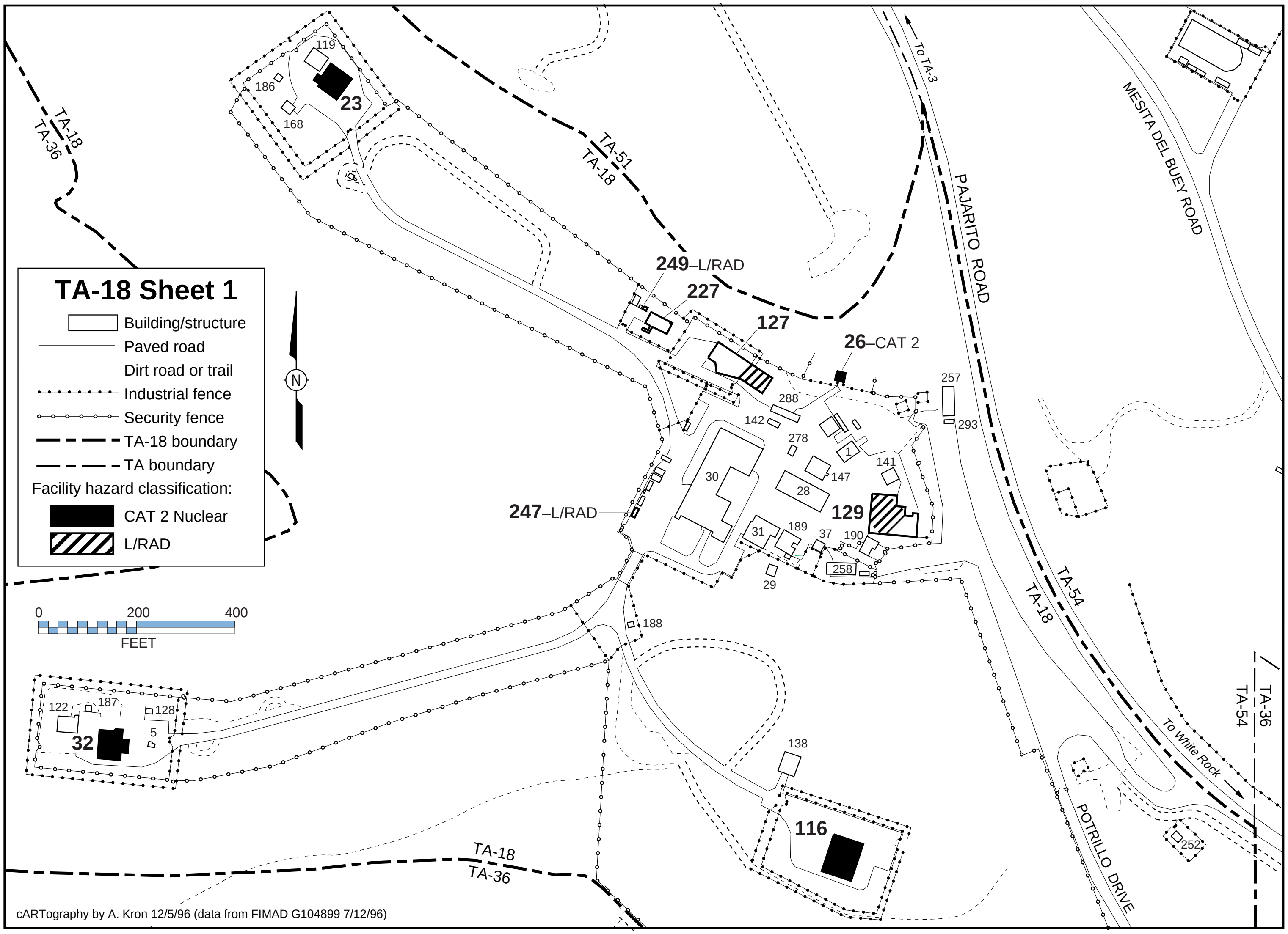


Figure 4-12. Map of TA-18, Pajarito Laboratory—Sheet 1.

4.13 TA-21, Plutonium Disposal Site

4.13.1 Site Description

TA-21, called DP Site [Table 4-11 and Figure 4-13 (index map of TA-21)], has two primary research areas: DP West and DP East. DP West is the site of the former radioactive-materials-processing facility and is gradually being decontaminated and decommissioned. DP East consists of two tritium facilities that provide space for energy, environmental, and weapons defense research. TA-21 is on DOE-controlled land approximately 0.6 mi (1 km) from the nearest residential area. A limited-access airstrip (TA-73) is located across a canyon, 0.37 mi (0.6 km) to the north, on a parallel mesa. The main public highway to the townsite runs along the north boundary of TA-21 parallel to the airstrip. TA-21 is isolated from other Laboratory facilities, and its only access route is through the Los Alamos townsite. Access to the fenced site is uncontrolled; building access is controlled by badge readers.

The Laboratory's long-range plan is to close TA-21. Plans are currently under way to obtain funding and support to consolidate TA-21 tritium operations and activities at WETF. This consolidation project will result in an upgrading of tritium facility safety features, more cost-effective tritium operations, and improved efficiencies in tritium operations and programs. The project is envisioned as a consolidation that will result in new building construction, equipment changes, improved safety designs and capabilities, and some reconfiguration of tritium operations currently conducted at TA-21. Although processes and operations may be changed to incorporate new technology, the primary focus is on relocating existing TA-21 tritium process equipment and operations. This move will result in an increased tritium inventory at WETF (Section 4.11.2.1.1.1.1) and a reduced tritium inventory at the TA-21 Tritium Systems Test Assembly (TSTA) Facility and Tritium Science and Fabrication Facility (TSFF). Following relocation, the remaining facilities at TA-21 would become candidates for D&D, which would result in a short-duration increase in radioactive waste volumes for the affected facilities. The consolidation project could begin as early as 2000 and be completed by 2006. These planned actions would reduce the overall impact of tritium operations on the environment and the public.

4.13.2 Facilities Description

4.13.2.1 Facility Hazard Categories

Table 4-11 identifies the facilities at TA-21 that fall into a facility hazard category because of the type of operations performed in the facility.

4.13.2.1.1 Nuclear Facility Hazard Categories

4.13.2.1.1.1 Hazard Category 2 Nuclear Facilities

Two Hazard Category 2 nuclear facilities are located at TA-21: the TSTA (Building 155) and the TSFF (Building 209, Figure 4-13, Sheet 2).

4.13.2.1.1.1.1 Tritium Systems Test Assembly

Planning for TSTA began in 1977 after LANL was chosen to develop, demonstrate, and integrate technologies related to the deuterium-tritium fuel cycle for large-scale fusion reactor systems. Construction was completed, and pretritium testing was initiated in 1982. The first tests with tritium in the system were conducted in 1984.

TSTA consists of a large gas loop that simulates the proposed fuel cycle for a fusion facility. The loop does not include any specific fuel injection system but is sufficiently versatile to allow systems to be added as the gas-handling system design requirements for fusion reactors are better defined. The gas loop is designed to handle up to ~360 moles/day of deuterium-tritium. This flow provides experience with operating a cycle on a scale that is near the full-scale cycles currently being addressed for the International Thermonuclear Experimental Reactor System. To accomplish this scale, TSTA requires an onsite tritium inventory of 180–200 g of tritium.

The main experimental tritium area (Room 5501) has a total of 1,129 ft^2 (344 m^2) of floor area. Two small laboratories used for nonloop experiments are connected to the ventilation system for Room 5501, which also services the main experimental tritium area. In the same building, but in the area surrounding the main experimental area, are an additional 1,828 ft^2 (557 m^2) of floor area, which is used for the control room, support center, office area, equipment rooms, an uninterrupted power supply, and a diesel generator. Another part of the building, used for offices and shops, contains 1,165 ft^2 (355 m^2).

In addition to the main building, 459 ft^2 (140 m^2) of storage space is available in a metal warehouse (Building 213) located directly north of the main experimental area. The east end of this building has been sectioned off and is used as a storage area for tritium-contaminated equipment. A portable building (Building 369) located on the west side of the main laboratory provides an additional 230 ft^2 (70 m^2) of office space.

The outside dimensions of the part of the building that houses the main experimental area are 77 ft (23.5 m) by 36 ft (11 m). The walls are constructed of 7.9-in. (20-cm) concrete masonry block. Concrete masonry units are reinforced with No. 4 deformed reinforcing bars, placed vertically at 32 in. (81 cm) on center, and truss-type reinforcing placed horizontally at alternate courses. The floors are 3.9-in.- (10-cm-) thick concrete on grade. The roof is 3.2-in. (8-cm) Tectum Tile T-300 and Tectum Plank P-300 over structural steel members. The main experimental area is 95 ft (29 m) long by 39.4 ft (12 m) wide and has a steel platform (mezzanine) 9.8 ft (3 m) above the floor that provides a total of 656 ft^2 (200 m^2) of floor space. Below the eastern portion of the mezzanine is a 4.9-ft- (1.5-m-) deep pit lined with concrete, whose width is 14.4 ft (4.4 m) and whose length is all but 5.9 ft (1.8 m) of the length of the mezzanine. The minimum height of the main floor of the test cell to the ceiling is 26 ft (8 m) at the sides of the room, and the height increases to 28 ft (8.5 m) at the center of the room. When required, an additional 4.9 (1.5 m) of ceiling height can be provided by the pit. An additional service pit 3.9 ft (1.2 m) in diameter by 20 ft (6.1 m) deep provides space for lowering the distillation column vacuum jacket of the isotope separations system. The ceiling height of the rooms surrounding the test cell is 13 ft (4 m).

Environmental and safety systems at the TSTA ensure personnel safety and minimal tritium release. The TSTA Project has been instrumental in developing and integrating these systems following a philosophy of redundant containment, detection, and recovery. The environmental and safety systems used at TSTA provide secondary containment for processing equipment, glovebox and gaseous effluent detritiation, room air detritiation, tritium monitoring, portable ventilation ducting, supplied-breathing-air system, and solid and liquid waste minimization and disposal. All significant quantities of tritium are triply contained; the building acts as the third and final barrier. The triple containment makes the probability of accidental releases into the environment extremely low. One stack, located in the northwest corner of Building 155, services the TSTA tritium-handling areas.

4.13.2.1.1.1.2 Tritium Science and Fabrication Facility

The Tritium Science and Fabrication Facility (TSFF) (Building 209) is a tritium research and development facility. The building is located east of the TSTA at the DP East research area. Built in 1964 as a chemistry process building, it was modified in 1974 to accommodate tritium salt synthesis and to provide physical preparation of the underground nuclear testing program. The salt synthesis work was discontinued in 1993 in response to the cessation of nuclear testing, and the facility's name was changed from the Tritium Salt Facility to the TSFF.

The current mission of the TSFF is to support DOE and LANL by providing experimental services such as neutron tube target loading, mass spectrometry, getter research, metal melt/tritium recovery, inertial confinement fusion target studies, calorimetry, salt line D&D, generic experiments on effluent treatment systems, and tritium storage. In the late 1990s, the neutron-tube-target-loading function will be relocated in part of WETF. To accomplish these program missions and operational capabilities, the TSFF requires an inventory of 366 g of tritium, primarily in gaseous form. Additional tritium inventory (mainly tritium gas and tritium adsorbed on solid metal storage beds) is maintained in the storage area at the TSFF. This tritium inventory is maintained in storage/shipping containers awaiting processing and/or transport to other locations.

The TSFF is a 3,000-ft^2 (300-m^2) block-walled portion of Building 209, which is a one-story building with a basement. TSFF is located at the north end of the building and is divided into several laboratory rooms. The floor consists of 6-in.- (15.2-cm-) thick, reinforced-concrete slab supported by reinforced-concrete beams, columns, and basement walls that extend to tuff below. The TSFF is located approximately 150 ft (46 m) east of the TSTA. The two facilities are connected by a spinal corridor, which also connects with adjacent office and nontritium laboratory areas.

Tritium experiments at the TSFF are performed in gloveboxes or in fume hoods, depending on the amount of tritium being handled and process needs. The TSFF is serviced by an exhaust ventilation system that discharges to a 75-ft- (22.9-m-) high exhaust air stack. This stack, as well as the general room air, is continuously monitored for tritium content. The glovebox atmospheres are also monitored for tritium, and the exhaust streams are processed by an effluent treatment system.

4.13.2.1.1.2 Hazard Category 3 Nuclear Facility

Building 146 (Figure 4-13, Sheet 1) is categorized as a Hazard Category 3 nuclear facility. This building is an old exhaust filter building that has been decontaminated and is awaiting DOE approval of its reclassification from a nuclear facility to a nonhazardous facility.

