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SWEIS Yearbook — 2001 LA-UR-02-3143

SWEIS Yearbook — 2001

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NNSA National Nuclear Security Administration

Native American pottery. PUB64-3003KN-9

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SWEIS Yearbook — 2001

Los Alamos
NATIONAL LABORATORY

Aerial view of main technical areas. RN94 373 006

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Aspens in the fall.

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Preface

In the Record of Decision for Stockpile Stewardship and Management, the US Department of Energy (DOE)[1] charged LANL with several new tasks, including war reserve pit production. DOE evaluated potential environmental impacts of these assignments in the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (DOE 1999a). This Site-Wide Environmental Impact Statement (SWEIS) provided the basis for DOE decisions to implement these new assignments at LANL through the SWEIS Record of Decision (ROD) issued in September 1999.

The Annual Yearbook compares operational data with projections of the SWEIS for the level of operations selected by the ROD. As originally planned, the Yearbook was to be published one year following the activities; however, publication was moved six months earlier to achieve timely presentation of the information. Yearbook publications to date include the following:

- "SWEIS 1998 Yearbook," LA-UR-99-6391, December 1999 (LANL 1999a, http://lib-www.lanl.gov/cgi-bin/getfile?00460172.pdf)

- "SWEIS Yearbook – 1999," LA-UR-00-5520, December 2000 (LANL 2000a, http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-00-5520.htm)

- "A Special Edition of the SWEIS Yearbook, Wildfire 2000," LA-UR-00-3471, August 2000 (LANL 2000b, http://lib-www.lanl.gov/cgi-bin/getfile?00393627.pdf)

- "SWEIS Yearbook – 2000," LA-UR-01-2965, July 2001 (LANL 2001a, http://lib-www.lanl.gov/cgi-bin/getfile?00818189.pdf)

- "SWEIS Yearbook – 2001," LA-UR-02-3143, September 2002 (http://lib-www.lanl.gov/cgi-bin/getfile?00818857.pdf)

The collective set of Yearbooks will contain data needed for trend analyses, will identify potential problem areas, and will enable decision-makers to determine when and if an updated SWEIS or other National Environmental Policy Act analysis is necessary.

As with previous editions, the cover includes inset photographs depicting important events that happened during the calendar year under review. Since the continued emphasis on working safely and new construction were significant in 2001, the two cover photos were chosen to portray these aspects. The photos selected show a laser setup being certified for safe operation and construction of the Nonproliferation and International Security Center.

[1] Congress established the National Nuclear Security Administration (NNSA) within the DOE to manage the nuclear weapons program for the United States. Los Alamos National Laboratory (LANL or Laboratory) is one of the facilities now managed by the NNSA. The NNSA officially began operations on March 1, 2000. Its mission is to carry out the national security responsibilities of the DOE, including maintenance of a safe, secure, and reliable stockpile of nuclear weapons and associated materials capabilities and technologies; promotion of international nuclear safety and nonproliferation; and administration and management of the naval nuclear propulsion program.

Executive Summary

In 1999, the US Department of Energy (DOE) published a Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory (DOE 1999a). DOE issued a Record of Decision (ROD) for this document in September 1999 (DOE 1999b).

To enhance the usefulness of this Site-Wide Environmental Impact Statement (SWEIS), DOE and Los Alamos National Laboratory (LANL or Laboratory) implemented a program, the Annual Yearbook, making comparisons between SWEIS ROD projections and actual operations. Each Yearbook focuses on operations during one calendar year and specifically addresses the following:

- facility and/or process modifications or additions,
- types and levels of operations during the calendar year,
- operations data for the Key Facilities, and
- site-wide effects of operations for the calendar year.

The SWEIS analyzed the potential environmental impacts of scenarios for future operations at LANL. DOE announced in its ROD that it would operate LANL at an expanded level and that the environmental consequences of that level of operations were acceptable. The ROD is not a predictor of specific operations, but establishes boundary conditions for operations. The ROD provides an environmental operating envelope for specific facilities and for the Laboratory as a whole. If operations at LANL were to routinely exceed the operating envelope, DOE would evaluate the need for a new SWEIS. As long as LANL operations remain below the level analyzed in the ROD, the environmental operating envelope is valid. Thus, the levels of operation projected by the SWEIS ROD should not be viewed as goals to be achieved, but rather as acceptable operational levels.

The Yearbooks address capabilities and operations using the concept of "Key Facility" as presented in the SWEIS. The definition of each Key Facility hinges upon operations (research, production, or services) and capabilities and is not necessarily confined to a single structure, building, or technical area. Chapter 2 discusses each of the 15 Key Facilities from three aspects—significant facility construction and modifications that have occurred during 2001, the types and levels of operations that occurred during 2001, and the 2001 operations data. Chapter 2 also discusses the "Non-Key Facilities," which include all buildings and structures not part of a Key Facility, or the balance of LANL.

During 2001, planned construction and/or modifications continued at 11 of the 15 Key Facilities. Most of these activities were modifications within existing structures. New structures completed and occupied during 2001 included the Weapons Engineering Tritium Facility office building and the Irradiation of Chips and Electronics House Control Room for the Los Alamos Neutron Science Center (LANSCE). Additionally, three major construction projects were either completed or continued for the Non-Key Facilities. Construction of the first building in the Los Alamos Research Park was completed in March 2001 and occupancy began in June 2001. Construction of the Strategic Computing Complex was completed in late 2001 and occupancy began in December 2001. Construction of the Nonproliferation and International Security Center began in March 2001.

The ROD projected a total of 38 facility construction and modification projects for LANL. Fifteen projects have now been completed: six in 1998, seven in 1999, and two in 2000. Six additional projects were started and/or continued in 2001. None of these projects was completed in 2001.

A major modification project, elimination and/or rerouting of National Pollutant Discharge Elimination System (NPDES) outfalls, was completed in 1999, bringing the total number of permitted outfalls down from the 55 identified by the SWEIS ROD to 20. During 2000, Outfall 03A-199, which will serve the TA-3-1837 cooling towers, was included in the new NPDES permit issued by the Environmental Protection Agency (EPA) on December 29, 2000. This brings the total number of permitted outfalls up to 21. During 2001, only 17 of the 21 outfalls flowed.

As in previous Yearbooks, this issue reports chemical usage and calculated emissions (expressed as kilograms per year) for the Key Facilities, based on an improved chemical reporting system. The 2001 chemical usage amounts were extracted from the Laboratory's Automated Chemical Inventory System. The quantities used for this report represent chemicals procured or brought on site in 2001. Information is presented in Appendix A for actual chemical use and estimated emissions for each Key Facility. Additional information for chemical use and emissions reporting can be found in the annual Emissions Inventory Report as required by New Mexico Administrative Code, Title 20, Chapter 2, Part 73 (20 NMAC 2.73). The most recent report is "Emissions Inventory Report Summary, Reporting Requirements for the New Mexico Administrative Code, Title 20, Chapter 2, Part 73 (20 NMAC 2.73) for Calendar Year 2000" (LANL 2001b).

Capabilities across LANL changed during 2001. The Cryogenic Separation Capability at the Tritium Key Facilities was lost. Also, following the events of September 11, 2001, the Laboratory was requested to provide support for homeland security.

During 2001, 89 of the 96 identified capabilities were active. No activity occurred under seven capabilities: Fabrication of Ceramic-Based Reactor Fuels at the Plutonium Complex, Cryogenic Separation at the Tritium Key Facilities, Diffusion and Membrane Purification at the Tritium Key Facilities, Destructive and Nondestructive Analysis at the Chemistry and Metallurgy Research Facility, Fabrication and Metallography at the Chemistry and Metallurgy Research Facility, Transmutation of Waste at LANSCE, Medical Isotope Production at LANSCE, and Other Waste Processing at the Solid Radioactive and Chemical Waste Facility.

As in 1998 through 2000, only three of LANL's facilities operated during 2001 at levels approximating those projected by the ROD—the Materials Science Laboratory (MSL), the Biosciences Facilities (formerly Health Research Laboratory), and the Non-Key Facilities. The two Key Facilities (MSL and Biosciences) are more akin to the Non-Key Facilities and represent the dynamic nature of research and development at LANL. More importantly, none of these facilities are major contributors to the parameters that lead to significant potential environmental impacts. The remaining 13 Key Facilities all conducted operations at or below projected activity levels.

Radioactive airborne emissions from point sources (i.e., stacks) during 2001 totaled approximately 15,400 curies, 70 percent of the ten-year average of 21,700 curies projected by the SWEIS ROD. The final dose is estimated to be approximately 1.9 millirem per year (compared to 5.44 projected), with the final dose being reported to the EPA by June 30, 2001. Calculated NPDES discharges totaled 124 million gallons compared to a projected volume of 278 million gallons per year. However, the apparent decrease in flows is primarily due to the methodology by which flow was measured and reported in the past. Historically, instantaneous flow was measured during field visits as required in the NPDES permit. These measurements were then extrapolated over a 24-hour day/seven-day week. With implementation of the new NPDES permit on February 1, 2001, data are collected and reported using actual flows recorded by flow meters at most outfalls. At those outfalls that do not have meters, the flow is calculated as before, based on instantaneous flow. Quantities of solid radioactive and chemical wastes ranged from 9 percent (mixed low-level radioactive waste) to 752 percent (chemical waste) of projections. The extremely large quantities of chemical waste (24.4 million kilograms) are a result of Environmental Restoration Project activities. (The remediation of Material Disposal Area P resulted in 21.5 million kilograms, or 88 percent, of the 24.4 million kilograms of chemical waste generated.) Most chemical wastes are shipped offsite for disposal at commercial facilities; therefore, these large quantities of chemical waste will not impact LANL environs.

The workforce was above ROD projections. The 12,380 employees at the end of calendar year 2001 represent 1,029 more employees than projected. Electricity use during 2001 totaled 375 gigawatt-hours with a peak demand of 71 megawatts compared to projections of 782 gigawatt-hours with a peak demand of 113 megawatts. Water usage was 393 million gallons (compared to 759 million gallons projected), and natural gas consumption totaled 1.49 million decatherms (compared to 1.84 projected). The collective Total Effective Dose Equivalent for the LANL workforce during 2001 was 113 person-rem, which is considerably lower than the workforce dose of 704 person-rem projected by the ROD.

