DOE-EA-1250

ENVIRONMENTAL ASSESSMENT

FOR THE PROPOSED

STRATEGIC COMPUTING COMPLEX

Los Alamos National Laboratory
Los Alamos, New Mexico

Date Prepared: December 18, 1998

Prepared by: US Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico

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LIST OF ACRONYMS

ADT	average daily trip
ASCI	Accelerated Strategic Computing Initiative
CFR	Code of Federal Regulations
CMR	Chemistry and Metallurgy Research Building
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIS	environmental impact statement
FONSI	Finding of No Significant Impact
FY	fiscal year
GPD	gallons per day
GPM	gallons per minute
GPY	gallons per year
kV	kilovolt
LAC	Los Alamos County
LANL	Los Alamos National Laboratory
LDCC	Laboratory Data Communications Center
mgy	million gallons per year
MW	megawatt of electricity
NEPA	National Environmental Policy Act
NISC	Non-Proliferation and International Security Center
ppm	parts per million
SCC	Strategic Computing Complex
SSM	Stockpile Stewardship and Management
SWEIS	Site-Wide Environmental Impact Statement
SWSCP	Sanitary Wastewater Systems Consolidation Plant
TA	Technical Area
TeraOp	trillion floating point operations per second (1×10^{12})
U.S.	United States
WTA	West Tech Area

EXECUTIVE SUMMARY

DOE is proposing to construct and operate the Strategic Computing Complex (SCC) within the Los Alamos National Laboratory Technical Area -3 located at Los Alamos, New Mexico. The SCC purpose and need would be to support the Stockpile Stewardship and Management (SSM) Program through providing an integrated system of computer processors capable of performing at 50 trillion floating point operations per second. DOE's SSM Program provides an integrated technical program for maintaining the continued safety and reliability of the nuclear weapons stockpile, without underground nuclear testing. As an alternative to underground testing, and due to the aging of nuclear weapons beyond original expectations, DOE must develop a means to verify the transportation, safe storage, and reliability of nuclear weapons. Without nuclear weapons testing, computer simulations that can perform highly complex three-dimensional large-scale calculations have become the only means of integrating the complex processes that occur in the life span of a nuclear weapon. Although the primary function of the SCC would be to support the SSM Program, it would provide predictive modeling and simulation in other crucial scientific and technological areas. For example, the effort to solve large-scale and complex problems, such as global climate prediction and impact assessment, and disaster planning and management could be accelerated.

As proposed, the SCC would be a 267,000-square-foot building designed as a state-of-the-art facility for housing computer processors capable of performing at the 50-TeraOp level. Approximately 300 employees would occupy the SCC. Of the 300 employees, approximately 20 would be new hires and the rest relocated from other facilities within TA-3.

The SCC and associated expansion of existing satellite parking areas are proposed for construction and operation in heavily developed areas within TA-3 containing little or no suitable habitat for most plant and animal species. The SCC would use approximately 63 million gallons of water a year in the computer cooling process. However, the SCC Project has pledged not to cause any net increase in the Los Alamos National Laboratory's water usage when the facility becomes operational. In order to meet this commitment, the SCC Project would use recycled sanitary wastewater effluent from the TA-46 Sanitary Wastewater Systems Consolidation Plant. Due to regional power supply limitations, electrical load shedding procedures may be implemented during periods of high peak electrical demand. The power requirements are an institutional, Los Alamos County, and northern New Mexico concern that both the Los Alamos National Laboratory site-wide and the Conveyance and Transfer Environmental Impact Statements are addressing as a potential cumulative impact and are therefore, not discussed in the SCC Environmental Assessment.

1.0 PURPOSE AND NEED FOR AGENCY ACTION

1.1 Introduction

The *National Environmental Policy Act of 1969* (NEPA) requires federal agencies to consider the environmental consequences of proposed actions before decisions are made. In complying with NEPA, the United States (U.S.) Department of Energy (DOE) follows the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1500-1508) and DOE's own NEPA implementing procedures (10 CFR 1021). The purpose of an Environmental Assessment (EA) is to provide DOE with sufficient evidence and analysis to determine whether to prepare an Environmental Impact Statement (EIS) or issue a Finding of No Significant Impact (FONSI). In this case, the DOE decision to be made is whether to construct and operate the Strategic Computing Complex (SCC) and associated satellite parking areas within the Los Alamos National Laboratory (LANL) Technical Area (TA)-3 at Los Alamos, New Mexico (Figures 1.1-1, and 1.1-2). The SCC would be a facility designed to house and operate an integrated system of computer processors capable of performing approximately 50 trillion floating point operations per second (TeraOp), in support of the Stockpile Stewardship and Management (SSM) Program Record of Decision (61 *Federal Register* 68014).

The objectives of this EA are to (1) describe the baseline environmental conditions at the proposed SCC site location and satellite parking areas, (2) analyze the potential effects to the existing environment from construction and operation of the SCC and satellite parking areas, and (3) compare the effects of the Proposed Action to the No Action Alternative. In addition, the EA provides DOE with environmental information that could be used in developing mitigative actions to minimize, or avoid, impacts to the integrity of the human environment and natural ecosystems should DOE decide to proceed with construction and operation of the SCC. Ultimately, the goal of NEPA and this EA is to aid DOE officials to make decisions based on understanding the environmental consequences.

1.2 Background

In response to direction from the President of the United States and Congress, DOE has developed its SSM Program to provide a single, highly integrated technical program for maintaining the continued safety and reliability of the nuclear weapons stockpile. Without underground nuclear weapons testing and no new-design nuclear weapons production, DOE expects existing nuclear weapons to remain in the nation's stockpile well into the next century. Because these weapons will age beyond original expectations, an alternative to underground nuclear testing must be developed to verify the transportation and storage safety and reliability of the weapons.