4.13.2.1.2 Non-Nuclear Facility Hazard Categories

4.13.2.1.2.1 Buildings Categorized M/CHEM

Two buildings at TA-21 are categorized as M/CHEM (Figure 4-13, Sheet 1). Buildings 3 and 4 were laboratory buildings that housed the Enriched-Uranium-Processing Facility. Operations at this facility ceased in July 1984, and the buildings were maintained under shutdown surveillance until decommissioning began. Decommissioning began in 1994 with Buildings 3 and 4 South. All contaminated and uncontaminated equipment—hoods, gloveboxes, tanks, and piping—was removed, and the buildings' walls and ceilings were cleaned. The buildings were then razed, and the utility tunnels under the buildings, exhaust ventilation ductwork, and stacks were removed. Decommissioning was completed in 1995. Decommissioning at TA-21 West is continuing as funding is available. It is expected that remediation work will continue on Buildings 3 and 4 North.

4.13.2.1.2.2 Buildings Categorized Low Hazard

Six buildings (Figure 4-13, Sheet 1) at DP West have been categorized as low hazard (L/RAD and L/CHEM) and are gradually being decommissioned. They include laboratory buildings (Buildings 5 and 150), which contain radiation and chemical hazards; the paint shop (Building 30), which contains chlorine gas (chemical) hazards; a filter building (Building 324), which contains residual radionuclides; the Calcium Building (Building 212), which contains chemical contaminants; and the waste disposal plant (Building 257).

4.13.2.2 Nonhazardous Facilities

Seventy-four administrative, technical, physical support, and other buildings and structures categorized as nonhazardous are located at TA-21.

TABLE 4-11

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-21, DP SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
3	Laboratory Building	D&D				X				
4	Laboratory Building	D&D				X				
5	Laboratory Building	Experimental Science					X			
30	Paint Shop	Experimental Science							X	
146	Filter Building	D&D		X						
150	Molecular Chemistry Building	Experimental Science					X			
155	Tritium Systems Test Assembly	SNM	X							
209	Tritium Science and Fabrication Facility	SNM	X							
212	Calcium Building	Experimental Science							X	
257	Radioactive Liquid Waste Disposal Plant	Physical Support					X			
324	Filter House	Physical Support					X			

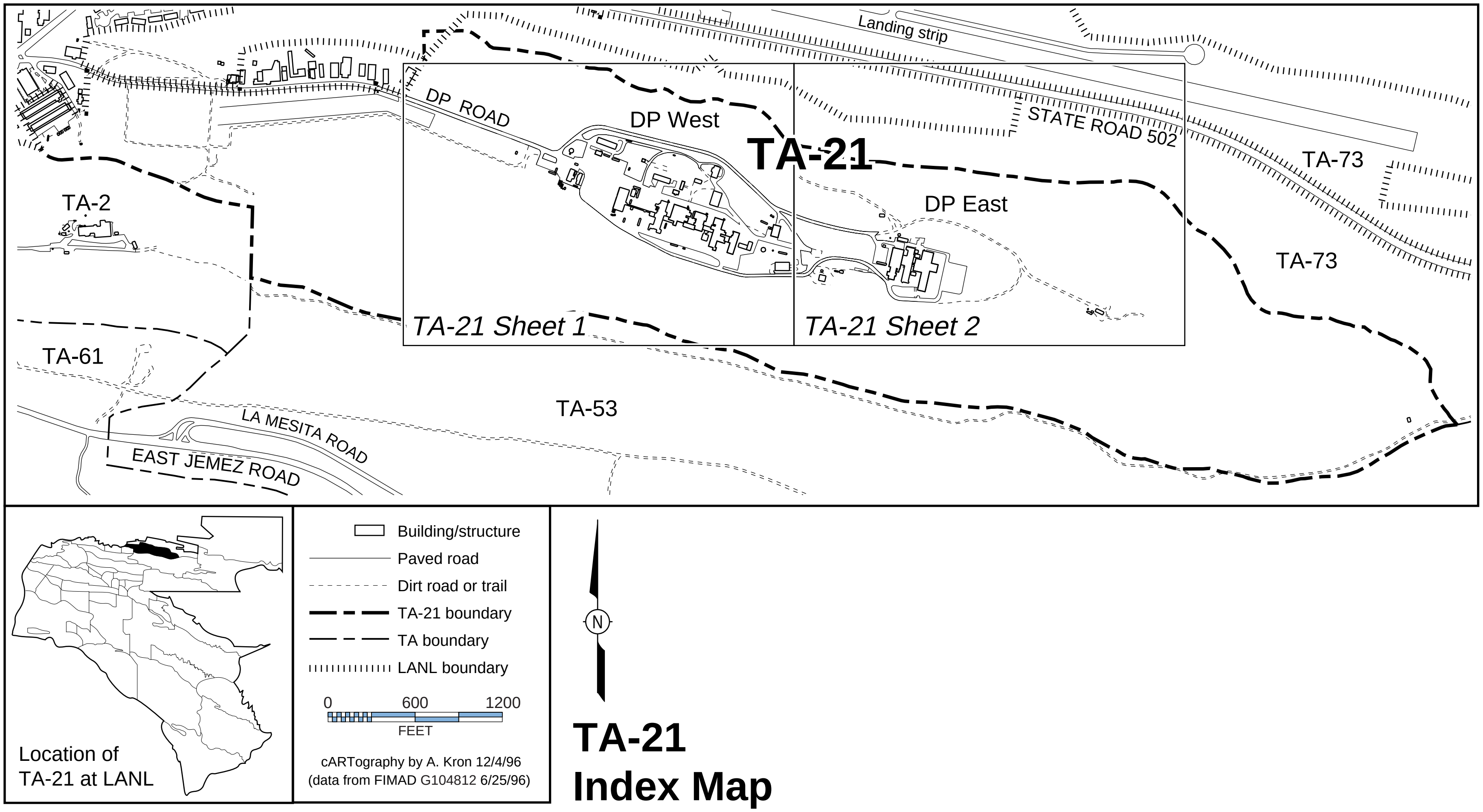


Figure 4-13. Map of TA-21, Plutonium Disposal Site—Index Map.

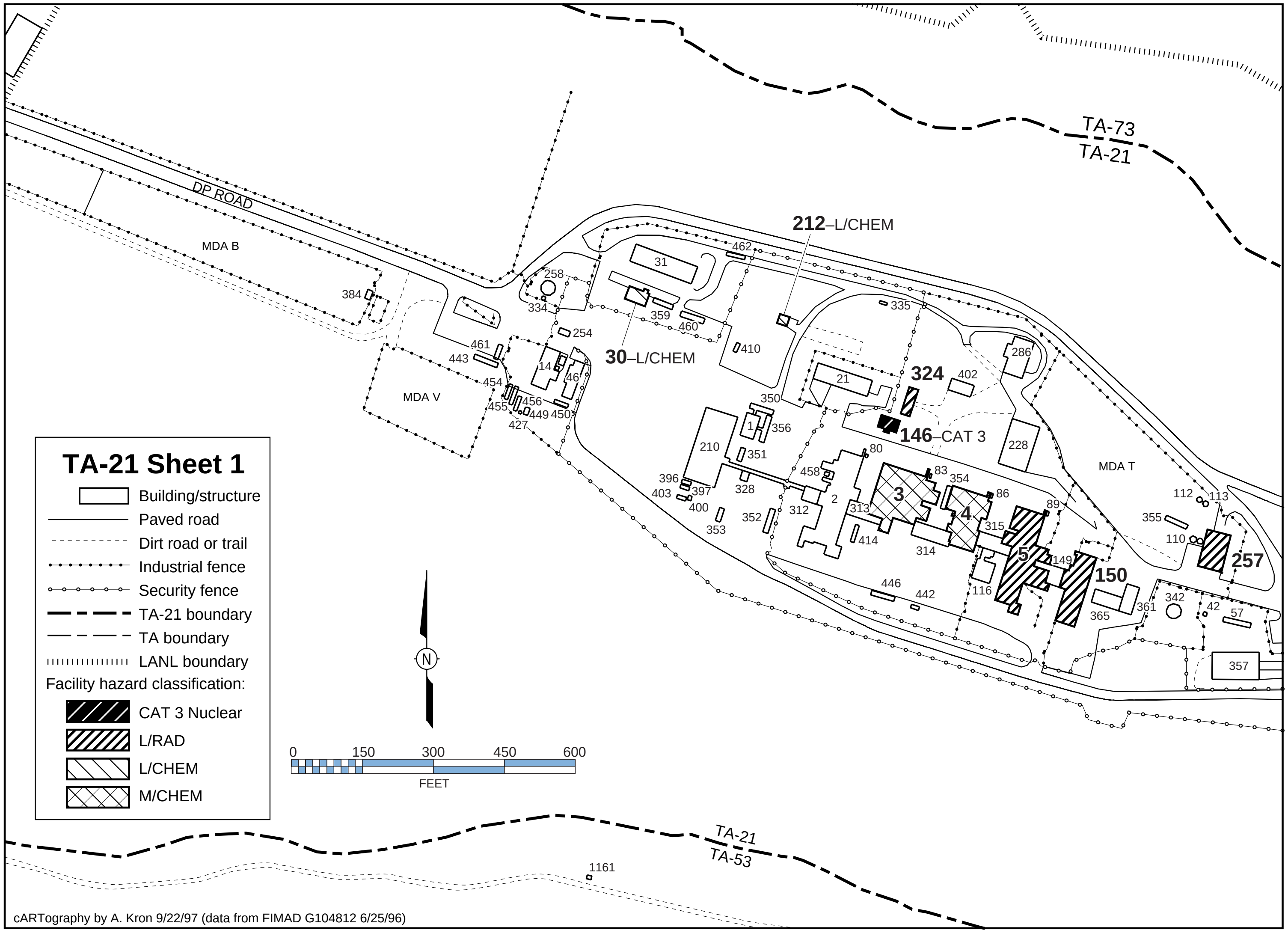


Figure 4-13. Map of TA-21, Plutonium Disposal Site—Sheet 1.

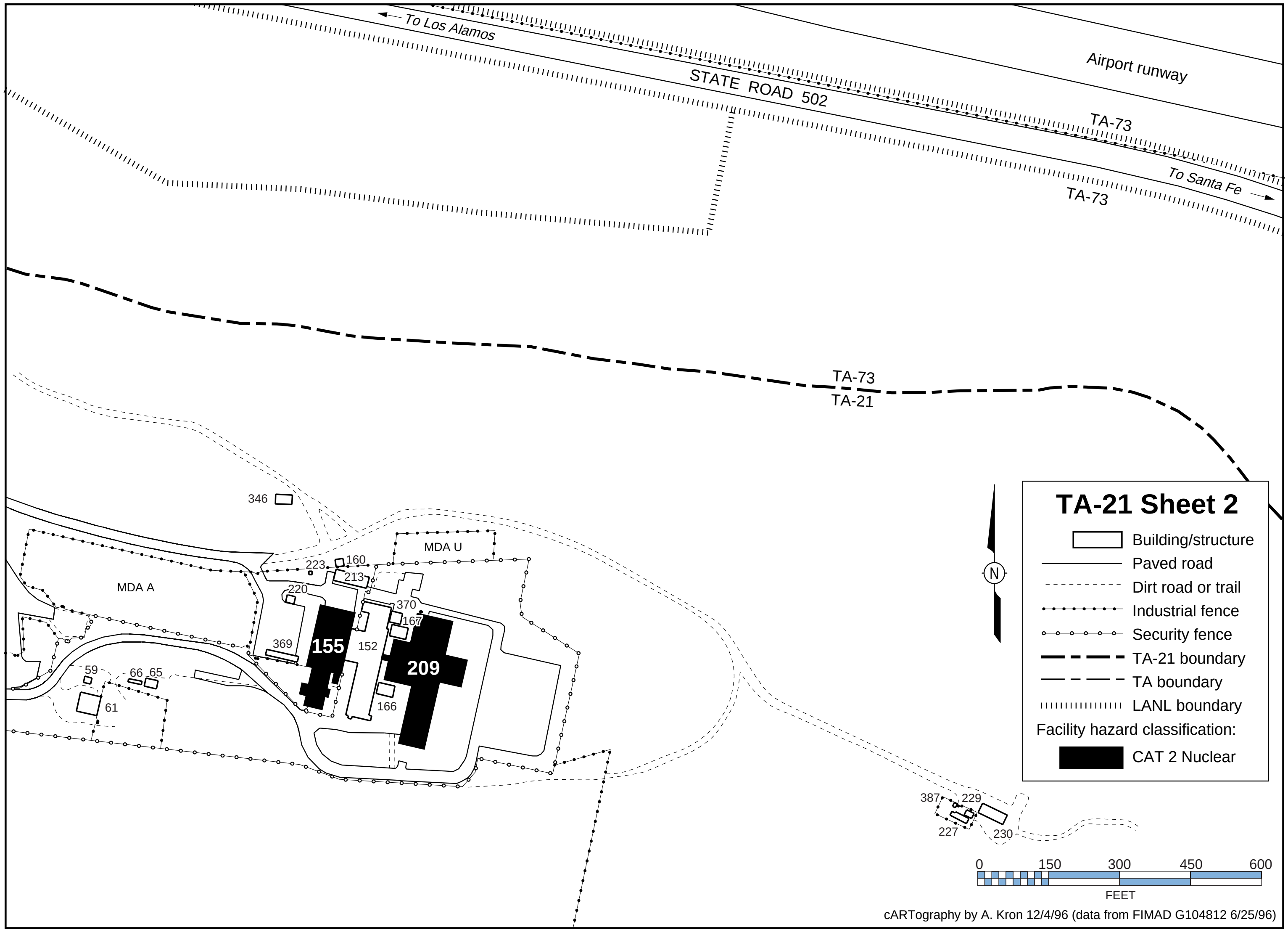


Figure 4-13. Map of TA-21, Plutonium Disposal Site—Sheet 2.