Measured parameters for ecological resources and groundwater were similar to ROD projections, and measured parameters for cultural resources and land resources were below ROD projections. For land use, the ROD projected the disturbance of 41 acres of new land at Technical Area (TA) 54 because of the need for additional disposal cells for low-level radioactive waste. As of 2001, this expansion had not become necessary. However, construction continued on 44 acres of land that are being developed along West Jemez Road for the Los Alamos Research Park. This project has its own National Environmental Policy Act documentation (an environmental assessment), and the land is being leased to Los Alamos County for this privately owned development.

Cultural resources remained protected, and no excavation of sites at TA-54 or any other part of LANL has occurred. (The ROD projected that 15 prehistoric sites would be affected by the expansion of Area G into Zones 4 and 6 at TA-54.)

As projected by the ROD, water levels in wells penetrating into the regional aquifer continue to decline in response to pumping, typically by several feet each year. In areas where pumping has been reduced, water levels show some recovery. No unexplained changes in patterns have occurred in the 1995–2001 period, and water levels in the regional aquifer have continued a gradual decline that started in about 1977. In addition, ecological resources are being sustained as a result of protection afforded by DOE ownership of LANL. These resources include biological resources such as protected sensitive species, ecological processes, and biodiversity. The recovery and response to the Cerro Grande Fire of May 2000 included a wildfire fuels reduction program, burned area rehabilitation and monitoring efforts, and enhanced vegetation and wildlife monitoring.

In conclusion, LANL operations data mostly fell within projections. Operations data that exceeded projections, such as number of employees or chemical waste from cleanup, either produced a positive impact on the economy of northern New Mexico or resulted in no local impact because these wastes were shipped offsite for disposal. Overall, the 2001 operations data indicate that the Laboratory was operating within the SWEIS envelope.

The Rio Grande. RN91 015 002

Acknowledgments

The Site-Wide Issues Program Office was closed on April 4, 2002. This office prepared the first three editions of the Yearbook and initiated preparation of this edition. The Ecology Group of the Risk Reduction and Environmental Stewardship Division accomplished completion of this Yearbook. Ken Rea served as document manager; chief contributors were Theresa Rudell, Lorraine Segura, Jayson Blanchard, and Tony Grieggs.

Jay Brown and Susan Roth provided prompt review of the document for classification issues and helped solve several concerns.

Pauline McCormick provided administrative support for the production of this Yearbook, keeping impeccable records so that information would not be lost.

Hector Hinojosa provided editorial support, Gail Flower served as the designer, combining text and photographs to create a final product, with the help of Deidré Plumlee, compositor. We would also like to thank Winters Red Star for creating the map for Figure 2-4.

Many individuals assisted in the collection of information and review of drafts. Data and information came from many parts of the Laboratory, including facility and operating personnel and those who monitor and track environmental parameters. The Yearbook could not have been completed and verified without their help. Though all individuals cannot be mentioned here, the table below identifies major players from each of the Key Facilities and other operations.

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Worker Safety/Doses	Tom Buhl

Acronyms

ALARA	as low as reasonably achievable
BSL-1	Biosafety Level 1
BSL-1	Biosafety Level 2
CASA	Critical Assembly and Storage Area
CDC	Centers for Disease Control
CGRP	Cerro Grande Rehabilitation Project
Ci	curie
CY	calendar year
CMR	Chemistry and Metallurgy Research
CRMP	Cultural Resources Management Plan
CRMT	Cultural Resources Management Team

CSP2000	Comprehensive Site Plan for 2000
CX	categorical exclusion
CX-TBD	the planned activity is anticipated to be within categorical exclusion
D&D	Decontamination and demolition
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
DOE	US Department of Energy
DX	Dynamic Experimentation (Division)
EA	environmental assessment
EA-CX	an environmental assessment found the proposed activity to be within categorical exclusion
EA-FONSI	an environmental assessment was conducted with a finding of no significant impact
EA-TBD	an environmental assessment has not been conducted but is anticipated
EIS	environmental impact statement
EIS Draft	an EIS was drafted and issued for public comment
EIS-Prep	an EIS has been determined to be needed and is currently being prepared
EIS-ROD	an EIS was drafted and record of decision issued
EIS-TBD	a determination of need for EIS is not yet complete, but an EIS is anticipated
EM	Environmental Management
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ER	Environmental Restoration (Project)
ESA	Engineering Sciences and Application (Division)
FTE	full-time equivalent (employee)
FY	fiscal year
HRL	Health Research Laboratory
HSWA	Hazardous and Solid Waste Amendment
IAEA	International Atomic Energy Agency
ICE	Irradiation of Chips and Electronics
ICRMP	Integrated Cultural Resources Management Plan
IWMT	Interagency Wildfire Management Team
JCNNM	Johnson Controls Northern New Mexico
kV	kilovolt
LA	Laboratory of Anthropology
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LEDA	Low-Energy Demonstration Accelerator
linac	linear accelerator
LIR	Laboratory Implementing Requirement
LLW	low-level radioactive waste
LPSS	Long-Pulse Spallation Source
LWC	lost workday cases (rate)
m	meter
MCC	Multi-Channel Communications
MDA	Material Disposal Area
MeV	million electron volts
MGY	million gallons per year
MLLW	mixed low-level radioactive waste
MSL	Materials Science Laboratory
NEPA	National Environmental Policy Act
NFA	no further action
NHC	nuclear hazard category

NMED	New Mexico Environment Department
NM SHPD	New Mexico State Historic Preservation Department
NMT	Nuclear Materials Technology
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OPC	other project cost
PCB	polychlorinated biphenyl
PRS	potential release site
psi	pounds per square inch
PTLA	Protection Technology Los Alamos
RAMROD	Radioactive Materials Research Operations and Demonstration (Facility)
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent man
RLWTF	Radioactive Liquid Waste Treatment Facility
ROD	record of decision
SCC	Strategic Computing Complex
SHPO	State Historic Preservation Office
SNM	special nuclear material
SWEIS	Site-Wide Environmental Impact Statement
TA	technical area
TEDE	total effective dose equivalent
TFF	Target Fabrication Facility
TRI	total recordable incident (rate)
TRU	transuranic
TSCA	Toxic Substances Control Act
TSFF	Tritium Science and Fabrication Facility
TSTA	Tritium System Test Assembly (facility)
TWISP	Transuranic Waste Inspectable Storage Project
TYCSP	Ten-Year Comprehensive Site Plan
UC	University of California
UF/RO	ultrafiltration/reverse osmosis
VCA	voluntary corrective action
WCRRF	Waste Characterization, Reduction, and Repackaging Facility
WETF	Weapons Engineering Tritium Facility
WIPP	Waste Isolation Pilot Plant
WNR	Weapons Neutron Research (facility)
WTA	Western Technical Area

1.0 Introduction

1.1 The SWEIS

In 1999, the US Department of Energy (DOE)[1], published a Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (DOE 1999a). DOE issued its Record of Decision (ROD) on this Site-Wide Environmental Impact Statement (SWEIS) in September 1999 (DOE 1999b). The ROD identified the decisions DOE made on levels of operation for LANL for the foreseeable future.

1.2 Annual Yearbook

To enhance the usefulness of this SWEIS, a National Environmental Policy Act (NEPA) document, DOE and LANL implemented a program making annual comparisons between SWEIS ROD projections and actual operations via an Annual Yearbook. The Yearbook's purpose is not to present environmental impacts or environmental consequences, but rather to provide data that could be used to develop an impact analysis. The Yearbook focuses on the following:

- Facility and process modifications or additions (Chapter 2). These include projected activities, for which NEPA coverage was provided by the SWEIS, and some post-SWEIS activities for which environmental coverage was not provided. In the latter case, the Yearbook identifies the additional NEPA analyses (i.e., categorical exclusions and environmental assessments) that were performed.

- The types and levels of operations during the calendar year (CY; Chapter 2). Types of operations are described using capabilities defined in the SWEIS. Levels of operations are expressed in units of production, numbers of researchers, numbers of experiments, hours of operation, and other descriptive units.

- Operations data for the Key Facilities, comparable to data projected by the SWEIS ROD (Chapter 2). Data for each facility include waste generated, air emissions, liquid effluents, and number of workers.

- Site-wide effects of operations for the CY (Chapter 3). These include measures such as number of workers, radiation doses, workplace incidents, utility requirements, air emissions, liquid effluents, and solid wastes. These effects also include changes in the regional aquifer, ecological resources, and other resources for which the DOE has long-term stewardship responsibilities as an owner of federal lands.

- Trend analysis (Chapter 4). This includes analysis on land use, quantities of wastes generated, utility consumption, long-term effects from Laboratory operations, and the Cerro Grande Rehabilitation Project (CGRP).

- Ten-Year Comprehensive Site Plan (TYCSP; Chapter 5). This is a summary of what the Laboratory is projecting for the future relative to land usage; structure maintenance, construction, and decontamination and demolition; and infrastructure maintenance and improvements.

- Summary and conclusion (Chapter 6). This chapter summarizes CY 2001 for the Laboratory in terms of overall facility construction and modifications, facility operations, and operations data and environmental parameters. These data form the basis of the conclusion for whether or not the Laboratory is operating within the envelope of the SWEIS ROD.

- References (Chapter 7). This chapter provides a listing of the documents used in preparing this Yearbook.

[1] Congress established the National Nuclear Security Administration (NNSA) within the DOE to manage the nuclear weapons program for the United States. Los Alamos National Laboratory (LANL or Laboratory) is one of the facilities now managed by the NNSA. The NNSA officially began operations on March 1, 2000. Its mission is to carry out the national security responsibilities of the DOE, including maintenance of a safe, secure, and reliable stockpile of nuclear weapons and associated materials capabilities and technologies; promotion of international nuclear safety and nonproliferation; and administration and management of the naval nuclear propulsion program.

- Chemical usage and emissions data (Appendix A). These data summarize the chemical usage and air emissions by Key Facility.

- Nuclear facilities list (Appendix B). This appendix provides a summary of the facilities identified as nuclear at the time the SWEIS was developed and during CY 2001.

- Radiological facilities list (Appendix C). These data identify the facilities considered as radiological in CY 2001 and indicate their categorization at the time the SWEIS was developed.

- Future projects (Appendix D). This summarizes in tabular format the projects identified in the TYCSP.

Data for comparison come from a variety of sources, including facility records, operations reports, facility personnel, and the annual Environmental Surveillance Report. The focus on operations rather than on programs, missions, or funding sources is consistent with the approach of the SWEIS.