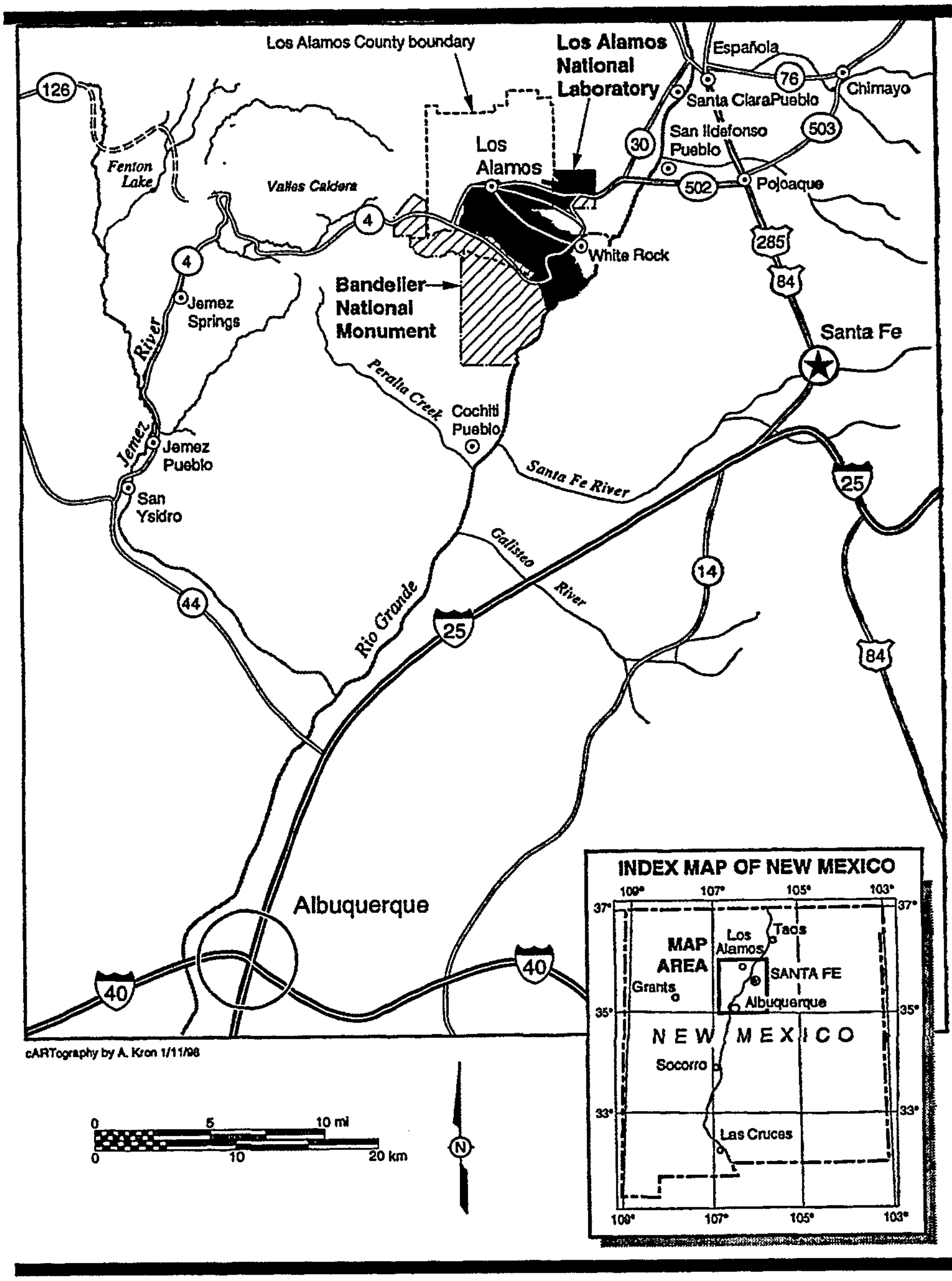

Figure 1.1-1 - ***Regional Location of Los Alamos National Laboratory***

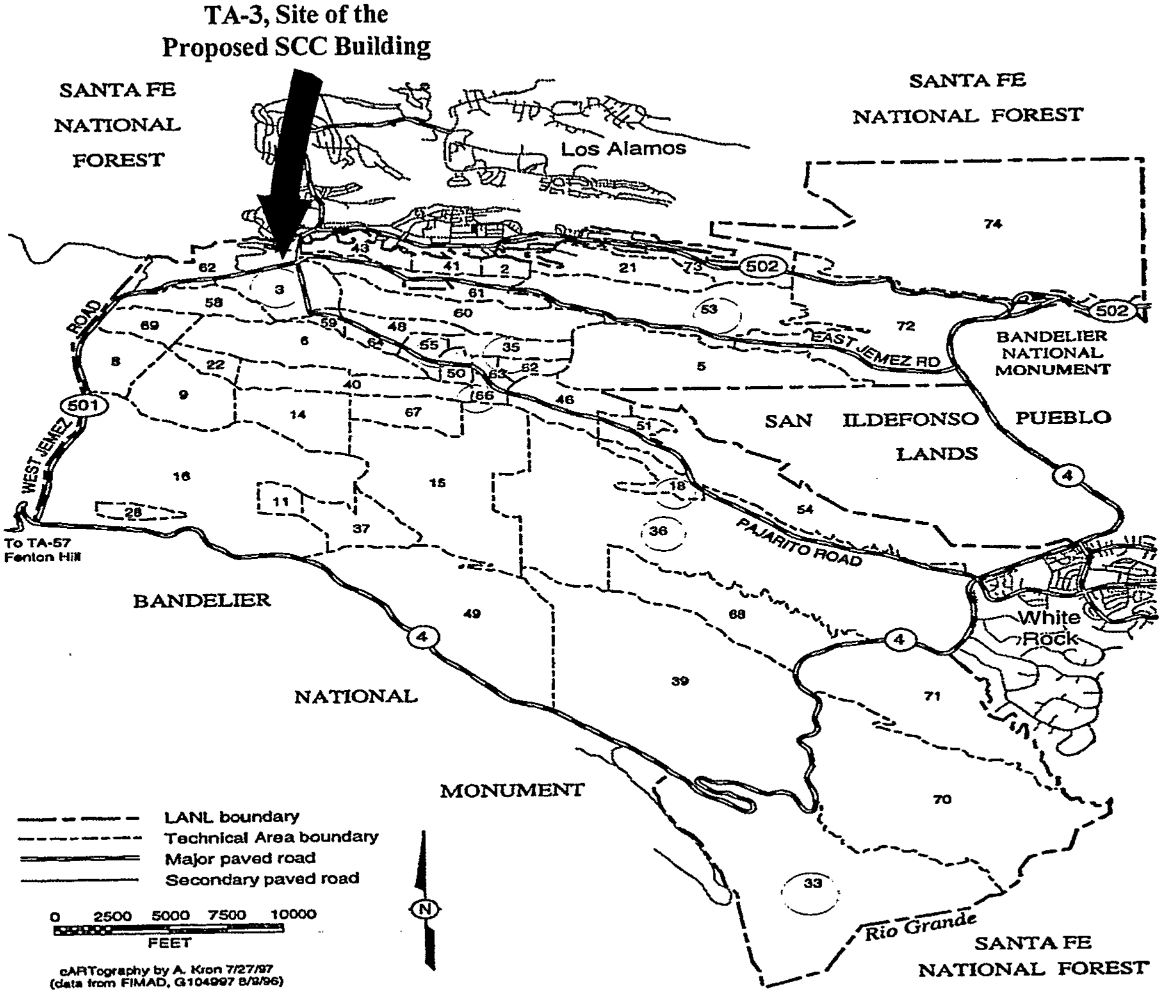

Figure 1.1-2. ***—Map of LANL Technical Areas Showing the Proposed Location of the SCC at TA-3.***

To meet these new challenges, DOE's science-based SSM Program has been developed to increase understanding of the basic aging phenomenon associated with nuclear weapons, to provide better predictive understanding of the transportation and storage safety and reliability of nuclear weapons, and to ensure a strong scientific and technical basis for future U.S. nuclear weapons policy objectives (DOE 1996a).

Without nuclear weapons testing DOE will rely on improved experimental capabilities coupled with an improved computational capability. Computer simulations have become the only means of integrating the many complex processes that occur in the life span of a nuclear weapon. Large-scale calculations are now the primary tools for estimating nuclear yield and evaluating the safety of the aging weapons in the nuclear stockpile. Aging effects may introduce small, three-dimensional defects in nuclear weapons components. The continued certification by each of DOE's three national laboratories (Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratories) of the safety and reliability of the aging stockpile depends upon the ability to perform highly complex, three-dimensional computer simulations. DOE has estimated that assessing the transportation and storage safety, and performance of the nuclear stockpile will require computation power 100,000 times greater than that required to design new weapons. The schedule to implement this technical requirement can only be accomplished efficiently via computer processors capable of performing at 50 TeraOps (a TeraOp is a trillion floating point operations per second) and greater. DOE has recognized that 1990's computing capabilities at its three national laboratories, while extremely advanced, is still inadequate to meet these enhanced requirements in support of the SSM Program. As stated in the 1996 Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management, the continued viability of all three DOE nuclear weapons laboratories will be essential in addressing the challenges of maintaining a safe and reliable nuclear weapons stockpile without nuclear testing and without new-design weapons.

In early 1998, an announcement was made by the President regarding the next step in the DOE's effort to develop the supercomputers of the 21st century. The "Path Forward" will emphasize the use of computers and simulation capabilities to keep the United States nuclear weapon stockpile safe, secure, and reliable without nuclear testing. Private companies in the U.S. will build the supercomputers for delivery to the DOE; the DOE's three national laboratories will develop technologies (e.g., computer software and simulation codes) necessary to certify confidence in the safety and reliability of the enduring nuclear weapons stockpile. The Path Forward is jointly administered by the DOE's three national laboratories, each of which will continue their individual historic roles in providing computing applications in support of the SSM Program. The Path Forward project is part of the Accelerated Strategic Computing Initiative (ASCI) to develop the simulation capability needed for stockpile stewardship. One of the four primary ASCI strategies is to create seamless management ---one program, three labs. ASCI would be executed at each of the three national laboratories under a single program and each laboratory would collaborate on development and share hardware and software resources.

The DOE's long-term goal is to develop a computer system capable of performing 100 TeraOps by 2004. The Path Forward project will develop technologies to interconnect tens of thousands of advanced commodity processors, providing the collective computing power of at least 30 TeraOps to begin with. As all of the computer hardware and software will be newly created, the DOE's long-term goal of 100 TeraOps functional capability will, by necessity, be achieved by a series of technologically pathbreaking hardware "platforms" at each of the three nuclear weapons laboratories, being developed and employed in a phased-evolution approach. The DOE has already achieved Path Forward milestones in the development of a 1 TeraOps machine in 1996; a 3.9 TeraOps machine in 1998; and a contract has been awarded to develop a 10 TeraOps machine by 2000. The Path Forward currently focuses on interconnect technology, data storage technology, as well as systems software and tools for large scale computing systems. These technologies were selected as the technologies that are most critical to construction of a 30 TeraOp machine by 2001(DOE 1998a).

Although the primary function of ACSI will be to support the SSM Program, it would provide predictive modeling and simulation in other critical scientific and technological areas. The effort to solve large-scale and complex problems such as global climate prediction and impact assessment, and disaster planning and management could be accelerated. Benefits would not be limited to the U.S. but would provide international value, e.g., in the development of a more accurate scientific foundation for international agreements in such areas as setting standards for carbon dioxide emissions (LANL 1998b).

1.3 Purpose and Need for DOE Action

DOE's SSM Program provides an integrated technical program for maintaining the continued safety and reliability of the nuclear weapons stockpile, without underground nuclear testing. As an alternative to underground testing, and due to the aging of nuclear weapons beyond original expectations, DOE must develop a means to verify the transportation, safe storage, and reliability of nuclear weapons. Without nuclear weapons testing, computer simulations that can perform highly complex three-dimensional large-scale calculations have become the only means of integrating the complex processes that occur in the life span of a nuclear weapon. Each facility is responsible for the certification of the weapons originally designed by that Laboratory. The DOE needs to significantly enhance its exiting computer system capabilities at each of its three national weapon's laboratories (Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratories) in order to fulfill its prime stewardship mission to ensure the safety, reliability, and performance of the nation's nuclear weapons stockpile, without underground nuclear testing.

1.4 Scope of This EA

This SCC NEPA analysis considers the potential impacts of constructing a building to house equipment for upwards of a 50-TeraOp computing capability at LANL. At construction completion, the SCC would have mechanical and electrical equipment installed to support a range of 30 TeraOps to about 50 TeraOps. Equipment for 30 TeraOps capability would be installed initially with approximately 50 TeraOps being the ultimate short term operating goal. While computing capability is expected to evolve to greater than a 50-TeraOp capacity, DOE has not yet made a programmatic decision to pursue that level of operation. As stated in Section 1.2, the DOE's goal of 100 TeraOp computing capability by the year 2004 would be expected to proceed in stages with each successive platform building upon the knowledge gained through installation and operation of the one before.

A sliding-scale approach as outlined in *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements* (the "Green Book"), is the basis for the analysis of potential affects in this EA (DOE 1993). The key element of this approach entails focusing on environmental issues in proportion to their potential effects. That is, certain aspects of implementing the construction and operation of the SCC have a greater potential for environmental effects than others and, therefore, are discussed in greater detail in the EA. Chapters 1.0, 2.0, and 3.0 are intended to provide sufficient detail so that the reader may understand the selection of subject categories and their corresponding level of affect analysis provided in Chapter 3.0, Affected Environment and Environmental Consequences. For example, a highly detailed effects analysis of ecological resources is not warranted because the SCC and satellite parking areas are proposed for construction and operation in heavily developed areas containing little or no suitable habitat for most plant and animal species.

The effect analysis in this EA considers the cumulative effects resulting from implementation of the construction and operation of the SCC and reasonably foreseeable future actions with potentially similar impacts. Cumulative affects on the environment result from the incremental affects of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes other actions. Cumulative affects can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7).

2.0 DESCRIPTION OF ALTERNATIVES

Section 2.1 describes the Proposed Action for the EA that would allow DOE to meet its purpose and need for agency action. The No Action Alternative is presented in Section 2.2 as a baseline for comparison with the consequences of implementing the Proposed Action. Alternatives that were considered but were not analyzed further in this EA are discussed in Section 2.3, and related actions are identified in Section 2.4.

2.1 Proposed Action—Design, Build, and Operate the Strategic Computing Complex at TA-3, LANL

DOE proposes to design, construct, and operate the 267,000-square-foot (24,800 square-meter) SCC at TA-3 at LANL. The SCC would be designed as a state-of-the-art facility housing an integrated system of computer processors capable of performing at about the 50-TeraOp level in support of the ASCI (Figure 2.1–1). At construction completion in the year 2002, the facility would have mechanical and electrical equipment installed to support about 30 TeraOps and evolve quickly to 50 TeraOps. Several companies are being considered to provide SCC computers, each having markedly different approaches and designs. The computer-room cooling system is planned to be adaptable for air-cooled or water-cooled computers, or a combination of both types; the SCC would be designed with the flexibility to accommodate either technology. Approximately 300 nuclear

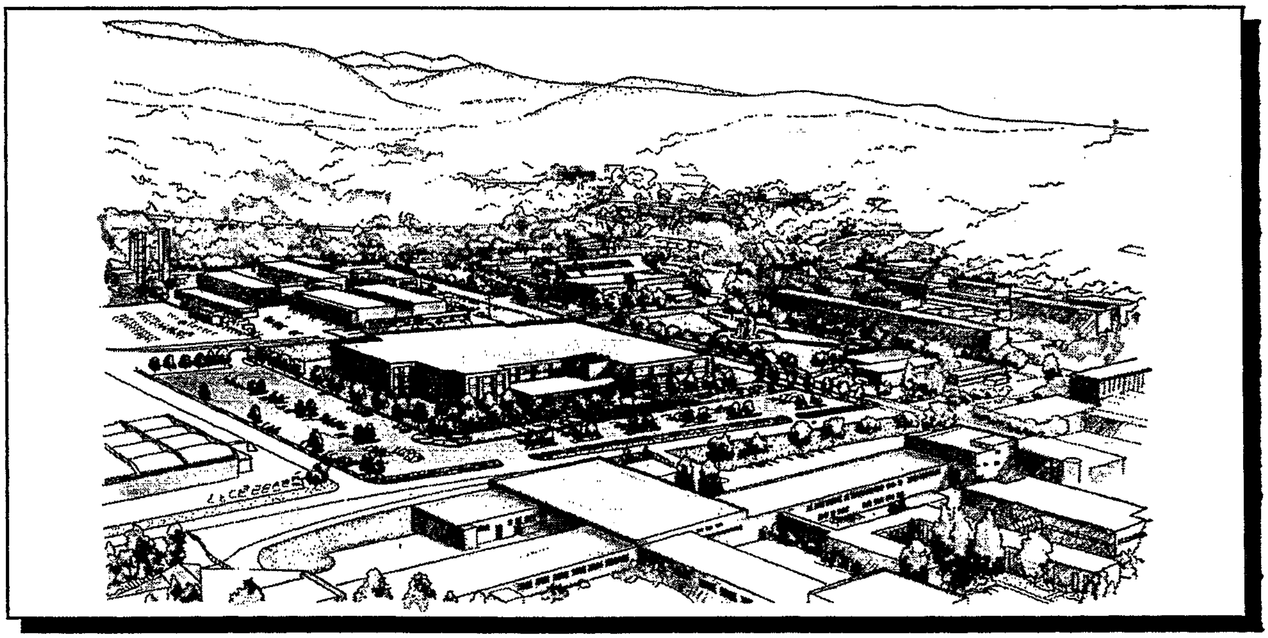

Figure 2.1–1.—*Conceptual Design of the SCC Located Within TA-3.*

weapons designers, computer scientists, code developers, and university and industrial scientists and engineers would occupy the complex. Of the 300 people, approximately 20 may be new hires; the rest of the personnel would be relocated from other facilities within TA-3, primarily the Laboratory Data Communication Center (LDCC) and Administrative Building. SCC construction is proposed for 1999 with completion and operation in 2002.