4.14 TA-22, TD Site

4.14.1 Site Description

Scientists at TA-22 [Table 4-12 and Figure 4-14 (index map of TA-22)] conduct research into, develop, and fabricate high-energy detonators and related devices. Detonators, cables, and firing systems for tests at local firing sites and at the Nevada Test Site are built here. Detonator qualification and other detonator tests are conducted at an adjacent firing site. Detonation system components built by DOE contractors and production and surveillance of components produced for war reserve detonation systems undergo quality assurance checks at this site.

A guard station controls access to the fenced TA-22 site. DOE clearance and a badge or personal escort by cleared personnel are required for entry. Building access rules require that visitors sign in and out with the receptionist.

4.14.2 Facilities Description

The buildings and structures at TA-22 compose a facility called the Explosives Detonator Facility. Major functional areas are the Detonation Systems Laboratory, the Advanced Development Laboratory, and peripheral buildings that house an electronics laboratory and storage magazines. Capabilities include detonator design; printed circuit manufacture; metal deposition and joining; plastic materials technology; explosives loading; initiation; diagnostics; lasers; and safety of explosives systems design, development, and manufacture.

Worker and environmental protection is provided by secondary containment around machinery and storage tanks; reinforced-concrete construction of explosives building; and remote locations and barricades for explosives areas to minimize risk to personnel, exclusion areas, interlocks, and automatic sprinkler systems.

4.14.2.1 Facility Hazard Categories

Table 4-12 identifies the facilities at TA-22 that fall into a facility hazard category because of the type of operations performed in the facility.

4.14.2.1.1 Nuclear Facility Hazard Categories

No buildings at TA-22 have been categorized as nuclear facilities.

4.14.2.1.2 Non-Nuclear Facility Hazard Categories

4.14.2.1.2.1 Buildings Categorized L/ENS

Twenty-five buildings at TA-22 have been categorized as L/ENS (Figure 4-14, Sheet 1).

4.14.2.1.2.1.1 Loading Building

The loading building (Building 1) is one of the buildings replaced by the Detonation Systems Laboratory. It is currently unoccupied; however, HE contamination is still present.

4.14.2.1.2.1.2 Magazines

The magazines (Buildings 7, 9-12, 14-24, 35, and 96) are HE storage facilities.

4.14.2.1.2.1.3 Process Buildings

HE is used in Building 8. Building 25 is one of the buildings replaced by the Detonation Systems Laboratory. It is currently unoccupied; however, HE contamination is still present.

4.14.2.1.2.1.4 Advanced Development Laboratory

The same kinds of explosives operations as those conducted at the Detonation Systems Laboratory occur in the Advanced Development Laboratory (Building 34); however, the Advanced Development Laboratory also conducts test firing operations, such as pulsed-high-voltage, hot-wire, and laser firing. The laboratory is enclosed by a fence and interlocking gates so that opening any interlocked gate or door safely disarms the high-voltage power distribution system. These precautions prevent inadvertently initiating a test.

4.14.2.1.2.1.5 Storage Building

Building 69 is another small building used to store HE.

4.14.2.1.2.1.6 Detonation Systems Laboratory

The Detonation Systems Laboratory (Buildings 91 and 93) is a 43,000-ft^2 (13,106-m^2) structure that provides research, development, and fabrication capabilities for detonation systems. This structure consists of three connected buildings, one of which, Building 90, is an office building (categorized as nonhazardous); Building 91 is a support building, and Building 93 is an HE fabrication building connected to Building 91 by an enclosed corridor. A five-compartment explosives storage magazine and a liquid solvent storage shed are located nearby.

In Building 93, bulk explosive powder is formed into detonator subassemblies and is incorporated in final assemblies, which are then measured, inspected, and prepared for storage or test firing. The area around the HE wing is enclosed by a fence with a locked gate, and access to the building is limited to authorized personnel.

4.14.2.1.2.2 Building Categorized L/CHEM

Building 95 (Figure 4-14, Sheet 1) is a solvent storage shed.

4.14.2.2 Nonhazardous Facilities

The rest of the buildings at TA-22 are categorized as nonhazardous.

TABLE 4-12

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-22, TD SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
1	Loading Building	Vacant/Unoccupied						X		
7	Storage Magazine	High Explosives						X		
8	Process Building	High Explosives						X		
9	Magazine	High Explosives						X		
10	Magazine	High Explosives						X		
11	Magazine	High Explosives						X		
12	Magazine	High Explosives						X		
14	Magazine	High Explosives						X		
15	Storage Magazine	High Explosives						X		
16	Magazine	High Explosives						X		
17	Magazine	High Explosives						X		
18	Magazine	High Explosives						X		
19	Magazine	High Explosives						X		
20	Magazine	High Explosives						X		
21	Magazine	High Explosives						X		
22	Magazine	High Explosives						X		
23	Magazine	High Explosives						X		
24	Magazine	High Explosives						X		
25	Process Building	High Explosives						X		
34	Laboratory Building	High Explosives						X		
35	Magazine	High Explosives						X		
69	Storage Building	High Explosives						X		
91	Detonator Facility	High Explosives						X		
93	High Explosives	High Explosives						X		
95	Solvent Storage Shed	High Explosives							X	
96	Day Magazine	High Explosives						X		

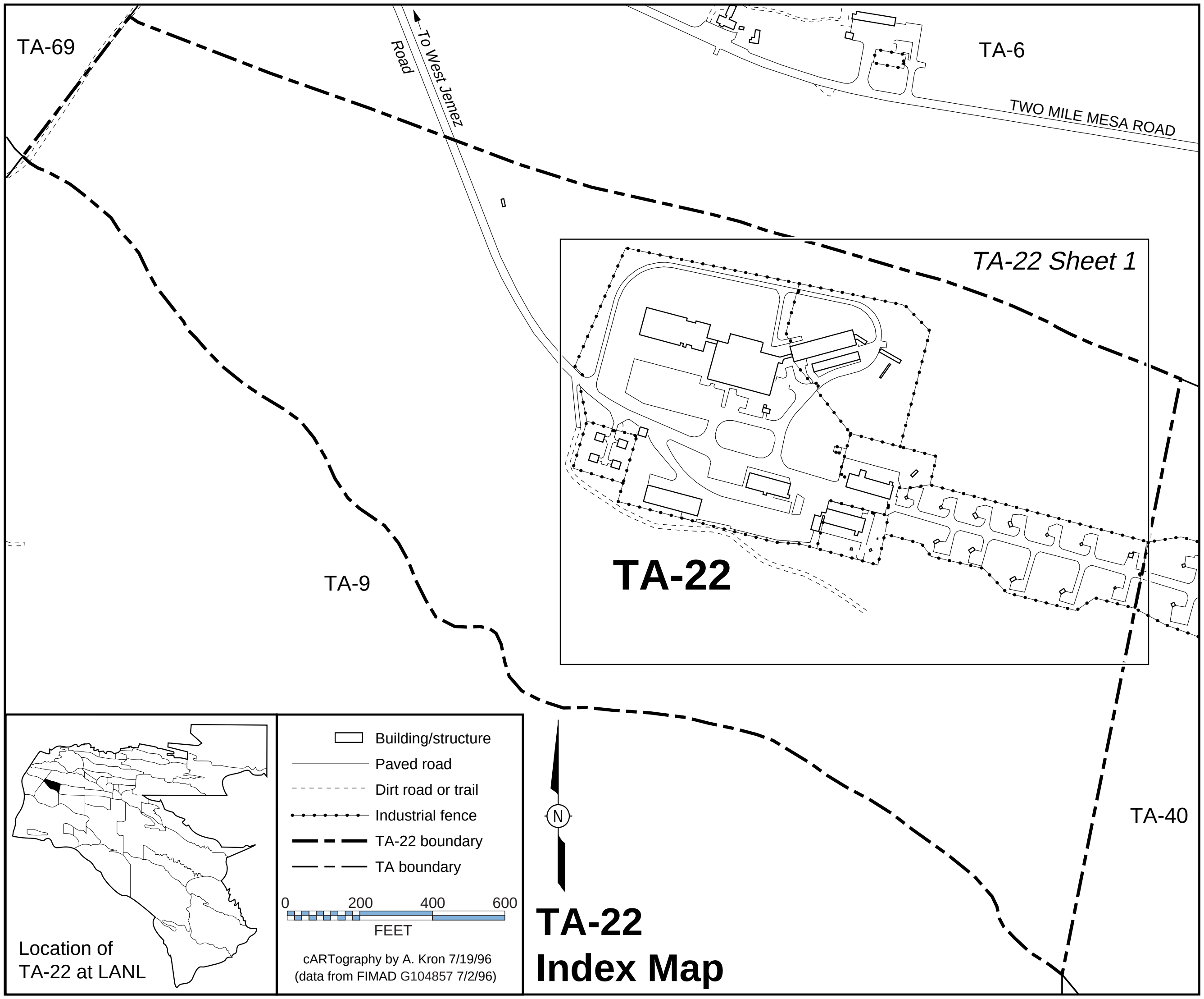


Figure 4-14. Map of TA-22, TD Site—Index Map.

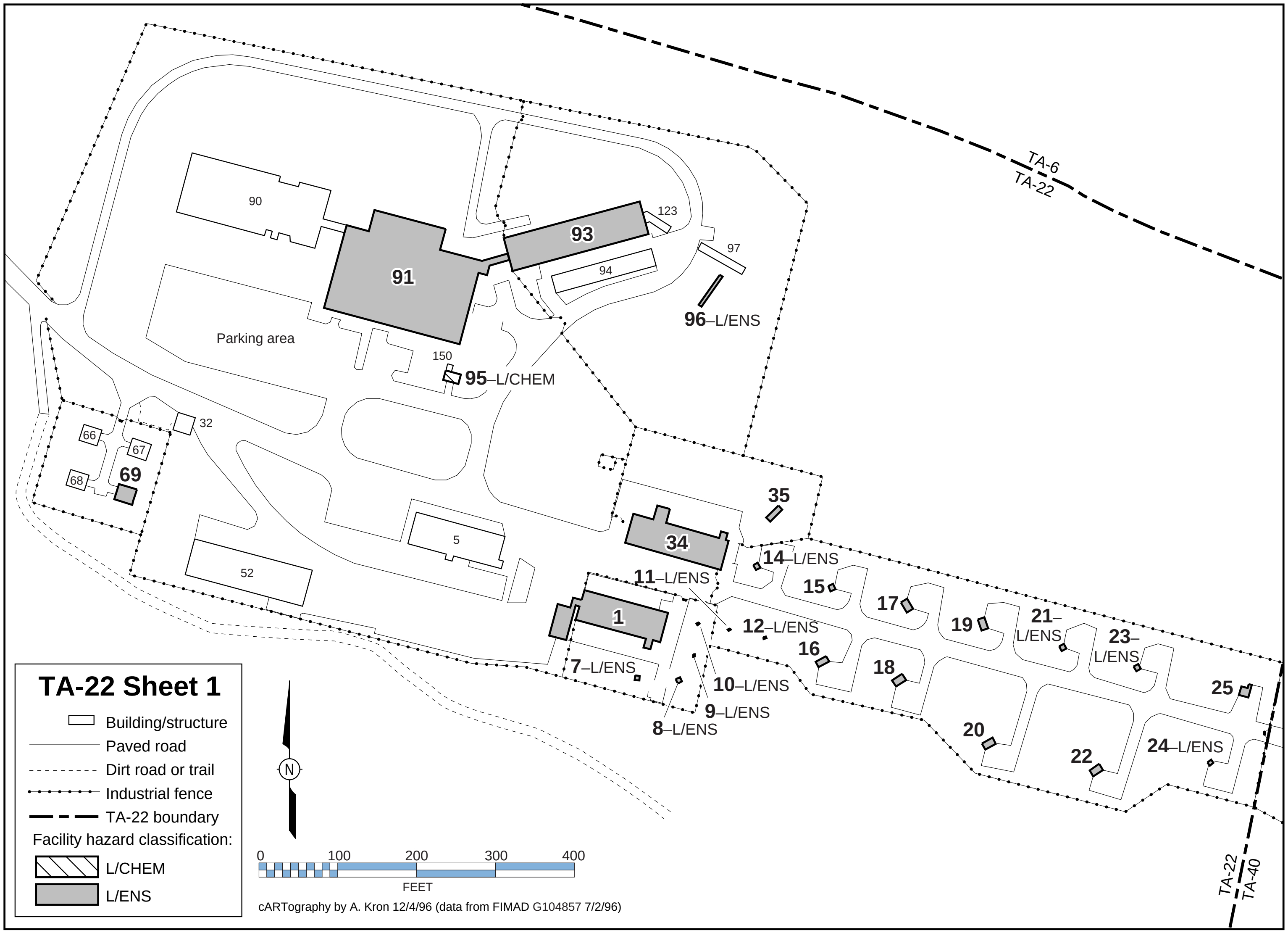


Figure 4-14. Map of TA-22, TD Site—Sheet 1.