The Annual Yearbooks provide DOE with information needed to evaluate adequacy of the SWEIS and will enable DOE to make a decision on when and if a new SWEIS is needed. The Yearbooks will also be a guide to facilities and managers at the Laboratory in determining whether activities are within the SWEIS operating envelope. The report does not reiterate the detailed information found in other LANL documents, but rather points the interested reader to those documents for the additional detail. The Yearbook serves as a guide to environmental information collected and reported by the various groups at LANL.

The SWEIS analyzed the potential environmental impacts of scenarios for future operations at LANL. DOE announced in its ROD that it would operate LANL at an expanded level and that the environmental consequences of that level of operations were acceptable. The ROD is not a predictor of specific operations, but establishes boundary conditions for operations. The ROD provides an environmental operating envelope for specific facilities and for the Laboratory as a whole. If operations at LANL were to routinely exceed the operating envelope, DOE would evaluate the need for a new SWEIS. As long as LANL operations remain below the level analyzed in the ROD, the environmental operating envelope is valid. Thus, the levels of operation projected by the SWEIS ROD should not be viewed as goals to be achieved, but rather as acceptable operational limits.

1.3 This Yearbook

The ROD selected levels of operations, and the SWEIS provided projections for these operations. This Yearbook compares data from 2001 to the appropriate SWEIS projections. Hence, this report uses the phrases “SWEIS ROD projections,” “SWEIS ROD,” or “ROD” to convey this concept, as appropriate.

The collection of data on facility operations is a unique effort. The type of information developed for the SWEIS is not routinely collected at LANL. Nevertheless, this information is the heart of the SWEIS and the Yearbook. Although this requires a special effort, the description of current operations and indications of future changes in operations are believed to be sufficiently important to warrant an incremental effort.

2.0 Facilities and Operations

LANL has more than 2,000 structures with approximately eight million square feet under roof, spread over an area of 43 square miles. To present a logical and comprehensive evaluation of LANL's potential environmental impacts, the SWEIS developed the Key Facility concept. Fifteen facilities were identified that were both critical to meeting mission assignments and

- housed operations that have potential to cause significant environmental impacts, or
- were of most interest or concern to the public (based on comments in the SWEIS public hearings), or
- would be more subject to change because of DOE programmatic decisions.

The remainder of LANL was called "Non-Key," not to imply that these facilities were any less important to accomplishment of critical research and development, but because they did not fit the above criteria (DOE 1999a, p. 2-17).

Taken together, the 15 Key Facilities represent the great majority of environmental risks associated with LANL operations. Specifically, the Key Facilities contribute

- more than 99 percent of all potential radiation doses to the public,
- more than 90 percent of all radioactive liquid waste generated at LANL,
- more than 90 percent of all radioactive solid waste generated at LANL,
- more than 99 percent of all radiation doses to the LANL workforce, and
- approximately 30 percent of all chemical waste generated by LANL.

In addition, the Key Facilities (as presented in the SWEIS) comprised 42 of the 48 Category 2 and Category 3 Nuclear Structures at LANL[2]. Subsequently, DOE and LANL have published four lists identifying nuclear facilities at LANL [one in 1998 (DOE 1998a), another in 2000 (DOE 2000a), and two in 2001 (LANL 2001c and 2001d)] that significantly changed the classification of some buildings. Appendix B provides a summary of the nuclear facilities and a table has been added to each section of this chapter to explain the differences and identify the 31 structures currently listed by DOE as nuclear facilities. Of these 31 structures, all but one reside within a Key Facility. The former tritium research facility (TA-33-86) is still listed as a Category 2 nuclear facility as it undergoes decontamination and decommissioning. Appendix C provides a comparison of the facilities identified as radiological when the SWEIS was prepared and those identified as radiological in 2001 (LANL 2001e). The 2001 list is shorter because of better guidance on the radiological designation.

[2] DOE Order 5480.23 (DOE 1992a) categorizes nuclear hazards as Category 1, Category 2, or Category 3. Because LANL has no Category 1 nuclear facilities (usually applied to nuclear reactors), definitions are presented for only Categories 2 and 3:

- Category 2 Nuclear Hazard – has the potential for significant onsite consequences. DOE-STD-1027-92 (DOE 1992b) provides the resulting threshold quantities for radioactive materials that define Category 2 facilities.
- Category 3 Nuclear Hazard – has the potential for only significant localized consequences. Category 3 is designed to capture those facilities such as laboratory operations, low-level radioactive waste (LLW) handling operations, and research operations that possess less than Category 2 quantities of material. DOE-STD-1027-92 (DOE 1992b) provides the Category 3 thresholds for radionuclides.

The identification of nuclear facilities is based upon the official list maintained by LANL for the DOE Los Alamos Area Office as of December 2001 (LANL 2001d).

The definition of each Key Facility hinges upon operations[3], capabilities, and location and is not necessarily confined to a single structure, building, or technical area. In fact, the number of structures comprising a Key Facility ranges from one, the Material Sciences Laboratory (MSL), to more than 400 for LANSCE. Key Facilities can also exist in more than a single technical area, as is the case with the High Explosives Processing and High Explosives Testing Key Facilities, which exist in all or parts of five and seven technical areas, respectively.

This chapter discusses each of the 15 Key Facilities from three aspects—significant facility construction and modifications that have occurred during 2001, types and levels of operations that occurred during 2001, and 2001 operations data. Each of these three aspects is given perspective by comparing them to projections made by the SWEIS ROD. This comparison provides an evaluation of whether or not data resulting from LANL operations continue to fall within the environmental envelope established by the SWEIS ROD. It should be noted that construction activities projected by the SWEIS ROD were for the ten-year period 1996–2005. All construction activities will not be complete and projected operations may not reach maximum levels until the end of the ten-year period.

This chapter also discusses Non-Key Facilities, which include all buildings and structures not part of a Key Facility, or the balance of LANL. Although operations at Non-Key Facilities do not contribute significantly to radiation doses or generation of radioactive wastes, the Non-Key Facilities represent a significant fraction of LANL. The Non-Key Facilities comprise all or the majority of 30 of LANL's 49 technical areas and approximately 15,500 of LANL's 27,816 acres. The Non-Key Facilities also employ about half the LANL workforce. The Non-Key Facilities include such important buildings and operations as the Central Computing Facility, the Atlas Facility, the Technical Area (TA) 46 sewage treatment facility, and the Main Administration Building. Table 2.0-1 identifies and compares the acreage of the 15 Key Facilities and the Non-Key Facilities. Figure 2-1 shows the location of LANL within northern New Mexico, while Figure 2-2 illustrates the technical areas. Figure 2-3 shows the locations of the Key Facilities.

With the issuance of 10 CFR 830 on January 10, 2001, onsite transportation also needs to be addressed relative to nuclear hazard categorization (FR 2001). This is a change from the SWEIS. At the time the SWEIS was published, onsite transportation was considered part of the affected environment in Section 4.10.3.1. The transportation evaluation is in progress at LANL.

The Nonproliferation and International Security Center. di02 0530

[3] As used in the SWEIS and this Yearbook, facility operations include three categories of activities—research, production, and services to other LANL organizations. Research is both theoretical and applied. Examples include modeling (e.g., atmospheric weather patterns) to subatomic investigations (e.g., using the Los Alamos Neutron Science Center [LANSCE] linear accelerator [linac]) to collaborative efforts with industry (e.g., fuel cells for automobiles). Production involves delivery of a product to a customer, such as radioisotopes to hospitals and the medical industry. Examples of services provided to other LANL facilities include utilities and infrastructure support, analysis of samples, environmental surveys, and waste management.

Table 2.0-1. Key and Non-Key Facilities

FACILITY	TECHNICAL AREAS	~SIZE (ACRES)
Plutonium Complex	TA-55	93
Tritium Facilities	TA-16 & TA-21	312
Chemistry and Metallurgy Research (CMR) Building	TA-03	14
Pajarito Site	TA-18	131
Sigma Complex	TA-03	11
MSL	TA-03	2
Target Fabrication Facility (TFF)	TA-35	3
Machine Shops	TA-03	8
High Explosives Processing	TAs 08, 09, 11, 16, 22, 28, 37	1,115
High Explosives Testing	TAs 15, 36, 39, 40	8,691
LANSCE	TA-53	751
Biosciences Facilities (Formerly Health Research Laboratory [HRL])	TAs 43, 03, 16, 35, 46	4
Radiochemistry Facility	TA-48	116
Radioactive Liquid Waste Treatment Facility (RLWTF)	TA-50	62
Solid Radioactive and Chemical Waste Facilities	TA-50 & TA-54	943
Subtotal, Key Facilities		12,256
Non-Key Facilities	30 of 49 TAs	15,560
LANL		27,816

The Nicholas C. Metropolis Center for Modeling and Simulation (Strategic Computing Complex).