LANL already has an extensive computer capability consisting of the LDCC, Central Computing Facility and Advanced Computing Laboratory facilities. As proposed, the SCC would be the cornerstone of the integrated laboratory campus and, with the LDCC, Central Computing Facility, and Advanced Computing Laboratory, would form the center for high-performance computing at LANL.

The SCC would house the 50-TeraOp computing platform, which would also be fully connected to the Central Computing Facility for data storage and to the LDCC for communications, data storage, and production computing not associated with the ASCI via underground cables. The high-performance data-storage technology required by the SCC would evolve in the LDCC as the SCC becomes operational. The machine room in the LDCC would be connected via fiber-optic links to the SCC, and the LDCC would house the tera-bytes of data storage needs of the SCC TeraOp computing platform. In this manner, simulation laboratory space in the SCC will be maximized. The LDCC would continue to be the center for telephone, video, and data communications operations at LANL. Eventually, the LDCC would become fully populated with high-performance data-storage systems in support of SCC operations.

The Central Computing Facility, the oldest computing facility at LANL, would continue to house business computing systems, non-ASCI related production computing systems, and active and archival data storage needs for the near future. Additionally, it would maintain many of the day-to-day functions required in a major computing environment, such as output printing capabilities; information storage, retrieval, and archiving; and other required functions. Over time, the Central Computing Facility would be phased out as functions are transitioned or are no longer required.

The Advanced Computing Laboratory would continue to support high-performance computation and computer science initiatives at LANL. The Advanced Computing Laboratory would remain a key asset for future advanced computational research and development.

2.1.1 Proposed SCC Location

The proposed location for the SCC is within an existing parking area at TA-3 that is bounded by four roadways: Pajarito Road along the eastern side, Mercury Road to the south, Bikini Atoll Road to the west, and Parry Road to the north (see Figure 2.1–2). During construction, the approximately 900 existing parking spaces would be unavailable for use. The parking area would be required for construction material and equipment storage and used for SCC pre-assembly activities. After construction, approximately half of the existing parking spaces would be permanently lost due to the SCC footprint and associated security buffer zone; however, six different locations currently used for vehicle parking would be expanded. Additionally, Parry Road and Pajarito Road between its intersections with Mercury Road and Parry Road would be permanently closed due to SCC security restrictions and parking lot expansion. A decommissioned vehicular service station located at the northernmost portion of the site would be demolished. A complex of three transportable office buildings, situated at the center of the proposed site, would be decommissioned and removed from the site. The proposed SCC site is otherwise paved with base course (gravel) and asphalt and bounded by concrete sidewalks, curbs, and gutters.

2.1.2 Facility Description and Operations

The proposed SCC Facility would be a three-story structure with the first floor, because of sloping site characteristics, below ground level on the westside and above grade on the eastside. Cast-in-place concrete would form the buildings perimeter walls. The first floor would consist of mechanical and electrical support space for the second floor computer complex. Offices, simulation laboratories, co-laboratories, a powerwall, visualization laboratory, and the computer complex would be on the second and third levels.

Floor construction for the second floor computer complex would consist of a 2-foot (0.6-meter) raised floor over a fully perforated concrete slab, which would allow for air movement between the mechanical system below and computer area above. The computer area would measure over 43,500 square feet (4,000 square meters) of clear-spanned area (no support columns present). The computer-room cooling system would be adaptable for either air-cooled or water-cooled computers, or a combination of both types. The SCC computer floor area is designed to accommodate two adjacent TeraOp-scale computers. This design would allow for repairs or change out of computer hardware without experiencing shutdown on existing operating units. The computer floor area is designed without obstacles (no columns, walls, or other obstructions) that may limit the ability to configure systems in the most efficient way or to install new hardware as it is delivered. The third floor would house simulation laboratories, offices, co-laboratories, and a division office for both classified and unclassified groups (Figures 2.1-3 and 2.1-4). In addition to the simulation laboratories, two theaters, one in a classified area and one in an unclassified area, would provide data presentation capabilities. These theaters would have overhead projection and wrap-around features supporting the latest virtual-reality and viewing environments. A powerwall theater in the secure environment would provide high-resolution back-projection technology. The SCC would also house an auditorium that would accommodate up to 250 people, a 40-person conference room, and on each floor smaller 20 person conference rooms.

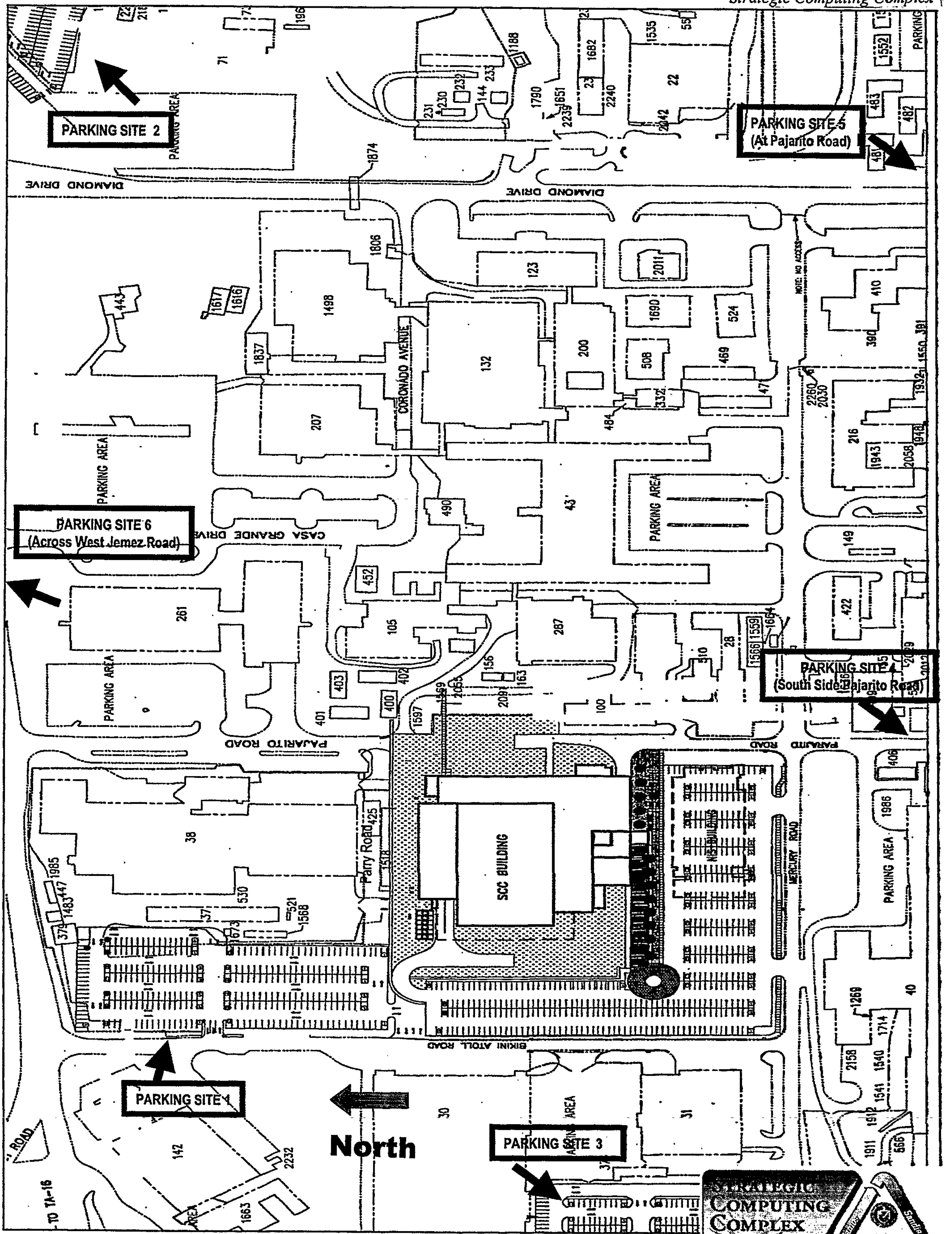

Figure 2.1 - 2: Proposed SCC Technical Area 3 Location and Satellite Parking Areas

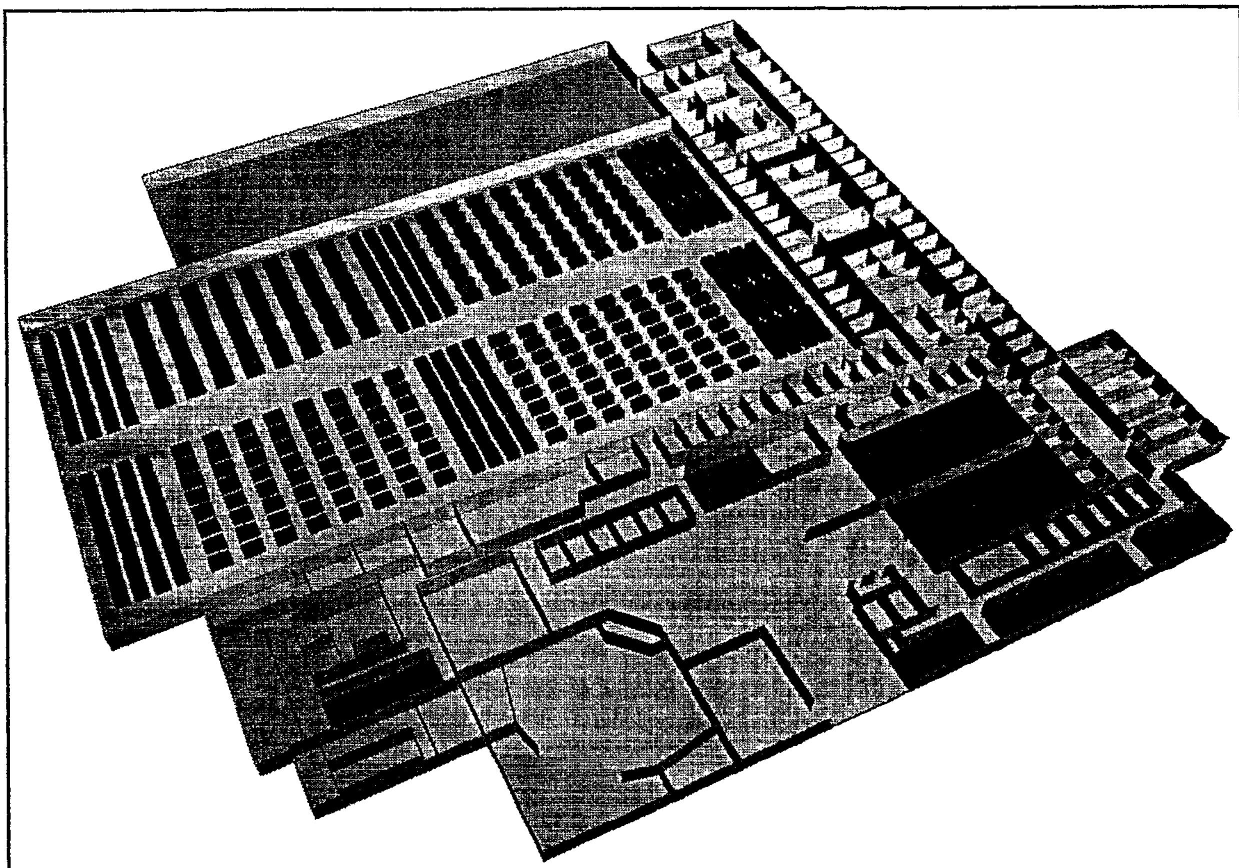

Figure 2.1–3.—*Strategic Computing Complex Second Floor Plan.*

The physical space required for the data storage equipment would be dictated by the space necessary to accommodate the automated tape libraries used to store data on magnetic media. Square footage estimates vary considerably depending on assumptions made about the evolution of data storage technology and presumed breakthroughs, e.g., optical tape. Current engineering estimates are that the archival storage would require floor space distributed between the LDCC and the Central Computing Facility.