4.15 TA-28, Magazine Area A

4.15.1 Site Description

TA-28, Magazine Area A [Table 13 and Figure 4-15 (index map of TA-28)], is an explosive storage area located near the southern edge of TA-16. This site contains five 280-ft^2 (85-m^2) storage magazines (Buildings 1-5).

4.15.2 Facilities Description

4.15.2.1 Facility Hazard Categories

Table 4-13 identifies the facilities at TA-28 that fall into a facility hazard category because of the type of operations performed in the facility.

4.15.2.1.1 Nuclear Facility Hazard Categories

No buildings at TA-28 have been categorized as nuclear facilities.

4.15.2.1.2 Non-Nuclear Facility Hazard Categories

All five of the buildings (Figure 4-15, Sheet 1) at TA-28 are categorized L/ENS. Buildings 1, 2, and 3 are used for storing ammunition and Buildings 4 and 5 for storing HE.

4.15.2.2 Nonhazardous Facilities

TA-28 contains no facilities other than the five categorized L/ENS described in the preceding section.

TABLE 4-13

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-28, MAGAZINE AREA A

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
1	Magazine	High Explosives						X		
2	Magazine	High Explosives						X		
3	Magazine	High Explosives						X		
4	Magazine	High Explosives						X		
5	Magazine	High Explosives						X		

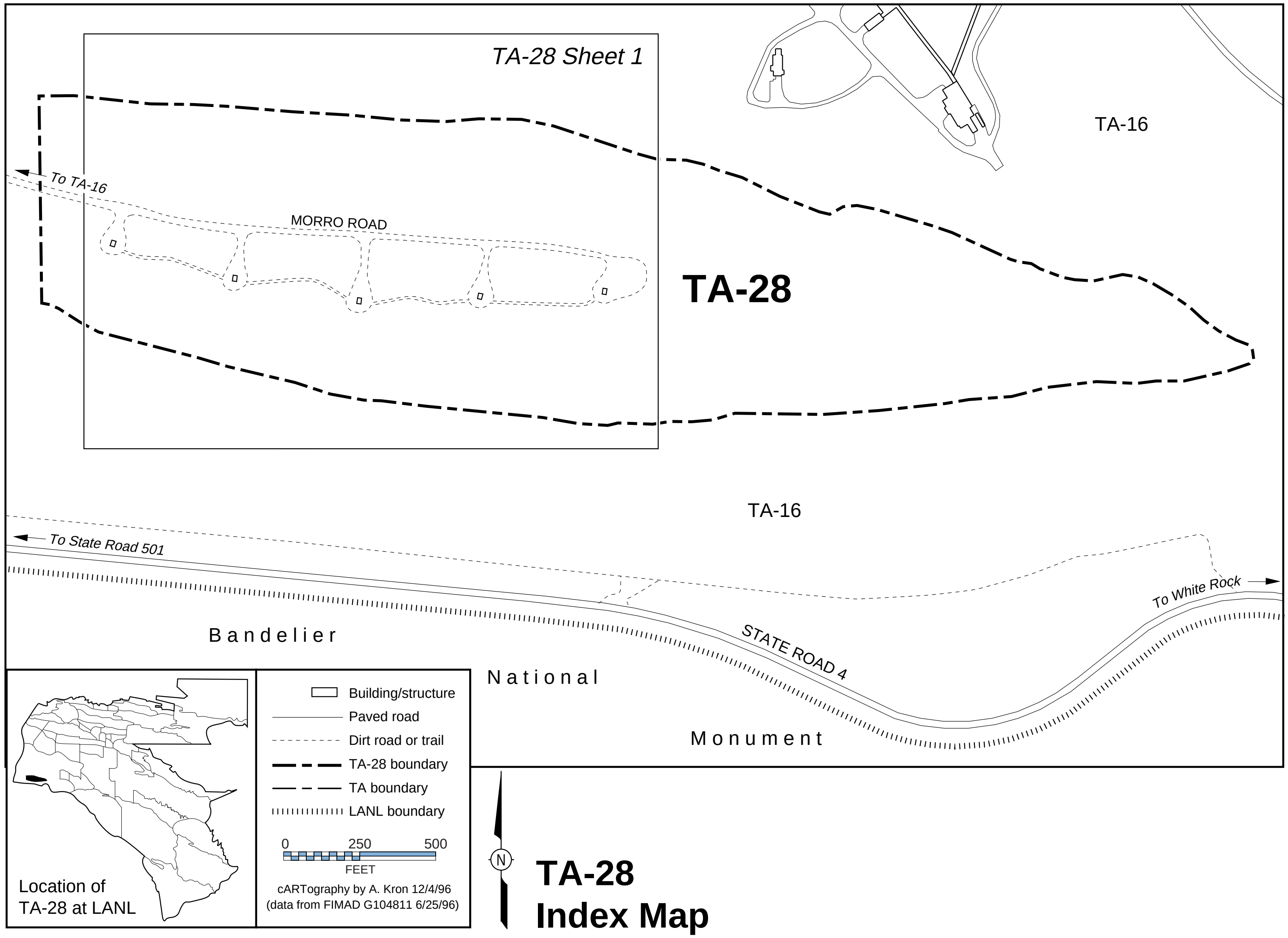


Figure 4-15. Map of TA-28, Magazine Area A—Index Map.

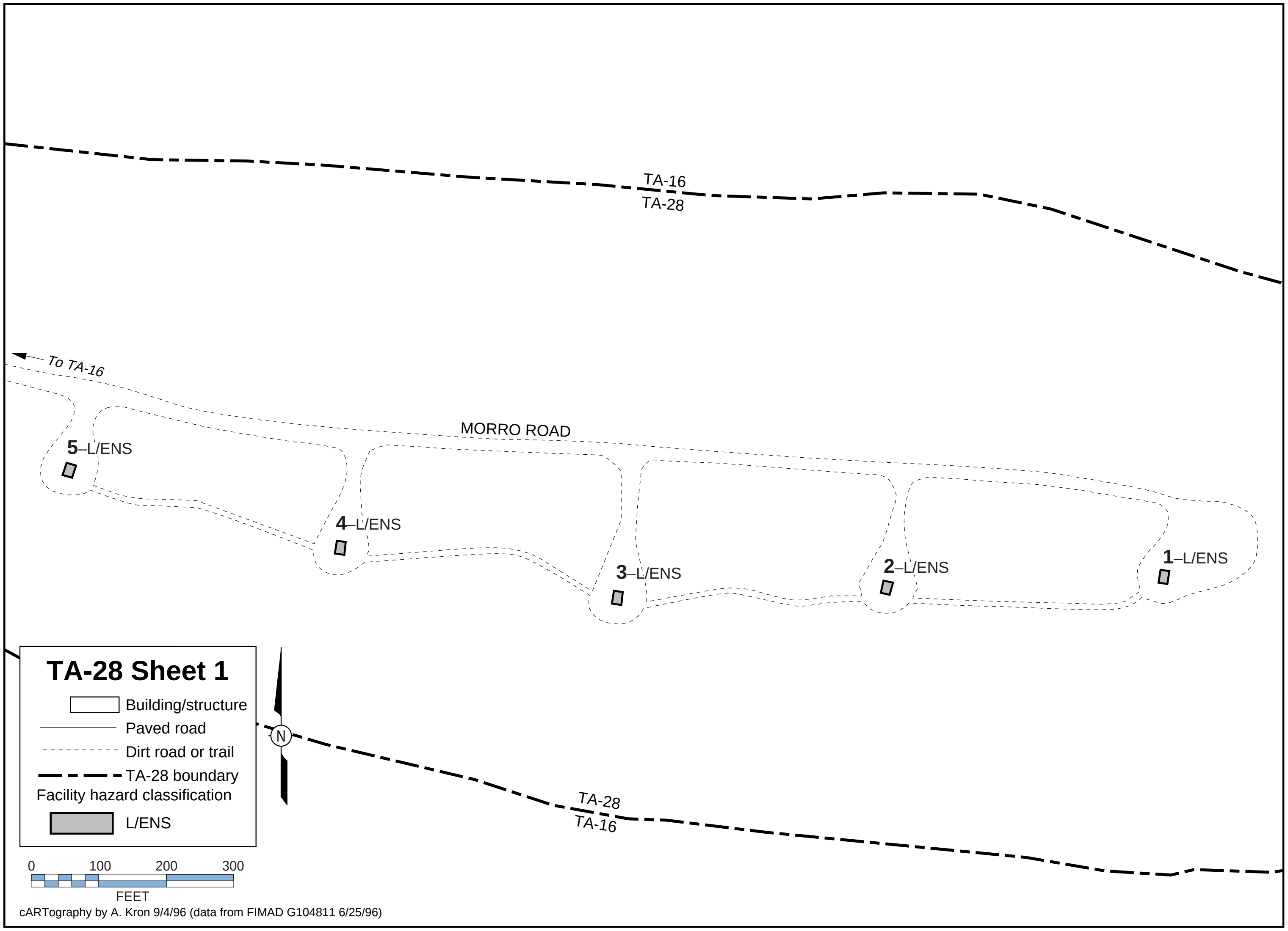


Figure 4-15. Map of TA-28, Magazine Area A—Sheet 1.

4.16 TA-33, HP SITE

4.16.1 Site Description

TA-33, the HP Site [Table 4-14 and Figure 4-16 (index map of TA-33)], is remotely located at the southeastern boundary of the Laboratory and has proven ideal for experiments that do not require daily oversight and for those requiring isolation. An intelligence technology group and the National Radioastronomy Observatory's Very Large Array telescope are located at this site. A guard station controls access to the part of the site that is controlled for security reasons.

4.16.2 Facilities Description

4.16.2.1 Facility Hazard Categories

Table 4-14 identifies the facilities at TA-33 that fall into a facility hazard category because of the type of operations performed in the facility.

4.16.2.1.1 Nuclear Facility Hazard Categories

The old High-Pressure Tritium Laboratory (Building 86), which is being decommissioned, is categorized a Hazard Category 3 nuclear facility because of tritium contamination. The laboratory was constructed in the early 1950s to house tritium-related activities for the Nuclear Weapons Program. The primary capabilities located in this facility were preparing and packaging tritium-containing gas mixtures to meet precise experimental specifications. Programmatic operations were suspended in October 1990. The accountable tritium inventory has been transferred from Building 86, equipment has been moved to satellite storage, and the facility remains in safe-shutdown mode pending approval and funding to proceed with D&D. The operations that used to be conducted at Building 86 have been moved to the WETF at TA-16 (Section 4.11.2.1.1.1.1).

4.16.2.1.2 Non-Nuclear Facility Hazard Categories

Three buildings (Buildings 19, 95, and 114) are categorized L/ENS because of the presence of Class 4 lasers and high-voltage equipment.

4.16.2.2 Nonhazardous Facilities

Eighty-seven administrative/technical, experimental science, and physical support buildings and structures at TA-33 are considered nonhazardous. The majority of the buildings and structures at TA-33 provide physical support and infrastructure.