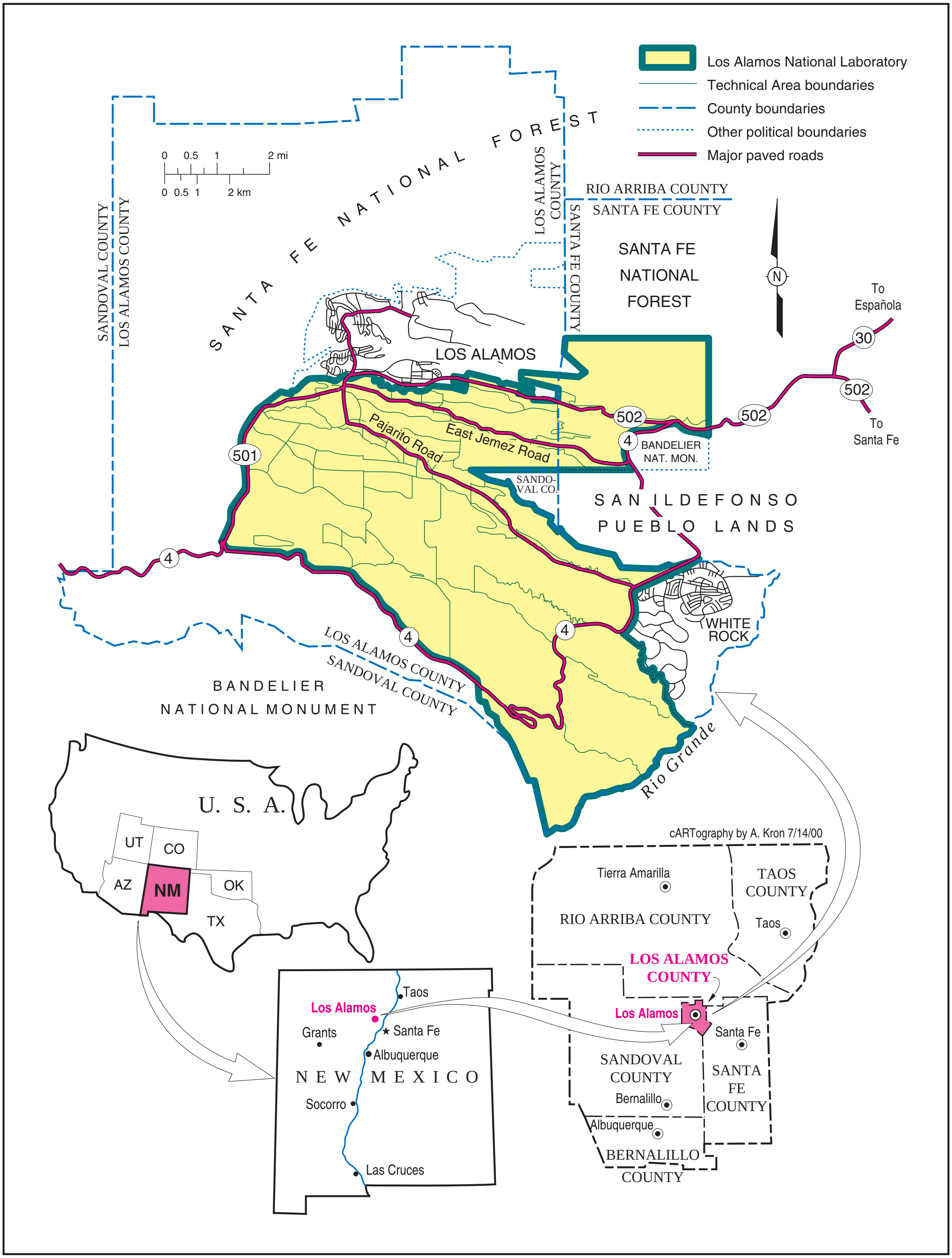

Figure 2-1. Location of LANL

Figure 2-2. Location of technical areas

Figure 2-3. Location of Key Facilities

2.1 Plutonium Complex (TA-55)

The Plutonium Complex Key Facility consists of six primary buildings and a number of lesser buildings and structures. As presented in the SWEIS, this Key Facility contained one operational Category 2 nuclear hazard facility (TA-55-4), two Low Hazard chemical facilities (TA-55-3 and TA-55-5), and one Low Hazard energy source facility (TA-55-7).

The DOE listing of LANL nuclear facilities for both 1998 and 2001 (DOE 1998a, LANL 2001d) retained Building TA-55-4 as a Category 2 nuclear hazard facility as shown in Table 2.1-1.

Table 2.1-1. Plutonium Complex Buildings with Nuclear Hazard Classification (NHC)

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-55-0004	PU-238 Processing	2	2	2
TA-55-0041	Nuclear Material Storage	2		

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)

The SWEIS also identified one potential Category 2 nuclear hazard facility (TA-55-41, the Nuclear Material Storage Facility), which was slated for potential modification to bring it into operational status. This was not done, and the DOE removed this facility from its list of nuclear facilities in its April 2000 listing (DOE 2000a). There are currently no plans to use this building for storage of nuclear materials.

2.1.1 Construction and Modifications at the Plutonium Complex

The SWEIS projected four facility modifications:

- renovation of the Nuclear Material Storage Facility (not currently planned to be used to store nuclear materials);
- construction of a new administrative office building (construction completed in 1999);
- upgrades within Building 55-4 to support continued manufacturing at the existing capacity of 14 pits per year; and
- further upgrades for long-term viability of the facility and to boost production to a nominal capacity of 20 pits per year.

During CY 2001, there were several projects that were started for maintenance or replacement purposes. The projects are listed below.

- Nuclear Materials Technology (NMT) Protect Combustible Materials (LANL 2001f, DOE 1996a),
- TA-55 Fire Protect Yard Main Replacement (LANL 2001g, DOE 1996b),
- CMR Replacement Project Preconceptual Design[4] (LANL 2001h),
- FRIT Transfer System (LANL 2001i; DOE 1996c),

[4] The CMR Replacement Project will be covered by an environmental impact statement that has not yet been started.

- TA-18 Relocation Project Office Building (LANL 2001j, DOE 2001a),
- TA-18 Relocation Project CATIII/IV at TA-55 (LANL 2001k, DOE 2001a),
- NMT Fire Safe Storage Building (LANL 2001l, DOE 1996d),
- TA-18 Relocation Project CAT-I Piece (LANL 2001m, DOE 2001a), and
- NMT [Fiscal Year] FY 2001 Office Building (LANL 2001n, DOE 1996e).

2.1.2 Operations at the Plutonium Complex

The SWEIS identified seven capabilities[5] for this Key Facility. No new capabilities have been added, however, one capability, Special Nuclear Materials (SNM) Storage, Shipping, and Receiving, had planned on using the Nuclear Material Storage Facility. Because of changes in plans, the Nuclear Material Storage Facility will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). For all seven capabilities, activity levels were below those projected by the SWEIS ROD. Table 2.1.2-1 presents details.

TA-55 looking southwest. RN99 172 015

[5] As defined in the SWEIS, a capability refers to the combination of buildings, equipment, infrastructure, and expertise necessary to undertake types or groups of activities and to implement mission assignments. Capabilities at LANL have been established over time, principally through mission assignments and activities directed by DOE Program Offices.

Table 2.1.2-1. Plutonium Complex/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
Plutonium Stabilization	Recover, process, and store the existing plutonium inventory in eight years.	Highest priority items have been stabilized. The implementation plan is being modified between DOE and the Defense Nuclear Facilities Safety Board to be complete by 2010.
Manufacturing Plutonium Components	Produce nominally 20 war reserve pits/yr. (Requires minor facility modifications.)	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile.
Surveillance and Disassembly of Weapons Components	Pit disassembly: Up to 65 pits/yr disassembled. Pit surveillance: Up to 40 pits/yr destructively examined and 20 pits/yr nondestructively examined.	Less than 65 pits were disassembled during 2001. Less than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in 2001.
Actinide Materials and Science Processing, Research, and Development	Develop production disassembly capacity. Process up to 200 pits/yr, including a total of 250 pits (over four years) as part of disposition demonstration activities.	Fewer than 200 pits were disassembled/converted in 2001.
	Process neutron sources up to 5,000 curies/yr. Process neutron sources other than sealed sources.	Neutron sources are not currently being disassembled and chemically processed.
	Process up to 400 kilograms/yr of actinides.[b] Provide support for dynamic experiments. The SWEIS has an error indicating that LANL would process one to two pits/month (up to 12 pits/yr) through tritium separation. The actual analysis for 400 kilograms/yr of actinides in the background information for TA-55 states up to one pit/month. This number is irrelevant given that the quantity of material processed is given and will not be included in future Yearbooks.	Less than 400 kilograms/yr of actinides were processed. Support was provided for dynamic experiments.
	Perform decontamination of 28 to 48 uranium components per month.	In 2001, less than 48 uranium components were decontaminated.
	Research in support of DOE actinide cleanup activities. Stabilize minor quantities of specialty items. Research and development on actinide processing and waste activities at DOE sites, including processing up to 140 kilograms of plutonium as chloride salts from the Rocky Flats Environmental Technology Site.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed.
	Conduct plutonium research and development and support. Prepare, measure, and characterize samples for fundamental research and development in areas such as aging, welding and bonding, coatings, and fire resistance.	Sample preparation and characterization continued.
	Fabricate and study nuclear fuels used in terrestrial and space reactors. Fabricate and study prototype fuel for lead test assemblies.	Minimal terrestrial and space reactor fuel development occurred in 2001.
	Develop safeguards instrumentation for plutonium assay.	Continued support of safeguards instrumentation development.
	Analyze samples in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.

Table 2.1.2-1. Plutonium Complex/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
Fabrication of Ceramic-Based Reactor Fuels	Build mixed oxide test reactor fuel assemblies and continue research and development on fuels.	No mixed oxide fuel was manufactured in 2001.
Plutonium-238 Research, Development, and Applications	Process, evaluate, and test up to 25 kilograms/yr plutonium-238. Recycle residues and blend up to 18 kilograms/yr plutonium-238.	Recovered approximately 1.1 kilograms of plutonium-238 and processed approximately 0.70 kilograms of plutonium-238 for heat source fuel in 2001.
Nuclear Materials Storage, Shipping, and Receiving	Store up to 6,600 kilograms SNM in the Nuclear Material Storage Facility; continue to store working inventory in the vault in Building 55-4; ship and receive SNM as needed to support LANL activities.	Because of changes in plans, the Nuclear Material Storage Facility will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). Building 55-4 vault levels remained approximately constant at levels identified during preparation of the SWEIS.
	Conduct nondestructive assay on SNM at the Nuclear Material Storage Facility to identify and verify the content of stored containers.	The Nuclear Material Storage Facility is not operational as a storage vault and was not used for nondestructive assay.

[a] Includes renovation of the Nuclear Material Storage Facility (which is no longer planned for use), construction of new technical support office building, and upgrades to enable the production of nominally 20 war reserve pits per year.

[b] The actinide activities at the CMR Building and at TA-55 are expected to total 400 kilograms/yr. The future split between these two facilities was not known, so the facility-specific impacts at each facility were conservatively analyzed at this maximum amount. Waste projections that are not specific to the facility (but are related directly to the activities themselves) are only projected for the total of 400 kilograms/yr.

Ed Wilson, NMT-2, does a tap density operation on material bound for Savannah River.

C552-2

2.1.3 Operations Data for the Plutonium Complex

Details of operational data are presented in Table 2.1.3-1. Radioactive air emissions were less than one percent of projections (less than five curies in 2001 compared to 1,000 curies projected). The 11,708 kilograms of chemical waste include 10,433 kilograms of solid waste material from the replacement of the hydraulic cylinders at the front gate. This waste consisted of dirt, rocks, concrete chips, and asphalt chips.