The SCC would have the capabilities to enable users at remote sites to use LANL's TeraOp computer. Furthermore, the co-laboratories and theaters would be equipped for distance operations. With these capabilities, the SCC would allow collaborations between weapons designers and engineers across the entire DOE weapons complex.

Computer operations would be performed 24 hours per day with personnel occupying the control room to support computer operation activities during prime business hours from approximately 7 a.m. until midnight each weekday and on weekends as necessary (Figure 2.1–4). They would be linked by computer to storage operations and software support personnel to help resolve difficult problems or manage unusual situations. Operations that would be conducted consist of office-type activities, light laboratory work such as the assembly and disassembly of computer and support equipment, and computer operations and maintenance. Only normal housekeeping functions would be required.

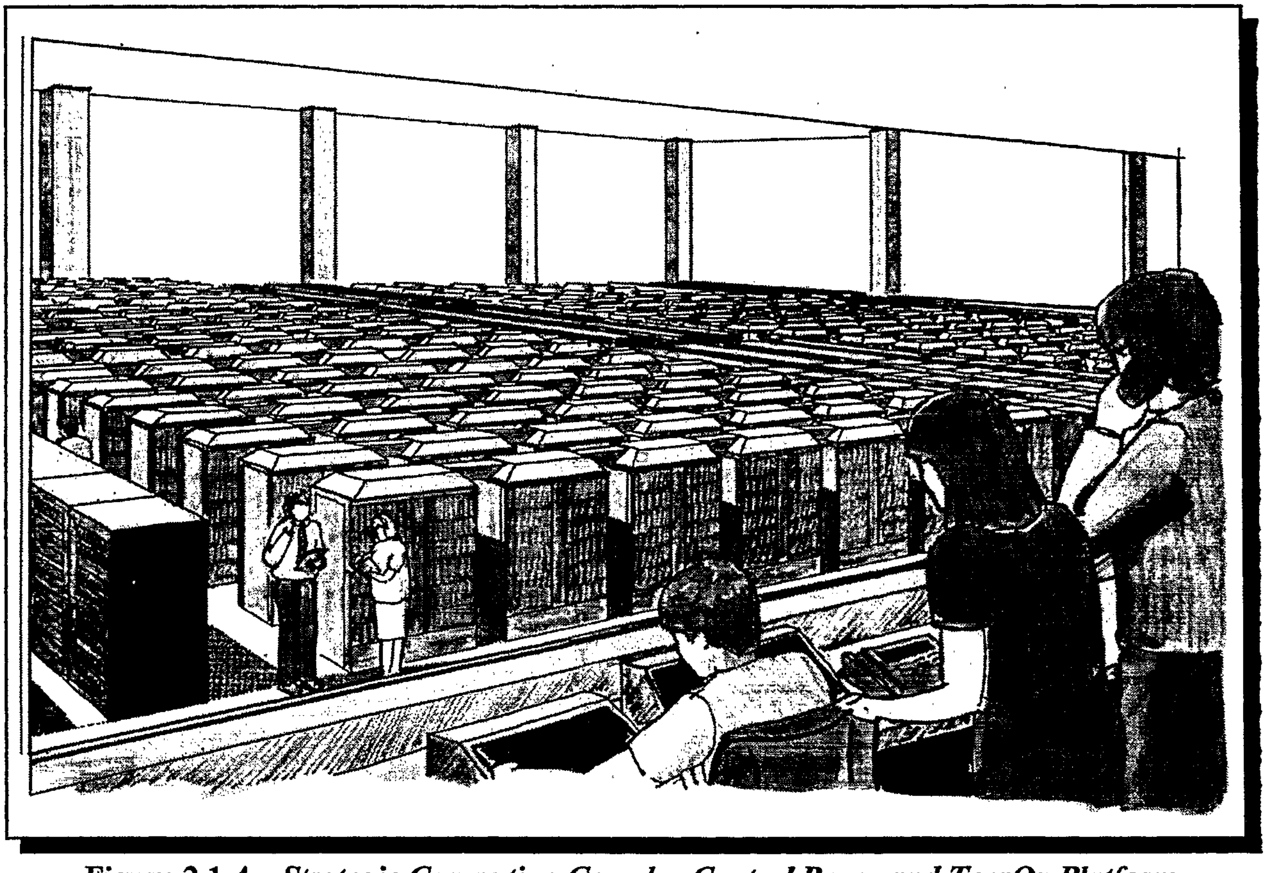

Figure 2.1-4.—*Strategic Computing Complex Control Room and TeraOp Platform.*

Utilities

The SCC would tie into the existing sanitary sewer, which runs along Pajarito Road, the waterline along Pajarito and Mercury Roads, and the steamlines and condensate in Pajarito and Bikini Atoll Roads. In addition, the project would provide a new 115/13.8 kV substation transformer at the existing substation at the TA-3 Power Plant.

Five cooling towers would be required, with a sixth tower available for standby use in the event of a failure. As currently designed, the towers would require an estimated 172,800 gallons per day of cooling water.

The actual electrical load relative to power capacity of the SCC would be expected to vary over time. The electrical load capacity to support the computer processor operations, support loads, such as the heating ventilation and air conditioning system, elevator system, and office equipment, is designed for a capability of approximately 30 MW of connected load.

2.1.3 SCC Site Preparation

A decommissioned vehicular service station located at the northernmost portion of the proposed construction site would be demolished. The fuel storage tanks, gas pumps, and canopy have already been removed and the site remediated under the Business Operations Division Project to decommission and remove refueling facilities. A complex of three transportable office buildings situated at the center of the proposed building site would be decommissioned, removed from the site, and salvaged. The building site is otherwise paved with asphalt and bounded by existing concrete sidewalks, curbs, and gutters. During construction, the approximately 900 existing parking spaces (650 of which are occupied during any given work day) would be unavailable for use because the area will be used for material storage and pre-assembly activities. After construction, approximately 450 parking spaces would remain. Due to Parry Road closure, roadway and loading dock access to Johnson Controls Building-38 would require modification and some trailers associated with this building would require removal.

Non-paved areas surrounding the proposed SCC would be landscaped. Landscaping would consist of ground cover and trees native to the Los Alamos area in keeping with the general site setting. An automatic underground irrigation system would be installed for use until the plants are well established.

2.1.4 Roadway Closures

In order to address security concerns regarding the SCC and associated parking area, Pajarito Road would be permanently closed between its intersection with Mercury Road to its intersection with Parry Road. Parry Road would be eliminated. Local traffic would be routed to Bikini Atoll Road to Mercury Road to Pajarito Road (see Figure 2.1–2).

2.1.5 Satellite Parking

Construction of the SCC would permanently remove 450 parking spaces of the 900 currently available. In order to replace the loss of these parking spaces, expansion of six parking lots in the general SCC area is proposed (see Figure 2.1–2). The parking lots would be permanently expanded and paved with asphalt.

2.1.6 SCC Decommissioning and Decontamination

The ultimate decommissioning or decontamination of the SCC building would be considered and a separate NEPA analysis would be prepared when the facility is no longer needed.

2.2 No Action Alternative

The No Action Alternative provides a description of current environmental conditions to compare the potential effects of the Proposed Action. It must be considered even when the Proposed Action is specifically required by legislation or court order (10 CFR 1021.321[c]). Under the No Action Alternative, DOE would not construct or operate the SCC. In this event one of the other national laboratories would need to house the computer equipment necessary to meet the 50 TeraOp capability in addition to their own share. The No Action Alternative would not meet DOE's purpose and need.

2.3 Alternatives Considered and Eliminated from Further Analysis

Four alternatives were considered but have been dismissed from detailed analysis. They are discussed in Sections 2.3.1 through 2.3.4.

2.3.1 Renovation of the Laboratory Data Communication Center

The ACSI schedule goal is for a 50-TeraOp platform in the Fiscal Year (FY) 2003–2004 time frame. Currently, the LDCC is scheduled to support space and operations for expansion from a 1- to a 3-TeraOp computer platform. The LDCC has approximately 12,000 square feet (1,100 square meters) of computer floor space that can accommodate this expansion.

The LDCC could be modified to increase the computer floor to approximately 17,000 square feet (1,600 square meters); beyond that, modification would be extremely difficult and the estimated life cycle cost would be greater than construction of a new facility. Additionally, construction would have to avoid disruption of current LDCC operations. Housing the 3-TeraOp platform in the LDCC may require all available LDCC computer floor space. Regardless, the specification of greater than 43,500 square feet (3,900 square meters) of unobstructed computer floor cannot be reasonably met through remodeling of the LDCC. Therefore, this alternative is not given further consideration due space limitations and expansion costs.

2.3.2 Use and Upgrade an Existing Facility at LANL

In order to support the requirements of an approximately 43,500-square-foot (3,900-square-meter) column-free computer floor, serviceable by substantial mechanical and electrical capacity, any existing facility, including the LDCC (see Section 2.3.1), would require costly, extensive, and major demolition and reconstruction. There are no facilities within TA-3 large enough to accommodate the SCC. Additionally, a new facility(ies) would be required to accommodate occupants of the facility undergoing modification. Due to these considerations, this alternative was dismissed from further consideration due to technical and cost considerations.

2.3.3 Construction and Operation at a Different LANL Location

TA-3 serves as the core area of LANL and has the necessary infrastructure (roadways, water, power, communication lines, etc.) already in place to support the SCC. Additionally, the proposed SCC facility would be compatible with the current LANL and TA-3 Master Plans (PC 1997a). The construction and operation of the SCC at a different LANL TA would not result in the additional reduction of potential environmental affects. Due to these considerations, this alternative was dismissed from further consideration.

2.3.4 Construct and Operate the SCC within the Proposed Research Park

The Research Park is an action whereby DOE would lease to Los Alamos County (LAC) an approximately 60-acre (24-hectare) tract of land located in TA-3 at LANL. The leased land would be used to establish a research park with facilities for a wide range of companies to work in the same geographic location and benefit from a well-planned environment suited to business needs. The intent of the lease is to assist LAC toward self-sufficiency by providing other options for which the elimination of DOE annual assistance payment can be offset.