<u>**TABLE 4-14**</u>

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES
TA-33, HP SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
19	Laboratory and Office Building	Experimental Science						X		
86	High-Pressure Tritium Facility	D&D		X						
95	Transformer Vault	Physical Support						X		
114	Laboratory and Office Building	Experimental Science						X		

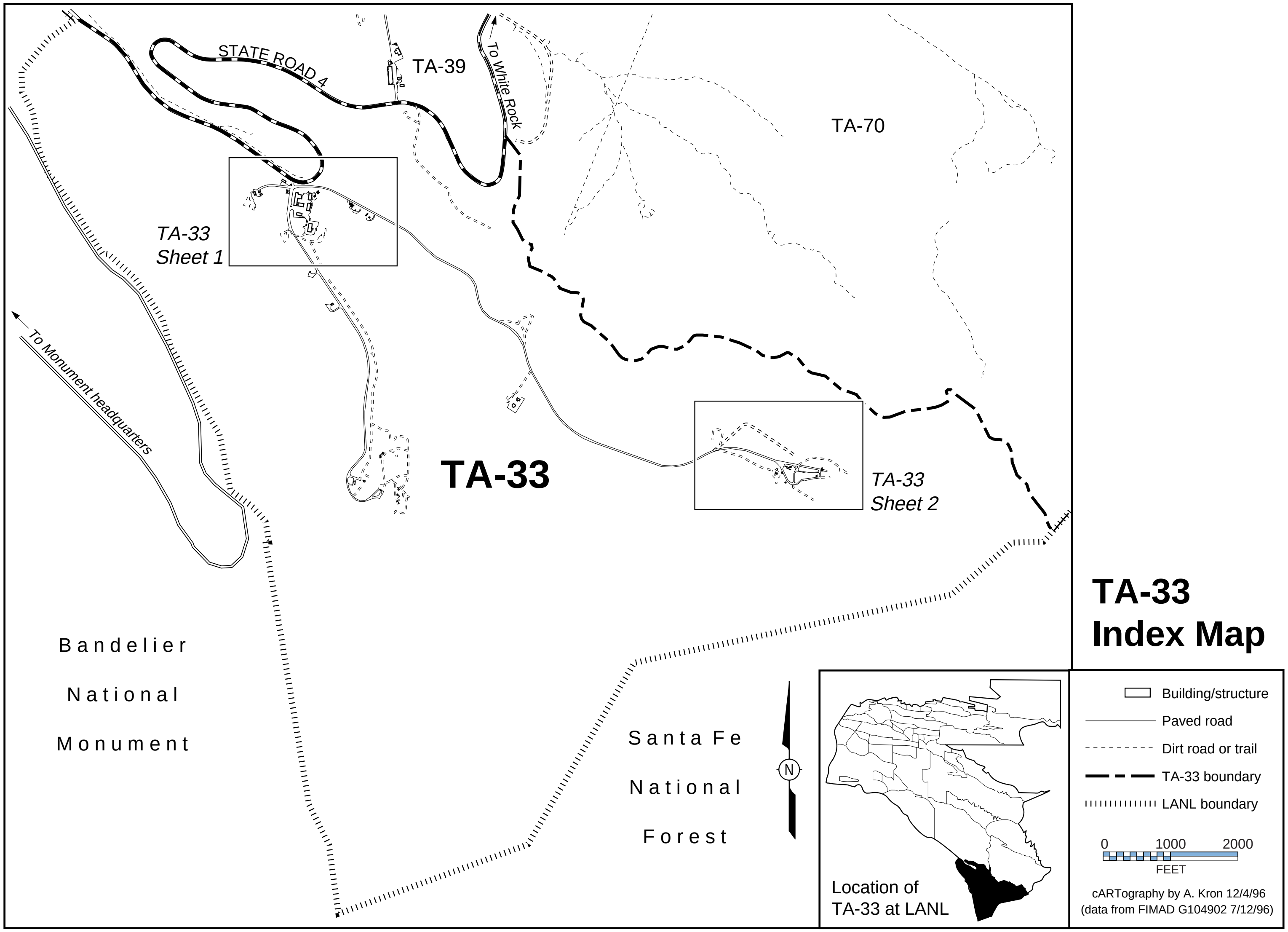
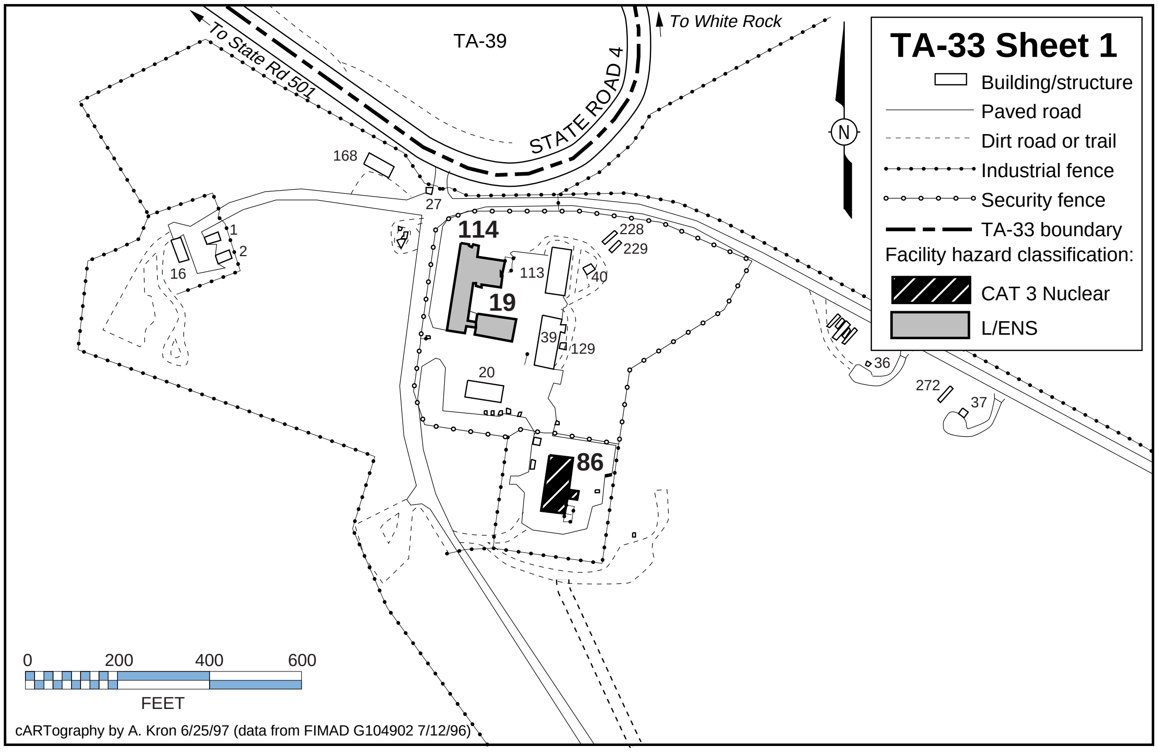


Figure 4-16. Map of TA-33, HP Site—Index Map.



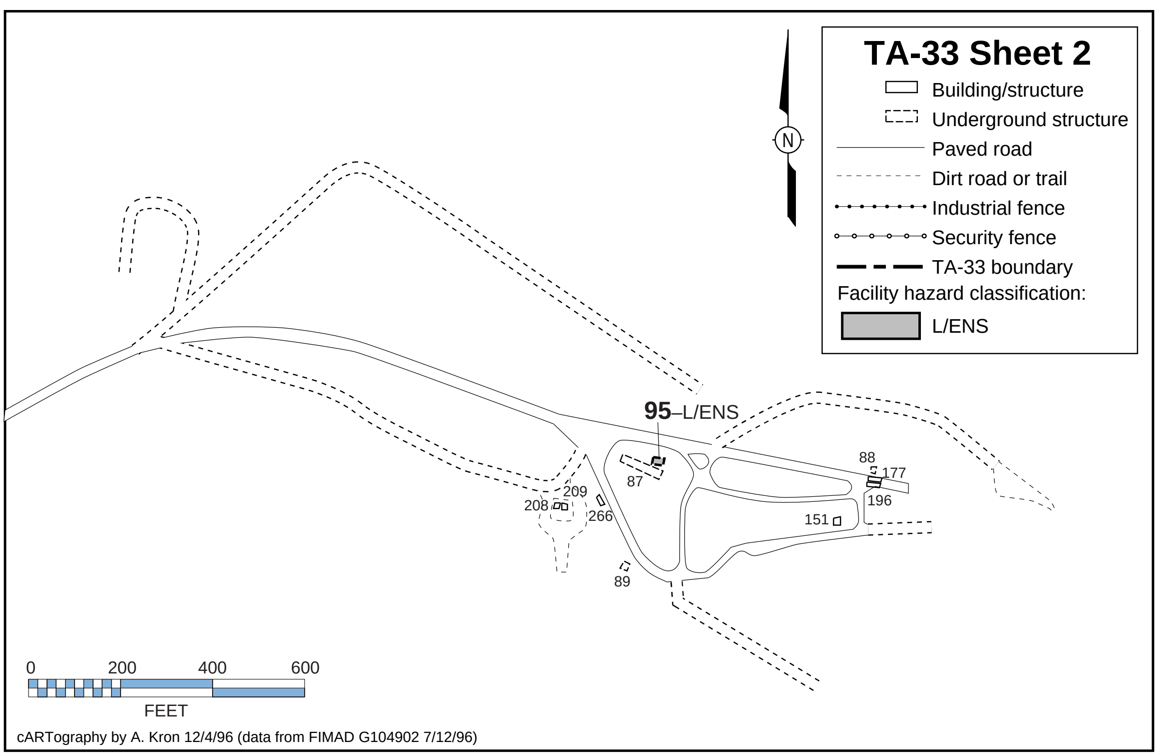


Figure 4-16. Map of TA-33, HP Site—Sheets 1 and 2.

4.17 TA-35, Ten Site

4.17.1 Site Description

TA-35 [Table 4-15 and Figure 4-17 (index map of TA-35)] is used for nuclear safeguards research and development, primarily in the areas of lasers, physics, fusion, materials development, and chemistry research and development. Additional activities include research in reactor safety, optical science, and pulsed-power systems. Metallurgy, ceramic technology, and chemical plating also occur at this site.

4.17.2 Facilities Description

4.17.2.1 Facility Hazard Categories

Table 4-15 identifies the facilities at TA-35 that fall into a facility hazard category because of the type of operations performed in the facility.

TA-35 is the location of the proposed Atlas Facility, which will use portions of existing Buildings 124, 125, 126, 294, and 301. These facilities currently support the National High-Magnetic-Field Laboratory (NHMFL) and other research activities. Atlas operations will require the following major special facilities equipment elements: 1,430-MW generator (existing at TA-35); 80-MW alternating-current to direct-current converter; 50-MJ inductive energy transfer system; 36-MJ capacitor bank; target chamber; and various types of control, diagnostic, and data acquisition equipment. All special facilities equipment and supporting facilities/infrastructure currently meet or will be designed to meet the requirements for a low-hazard facility. Additional information on Atlas can be found in DOE's Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management (DOE 1996).

For the purpose of this document, Buildings 125, 125, 126, 294, and 301 are treated as pulsed-power facilities and are discussed together in the following sections.

4.17.2.1.1 Nuclear Facility Hazard Categories

TA-35 contains two facilities (Buildings 2 and 27) currently categorized as Hazard Category 3 nuclear facilities. The major purpose of both buildings is to support nonproliferation and international security research. Other R&D includes various studies of radiation effects on materials, which are conducted under fusion and ceramic science and technology programs. These buildings are used primarily for R&D, engineering, technology transfer, and training for nondestructive assay related to nuclear safeguards and hazardous materials.

4.17.2.1.1.1 Hazard Category 3 Nuclear Facilities

4.17.2.1.1.1.1 Nuclear Safeguards Research Building

The Nuclear Safeguards Research Building (Building 2, Figure 4-17, Sheet 2) contains approximately 82,000 ft^2 (24,994 m^2) of floor space and is primarily constructed of reinforced concrete and concrete block. The roof is constructed of stressed-concrete T-beams with a built-up roofing system.

The building contains three wings; Wings A and C have basements. Wing A, which contains a high bay with massive reinforced-concrete walls at the east end, is used for the Isotopic Fuels Impact Test Facility, also known as the 7-in. launcher. The 7-in. launcher is used to impact ^{238}Pu heat sources, fuel materials, structural materials, and subassemblies of isotope generators to determine their responses to impacts and the effects on different target materials. Most of the office spaces for Building 2 are located in Wing B. Wing C and the remaining portion of Wing A house two major R&D programs: radiation effects in ceramics and fusion materials. An SNM vault is also provided.

4.17.2.1.1.1.2 Nuclear Safeguards Research Building

Building 27 (Figure 4-17, Sheet 2), which contains approximately 45,000 ft^2 (13,716 m^2) of floor space, is a three-story sheet metal, steel, and concrete block building. Levels 2 and 3 are underground. The roof is supported by steel beams. Some portions of the roof system are composed of sheet metal and others of built-up roofing. The underground areas are enclosed by massive reinforced-concrete walls.

The primary activities in Building 27 are nuclear safeguards research, development, and training, which address new ways of conducting nondestructive analysis (NDA) tests on samples of many different sizes and shapes to determine their uranium and plutonium content. This R&D is supported by electronics development, mechanical design and fabrication, and administrative activities. The main SNM vault is located in the third floor of the building, and an alternate vault is located on the first floor.

All radioactive sources and SNM are encapsulated to prevent any contamination of workers or the facility. The uranium in this facility is singly contained, and plutonium is doubly contained. No nuclear material is processed, and samples remain sealed at all times, including when they are used in instruments. SNM is used as a radiation source for calibrating and testing the performance of prototype and finished instruments, as well as for the Nuclear Safeguards Technology Training Program.

4.17.2.1.2 Non-Nuclear Facility Hazard Categories

4.17.2.1.2.1 Building Categorized M/CHEM

The Target Fabrication Facility (TFF) (Building 213, Figure 4-17, Sheet 1) is located in TA-35, about 1.25 mi (2 km) southeast of the central technical area (TA-3) off Pajarito Road on Pecos Road. It is immediately to the east of TA-55 and directly north of TA-50. TFF is a restricted area surrounded by a security fence with controlled access. At one time, the facility contained tritium. The last of the tritium was removed in 1993.