Table 2.1.3-1. Plutonium Complex/Operations Data

PARAMETER	UNITS[a]	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions:			
Plutonium-239 [b]	Ci/yr	2.70E-5	3.2E-8
Plutonium-238	Ci/yr	Not projected [c]	1.0E-8
Americium-241	Ci/yr	Not projected [c]	6.2E-9
Other actinides [d]	Ci/yr	Not projected [c]	3.2E-7
Tritium in Water Vapor	Ci/yr	7.50E+2	7.4E-1
Tritium as a Gas	Ci/yr	2.50E+2	2.5E+0
NPDES Discharge [e] 03A–181 [f]	MGY	14	0.4
Wastes:			
Chemical	kg/yr	8,400	11,708
LLW [g]	m^3/yr	754 [h]	326
MLLW	m^3/yr	13 [h]	13
TRU	m^3/yr	237 [i]	36
Mixed TRU	m^3/yr	102 [i]	30
Number of Workers	FTEs	589 [j]	635 [j]

[a] Ci/yr = curies per year; MGY = million gallons per year; FTEs = full-time equivalent workers.
[b] Projections for the SWEIS were reported as plutonium or plutonium-239, the primary material at TA-55.
[c] The radionuclide was not projected in the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.
[d] These radionuclides include isotopes of thorium and uranium.
[e] NPDES is National Pollutant Discharge Elimination System.
[f] This outfall flowed all four quarters during CY 2001.
[g] LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; TRU = transuranic.
[h] Includes estimates of waste generated by the facility upgrades associated with pit fabrication.
[i] The SWEIS provided data for TRU and mixed TRU wastes in Chapter 3 and Chapter 5. However, projections made had to be modified to reflect the decision to produce nominally 20 pits per year.
[j] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include Protection Technology Los Alamos (PTLA), Johnson Controls Northern New Mexico (JCNNM), and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.2 Tritium Facilities (TA-16 and TA-21)

This Key Facility consists of tritium operations at TA-16 and TA-21. Tritium operations are conducted in three buildings: the Weapons Engineering Tritium Facility (WETF, Building TA-16-205), the Tritium Systems Test Assembly (TSTA, Building TA-21-155N), and the Tritium Science and Fabrication Facility (TSFF, Building TA-21-209). Limited operations involving the removal of tritium from actinide material are conducted at LANL's TA-55 Plutonium Facility; however, these operations are small in scale and this operation was not included as part of the Tritium Facilities in the SWEIS.

The three facilities, (WETF, TSTA, and TSFF) have tritium inventories greater than 30 grams and thus are Category 2 nuclear facilities. The tritium inventory at TSTA and TSFF (the TA-21 tritium facilities) has been reduced. It is expected that these facilities can be reclassified to Category 3 nuclear facilities in 2003. When funding becomes available, both facilities will transition to radiological facilities. TSTA may become a radiological facility in 2003 or 2004. For TSFF, the transition to radiological is estimated to occur in 2007.

As shown in Table 2.2-1, the NHC of these three facilities has remained constant. However, WETF was separated into its three component buildings in the SWEIS but is now considered a single building.

Table 2.2-1. Tritium Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-16-0205 [c]	WETF	2	2	2
TA-16-0205A [c]	WETF	2		
TA-16-0450 [c]	WETF	2		
TA-21-0155	TSTA	2	2	2
TA-21-0209	TSFF	2	2	2

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)
[c] In 2001, only TA-16-205 is indicated as nuclear because TA-16-205A and -450 are not operational. When the WETF Safety Analysis Report is approved, TA-16-205, -205A, and -450 will be considered one facility.

In November 1999, DOE determined that TSTA had completed its mission. Therefore, the tritium will be removed from this facility over the next several years. During 2001, only a limited experimental program was carried out in TSTA, and this program was completed by June 2001.

A formerly used tritium facility also remains at TA-33, the High-Pressure Tritium Laboratory. It is not an operational facility and it is in the final stages of deactivation preparatory to final decontamination and decommissioning. The only activities conducted at this facility are removal and packaging of tritium-contaminated equipment.

2.2.1 Construction and Modifications at the Tritium Facilities

During 2001, there were no new major construction activities or building modifications at WETF at TA-16. Several of the existing systems at WETF were upgraded to enhance capabilities. The remodeling of Building TA-16-450 was completed in 2000. The operational readiness review to extend the tritium processing area of WETF into Building 450 will be completed in CY 2003. At that time, this area will be integrated into WETF. Modification of Building 450 is to accommodate neutron tube target loading operations and related research. This modification was addressed by the SWEIS ROD, and has its own NEPA coverage via an environmental assessment and Finding of No Significant Impact (DOE 1995a).

Upgrade of a part of the WETF roof to meet current seismic requirements was begun in November 2000 (LANL 1998). This was completed in March 2001. The modification involves additional structural attachment of the existing roof to the facility walls.

A new WETF Office Building (Building 824) was completed in December 2001. The work was done under a categorical exclusion, LAN-96-022 (DOE 1996b).

There have been no facility modifications made to the TA-21 facilities.

2.2.2 Operations at the Tritium Facilities

The SWEIS identified nine capabilities for this Key Facility. No new capabilities have been added, and one, Cryogenic Separation: TSTA, has been deleted. Table 2.2.2-1 lists the nine capabilities identified in the SWEIS and presents CY 2001 operational data for each of these capabilities. Operations in 2001 were below projections by the SWEIS ROD and remained within the established environmental envelope. For example, 25 high-pressure gas fill operations were conducted in 2001 (compared to 65 fills projected by the SWEIS ROD), and approximately 30 gas boost system tests and gas processing operations were performed (compared to 35 projected).

Personnel working at the high-pressure glovebox in WETF.

Table 2.2.2-1. Tritium Facilities/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
High-Pressure Gas Fills and Processing: WETF	Handling and processing of tritium gas in quantities of up to 100 grams with no limit on number of operations per year. Capability used approximately 65 times/yr.	Approximately 25 high-pressure gas fills/processing operations were conducted in 2001.
Gas Boost System Testing and Development: WETF	System testing and gas processing operations involving quantities of up to 100 grams. Capability used approximately 35 times/yr.	Approximately 30 gas boost tests and operations.
Cryogenic Separation: TSTA	Tritium gas purification and processing in quantities up to 200 grams. Capability used five to six times/yr.	This capability was disabled at TSTA and will no longer be used. A system to separate hydrogen isotopes using a chromatographic process was being tested. The testing did not use tritium.
Diffusion and Membrane Purification: TSTA, TSFF, WETF	Research on tritium movement and penetration through materials. Expect six to eight experiments/month. Capability also used continuously for effluent treatment.	Capability not used in 2001.
Metallurgical and Material Research: TSTA, TSFF, WETF	Capability involves materials research including metal getter research and application studies. Small quantities of tritium supports tritium effects and properties research and development. Contributes <2% of LANL's tritium emissions to the environment.	Activities resulted in <1% tritium emissions from each facility.
Thin Film Loading: TSFF (WETF by 2001)	Chemical bonding of tritium to metal surfaces. Current application is for tritium loading of neutron tube targets; perform loading operations up to 3,000 units/yr.	Approximately 900 units were loaded. Operations occurred at TSFF.
Gas Analysis: TSTA, TSFF, WETF	Analytical support to current capabilities. Operations estimated to contribute <5% of LANL's tritium emissions to the environment.	Gas analysis operations were continued at all three facilities during 2001. No changes in facility emissions occurred from this activity.
Calorimetry: TSTA, TSFF, WETF	This capability provides a measurement method for tritium material accountability. Contained tritium is placed in the calorimeter for quantity measurements. This capability is used frequently, but contributes <2% of LANL's tritium emissions to the environment.	Calorimetry activities were conducted at WETF and TSFF. No changes occurred in facility emissions from this activity.
Solid Material and Container Storage: TSTA, TSFF, WETF	Storage of tritium occurs in process systems, process samples, inventory for use, and as waste. Onsite storage could increase by a factor of 10 over levels identified during preparation of the SWEIS, with most of the increase occurring at WETF.	The storage at TSTA and TSFF decreased. The storage at WETF has increased by approximately 5% over levels identified during preparation of the SWEIS.

[a] Includes the remodel of Building 16-450 to connect it to WETF in support of neutron tube target loading.

2.2.3 Operations Data for the Tritium Facilities

Most data for operations at the Tritium Facilities were slightly below levels projected by the SWEIS ROD. An exception to this is airborne releases of elemental tritium from WETF. During January 2001, approximately 7,600 curies of elemental tritium were released from the facility during a single event. No hazardous wastes (chemical, LLW, MLLW, TRU, or mixed TRU) were generated. (In 2002, some MLLW may be generated at TSTA.)

During 2001, the cross-country transfer line, dedicated to the transfer of radioactive liquid wastes from the TA-21 tritium facilities to the TA-50 RLWTF, was taken out of service, flushed, drained, and capped. Environmental protection was the primary reason for removing this pipeline from service; it was a single-walled pipe for its entire length (~two miles; Figure 2-4). The reduction of radioactive liquid waste volumes gener-