This alternative is not considered viable for two primary reasons. (1) The Research Park is intended for development and private sector use in order to foster economic development activities within LAC. Regional employment opportunities will be created by offering underutilized Federal land for private sector use (DOE 1997a). (2) Construction and operation of the SCC in this private sector Research Park would raise national defense considerations regarding national security. Therefore, this alternative was dismissed from further consideration.

2.3.5 Construction and Operation of the SCC at Another DOE National Laboratory

Construction of the SCC in much the same way as proposed at either Lawrence Livermore National Laboratory or Sandia National Laboratories was considered. It is possible to construct the first ASCI platform of 50 TeraOp computing capability at any of the national laboratories at approximately the same cost and schedule. This alternative would, further more, meet the purpose and need for DOE's action to enhance the computing capability at each of its three national laboratories. However, doing so would only delay the ultimate plan to have such a facility at LANL at a 50 TeraOp computing capability or greater. It is expected that as the ASCI objectives are met that each of the three national laboratories would enhance their individual existing computing capabilities to about the 50 TeraOp computing capability level, or greater, so that a interconnected web of multi-TeraOp capabilities ultimately could be achieved to work on increasingly more complex computational problems. Since the platforms must be implemented sequentially to build upon the knowledge of the last, it is necessary to build and operate the first platform at one of the three laboratories. LANL is being considered as the prime choice for the location of the first platform because it is poised and ready to move to that level of operation. It has the personnel and the existing computational infrastructure to take that step. About 80 per cent of the weapons scientists are employed at LANL. Many of these individuals are at or nearing retirement and it is important to take advantage of their presence so as to utilize their corporate knowledge in the computer code development of this first platform stage of the ASCI program. While the three laboratories would develop and share hardware and software resources under the ASCI program, the support work being performed to certify the performance of the weapons originally designed by that laboratory will be unique to that laboratory. Computational work is expected to complement rather than be duplicated at each of three national laboratories. Therefore, the alternative of constructing the SCC at either of two other national weapon's laboratories is not considered further in this EA analysis.

2.4 Related Actions

2.4.1 Non-Proliferation and International Security Center

DOE is proposing to design, construct, and operate a Non-Proliferation and International Security Center (NISC) on the northwest corner of Pajarito Road and Mercury Drive in TA-3, adjacent to the proposed SCC (Figure 2.1-2). This new facility would consolidate the verification and intelligence functions of approximately 600 NISC Division personnel who are currently spread out over eight TAs and 45 facilities. The NISC and SCC Project Leaders have executed a Memorandum of Understanding that provides guidelines for the coordination of the two efforts. An independent NEPA impact analysis for the NISC is currently being conducted.

2.4.2 Los Alamos National Laboratory Site-Wide Environmental Impact Statement

On Aug 27, 1998, the DOE Los Alamos Area Office submitted a request and recommendation (DOE 1998b) that the SCC EA proceed separately from the LANL Site-Wide Environmental Impact Statement (SWEIS), which was released as a draft to the public in April 1998. The request for NEPA analysis separate from the LANL SWEIS is to enable the timely planning and analysis for construction of the SCC, given the immediate need for the SCC capabilities in support of the SSM Program. The request for interim action was approved on October 2, 1998 (DOE 1998c).

2.4.3 Conveyance and Transfer Environmental Impact Statement

This EIS will assess the potential environmental impacts of conveying and transferring certain DOE land tracts located within the Incorporated County of Los Alamos and Santa Fe County at LANL to LAC or The Secretary of the Interior in trust for San Ildefonso Pueblo. This Proposed Action has been prescribed by Congress in Public Law 105-119 and the EIS will analyze the following future uses: (1) historic, cultural, or environmental preservation, (2) economic diversification, or (3) community self-sufficiency (DOE 1998g). The EIS is currently being drafted and is scheduled for release to the public and area stakeholders in early 1999.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Chapter 3.0 describes the natural and human environment that could be affected by the Proposed Action and the No Action Alternative. Based on the proposed project description, potential environmental resources that may be affected as a result of implementing the Proposed Action have been considered. Environmental issues were identified and either addressed in this section or not based on the "Sliding Scale Approach" (see Section 1.4). Detailed descriptions of LANL's natural resources environment, cultural resources, socioeconomics, waste management, regulatory compliance record, and general operations are presented in the *Draft Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory* (DOE 1998d) and the 1998 *Environmental Surveillance and Compliance at Los Alamos During 1997* report (LANL 1998i). These documents may be found in the LANL library and are available on the world wide web at http://tis.eh.doe.gov/nepa/docs/eis-0238/summary/sum-toc.html/ and http://lib-www.lanl.gov/pubs/la-13487.html.

It is important to understand that the proposed SCC floor space and electrical power and cooling water requirements are based on current state-of-the-art computer technology. Moore's Law, named after Intel Corporation Chairman emeritus Gordon Moore who observed that semiconductor computational speed doubles approximately every 18 months, has been accurate for decades. However, computer chipmakers are developing ways to boost performance of microprocessors that may challenge Moore's Law. For example, IBM's new copper and silicon chips can improve performance by up to 35 percent and require as little as one-third the power of today's microchips (IBM 1998). By the time the SCC is operational, the forecasted power and water requirements for a 50-TeraOp computer platform may be substantially reduced from those addressed in this EA.

Regional Setting and Climate

The 43-square-mile (111-square-kilometer) LANL is owned by DOE and managed and operated by the Regents of the University of California. It is located in LAC, in north-central New Mexico, approximately 100 highway miles (160 kilometers) north-northeast of Albuquerque, 30 miles (48 kilometers) northwest of Santa Fe, and 20 miles (32 kilometers) southwest of Española in Los Alamos and Santa Fe counties (LANL 1997a) (See Figure 1.1-1). The area is dominated by the Jemez Mountains to the west and the Sangre de Cristo Mountains to the east. These two mountain ranges and the State of New Mexico are divided north to south by the Rio Grande. LANL is situated on the Pajarito Plateau, a volcanic shelf on the eastern slope of the Jemez mountains at an approximate elevation of 7,200 feet (2,200 meters) (DOE 1998d). The Pajarito Plateau is dissected by 13 steeply sloped and deeply eroded east-to-west oriented canyons containing intermittent streams. Los Alamos has a temperate, semiarid mountain climate. However, its climate is strongly influenced by elevation, and large temperature and precipitation differences are observed in the area due to a 1,080-foot (330-meter) change in elevation across the site.

The average annual precipitation is approximately 19 inches (48 centimeters) with approximately 37 percent of the rainfall occurring in the summer rainy season (LANL 1997a).

Winds in the local area are affected by the complex topography and are generally upslope in the daytime, causing a southeasterly component to the winds on the Pajarito Plateau. Nighttime flow is primarily downslope with light westerly and northwesterly flow (LANL 1997a).

3.1 Proposed Action—Construction and Operation of the SCC

Sections 3.1.1 through 3.1.13 describe the potential environmental affects associated with implementing the Proposed Action.

3.1.1 Land Use, Aesthetics, Noise, and Affected Population

The proposed construction and operation of the SCC would not alter the character of the site or introduce new land use elements.

TA-3, the proposed site of the SCC, is the core area of LANL, containing approximately 50 percent of all LANL floor space. TA-3 serves as the central technical, administrative, and physical support area for LANL (LANL 1995, LANL 1997a). Representative facilities include the Director's office, administrative offices, central computing facilities, chemistry and materials science laboratories, earth and space science laboratories, physics laboratories, technical shops, cryogenics laboratories, main cafeteria, and study center. An estimated 6,150 personnel reside at TA-3, representing approximately 48 percent of LANL's 12,753 employees (LANL 1997b). The proposed SCC site area is characterized by the presences of office buildings, storage and warehouse facilities, and parking lots, and is illuminated at night (Figure 2.1–2). SCC design and operation would be compatible with surrounding facilities and would not introduce new, or effect current aesthetics. Currently, ambient noise levels are typical for a lightly industrialized area, with noise generated primarily by vehicle traffic and operating facility heating and air conditioning systems. SCC noise levels during construction would be typical of this activity. Ambient noise levels during SCC operation would be generated primarily by vehicle traffic and facility heating and air conditioning systems. Noise resulting from construction and operations would be limited to the LANL TA-3 vicinity which is already highly industrialized.

3.1.2 Cultural Resources

The New Mexico State Historic Preservation Office was requested to concur in a "Determination of No Effect" on April 1998, and concurrence was received on June 1, 1998 (DOE 1998e).

The LANL region is rich in prehistoric and historic resources. Prehistoric cultural resources refer to any material remains used or modified by people prior to the establishment of a European presence in the upper Rio Grande valley in the early 17th century (DOE 1995). Over 13,000 known prehistoric sites exist on LANL property alone (LANL 1997d). Historic cultural resources include all material remains and any other physical alterations of the landscape since the arrival of Europeans in the region (DOE 1995). Representative historic period sites on LANL include facilities from the World War II Manhattan and Cold War eras.

Cultural resource surveys were conducted at the proposed location of the SCC, the six new parking lots, and the three buildings proposed for demolition. No prehistoric sites eligible for nomination to the National Register are located within the surveyed areas. The three buildings proposed for demolition were built during the Manhattan Project/early cold war years at Los Alamos. TA-3-36, a service station, was built in 1952; TA-3-224, a three-sided open storage shed, was built in 1949; and TA-3-1233, a small storage shed, was built in 1944. Because these properties were constructed during this significant time period at Los Alamos, historic building assessments were conducted. The three buildings were determined not to be significant historic properties and are not eligible for inclusion on the National Register of Historic Places (DOE 1998e). If during construction, any buried materials of cultural significance are encountered, construction would cease until their significance is determined.

3.1.3 Utilities—Steam, Sewage, Electrical Power, Communications

All necessary utilities are available within close proximity to the proposed location. There is surplus capacity for steam generation and sewage treatment. Due to regional power supply limitations, electrical load shedding procedures may be implemented during periods of high peak electrical demand. Communication lines would use existing ductbanks.

The general area is supplied by water service for both potable and fire protection by a network of 10-inch (25-centimeter) lines or larger. There is an existing 10-inch (25-centimeter) water main located along Pajarito Road. Fire hydrants are in place at the corner of Mercury and Pajarito Roads (LANL 1998a).

The TA-3 Steam Plant has a capacity of 0.2 million pounds (0.09 million kilograms) of steam per hour with two boilers in operation and one on standby. The peak winter demand on the plant is 0.125 million pounds (0.057 million kilograms) per hour. The proposed SCC heating requirement would use approximately 5,000 pounds (2,300 kilograms) of steam per hour, which is well within the existing capacity of the TA-3 Steam Plant. Existing steamlines in Pajarito and Bikini Atoll Roads would provide service to the SCC.

The existing sanitary sewer line that parallels Mercury Road is near capacity and unavailable for service. However, there is an 8-inch (20-centimeter) line in place along Pajarito Road about 100 feet (30 meters) south of Mercury Road. The capacity of this line is approximately 0.442 million gallons (1.673 million liters) per day; its present peak flow is 0.084 million gallons (0.318

million liters) per day (LANL 1998a, DOE 1997a). The proposed SCC is projected to add approximately 6,400 gallons of sewage per day; thus, line capacity will not be exceeded. As part of the LANL maintenance program, this sewage line may either have a sleeve introduced due to its deteriorating condition or be replaced with a 10-inch (25-centimeter) line prior to construction of the SCC. The sewage from different parts of TA-3 is collected and merged before it goes to the LANL Sanitary Waste Systems Consolidation Plant at TA-46. The Sanitary Waste Systems Consolidation Plant has surplus capacity as it is capable of processing approximately 0.6 million gallons (2.3 million liters) per day; its current use is an estimated 0.4 million gallons (1.35 million liters) per day (DOE 1997a).