The two-story structure is approximately 61,000 ft^2 (18,593 m^2) with approximately 48,000 ft^2 (14,630 m^2) of laboratory area and 13,000 ft^2 (3,962 m^2) of office area. In general, the structure is reinforced concrete with isolated concrete floor slabs for vibration-sensitive equipment. The HVAC system maintains a negative pressure in the laboratories, venting both room air and hood exhaust to the atmosphere through filtered and monitored exhaust stacks. Sanitary waste is piped to the sanitary waste disposal plant near TA-46. Radioactive liquid waste and liquid chemical wastes are shipped to TA-50.

The TFF laboratories and shops are specialized to provide precision machining, polymer science, physical vapor deposition, chemical vapor deposition, and target assembly, which are supported by industrial collaborations and energy, environment, nuclear weapons, and conventional defense programs.

Potential hazards related to operations performed at TFF include handling toxic chemical vapors and liquids associated with electroplating and other coating and fabricating processes. The potential for explosions caused by releases of hydrogen or other explosive chemicals exists at this facility.

4.17.2.1.2.2 Building Categorized L/ENV

Building 85 (Figure 4-17, Sheet 1) was originally designed to produce high-energy, high-frequency laser radiation. Several names have been associated with the building (the Mercury Laser Laboratory, the Advanced Laser Laboratory, and the Chemical Laser Laboratory). The building is modified periodically to meet new laser research criteria.

4.17.2.1.2.3 Building Categorized L/RAD

The Air Filter Building (Building 7, Figure 4-17, Sheet 2) is an old filter building that was part of the physical support facilities at TA-35. The ductwork still contains plutonium contamination.

4.17.2.1.2.4 Buildings Categorized L/ENS

4.17.2.1.2.4.1 Pegasus II Facility

The Pegasus II Facility (also called the Laboratory and Office Building) (Building 86, Figure 4-17, Sheet 2), a pulsed power facility, features a capacitor bank consisting of 8 Marx modules that store up to 4.3 MJ of electrical energy. The facility houses experiments in hydrodynamics and radiation transport.

4.17.2.1.2.4.2 Pulsed-Power Facilities

Buildings 124 and 125 (Figure 4-17, Sheet 1) were constructed in 1980 to house the Antares Project, a laser-fusion project. Buildings 294 and 301 were constructed in 1990 as part of a more recent project that uses a 1,430-MVA generator. Currently, these facilities are used to support the NHMFL's Pulsed-Field Facility.

The Pulsed-Field Facility is one of three components of the NHMFL; the other two are at Florida State University at Tallahassee (continuous fields, magnetic resonance, and general headquarters) and the University of Florida at Gainesville (ultralow temperatures at high magnetic fields). The National Science Foundation and the DOE are the primary sponsors of NHMFL.

The Pulsed-Field Facility is a general-user facility, open on a proposal review basis to all researchers who wish to perform experiments in high magnetic fields. The great majority of experiments are directed at studying the materials and physics of condensed matter. In condensed matter and materials research, pulsed fields are useful primarily for reaching higher fields than it is possible to reach with steady-state magnets, which are limited to 2 Tesla for permanent magnets, 20 Tesla for superconducting magnets, 33 Tesla for water-cooled resistive magnets, and 45 Tesla for hybrid magnets (a combination of the superconducting and resistive magnets). [One Tesla is equal to 10,000 oersteds or, in vacuum, 10,000 G. The earth's magnetic field is about 1/4 to 1/2 G.]

This set of facilities is the location of the proposed Atlas Project (Section 4.17.2.1). The NHMFL will continue to use the generator when it is not serving the Atlas Project. A firing site (PT-6) at TA-39 also supports the NHMFL (Section 4.20.2.1.2.2.1).

4.17.2.1.2.4.3 Buildings 124 and 125

Buildings 124 and 125 (Figure 4-17, Sheet 1) have the following special features: Both buildings were designed for large-scale experimental work and both feature high ceilings with heavy-duty gantry cranes that can access the entire interior space. Both buildings were designed to house the power amplifiers and target chamber of a laser fusion facility. To protect the public from the potential hazards of this work, the buildings were constructed with concrete walls and roofs. This type of construction is ideal for a high-energy capacitor bank because shrapnel caused by possible defects will be contained within the building. The walls and ceiling will also contain any diagnostic x-rays produced. Building 124 has an electrically shielded data acquisition room that is protected by a concrete wall. This room satisfies the requirement for a secure site for classified data. Building 125 has a 282-ft^2 (86-m^2) electrically shielded control and data acquisition room. This room satisfies the requirements for machine control and unclassified data acquisition

4.17.2.1.2.4.4 Building 294

Building 294 (Figure 4-17, Sheet 1) is constructed of steel framing with synthetic stucco panels at the east and west ends. The building fills the space between Building 124 to the north and Building 125 to the south and shares the exterior north and south walls of these buildings. The building currently houses the power supply for the Pulsed-Field Facility.

4.17.2.1.2.4.5 Building 301

Building 301 (Figure 4-17, Sheet 1) is a 3,566-ft^2 (1,087-m^2), preengineered steel building set on a concrete pad. The building, which houses a 1,430-MVA generator, has several significant features to isolate generator vibrations from surrounding buildings. The generator and associated controls and alarms currently support the Pulsed-Field Facility.

4.17.2.1.2.4.6 Physics/Laser Building

The Physics/Laser Building (Building 128, Figure 4-17, Sheet 1) is an experimental science laboratory.

4.17.2.1.2.4.7 Trident Laboratory

Trident (Building 189, Figure 4-17, Sheet 1) is a multipurpose laboratory for developing instrumentation and conducting experiments requiring high-energy-laser light pulses. It is operated primarily for inertial confinement fusion research, weapons physics, and basic research and features flexible-driver characteristics and illumination geometries, broad resident diagnostic capability, and flexible scheduling. The facility includes a frequency-doubled, neodymium-glass laser driver; a high-vacuum target chamber; a basic optical and x-ray diagnostic suite; and ancillary equipment and facilities.

4.17.2.1.2.4.8 Experimental Support Building

The Experimental Support Building (Building 207, Figure 4-17, Sheet 1) is an experimental science laboratory.

4.17.2.2 Nonhazardous Facilities

Approximately 123 other facilities at TA-35 are categorized as nonhazardous.

TABLE 4-15

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES TA-35, TEN SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
2	Nuclear Safeguards Research Building	SNM		X						
7	Air Filter Building	Physical Support					X			
27	Nuclear Safeguards Lab	SNM		X						
85	Mercury Laser Facility	Experimental Science								X
86[a]	Laboratory and Office Building (Pegasus II)	Experimental Science						X		
124[b]	Antares Target Hall	Experimental Science						X		
125	Laser Building	Experimental Science					X	X		
128	Physics/Laser Building	Experimental Science						X		
189[a]	Optics Evaluation Lab (Trident)	Experimental Science						X		
207	Experimental Support Building	Experimental Science						X		
213	Target Fabrication	Experimental Science				X				
294[b]	Power Supply Building	Experimental Science						X		
301[b]	Generator Building	Experimental Science						X		

a. DOE added these buildings in October of 1986: Building 86 (Pegasus) and Building 189 (Trident Laser).
b. These three buildings are not currently identified in the ESH-3 listing of hazardous facilities; however, they do contain energy sources that have associated hazards.

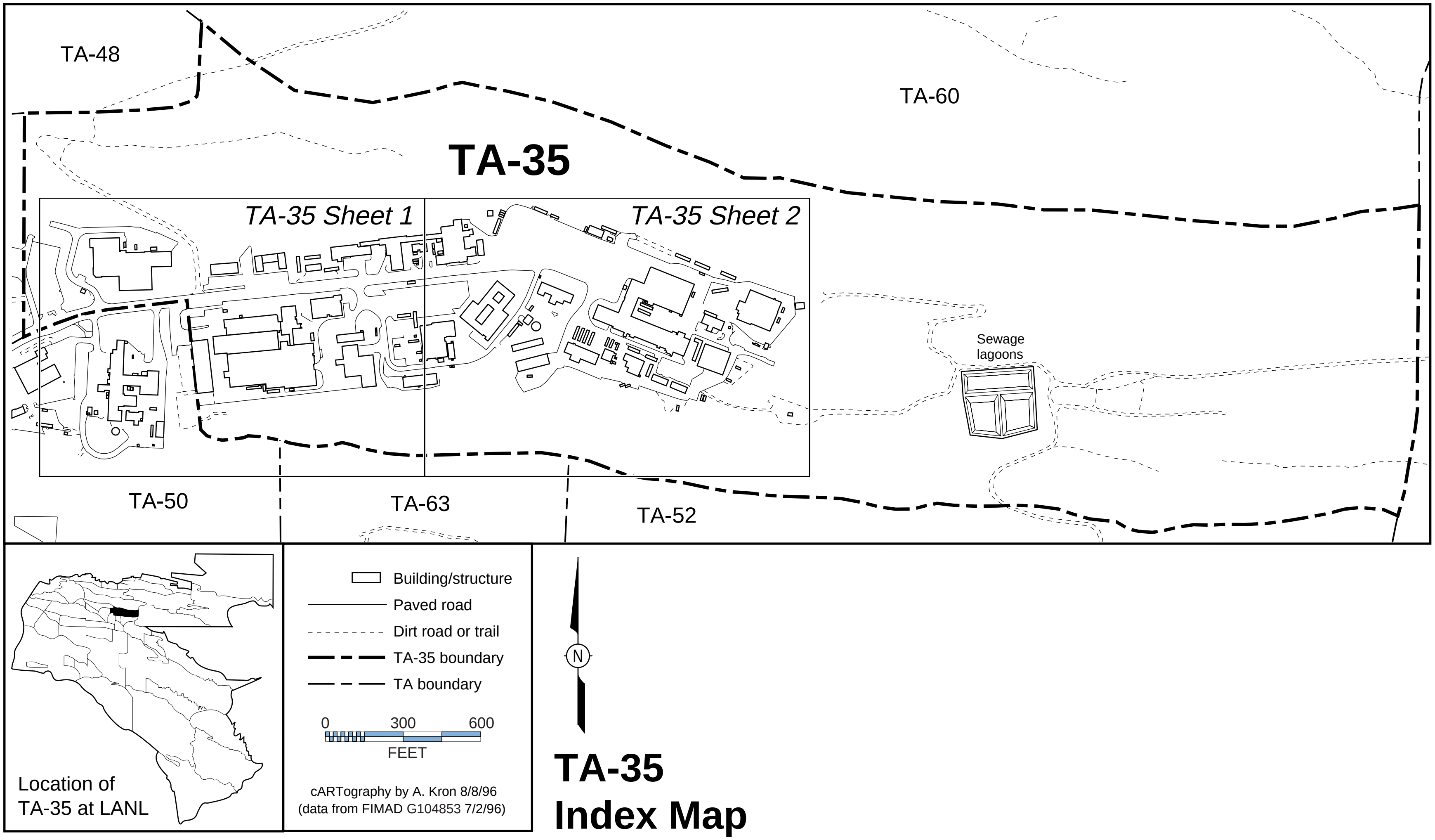


Figure 4-17. Map of TA-35, Ten Site—Index Map.

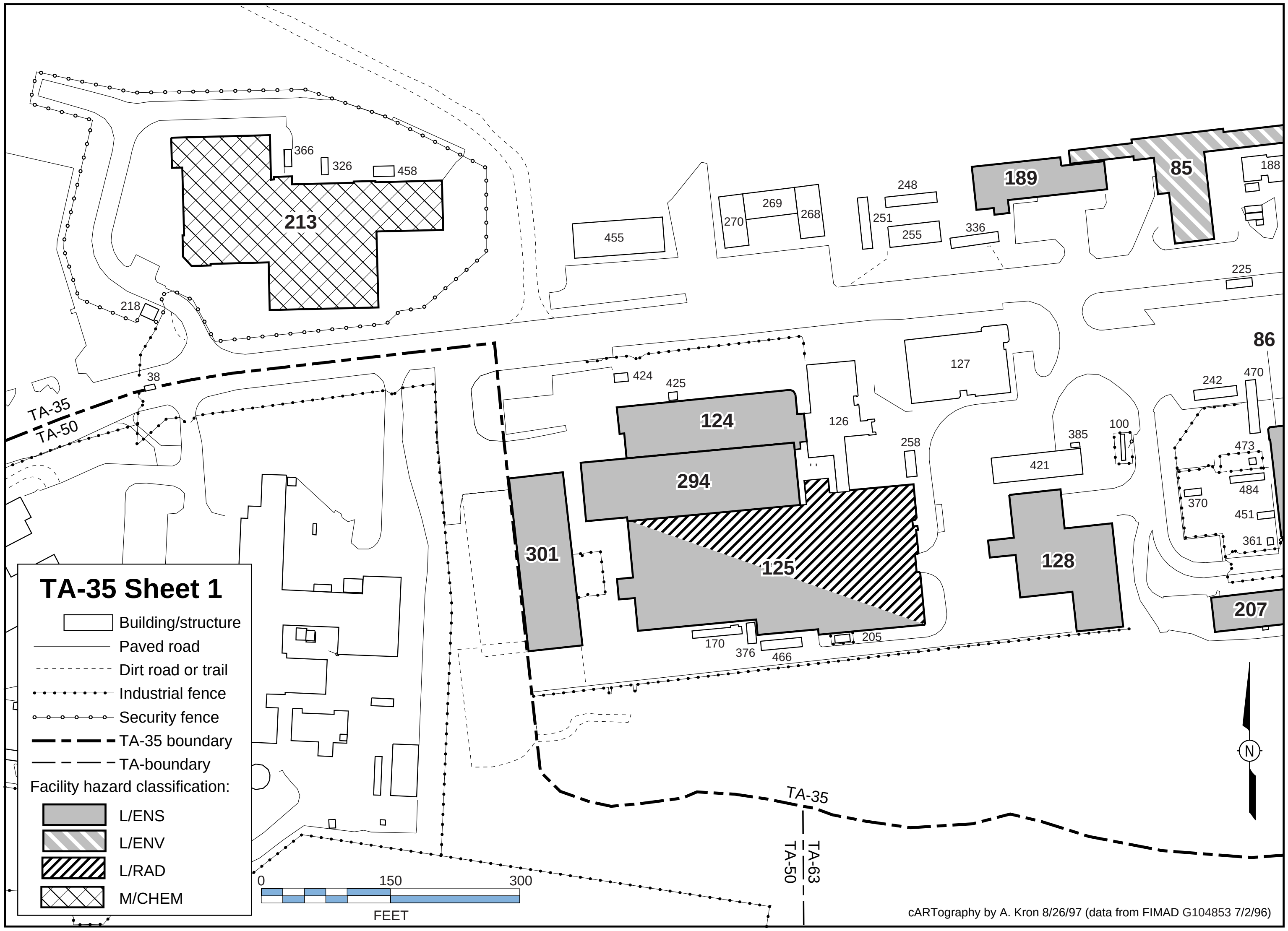


Figure 4-17. Map of TA-35, Ten Site—Sheet 1.