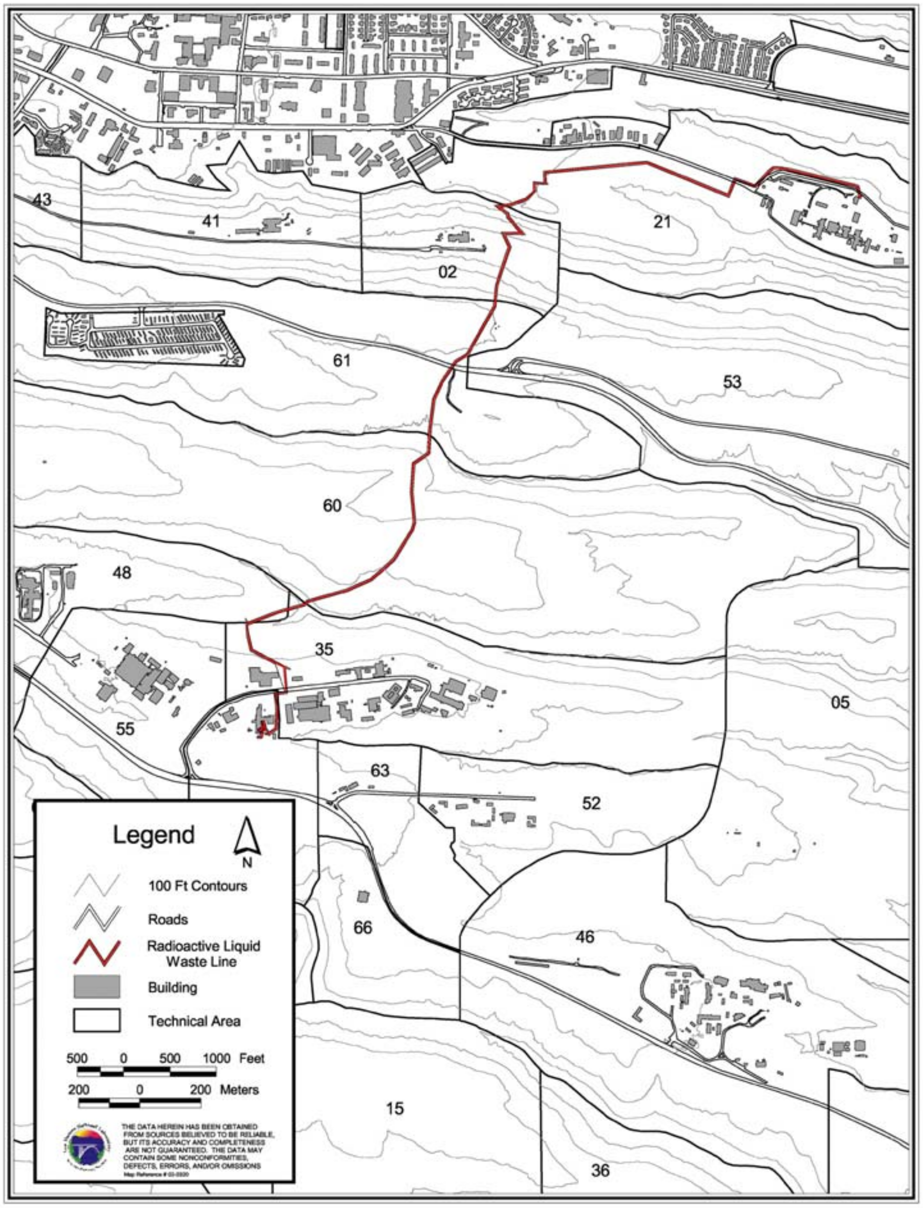

Figure 2-4. The cross-country radioactive liquid waste transfer line was removed from service in 2001.

ated at the TA-21 facilities enabled the line to be taken out of service; the smaller volumes can now be transported from TA-21 to TA-50 by truck. The TSTA cooling tower blowdown was changed from the liquid radioactive waste system to the outfall on the southwest end of TA-21, Building 209. Operational data are summarized in Table 2.2.3-1.

Table 2.2.3-1. Tritium Facilities (TA-16 and TA-21)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions:			
TA-16/WETF, Elemental tritium	Ci/yr	3.00E+2	7.7E+3
TA-16/WETF, Tritium in water vapor	Ci/yr	5.00E+2	2.0E+2
TA-21/TSTA, Elemental tritium	Ci/yr	1.00E+2	7.1E+0
TA-21/TSTA, Tritium in water vapor	Ci/yr	1.00E+2	5.8E+1
TA-21/TSFF, Elemental tritium	Ci/yr	6.40E+2	3.1E+1
TA-21/TSFF, Tritium in water vapor	Ci/yr	8.60E+2	3.9E+2
NPDES Discharge: [a]			
Total Discharges	MGY	0.3	0.3932 [b]
02A-129 (TA-21)	MGY	0.1	0.3902 [b]
03A-158 (TA-21)	MGY	0.2	0.00300
Wastes:			
Chemical	kg/yr	1,700	0
LLW	m^3/yr	480	0
MLLW	m^3/yr	3	0
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	28 [c]	25

[a] Outfalls eliminated before 1999: 05S (TA-21), 03A-036 (TA-21), 04A-091 (TA-16). Consolidation and removal of outfalls has resulted in projected NPDES volumes underestimating actual discharges from the exiting outfalls.

[b] Discharge quantity is not considered significantly different from the SWEIS ROD.

[c] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.3 Chemistry and Metallurgy Research Building (TA-03)

The CMR Building Key Facility serves as a production, research, and support center for actinide chemistry and metallurgy research and analysis, uranium processing, and fabrication of weapon components. It consists of a main building (TA-3-29) and a radioactive liquid waste pump house, TA-3-154. The main two-story building has a central corridor and seven wings. It is a Category 2 nuclear facility, primarily because of hot cell activities in Wing 9 and the quantities of nuclear material in the storage vault.

As shown in Table 2.3-1, CMR has five areas that DOE lists as Category 2 nuclear facilities (LANL 2001d). The SWEIS simply listed the whole CMR Building as a Category 2 nuclear facility.

Table 2.3-1. CMR Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-03-0029	CMR	2		2
TA-03-0029	Radiochemistry Hot Cell		2	2
TA-03-0029	SNM Vault		2	2
TA-03-0029	Nondestructive analysis/nondestructive examination Waste Assay		2	2
TA-03-0029	IAEA Classroom [c]			2
TA-03-0029	Wing 9 (Enriched Uranium)		2	2

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)
[c] The IAEA (International Atomic Energy Agency) Classroom was used to conduct Nonproliferation Training. This capability was moved to Pajarito Site (TA-18) and renamed the "Nuclear Measurement School."

2.3.1 Construction and Modifications at the CMR Building

The ROD projected five facility modifications by December 2005:

- Phase I Upgrades to maintain safe operating conditions for 5–10 years;
- Phase II Upgrades (except seismic) to enable operations for an additional 20–30 years;
- modifications for production of targets for the molybdenum-99 medical isotope;
- modifications for the recovery of sealed neutron sources; and
- modifications for safety testing of pits in the Wing 9 hot cells.

In August 1998, DOE approved the CMR Basis for Interim Operations, and in the fall of 1998, DOE determined that extensive upgrades to CMR would not be cost effective. In 1999, DOE directed the CMR Upgrades Project to re-baseline including only those upgrades needed to ensure compliance with the Basis for Interim Operations. These upgrades were required for the facility to be reliable through 2010. The new baseline was approved in October 1999 and included 16 upgrades necessary to ensure worker safety, public safety, environmental compliance, and reliability of services to safety systems. Table 2.3.1-1 identifies these 16 upgrades and their status during 2001.

Table 2.3.1-1. CMR Upgrade Status/December 2001

% COMPLETE 2000	STATUS 2000	UPGRADE	% COMPLETE 2001	2001 UPGRADE
75	In construction	Duct Washdown System Upgrade	100	Completed
100	Completed	Heating, Ventilation, and Air Conditioning delta Pressure System Upgrade	100	Completed
65	In construction	Hood Washdown System Upgrade	100	Completed
55	In design	West Bank Hot Cell delta Pressure System Upgrade	95	Turnover
40	In design	West Bank Hot Cell Controls Upgrade	95	Turnover
100	Completed	Stack Monitors Phase A Upgrade	100	Completed
60	In construction	Emergency Personnel Accountability System Upgrade	95	Turnover
90	Completed	Stack Monitors Phase B Upgrade	100	Completed
80	In construction	Compressor System Upgrade	100	Completed
100	Completed	Sprinkler Head Replacement Upgrade	100	Completed
55	In construction	Emergency Lighting System Upgrade	100	Completed
35	In design	Emergency Notification Upgrade	90	Turnover
40	In design	Internal Power Distribution Upgrade	90	Turnover
0	Not started	Operations Center Upgrade	80	Construction
45	In design	Ventilation System Filter Replacement Upgrade	100	Completed
40	In design	Fire Protection System Upgrade	100	Completed

Substantial progress was experienced during 2000 and 2001. Based on current projections, these upgrades should be completed during FY 2002.

2.3.2 Operations at the CMR Building

The eight capabilities identified in the SWEIS for the CMR Facility are presented in Table 2.3.2-1. No new capabilities have been added, but one capability (Nonproliferation Training) was removed from CMR and relocated back to TA-18.

The CMR Building.

Table 2.3.2-1. CMR Building (TA-03)/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
Analytical Chemistry	Sample analysis in support of a wide range of actinide research and processing activities. Approximately 7,000 samples/yr.	Approximately 2,500 samples were analyzed.
Uranium Processing	Activities to recover, process, and store LANL highly enriched uranium inventory by 2005. Includes possible recovery of materials resulting from manufacturing operations.	Highly enriched uranium was repackaged. Five shipments were made to Y-12 at Oak Ridge National Laboratory. Other material was moved to TA-18.
Destructive and Nondestructive Analysis	Evaluate 6 to 10 secondaries/yr through destructive/nondestructive analyses and disassembly.	No activity. Project is no longer active, and capability was not used in 2001.
Nonproliferation Training (moved to Pajarito Site [TA-18] and renamed the Nuclear Measurement School).	Nonproliferation training involving SNM. No additional quantities of SNM, but may work with more types of SNM than present during preparation of the SWEIS.	This capability was moved back to TA-18, and no more training is planned at CMR Building because of a change in status.
Actinide Research and Processing [b]	Process up to 5,000 Curies/yr plutonium-238/beryllium and americium-241/beryllium neutron sources. Process neutron sources other than sealed sources. Stage up to 1,000 Curies/yr plutonium-238/beryllium and americium-241/beryllium sources in Wing 9 floor holes.	No activity.
	Introduce research and development effort on spent nuclear fuel related to long-term storage and analyze components in spent and partially spent fuels.	Analyzed approximately 50 samples in 2001.
	Metallurgical microstructural/chemical analysis and compatibility testing of actinides and other metals. Primary mission to study long-term aging and other material effects. Characterize about 100 samples/yr. Conduct research and development in hot cells on pits exposed to high temperatures.	Performed microstructural characterization tests on approximately 200 samples containing less than 20 grams of plutonium per sample.
	Analysis of TRU waste disposal related to validation of the Waste Isolation Pilot Plant (WIPP) performance assessment models. TRU waste characterization. Analysis of gas generation such as could occur in TRU waste during transportation to WIPP. Performance Demonstration Program to test nondestructive analysis/nondestructive examination equipment. Demonstrate actinide decontamination technology for soils and materials. Develop actinide precipitation method to reduce mixed wastes in LANL effluents.	This is no longer an ongoing program.
Fabrication and Metallography	Produce 1,080 targets/yr, each containing approximately 20 grams uranium-235, for the production of molybdenum-99, plus an additional 20 targets/wk for 12 weeks. Separate fission products from irradiated targets to provide molybdenum-99. Ability to produce 3,000 six-day curies of molybdenum-99/wk.[c]	No activity. Project was terminated.

Table 2.3.2-1. CMR Building (TA-03)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
	Support complete highly enriched uranium processing, research and development, pilot operations, and casting. Fabricate metal shapes, including up to 50 sets of highly enriched uranium components, using 1 to 10 kilograms highly enriched uranium per operation. Material recovered and retained in inventory. Up to 1,000 kilograms annual throughput.	No activity.