An additional 115/13.8 kV transformer of approximately 40 megavolt-ampere capability along with its necessary interconnection equipment is needed to meet the steady-state power reliability requirements of the Laboratory electrical loads. Existing site-wide 115/13.8 kV transformation capacity and redundancy (reliability) has reached design limits. Added transformation capability to support the Laboratory could be accommodated at either the existing TA-3 substation or at the proposed West Tech Area (WTA) substation at TA-69. The WTA substation is part of a defined DOE bulk electric power infrastructure project that will partially mitigate reliability issues in the 115-kV power deliver system for the Laboratory. In either case, medium voltage power cable ductbanks for dedicated delivery of 13.8 kV power to the SCC would need to be installed. This would involve either upgrading the ductbank system emanating from the TA-3 substation to the site of the SCC, or the completion of a partially existing ductbank path from WTA to SCC at TA-3.

Table 3.1–1 presents the maximum forecasted electrical power requirement for both the SCC building and its associated computer complex.

Table 3.1–1.—*Forecasted Maximum Power Requirements**

50 TeraOp	SCC Electrical Capacity	Computer Load	Building Load	Total Load
Maximum Load	30 MW	5.2 MW	1.9 MW	7.1 MW
MW Hour/Year	30 MW	45,552 MW	16,644 MW	62,196 MW
*Megawatts of electricity (MW)				
Source: CGCE 1998.				

In 1985, the DOE and LAC formed the Los Alamos Power Pool to share their respective power supply resources and serve their combined power requirements (LANL 1997f). However, once the SCC is on-line, Pool operations may on occasion require optimization or shedding of other less critical LANL power loads as constrained by Pool contractual power import limitations due to regional offsite bulk transmission contingencies. The Distribution System Operation and Load Shedding Agreement between DOE and LAC specifies the criteria set forth by DOE and LAC under Operating Procedure No. C10 of the DOE County Power Pool Operation Procedures

(DOE/LAC 1993). Load shedding would be based on the activities and programmatic priorities at LANL at that time. LANL has had to make such adjustments when external circumstances (combined with internal demand) required it. Since the magnitude of the anticipated load shedding may affect laboratory-wide programs as well as LAC, the existing load shedding procedure may have to be revised and agreed upon by DOE and LAC. In addition, specifics of the plan will have to be acknowledged and approved by LANL management and the DOE/LAC Power Pool Operating Committee (LANL 1998d).

Voice communications and secure and non-secure fiberoptic communication lines would use exiting ductbanks. A secure fiberoptic communications ductbank between the LDCC and SCC would utilize existing ductbank running east along Mercury Road. The secure ductbank would be extended into Pajarito Road and into the SCC (LANL 1998a).

3.1.4 Transportation, Traffic, Road Closure, and Parking Capacity

Traffic congestion is expected to increase in the future due primarily to additional personnel at the Research Park. Parry Road and a segment of Pajarito Road would be permanently closed, requiring the rerouting of through traffic. Six parking lots would be expanded to make up for the loss of parking spaces during construction and operation of the SCC.

Motor vehicles are the primary method of transportation, and highways are the primary access to LANL and the rest of LAC. LANL has a number of roads, including major thoroughfares, that allow public access. However, since DOE controls the entire area within LANL's boundaries, DOE has the option to restrict traffic on LANL roadways (DOE 1997a). There are four main access points to LANL that convey about 43,000 personnel average daily trips (ADTs) (see Table 3.1-2). The State of New Mexico reports that LAC has an annual average of 280 accidents per 1.83 vehicles per 100 million miles (2.95 x 10^8 kilometers) driven (DOE 1997a). The proposed SCC site is accessed most easily from Pajarito Road to Mercury Road or West Jemez Road to Bikini Atoll Road (see Figure 2.1-2). Traffic on these roadways can be heavy, particularly during peak commuting hours. At present, the nearby Diamond Drive and West Jemez Road intersection has considerable congestion during peak traffic periods (DOE 1997a). As proposed, the SCC building site would extend into Pajarito Road thus requiring its permanent closure between its intersections with Mercury Road and Parry Road. Traffic from West Jemez Road requiring access to Pajarito Road, or the converse, would be rerouted via Mercury Road to Bikini Atoll Road or Diamond Drive to Pajarito Road. The required rerouting may further add to the congestion during peak commuting hours at the Diamond Drive and West Jemez Road intersection. Parry Road would also require permanent closure. Approximately 9 more vehicles (based on approximately 20 new employees and a ratio of 0.45 vehicles/employees) may be added to these roadways as a result of new SCC personnel.

Table 3.1-2.—*LANL Main Access Points*

Location	Average Daily Vehicle Trips
Diamond Drive Across the Los Alamos Canyon Bridge	28000
Pajarito Road	8000
East Jemez Road	6000
State Road 4/West Jemez Road from the west	1000
Total	43000
Source: DOE 1997a	

Site	Proposed Additional Spaces
1	135
2	150
3	85
4	105
5	55
6	135
Total	665

Table 3.1-3.—*SCC Parking Spaces*

The existing 900-space parking lot at the proposed project site would be lost for potential use during the SCC construction period, 1999 through 2002. Use of the parking lot would be required for construction as a staging and preassembly area. The parking lot was surveyed twice a day for nine days (May 13-23) during 1997, and was found to have approximately 300 spaces available at 9:00 a.m. and 370 available at 2:00 p.m.—an occupancy rate of 67 and 59 percent, respectively. An adjacent 247-space parking lot (south of Mercury Road and adjacent to and east of Pajarito Road) (see Figure 2.1-2) had approximately 42 and 70 spaces available at 9:00 a.m. and 2:00 p.m., respectively. A parking lot with an occupancy rate of 85 percent or more is considered to be at capacity. Therefore, approximately 650 parking spaces are required to make up for the lost parking spaces. Six existing parking lots are proposed for permanent expansion in order to provide for no net loss of parking spaces (Table 3.1-3 and Figure 2.1-2). Expansion of the parking lots is compatible with the TA-3 Master Plan. The number of parking spaces remaining on the proposed SCC site after construction of the SCC building would be approximately 450.

3.1.5 Geological Setting

There is no indication of near-surface faulting at the proposed site location.

Geologically, LANL is located within the northern Rio Grande rift, a seismically active province. Although surface-faulting earthquakes have not occurred historically in the LANL region (within 60 miles [100 kilometers] of LANL), geological evidence indicates they have occurred during the Quaternary Period (1.6 million years). Geologic structure at the proposed SCC site is dominated by three fault zones: the Pajarito, Rendija Canyon, and Guaje Mountain faults. Evidence indicates that the most recent surface-faulting seismic events occurred approximately 4,000 to 6,000 years ago (Guaje Mountain fault). All three faults are geologically young and are capable of producing future earthquakes, and both geologic and seismic evidence indicates that faulting in the region is an ongoing process (DOE 1995).

Evaluation of seismic hazards for LANL's TA-3, site of the proposed SCC, provides results in terms of mean annual probability of exceedence. In any one year, the chance of a seismic event producing a peak horizontal ground acceleration of 0.14*g* is 1 in 500. In any one year, the chance of a seismic event producing a peak horizontal ground acceleration of 0.30*g* is 1 in 2,000 (DOE 1997a).

A review of the U.S. Geological Survey maps and the State of New Mexico Environment Department Geological Map of the LANL Reservation found no evidence of faulting at the proposed SCC site. However, preliminary data from ongoing geological studies in the vicinity of the SCC site indicate a possibility that TA-3 is located in a fault zone. The observed faulting in these studies is believed to be subsidiary to the Rendija Canyon fault, which appears to be terminating in the TA-3 area. However, on the basis of further field observations, there is no indication of near-surface faulting at the proposed site. Geochemical analysis of core-hole samples are in progress and are needed to confirm the field observations. A component of the site-specific evaluation is to define criteria for siting new facilities in the vicinity of faults. DOE Orders and Standards do not provide definitive guidance, but other federal and state guidelines are available for non-nuclear structures such as the SCC (LANL 1998e). Should an active surface fault (defined as having movement within the past 11,000 years) be encountered, the SCC would be constructed a minimum of 50 feet from the active fault and SCC design criteria may be revised after consideration of the recommendations and guidance developed from a site-specific study.

The Valles Volcanic province is situated just west of LANL. Physical evidence indicates that the last volcanic eruption occurred approximately 60,000 years ago. Presently, the volcanic center that produced the past eruptions is considered to be dormant but geologically active. The Valles Volcanic province is noteworthy due to its lack of seismicity (DOE 1997a).

3.1.6 Air Quality

During construction of the SCC, there would be a temporary increase in localized particulate emissions. There are no normal SCC operations that would result in air emissions.

SCC construction and earth-moving activities would temporarily increase localized particulate emissions. Dust suppression procedures would be implemented to control fugitive dust emissions. The air emissions would not be expected to exceed either National Ambient Air Quality Standards or New Mexico Ambient Air Quality Standards. Temporary increases of volatile organic compounds off-gassed from asphalt used to pave the parking lots would occur. Based on air emission analysis conducted for other similar projects, no exceedence of air quality standards are expected during construction of the proposed SCC.

Emissions from industrial sources (i.e., the power plants and asphalt plant) are calculated annually because these sources are responsible for over 90 percent of all the non-radiological air pollutant emissions at LANL. Nonradioactive ambient monitoring is limited to particulate matter. In 1996, all nonradioactive air emissions from normal operations at LANL were in compliance with the *Clean Air Act* and the *New Mexico Air Quality Control Act* (LANL 1997a). At the proposed SCC site, the main contributor to air pollution would be automobile exhaust and the TA-3 LANL gas-fired power plant. SCC operations that would consist of office-type activities, light laboratory work such as the assembly and disassembly of computer and support equipment, and computer operations and maintenance. As a result, there would be no normal operations at the proposed SCC that would result in regulated air emissions.

3.1.7 Water Resources

Due to the potential direct and cumulative impacts of water used in the cooling process that is lost to both evaporation and blowdown, the SCC Project has pledged not to cause any net increase in the Laboratory's water usage when the facility becomes operational. The SCC Project has committed to the use of treated sanitary wastewater effluent from the TA-46 Sanitary Wastewater Systems Consolidation Plant (SWSCP).

The 50-TeraOp system cooling towers would use an estimated 172,800 gallons of water per day in order to maintain the computer complex at its optimal operating temperature. Cooling towers evaporate water in the cooling process, causing the solids (silica) in the water to increase in concentration and requiring replacement or "make-up" water to reduce the silica concentration.

LANL groundwater has a high concentration of silica at approximately 100 parts per million (ppm). When silica concentrations, due to the cooling tower evaporative process, reach about 150 ppm, scaling in the pipes and cooling towers occur. Therefore, inhibitors (chemicals) are added to the cooling water to maintain silica in solution.

When there is a high concentration of solids present before the evaporation process begins, more frequent changes in the cooling tower water are necessary to reduce this concentration, thereby reducing mineral deposits in the equipment. This process of flushing the tower water system is referred to as "blowdown". Treatment of the recycled water to maintain the silica in solution allows for higher concentrations of solids before the tower requires blowdown. At LANL, the addition of inhibitors allows for a maximum of 2.5 water cycles. Environmental impacts of cooling tower operation include both the evaporative loss and blowdown loss of water.