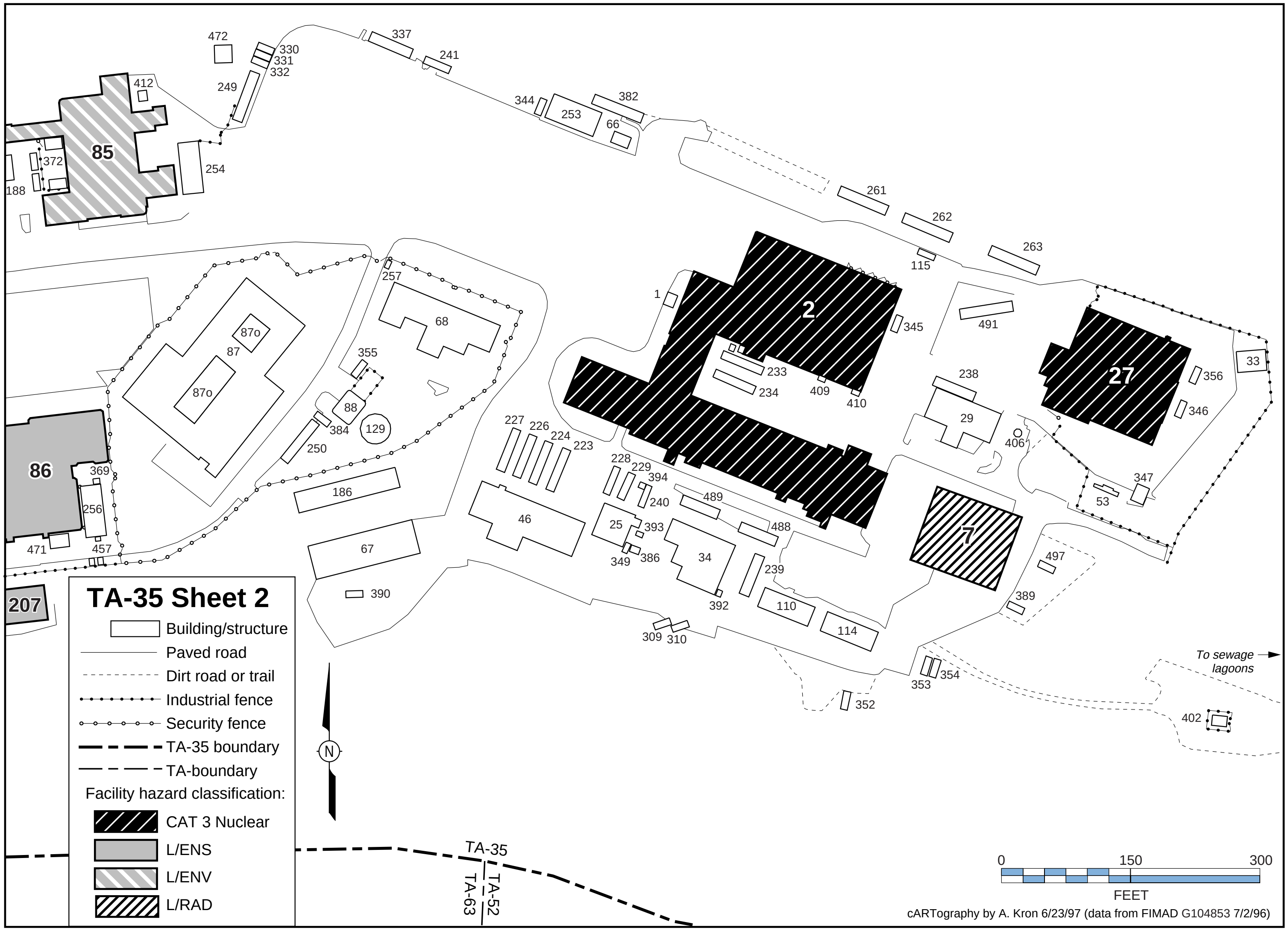


Figure 4-17. Map of TA-35, Ten Site—Sheet 2.

4.18 TA-36, Kappa Site

4.18.1 Site Description

TA-36 [Table 4-16 and Figure 4-18 (index map of TA-36)] has four active firing sites that support explosives testing. The sites and associated buildings are used for a wide variety of non-nuclear ordnance tests for DoD, which include tests of warhead designs during development, armor and armor-defeating mechanisms, explosives vulnerability to projectile and shaped-charge attack, warhead lethality, and tests to determine the effects of shock waves on explosives and propellants. TA-36 is located in a remote area that is fenced and patrolled. Warning signs are provided at roadblocks, and sirens and flashing lights warn of imminent testing and firing.

4.18.2 Facilities Description

The facilities at TA-36 accommodate shipping, receiving, transporting, and testing HE. Hazards in this technical area include explosives and propellants, warheads, projectiles fired from guns, depleted uranium, radiation from various x-ray systems, and normal industrial hazards from handling and transporting materials. (These hazards do not warrant categorization as moderate-, high-, or nuclear hazard facilities.) Operations at TA-36 include

- developing diagnostic techniques for high-explosives characterizations and applications,
- conducting scaling studies that consist primarily of work on subscale models for firing tests,
- testing special armor/antiarmor that consists of chemical energy warhead tests and kinetic energy projectile tests,
- testing nuclear weapons components,
- testing large- and small-bore guns,
- testing special-application warheads and developing and calibrating computer models based on test results, and
- conducting insensitive munitions research that uses special techniques to evaluate fragmentation of military bombs.

4.18.2.1 Facility Hazard Categories

Table 4-16 identifies the facilities at TA-36 that fall into a facility hazard category because of the type of operations performed in the facility.

4.18.2.1.1 Nuclear Facility Hazard Categories

No buildings at TA-36 are categorized as nuclear facilities.

4.18.2.1.2 Non-Nuclear Facility Hazard Categories

A variety of diagnostic equipment is available at the four firing sites: four 2.3-MeV, six 600-keV, four 450-keV, and twelve 150-keV flash radiographic systems are available. Rotating-mirror streak cameras with 20-mm/µs writing speed, image-intensifier cameras with 10-ns shutter times, a combination streak and 2-million-frame-per-second framing camera, other framing cameras, and high-speed digitizers are available for use at all firing sites. Nanosecond-resolution, time-interval meters, and digital delay units are installed at each firing site.

Only one of the buildings (Building 86) discussed below is categorized as L/RAD; the rest are L/ENS. For the purpose of clarity, Building 86 is discussed below with its associated firing site. Buildings 3, 4, 5, 7, 9, 10, 11, 12, 55, 82, and 83, all of which are used for preparing and storing HE, are categorized as L/ENS. The more significant among these are described below.

4.18.2.1.2.1 Buildings Characterized L/ENS

4.18.2.1.2.1.1 Eenie Site

The Eenie Site (Buildings 3 and 4, Figure 4-18, Sheet 2) has the only aboveground bunker at TA-36. This bunker allows the use of a variety of optical and electronic diagnostics. Belowgrade bunkers at TA-36 are used to protect 35-mm streak cameras, which observe the test device through a periscope. Image-intensifier cameras, a 70-mm streak camera, a combination streak camera with a 2-million-frame-per-second framing camera, and a laser velocimeter are routinely available at this site as needed for specific tests. The Eenie Site primarily performs small-bore (less than 100 mm) gun tests against conventional, ceramic, and reactive armors; shaped-charge jet tests against conventional, ceramic, and reactive armors; diagnostic experiments to determine shaped-charge jet physics; deflagration-to-detonation experiments; detonation physics experiments; and studies in explosives vulnerability to projectile and shaped-charge attack. The site has a load limit of 2,000 lb (907 kg) of HE. The Eenie Control Building (Building 3) and the Eenie Preparation Building (Building 4) are categorized as L/ENS.

4.18.2.1.2.1.2 Meenie Site

Meenie Site (Building 5, Figure 4-18, Sheet 2) is a general-purpose firing site usually configured to perform large-bore (105-mm, 120-mm, 5-in., and 7-in.) gun tests. Numerous diagnostic experiments are performed to help define the characteristics of shaped-charge jet physics, deflagration-to-detonation experiments, and explosives vulnerability to projectile and shaped-charge attack. Primary diagnostics include portable, low-resolution flash radiography and electrical timing and pressure measurements rather than optical observations. Meenie Site is the primary site for weapons components tests that require the use of a 35-mm smear camera. The site has a load limit of 2,000 lb (907 kg) of HE. Minie Site has also been granted a permit for treating explosive and explosive-contaminated material. The Meenie Preparation Building (Building 5) is categorized as L/ENS.

4.18.2.1.2.1.3 Minie Site

The Minie Site (Building 7, Figure 4-18, Sheet 2) is also a general-purpose firing site used primarily for shaped-charge jet tests against conventional, ceramic, and reactive armors. Some deflagration-to-detonation experiments and studies to determine explosives vulnerability to projectile and shaped-charge attack are performed at Minie Site when the primary diagnostics required by the customer are low-resolution flash radiography or electrical timing and pressure measurements rather than optical systems. Minie Site also serves as the backup site when scheduling conflicts preclude the use of the Meenie Site. Tests on destroying explosives and chemicals are also performed at the Minie Site. The site has a load limit of 2,000 lb (907 kg) of HE. The Minie Preparation Building (Building 7) is categorized as L/ENS.

4.18.2.1.2.1.4 Lower Slobbovia

Lower Slobbovia (Buildings 11, 12, and 86; Figure 4-18, Sheet 4) is a multipurpose site. It contains an upper firing site with instrumentation that is virtually identical to that found at the Minie Site. The primary diagnostics used here are optical, electrical timing, and pressure. The explosive load limit for the upper site is 5,000 lb (2,268 kg).

A 1,000-ft (305-m) sled track is also located at Lower Slobbovia. In the current configuration and the present sled design, the facility is capable of developing payloads of up to 100 lb (45.4 kg) to velocities slightly above Mach 1. With a moderately redesigned sled, velocities approaching Mach 2 and sled weights up to 1,000 lb (453.6 kg) should be possible. It is also possible to increase the track length to 2,000 ft (610 m). At that length, multirocket motor sleds could accelerate payloads of several hundred pounds above Mach 2. The use of large rocket motors, greater than the 5-in.- (12.7-cm-) diameter motors currently used, is anticipated. The diagnostics currently available at the target end of the sled track include flash x-ray, time interval meters, digital delay modules, high-speed movie capability, four independent capacitive discharge units, rotating-mirror combination streak and framing camera, and image intensifier camera.

The Lower Slobbovia control buildings (Buildings 11 and 12) are categorized as L/ENS. Mo (Building 9, Figure 4-18, Sheet 3), a magazine, is also located at this site and is categorized as L/ENS. Two additional magazines are categorized as L/ENS: Building 10 (Magazine) and Building 83 (Promo Magazine).

4.18.2.1.2.2 Building Categorized L/RAD

The Pulsed Intense X-Ray Facility (PIXY), an 8-MeV flash radiographic facility (Building 86, Figure 4-18, Sheet 4), is also located at Lower Slobbovia adjacent to the target end of the sled track. The PIXY machine enables low-to-medium resolution, deep-penetration radiography to be performed on a variety of conventional, ceramic, and reactive targets. PIXY will be fully integrated with the sled track and with the large-bore gun range located parallel and adjacent to the sled track to enable deep-penetration radiography to be performed in a variety of dynamic experiments.