[a] Includes completion of Phase I and Phase II Upgrades, except for seismic upgrades, modifications for the fabrication of molybdenum-99 (Mo-99) targets, modifications for the Radioactive Source Recovery Program, and modification for safety testing of pits.

[b] The actinide activities at the CMR Building and at TA-55 are expected to total 400 kilograms/yr. The future split between these two facilities is not known, so the facility-specific impacts at each facility are conservatively analyzed at this maximum amount. Waste projections, which are not specific to the facility (but are related directly to the activities themselves), are only projected for the total of 400 kilograms/yr.

[c] Mo-99 is a radioactive isotope that decays to form metastable technicium-99, a radioactive isotope that has broad applications in medical diagnostic procedures. Both isotopes are short-lived, with half-lives (the time in which the quantity of the isotope is reduced by 50 percent) of 66 hours and 6 hours, respectively. These short half-lives make these isotopes both attractive for medical use (minimizes the radiation dose received by the patient) and highly perishable. Production of these isotopes is therefore measured in "six-day curies," the amount of radioactivity remaining after six days of decay, which is the time required to produce and deliver the isotope to hospitals and other medical institutions.

2.3.3 Operations Data for the CMR Building

Operations data from research, services, and production activities at the CMR Building were well below those projected by the SWEIS ROD. Radioactive air emissions were less than one curie (compared to 1,645 projected)—principally because processing of irradiated molybdenum-99 targets in the hot cells did not occur. Of the wastes generated, only TRU waste exceeded SWEIS ROD projections; the others remained low, ranging from about 2 percent to about 25 percent of these projections. The TRU waste was above projections due to remodeling activities. Table 2.3.3-1 provides details of these and other operational data.

A Material Balance Area in CMR.

Table 2.3.3-1. CMR Building (TA-03)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions:			
Total Actinides[a]	Ci/yr	7.60E-4	1.7E-5
Krypton-85	Ci/yr	1.00E+2	Not measured [b]
Xenon-131m	Ci/yr	4.50E+1	Not measured [b]
Xenon-133	Ci/yr	1.50E+3	Not measured [b]
Tritium Water	Ci/yr	Negligible	Not measured [b]
Tritium Gas	Ci/yr	Negligible	Not measured [b]
NPDES Discharge:			
03A–021	MGY	0.53	0.02090
Wastes:			
Chemical	kg/yr	10,800	676
LLW	m^3/yr	1,820	448
MLLW	m^3/yr	19	0.4
TRU	m^3/yr	28 [c]	46
Mixed TRU	m^3/yr	13 [c]	1
Number of Workers	FTEs	204 [d]	192

[a] Includes uranium, plutonium, americium, and thorium.

[b] Potential emissions during the period were sufficiently small that measurement of these radionuclides was not necessary to meet facility or regulatory requirements.

[c] The SWEIS provided the data for TRU and mixed TRU wastes in Chapter 3 and Chapter 5. However, the projections made had to be modified to reflect the decision to produce nominally 20 pits per year.

[d] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.4 Pajarito Site (TA-18)

The Pajarito Site Key Facility is located entirely at TA-18. Principal activities are design and performance of nuclear criticality experiments and detector development in support of emergency response, nonproliferation, and arms control.

The SWEIS defined the facility as having a main building (18-30), three outlying, remote-controlled critical assembly buildings then known as "kivas" (18-23, -32, -116), and a number of additional support buildings, including the hillside vault (18-26). During 2000, in response to concerns expressed by two Native American Indian Pueblos (Santa Ana and Picuris), the term "kiva" (which has religious significance to these Native Americans), was replaced with the acronym CASA (Critical Assembly and Storage Area).

As shown in Table 2.4-1, DOE lists this whole Key Facility as a Category 2 facility and identifies seven buildings with NHCs. The four buildings identified in the SWEIS (TA-18-23, -26, -32, and -116) have remained Category 2 nuclear facilities. The additions represent buildings with inventories meeting the current nuclear facility classification guidelines. It is interesting to note that the IAEA classroom (Building TA-18-258) represents a capability that was originally at TA-18, transferred to the CMR Building, and then brought back to TA-18 in 2000.

Table 2.4-1. Pajarito Site Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-18	Site Itself		2	2
TA-18-0023	SNM Vault (CASA 1)	2	2	2
TA-18-0026	Hillside Vault	2	2	2
TA-18-0032	SNM Vault (CASA 2)	2	2	2
TA-18-0116	Assembly Building (CASA 3)	2	2	2
TA-18-0127	Accelerator used for weapons x-ray		2	2
TA-18-0129	Calibration Laboratory		2	2
TA-18-0247	Sealed Sources		3	
TA-18-0258	IAEA Classroom (Trailer) [c]		2	

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)
[c] The IAEA Classroom was moved from CMR to TA-18. The capability was renamed from "Nonproliferation Training" to "Nuclear Measurement School" as part of the move.

No changes were made to the authorization basis documents in 2000 or 2001. During 2000 a new Basis for Interim Operations document was initiated that will supersede the approved safety analysis report when issued in 2002.

2.4.1 Construction and Modifications at the Pajarito Site

The SWEIS ROD projected replacement of the portable linac machine. This has not been done. Construction projects for 2001 consisted of the installation of two office trailers (Buildings 300 and 301) and security enhancements.

Adjusting the controls for an experiment.

2.4.2. Operations at the Pajarito Site

The SWEIS identified nine capabilities for this Key Facility. No research capabilities have been deleted. However, the Nuclear Measurement School, which was originally moved from TA-18 to CMR (before the SWEIS), was moved back to TA-18 in 2000. The TA-18 facility experienced normal operations during 2001 and conducted 140 criticality experiments. This total of 140 experiments represents only about 13 percent of the SWEIS ROD projection of a maximum of 1,050 experiments in any given year. In addition, inventory levels remained essentially constant, and there was not a significant increase in nuclear weapons components and materials at the facility. Table 2.4.2-1 provides details.

Machine shop at TA-18.

2.4.3 Operations Data for the Pajarito Site

Research activities were well below those projected by the SWEIS ROD; consequently, operations data were also well below projections. The chief environmental measure of activities at the Pajarito Site is the estimated radiation dose to a hypothetical member of the public, referred to as the maximally exposed individual. The dose estimated to result from 2001 activities was 4.2 millirem, compared to 28.5 millirem per year projected by the SWEIS ROD. Chemical waste generation was below projections (91 kilograms generated in 2001 compared to 4,000 projected). Operational data are detailed in Table 2.4.3-1.

Table 2.4.2-1. Pajarito Site (TA-18)/Comparison of Operations

CAPABILITIES	SWEIS ROD[a]	2001 OPERATIONS
Dosimeter Assessment and Calibration	Perform up to 1,050 criticality experiments per year.	Performed 140 experiments.
Detector Development	Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%, and replace portable linac.	The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. Did not replace the portable linac.
Materials Testing	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing.	Performed 140 experiments.
Subcritical Measurements	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. The SKUA critical assembly was de-fueled at DOE's request and is no longer available for criticality experiments.
Fast-Neutron Spectrum	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%, and increase nuclear weapons components and materials.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. Slight increase in nuclear weapons components and materials in 1998, no additional increase in 1999 through 2001.
Dynamic Measurements	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory.
Skyshine Measurements	Perform up to 1,050 criticality experiments per year.	Performed 140 experiments.
Vaporization	Perform up to 1,050 criticality experiments per year.	Performed 140 experiments.
Irradiation	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, interrogation techniques, and field systems. Increase nuclear materials inventory by 20%.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory.
Nuclear Measurement School (relocated from CMR and renamed. At CMR it was called "Nonproliferation Training").	Not in SWEIS ROD (was located in CMR).	This capability was located at TA-18 in years past, but had been moved to CMR. In the effort to reduce the CMR Building to a Category 3 nuclear facility, these operations were moved back to TA-18, necessitating the transfer of additional nuclear material to the facility for use in the classes.

[a] Includes replacement of the portable linac.

Table 2.4.3-1. Pajarito Site (TA-18)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions:			
Argon-41 [a]	Ci/yr	1.02E+2	2.9E-1
External Penetrating Radiation	mrem/yr	28.5 [b]	4.2
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	4,000	91
LLW	m^3/yr	145	13
MLLW	m^3/yr	1.5	0
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	70 [c]	73 [c]

[a] These values are not stack emissions. The SWEIS ROD projections are from Monte Carlo modeling. Values are from the first 394-foot (120-meter) radius. Other isotopes (nitrogen-13 and oxygen-15) are not shown because of very short half-lives.

[b] Page 5-116, Section 5.3.6.1, "Public Health," of the SWEIS.

[c] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.5 Sigma Complex (TA-03)

The Sigma Complex Key Facility consists of four principal buildings: the Sigma Building (3-66), the Beryllium Technology Facility (3-141), the Press Building (3-35), and the Thorium Storage Building (3-159). Primary activities are the fabrication of metallic and ceramic items, characterization of materials, and process research and development. As shown in Table 2.5-1, this Key Facility had two Category 3 nuclear facilities, 3-66 and 3-159 identified in the SWEIS; however, in April 2000, Building 3-159 was downgraded from a hazard category 3 nuclear facility to a radiological facility and removed from the nuclear facilities list. In March 2001, Building 3-66 was downgraded from a hazard category 3 nuclear facility and removed from the nuclear facilities list (LANL 2001c). In September 2001, Buildings 3-35, 3-66, and 3-159 were placed on the radiological facility list (LANL 2001e). Building 3-141 is a Non-nuclear Moderate Hazard Facility.

Table 2.5-1. Sigma Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-03-0066	44 metric tons of depleted uranium storage	3	3	
TA-03-0159	thorium storage	3	3	

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)

[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2001d)

2.5.1 Construction and Modifications at the Sigma Complex

The SWEIS projected significant facility changes for the Sigma Building itself. Three of five planned upgrades are done, one is essentially done, and one remains undone. They are

- replacement of graphite collection systems–completed in 1998,
- modification of the industrial drain system–completed in 1999,
- replacement of electrical components–essentially completed in 2000; however, add-on assignments will continue,
- roof replacement–most of the roof was replaced in 1998 and 1999; however, additional work needs to be done, and
- seismic upgrades–not started.