Blowdown water would be routed to a crystalizer unit. The crystalizer unit would heat, evaporate, and eliminate the blowdown water, leaving behind a residue of nonhazardous mineral residue.

Cooling water use would be equal for computers that are water-cooled, air cooled, or a combination of the two cooling systems. The water requirements under a 50-TeraOp system are shown in Table 3.1–4. It should be noted that the values in Table 3.1–4 are conservative, as the computer complex water use calculations assume operation at maximum load during the highest outdoor temperature, i.e., the computer complex is running at capacity 24 hours per day during a hot summer day for 365 days per year.

Water (172,800 gallons per day) would be required to support either an air-cooled, a water-cooled, or a combination of the two, computer complex. The water requirement is based on a 7,200-gallon per minute heat exchange/water circulation rate multiplied by an evaporation factor of 0.010 percent, the result of which indicates a 72-gallon per minute evaporative loss rate. Blow down loss is calculated to be 48 gallons per minute. Combining the two loss rates yields a total loss and water replacement rate of 120 gallons per minute, or 172,800 gallons per day or 63,072,000 gallons per year, assuming operations at 24 hours per day for 365 days per year (see Table 3.1–4).

Table 3.1–4.—*Cooling Tower Water Usage*[1]

System Capacity	50 TeraOp
Tower Circulation GPM	7,200
Evaporation Rate[2] -GPM	72
Blowdown Rate[3] - GPM	48
Total Water Use - GPM	120
Total Daily Water Use - GPD	172,800
Total Yearly Water Use - GPY	63,072,000

[1]Based on a 2.5 recycle rate

[2]Evaporation rate equals approximately 0.01 times the circulation rate

[3]Blowdown rate equals approximately the evaporation rate (gpm)/cycles -1

Domestic water use is calculated to require an additional 100,000 gallons per year. This calculation is based on 20 gallons/person/day (assuming fifty 5-day workweeks and 8-hour days) for an estimated 20 new-hire employees (BPCE 1998). Domestic water use is independent of the computer system. Domestic water would be discharged into the existing sewer line and routed to the Sanitary Waste Systems Consolidation Plant (SWSCP) at TA-46.

Due to the potential direct and cumulative impacts of water used in the cooling process that is lost to both evaporation and blowdown, the SCC Project has pledged not to cause any net increase in the Laboratory's water usage when the facility becomes operational. The SCC Project has committed to the use of treated sanitary wastewater effluent from the TA-46. The SWSCP currently processes approximately 400,000 gallons of effluent per day. Currently, when operational, the TA-3 power plant uses this effluent for cooling purposes. There is enough treated effluent to fulfill the requirements of both the SCC and TA-3 Power Plant. Additionally, the analysis contained in the LANL Site-Wide EIS indicated that under all alternatives effluent to the SWSCP is expected to increase to approximately 507,000 gallons per day or 185 million gallons per year. Use of this water by the SCC would result in no net increase to the LANL water demand and would not require any additional pumping from the groundwater aquifer during normal SCC operations (LANL 1998g, PC 1998c). Additionally, the current LDCC water requirements may also be met with use of SWSCP waters. The LDCC has an existing line from the SWSCP, so only minimal infrastructure improvements would be necessary. The SCC Project process is the catalyst for LANL's proposed implementation of an institutional approach for reducing cooling tower water usage by increasing the number of cooling water cycles, from the current LANL maximum of 2.5 cycles to 5 cycles or greater, through silica removal and/or other technologies. An example of potential water use reduction for the SCC through additional recycling of cooling water is presented in Table 3.1-5.

Table 3.1-5.—*Potential SCC Cooling Tower Water Use Reduction*[1]

(Based on a 5.0/10.0 Recycle Rate)

System Capacity	50 TeraOp (gal/min)
Tower Circulation - GPM	7,200
Evaporation Rate[1] - GPM	72
Blowdown Rate[2] - GPM	18/8
Total Water Use - GPM	90/80
Total Daily Water Use - GPD	129,600/115,200
Total Annual Water Use - GPY	47,304,000/42,048,000

[1]Evaporation rate equals approximately 0.010 times the circulation rate

[2]Blowdown rate equals approximately the evaporation rate (gpm)/cycles -1

Appropriately engineered best management practices for the SCC building and satellite parking areas would be implemented as part of a site Storm Water Pollution Prevention Plan executed under a National Pollutant Discharge Elimination System construction permit. These best management practices may include the use of hay bales, plywood, or synthetic sedimentation fences with appropriate supports installed to contain excavated soil and surface water discharge during construction of the SCC and associated satellite parking areas. After each construction activity, mounds of loose soil would be removed from the area. The site would be restored to natural-like countours and reseeded with an appropriate seed mix to stabilize the site. Permanent site engineered controls for stormwater run-off may include the site grading, curbing, or the use of rip-rap to slow water flow run-off.

3.1.8 Ecological Resources

The proposed SCC site and associated satellite parking areas are within or adjacent to heavily developed areas characterized by buildings, roadways, and parking lots and do not contain suitable habitat for federal- or state-listed species.

The biodiversity of the LANL region is shaped by the variety and dynamic interactions of elevation, climate, topography, soils, water, vegetation, and animal life, along with historic and current land use practices. The plants and animals found on or near LANL property include over 900 species of vascular plants (i.e., grasses, flowers, trees), 57 species of mammals, 200 species of birds including 112 species known to breed in LAC, 28 species of reptiles, 9 species of amphibians, and over 1,200 species of arthropods (i.e., terrestrial and aquatic insects). No fish species have been found in the watersheds within LANL boundaries. Thirty species, present or potentially present due to suitable habitat, have been designated as endangered, threatened, species of concern, or rare and sensitive at the Federal and/or State level.

The proposed SCC site and associated satellite parking areas are within or adjacent to heavily developed areas characterized by buildings, roadways, and parking lots and do not contain suitable habitat for any of the federal- or state-listed species. The SCC site is a paved parking lot with trailers and a decommissioned service station. All proposed satellite parking areas, except Site 3, are either paved, compacted dirt, or contain grasslands with weedy vegetation. Site 3 is characterized primarily by compacted soil, grasses, and scattered Ponderosa Pine.

3.1.8.1 Wetlands

As proposed, the SCC use of SWSCP treated effluent and evaporation of blowdown would affect the quantity of water discharged to the TA-3 Power Plant Outfall 001 in Sandia Canyon. The existing Sandia Canyon wetland could undergo a small reduction in size; however, its structure and function is expected to remain essential the same.

Rain and natural runoff and LANL discharges from the TA-3 Power Plant Outfall 001 support a 6-acre wetland located near the head of Sandia Canyon. Wetland vegetation is dominated by cattails (*Typha sp.*) with little standing water. An estimate of less than 20 percent of flow into the wetland is contributed by the power plant. Over the past several years flows have tended to concentrate into a single, incised channel which has acted to reduce moisture availability to wetland areas more distant from the more persistent water in the channel.

The SWSCP treated effluent is pumped up to a holding tank for use by the TA-3 Power Plant. The TA-3 Power Plant when generating electricity discharges blowdown to Outfall 001 at the head of Sandia Canyon along with the overflow from the holding tank. Of the projected approximately 185 million gallons per year (mgy) of SWSCP treated effluent that is pumped to the holding tank (based on LANL SWEIS estimates) the SCC would recycle upwards of 63 mgy (120 gpm use rate) with no discharge back to the environment, leaving 122 mgy available. When the TA-3 Power Plant is not producing power, much of the remaining effluent would discharge to Sandia Canyon. The LANL SWEIS analysis indicates that for Outfall 001, under all alternatives, approximately 114 mgy would be discharged into Sandia Canyon (DOE 1998f). This is an increase over the estimated existing discharge of 78 mgy by approximately 36 mgy. The SCC Project would potentially reduce the SWSCP component of the outfall, under all SWEIS Alternatives, by 63 mgy, thus reducing the total from 114 mgy outfall to an estimated 51 mgy. This would be a reduction from current conditions of approximately 35 percent. This reduction would be in line with the stated purpose as found in the LANL National Pollutant Discharge Elimination System permit re-application to the Environmental Protection Agency that "outfall owners will be encouraged to develop designs and plant modifications that provide for reduced or no-flow outfall wastewater effluent discharge systems" (LANL 1998f). An approximate 35 percent reduction in effluent discharged to Outfall 001 could correspondingly reduce the amount of water being contributed to the wetland. Because this reduction is small compared to the total amount contributed to the wetland, the impact on the wetland would be expected to be correspondingly small. Wetland structure and function would not be expected to be substantially affected.

3.1.9 Socioeconomics

Construction of the SCC would generate revenue to the local economy.

LANL is the largest employer in the tri-county region (Los Alamos, Santa Fe, and Rio Arriba counties), directly employing approximately 12,753 workers, including Johnson Controls Northern New Mexico, Protection Technology Los Alamos, and contract labor personnel. Annual salaries and benefits are approximately $590.7 million and the annual operating budget at LANL is an estimated $1.11 billion. Over half (57 percent) of LANL's employees and approximately 19 percent of the subcontractor employees (Johnson Controls Northern New Mexico and Protection Technology Los Alamos) reside in LAC (LANL 1997b). The overall economic impact from DOE LANL operations in FY 1996 is indicated by the following multipliers: for every dollar spent by DOE or its contractors on materials, labor, benefits, equipment, services, etc., another $1.90 is generated in the region; for every $1 of personal income from LANL for labor, another $0.97 is generated through indirect and induced effects; and for each person employed by DOE, another 1.64 jobs are supported in the region. In FY 1996, DOE expended approximately $14.855 million in the construction sector (DOE 1997c). The design and construction of the SCC would cost approximately $100 million. Based on industrial standards, approximately $40 million and $60 million are the expected breakdowns of labor and material costs, respectively (PC 1998d). A peak of approximately 200 SCC construction personnel could be required during the construction period of calendar years 1999 to 2002. Currently, there is a surplus of construction laborers in the LANL region (PC 1998b). Construction of the SCC would generate revenue to the local economy.

3.1.10 Human Health

There are no conditions, either during construction or operation, including accident scenarios, of the SCC that would pose an undue risk or hazard to SSC personnel, adjacent personnel or facilities.

The radiation environment at LANL and the surrounding communities is continuously monitored and characterized. The results are reported in annual LANL environmental surveillance reports (e.g., LANL 1997a). Air emissions are routinely sampled at locations on LANL property, along the DOE boundary perimeter, and in more distant areas that serve as regional background stations. Atmospheric concentrations of radionuclides are measured to estimate internal radiation doses.

The radiation environment in the communities surrounding LANL consists primarily of naturally occurring radiation. Workers at LANL may also be exposed to radiation when they work with or are exposed to radioactive substances. However, office workers such as those to be employed at the proposed SCC would not be expected to receive any measurable dose from LANL operations.

3.1.10.1 Construction

Standard mitigation measures would be in effect during all construction activities. These measures would include the sampling of potentially contaminated construction debris and surplus equipment, dust and erosion control, and worker health and safety procedures. Construction safety requirements would conform to those required by normal contractual provision and the *Occupational Safety and Health Act*. Construction safety documentation would include a contractor-prepared safety plan, preliminary hazard assessment, and a activity hazards analysis. The proposed SCC site is in a congested industrial portion of LANL. Access by heavy construction equipment and the heavy construction traffic pose some hazards to both the site workers and local employees. Traffic management and site control would be required to control and reduce these types of hazards.