4.18.2.2 Nonhazardous Facilities

The rest of the facilities at TA-36, consisting of HE storage, general storage, HE testing, and administrative/technical areas, house activities considered to be nonhazardous.

TABLE 4-16

FACILITIES THAT FALL INTO NUCLEAR AND NON-NUCLEAR HAZARD CATEGORIES TA-36, KAPPA SITE

Facility Number	Building Name	Operations Category	Nuclear Facilities Hazard Categories		Non-Nuclear Facility Hazard Categories					
			Cat. 2	Cat. 3	M/RAD	M/CHEM	L/RAD	L/ENS	L/CHEM	L/ENV
3	Eenie Control Building	High Explosives						X		
4	Eenie Preparation Building	High Explosives						X		
5	Meenie Preparation Building	High Explosives						X		
7	Minie Preparation Building	High Explosives						X		
9	Mo Magazine	High Explosives						X		
10	Magazine	High Explosives						X		
11	Lower Slobbovia Preparation Building	High Explosives						X		
12	Lower Slobbovia Control Building	High Explosives						X		
55	Control Building	High Explosives						X		
82	Daisy Preparation Building	High Explosives						X		
83	Promo Magazine	High Explosives						X		
86	PIXY Facility	High Explosives					X			

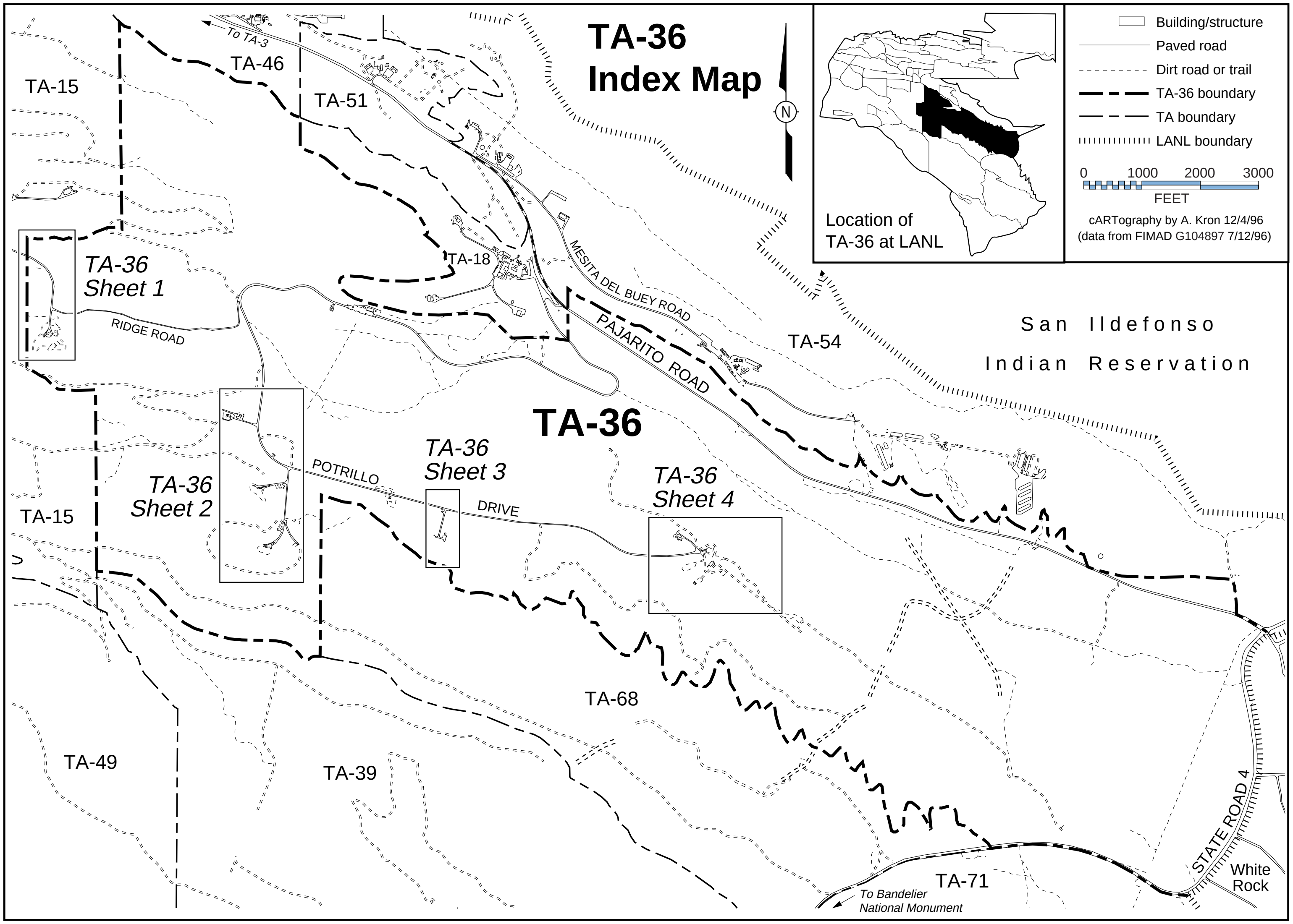


Figure 4-18. Map of TA-36, Kappa Site—Index Map.

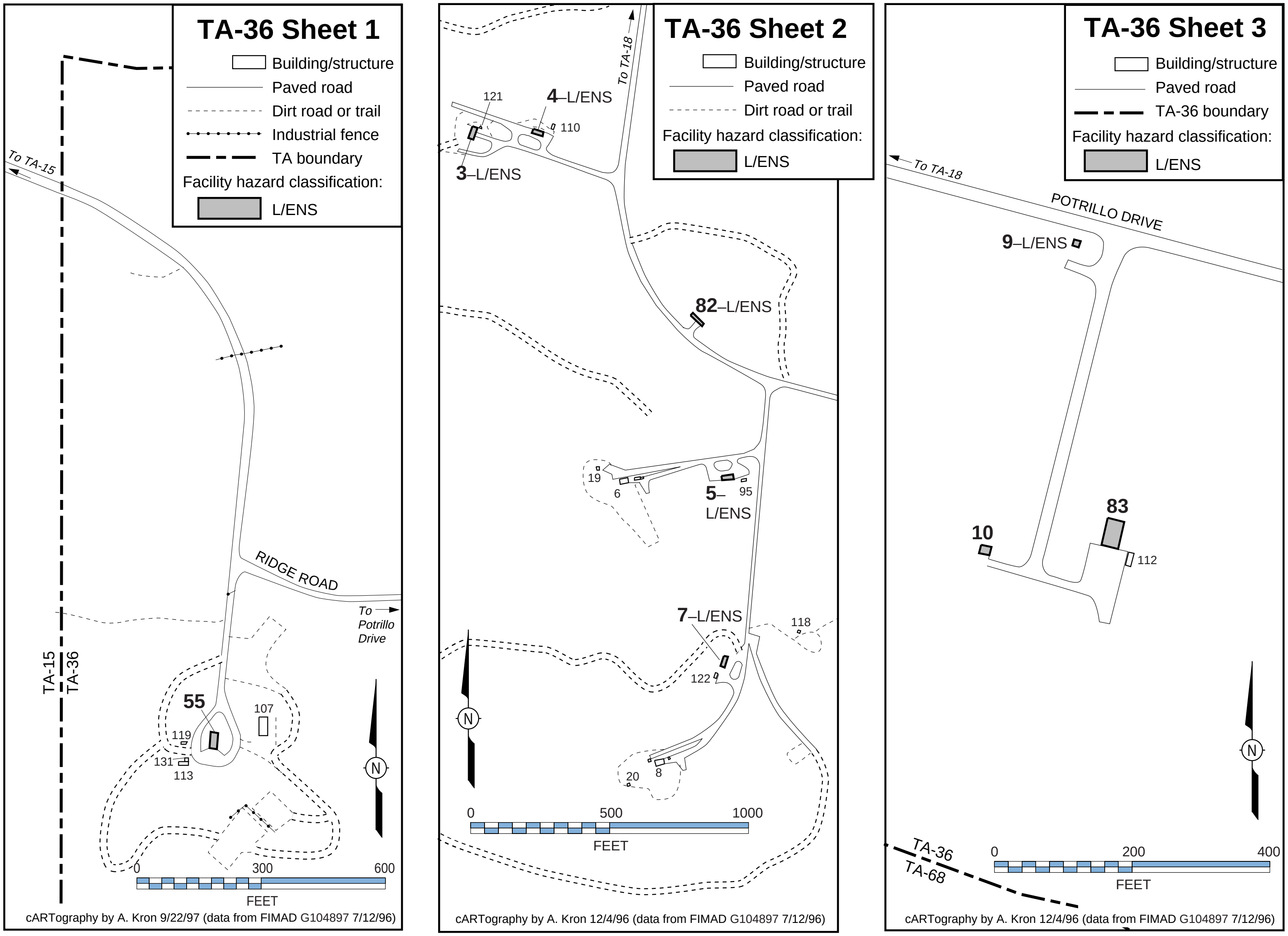


Figure 4-18. Map of TA-36, Kappa Site—Sheets 1, 2, and 3.

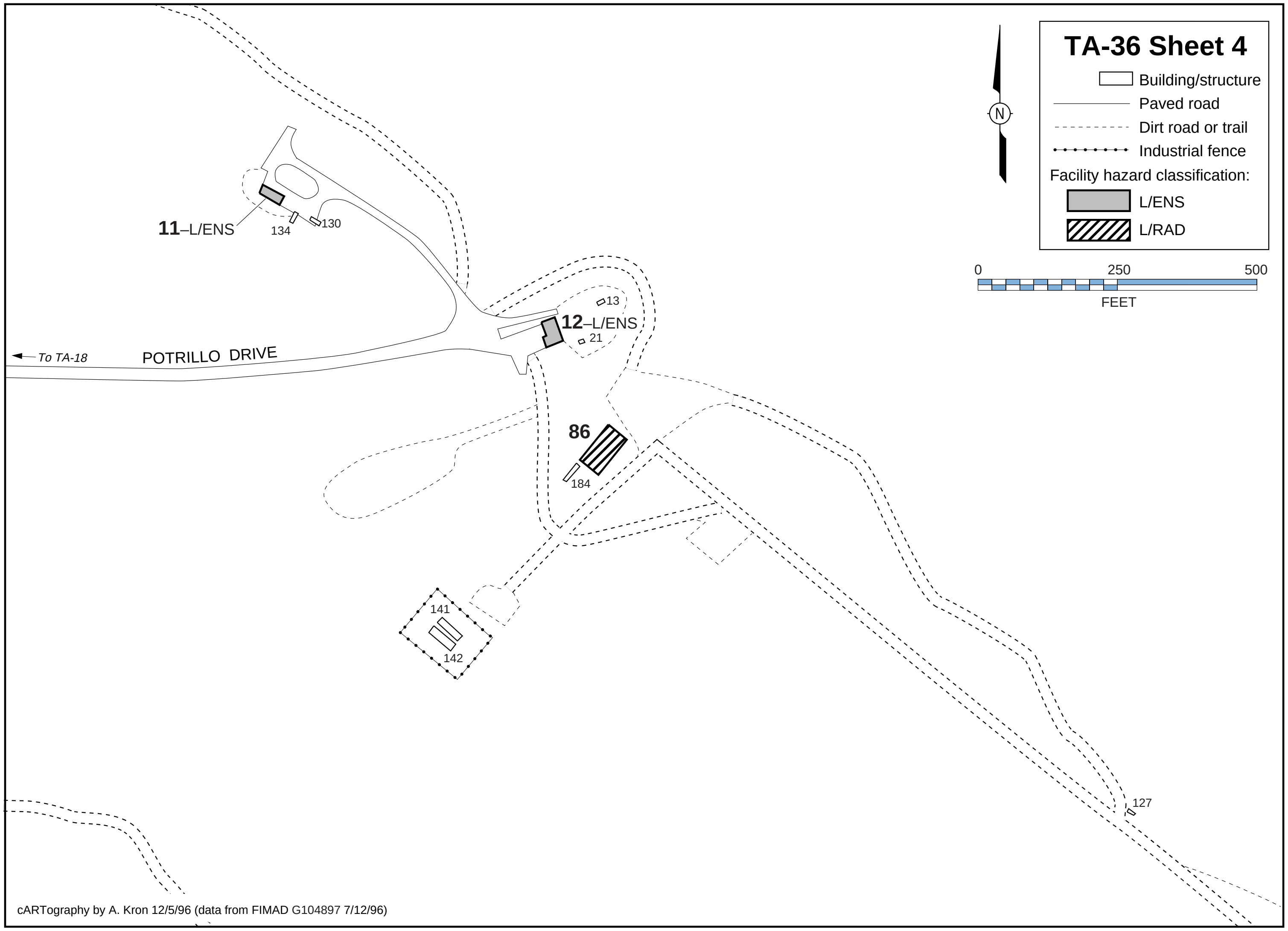


Figure 4-18. Map of TA-36, Kappa Site—Sheet 4.