3.1.10.2 Operations

Operations in the SCC would consist of office-type activities, light laboratory work such as the assembly and disassembly of computer and support equipment, and computer operations and maintenance. Normal housekeeping functions would be required. Only one operational design requirement poses an increased risk to workers: the need to run both water and electrical supply lines close together. These utilities would be routed under the SCC's floor to provide power and cooling for the computers and their support systems. Leaks from a water distribution system could present both a fire and personnel hazard to workers, particularly those accessing the crawl space between the basement utility area and the computer floor. However, the SCC would use an extremely sensitive smoke and leak detection system. It should be noted that the LDCC, a LANL facility that has for years performed a similar function, has had no operational upsets that have posed safety problems to either their workers or those in nearby facilities. Similar computer facilities are located at various sites; none of these facilities are known to have demonstrated safety concerns that would influence the design or operation of the proposed SCC. It is important to note that the proposed SCC operations are similar to those performed at the LDCC by the same operators who would be working at the SCC. Therefore, the hazards are well understood and the methods used to manage those hazards are well developed and proven. Thus, based on the Preliminary Hazard Analysis, the most appropriate hazard classification is that of *Low*. This determination is additionally supported by the classification of the LDCC as a low-hazard facility.

3.1.10.3 Accidents

There are no postulated SCC accidents that would pose an undue hazard to either adjacent personnel or facilities.

The Chemistry and Metallurgy Research Building (CMR) is located in close proximity to the proposed SCC. A major release of radioactive material could adversely affect personnel in the SCC. CMR is currently undergoing upgrades to enable DOE to maintain the capability to continue to perform uninterrupted radioactive, chemical, and metallurgical research activities in a safe, secure, and environmentally sound manner at LANL over the next 20 to 30 years (DOE 1997b).

The SCC would be located near LANL's central chemical receiving and distribution facility. A fire in that facility could result in the exposure of SCC personnel to toxic chemical fumes. An assessment of the chemical facility indicates that due to the small chemical inventory and a fire station located within 0.5 mile (0.03 kilometer) of the proposed SCC, the probability of a major chemical release is low.

3.1.11 Environmental Justice

Based on the analysis in this EA there are no Environmental Justice concerns.

There are no potential impacts to the human population. Therefore, there would be no disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

3.1.12 Environmental Restoration and Waste Management

There are six potentially contaminated sites located within the proposed footprint of the SCC. All sites have been proposed for No Further Action by the LANL Environmental Restoration Project.

These six potentially contaminated sites consist of three locations where underground storage tanks were removed; one location where an antifreeze spill occurred, and two locations in the old vehicle service center where a floor drain and vehicle maintenance sump were located. On April 7, 1998, a meeting was held with the New Mexico Environment Department to discuss the regulatory approval of the No Further Action request. At this meeting the New Mexico Environment Department agreed to a priority review of these sites and to discuss any future additional scope. No concurrence with DOE's determination has yet been made (LANL 1998h). If approved, these sites would be removed from further consideration by the ER Project. If not approved, the ER Project would propose further actions that may include characterization, a corrective measure study, a clean-up, an interim action, or a best management practice. No site is removed from the Hazardous and Solid Waste Amendments module until the regulators approve no further action. While it is expected that construction would not occur within the lateral extent of a site still listed in the Hazardous and Solid Waste Amendments module, it is possible that any necessary remediation may be complicated by the presence of buildings or other infrastructure in the vicinity. Until the appropriate agency (EPA or NMED) determines that the sites meet regulatory clean-up standards applicable to planned future uses, the areas at or near each potentially contaminated site would not be developed. Because of the recommendations for no further action, no adverse effects on the development of the SCC would be expected from construction activities occurring in the vicinity of these potentially contaminated sites.

Solid waste associated with the construction (i.e., parking lot asphalt, wood, metal, etc.) and operation (general office trash) of the SCC would be disposed of at the LAC landfill, which is operated by the county on LANL property. LANL disposes an average of approximately 31,279 cubic yards (23,910 cubic meters) of solid waste annually at the county landfill. The county maintains a separate location at the landfill for construction debris that is available for reuse by individuals or companies. In 1996, an estimated 11.8 million pounds (5.34 million kilograms) of construction debris were disposed of at the county landfill (DOE 1997a). The landfill has an expected use life of about 15 more years based on current usage (PC 1997b).

Preliminary estimates of the proposed construction of the SCC indicate that approximately 5,000 cubic yards (3,800 cubic meters) of fill (soil) would be required. The fill would be obtained from an old borrow and fill site off Mercury Road characterized by grasses, flowering plants, and mounds of bare soil disposed of from other projects surplus fill.

Construction waste associated with demolition of the gas station would include asbestos and lead-based paints. Asbestos is contained in the service station to be demolished to make way for the SCC. Items containing asbestos include pipe insulation, perimeter parapet flashing, and a beam support. Lead is present on the service station window trim, yellow-painted canopy post, fire sprinkler pipes, and attached utility shed structure. Both asbestos and lead contaminated materials would be disposed of at a permitted commercial waste disposal facility.

3.1.13 Cumulative Impacts

No new types of operations and few new personnel would be introduced as a result of SCC operations. Local traffic congestion centered around the West Jemez Road, Diamond Drive, East Jemez Road, west Road and Pajarito Road would be affected by the addition of approximately 18 vehicle trips per day (assuming 20 new employees and 0.45 cars per employee) during each morning and evening rush hour and Pajarito Road closure to through traffic. The addition of the SCC, NISC, and Research Park associated vehicles, estimated at between 2,300 and 3,000 vehicle trips per day, could severely exacerbate already over-crowded roadways during rush hours. However, most of this traffic would result from the Research Park that has yet to be constructed but will probably be gradually phased in over a number of years. It is anticipated that LAC will prepare a master plan for the Research Park that will include a traffic impact study specifying the details of necessary traffic improvements. Additionally, a TA-3 master planning effort is currently underway and is anticipated to specify traffic improvements in the TA-3 roadway network (DOE 1997a).

Construction and operation of the NISC will require additional TA-3 parking spaces above what the SCC would be providing. The NISC project and associated NEPA documentation will address the addition of parking spaces necessary to accommodate NISC project personnel.

According to the alternatives analysis in the LANL SWEIS peak electrical demand under the Reduced Operations Alternative exceeds supply during the winter months and may result in periodic brownouts. Peak electrical demand under the No Action, Expanded Operations, and Greener Alternatives exceeds the power supply in winter and summer; this may result in periodic brownouts. Power supply to the Los Alamos area has been a concern for a number of years, and DOE continues to work with other users in the area and power suppliers to increase power reliability and supply. The impact analysis in the LANL SWEIS emphasizes the severity of these issues and the consequences if they are not resolved. Solutions to power supply issues are essential to mitigate the effects of power demand under all LANL SWEIS alternatives. DOE is committed to measures that will conserve energy and avoid, or at least minimized, periods for brownouts. Some of the measures being contemplated by DOE include: (1) operation of large users of electricity during periods of low demand, (2) reduced operation of Low Energy Demonstration Accelerator (not implement all phases of this project), and (3) contractual mechanisms to bring additional electric power to the region.

Because Power requirements are an institutional, LAC, and northern New Mexico concern that the LANL SWEIS and the Conveyance and Transfer EIS are addressing as a potential cumulative impact, and neither has issued a Record of Decision, this issue is acknowledged but is not "ripe for analysis" in this EA.

3.2 No Action Alternative

Under the No Action Alternative, the SCC would not be constructed.

Implementation of the No Action Alternative would hamper DOE's purpose and need to support the ASCI, a component of the SSM Program, and DOE's prime stewardship mission to ensure the safety, reliability, and performance of the nation's nuclear weapons stockpile without underground nuclear weapons testing. Development of computer codes, utilizing the knowledge and unique insights of this nation's experienced nuclear weapons scientists, approximately 80 percent of whom are located at LANL, to model the behavior and aging affects of nuclear weapons would be compromised. In addition, the U.S. national security policy directs DOE to maintain the core intellectual and technical competencies of the U.S. in nuclear weapons, including: research, design, development, testing, reliability assessment, certification, manufacturing, surveillance, and the maintenance of a safe and reliable U.S. nuclear weapons stockpile (DOE 1996a). The three weapons laboratories that possess most of the core intellectual and technical competencies are LANL, LLNL, and SNL. Without the SCC, LANL's unique core competency capability would not evolve to its full potential and its participation as an equal partner to the ASCI program would be compromised.

Potential effects associated with the construction and operation of the SCC would not occur. In addition, potential impacts to natural resources, as described and analyzed in Section 3.1, should the Proposed Action be implemented, would not occur.

4.0 PERMIT AND NOTIFICATION REQUIREMENTS

Construction projects that disturb more than 5 acres of soil are required to obtain a permit for their storm water discharges under the EPA NPDES Storm Water Program. Calculation of the amount of disturbed area must include the footprint of the SCC and project site, including any soil stockpile areas, satellite parking areas, and any other areas where soil disturbance would occur during any phase of the project. Prior to submitting the permit application, a Storm Water Pollution Prevention Plan must be developed. The permit application must be postmarked two days prior to initiation of any soil disturbing phase of the project. Permit coverage is automatically received after two days. Recently, EPA published a new NPDES Construction General Permit; for this new general permit, EPA Region VI chose not to be included and is developing a different general permit. When this new permit is published, additional requirements will affect the permit application process and Storm Water Pollution Prevention Plan requirements for this project.

Emissions from asbestos and asbestos waste generated during demolition are regulated under National Emission Standards for Hazardous Air Pollutants. A notification to the New Mexico Environment Department is required prior to asbestos removal during demolition and renovation activities and a notification is required prior to performing any demolition activities. Due to the demolition of the decommissioned service station, DOE is to provide notification to the New Mexico Environment Department prior to demolition.

5.0 AGENCIES AND PERSONS CONTACTED

DOE provided written notification of the NEPA review to the State of New Mexico, the four Accord Pueblos* (San Ildefonso, Santa Clara, Jemez, and Cochiti), the Mescalero Apache Tribe, and to other stakeholders in the Tri-County area on October 19, 1998. On November 24, 1998, the Predecisional Draft EA was provided to the State and to the four Accord Pueblos for review and comment, and at the same time was made available to the public for review through placement in the DOE Public Reading Rooms at Los Alamos and Albuquerque. Upon request, the Predecisional Draft EA will be provided to all interested parties for their review. The Predecisional Draft EA will also be available for public review through the World Wide Web Computer Internet System at http://www.laao.doe.gov.

On May 28, 1998, DOE submitted a Cultural Resources Survey Report and Associated Determination of No-Effect, in compliance with Section 106 of the *National Historic Preservation Act*, to the New Mexico State Historic Preservation Office describing the Proposed Action and DOE's finding of no effect to cultural resources. On June 1, 1998, the New Mexico State Historic Preservation Office concurred with DOE's Determination of No-Effect, completing the formal consultation process.

In addition to the DOE formal notification procedures, informal interviews were conducted with an array of community representatives (federal, state, Los Alamos and Santa Fe counties, two Accord Pueblos, and various organizations) to aid in the identification of areas of concern and interest regarding the SCC (TRI 1998). Concerns expressed by many of these representatives lead directly to the SCC project proposing to recycle the TA-46 SWSCP treated effluent for computer cooling purposes.

*Accord refers to the written agreements signed by DOE and the four Pueblos on December 8, 1992, stating the basic understanding and commitments of the parties and describing the general framework for their working together. Subsequently, cooperative agreements between each Pueblo and DOE, and between each Pueblo and the University of California have been signed, which specify further details related to the accord agreements.

6.0 REFERENCES

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