Construction of the Beryllium Technology Facility, formerly known as the Rolling Mill Building, was completed during 1999. The Beryllium Technology Facility, a state-of-the-art beryllium processing facility, has 16,000 square feet of floor space, of which 13,000 are used for beryllium operations. The remaining 3,000 square feet will be used for general metallurgical activities. The mission of the new facility is to maintain and enhance the beryllium technology base that exists at LANL and to establish the capability for fabrication of beryllium powder components. Research will also be conducted at the Beryllium Technology Facility and will include energy- and weapons-related use of beryllium metal and beryllium oxide. As discussed in Section 2.8, Machine Shops, beryllium equipment was moved from the shops into the Beryllium Technology Facility in stages during 2000. The authorization to begin operations in the Beryllium Technology Facility was granted by DOE in January 2001.

2.5.2 Operations at the Sigma Complex

The SWEIS identified three capabilities for the Sigma Complex. No new capabilities have been added, and none have been deleted. As indicated in Table 2.5.2-1, activity levels for all capabilities were less than levels projected by the SWEIS ROD.

Exterior view of Sigma.

Table 2.5.2-1. Sigma Complex (TA-03)/Comparison of Operations

CAPABILITY	SWEIS ROD [a]	2001 OPERATIONS
Research and Development on Materials Fabrication, Coating, Joining, and Processing	Maintain and enhance capability to fabricate items from metals, ceramics, salts, beryllium, enriched uranium, depleted uranium, and other uranium isotope mixtures including casting, forming, machining, polishing, coating, and joining.	Capability maintained and enhanced, as projected.
Characterization of Materials	Maintain and enhance research and development activities on properties of ceramics, oxides, silicides, composites, and high-temperature materials. Characterize components for accelerator production of tritium.	Totals of 184 assignments and 961 specimens were characterized.
	Analyze up to 36 tritium reservoirs/yr.	Activity transferred to TFF (See Table 2.7.2-1.) [b]
	Develop library of aged non-SNM materials from stockpiled weapons and develop techniques to test and predict changes. Store and characterize up to 2,500 non-SNM component samples, including uranium.	Approximately 500 non-SNM materials samples and 500 non-SNM component samples stored in library.
Fabrication of Metallic and Ceramic Items	Fabricate stainless steel and beryllium components for about 80 pits/yr.	No development pits fabricated.
	Fabricate up to 200 tritium reservoirs per year.	Less than 25 reservoirs fabricated.
	Fabricate components for up to 50 secondaries per year.	Fabricated components for less than 50 secondaries.
	Fabricate nonnuclear components for research and development: about 100 major hydrotests and 50 joint test assemblies/yr.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.
	Fabricate beryllium targets.	Provided material for the production of ICF targets but did not fabricate any targets.
	Fabricate targets and other components for accelerator production of tritium research.	Two radio-frequency cavities were polished. None were produced.
	Fabricate test storage containers for nuclear materials stabilization.	Produced 50 containers.
	Fabricate nonnuclear (stainless steel and beryllium) components for up to 20 pit rebuilds/yr.	Less than 10 stainless steel, and no beryllium, components produced.

[a] Includes Sigma Building renovation and modifications for Beryllium Technology Facility.
[b] The SWEIS indicated that this activity would also be accomplished at TFF.

2.5.3 Operations Data for the Sigma Complex

Levels of research and operations were less than those projected by the SWEIS ROD; consequently, operations data were also below projections. Waste volumes and NPDES discharge volumes were all lower than projected by the SWEIS ROD. Table 2.5.3-1 provides details.

Table 2.5.3-1. Sigma Complex (TA-03)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions: [a]			
Uranium-234	Ci/yr	6.60E-5	Not Measured
Uranium-238	Ci/yr	1.80E-3	Not Measured
NPDES Discharge:			
Total Discharges	MGY	7.3	0.05
03A–022	MGY	4.4	0.05
03A–024	MGY	2.9	0
Wastes:			
Chemical	kg/yr	10,000	1,265
LLW	m^3/yr	960	0.5
MLLW	m^3/yr	4	1.3
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	101 [b]	94

[a] Stack monitoring at Sigma was discontinued early in 2000. This decision was made because the potential emissions from the monitored stack were sufficiently low that stack monitoring was no longer warranted for compliance with Environmental Protection Agency (EPA) or DOE regulations. Therefore, no emissions from monitoring data are available.

[b] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.6 Materials Science Laboratory (TA-03)

The MSL Key Facility is a single laboratory building (3-1698) containing 27 labs, 60 offices, 21 materials research areas, and support rooms. The building, a two-story structure with approximately 55,000 square feet of floor space, was first opened in November 1993. Activities are all related to research and development of materials science. In September 2001, MSL was placed on the Radiological Facility List (LANL 2001c).

2.6.1 Construction and Modifications at the Materials Science Laboratory

There were no facility modifications during 2001. The SWEIS identified that completion of the top floor of the MSL was planned and was included in an environmental assessment (DOE 1991), but was not funded. To date, this work remains unscheduled and unfunded.

2.6.2 Operations at the Materials Science Laboratory

The SWEIS identified four major types of experimentation at MSL: materials processing, mechanical behavior in extreme environments, advanced materials development, and materials characterization. No new capabilities have been added, and none have been deleted. In 2001, MSL conducted operations at levels approximating those projected by the SWEIS ROD.

In 2001, there were approximately 109 total researchers and support staff at MSL, about 33 percent more than the 82 projected by the SWEIS ROD[6]. (The primary measurement of activity for this facility is the number of scientists doing research.) This increase was accomplished by having researchers share offices and laboratories and reflects the high value placed on the MSL because of its quality lab space. Table 2.6.2-1 compares 2001 operations to projections made by the SWEIS ROD.

Table 2.6.2-1. Materials Science Laboratory (TA-03)/Comparison of Operations

CAPABILITY	SWEIS ROD [a]	2001 OPERATIONS
Materials Processing	Maintain seven research capabilities at levels identified during preparation of the SWEIS: • Wet chemistry • Thermomechanical processing • Microwave processing • Heavy equipment materials • Single crystal growth • Amorphous alloys • Powder processing Expand materials synthesis/processing to develop cold mock-up of weapons assembly and processing. Expand materials synthesis/processing to develop environmental and waste technologies.	These capabilities were maintained as projected by the SWEIS ROD.
Mechanical Behavior in Extreme Environment	Maintain two research capabilities at levels identified during preparation of the SWEIS: • Mechanical testing • Fabrication and assembly Expand dynamic testing to include research and development for the aging of weapons materials. Develop a new research capability (machining technology).	Items were maintained and processes improved. New capabilities development and process improvement is an ongoing effort.
Advanced Materials Development	Maintain four research capabilities at levels identified during preparation of the SWEIS: • New materials • Synthesis and characterization • Ceramics • Superconductors	This capability was maintained as projected by the SWEIS ROD.
Materials Characterization	Maintain four research capabilities at levels identified during preparation of the SWEIS: • Surface science chemistry • X-ray • Optical metallography • Spectroscopy Expand corrosion characterization to develop surface modification technology. Expand electron microscopy to develop plasma source ion implantation.	These processes are expanded and improved upon on a continual basis.

[a] Includes completion of the second floor of MSL.

[6] This number should not be confused with the FTE index shown in Table 2.6.3-1 (59 FTEs) as the two numbers represent different populations of individuals. The 109 total researchers represent students, temporary employees, and visiting staff from other institutions. The 59 FTEs represents only regular full-time and part-time LANL staff.

2.6.3 Operations Data for the Materials Science Laboratory

The overall size of the MSL workforce has increased from about 59 workers in 2000 to about 60 in 2001 (regular part-time and full-time LANL employees listed in Table 2.6.3-1). Operational effects have been normal relative to SWEIS ROD projections. Waste quantities were lower than projected by the SWEIS ROD as only 251 kilograms of industrial waste were generated during 2001. Industrial solid waste is nonhazardous, may be disposed in county landfills, and does not represent a threat to local environs. Radioactive air emissions continue to be negligible and therefore were not measured. Table 2.6.3-1 provides details.

Table 2.6.3-1. Materials Science Laboratory (TA-03)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions	Ci/yr	Negligible	Not Measured
NPDES Discharge Volume	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	600	255
LLW	m^3/yr	0	0
MLLW	m^3/yr	0	0
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	57 [a]	60[a]

[a] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.7 Target Fabrication Facility (TA-35)

The TFF is a two-story building (35-213) housing activities related to weapons production and laser fusion research. This Key Facility is categorized as a Low Hazard nonnuclear facility.

2.7.1 Construction and Modifications at the Target Fabrication Facility

There were no significant facility additions or modifications during 2001. The ROD did not project any facility changes through 2005.

2.7.2 Operations at the Target Fabrication Facility

The SWEIS identified three capabilities for the TFF Key Facility. The primary measurement of activity for this facility is production of targets for research and testing (laser and physics testing). In 2001, approximately 1,600 targets and specialized components were fabricated for testing purposes, which is less than the 6,100 targets per year projected by the SWEIS ROD. As seen in the Table 2.7.2-1, other operations at the TFF were also below levels projected by the SWEIS ROD. The Characterization of Materials capability has been added to Table 2.7.2-1. This was a capability identified in the SWEIS for the TFF and Sigma Key Facilities but, before the 2001 Yearbook, was only listed for the Sigma Key Facility.

Table 2.7.2-1. Target Fabrication Facility (TA-35)/Comparison of Operations

CAPABILITY	SWEIS ROD	2001 OPERATIONS
Precision Machining and Target Fabrication	Provide targets and specialized components for about 6,100 laser and physics tests/yr, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, and including about 100 high-energy-density physics tests.	Provided targets and specialized components for about 1,600 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical High Energy Density Hydrodynamics. Supported about 7 high-energy-density physics tests.
Polymer Synthesis	Produce polymers for targets and specialized components for about 6,100 laser and physics tests/yr, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, and including about 100 high-energy-density physics tests.	Produced polymers for targets and specialized components for about 800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical High Energy Density Hydrodynamics. Supported about 7 high-energy-density physics tests.
Chemical and Physical Vapor Deposition	Coat targets and specialized components for about 6,100 laser and physics tests/yr, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, including about 100 high-energy-density physics tests, and including support for pit rebuild operations at twice the levels identified during preparation of the SWEIS.	Coated targets and specialized components for about 800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical High Energy Density Hydrodynamics. Supported about 7 high-energy-density physics tests. Provided coatings for pit rebuild operations.
Characterization of Materials [a]	Analyze up to 36 tritium reservoirs/yr. [a]	Less than 36 tritium reservoirs analyzed.

[a] The SWEIS indicated that this activity would be accomplished at TFF as well as the Sigma Complex. See Table 2.5.2-1.

2.7.3 Operations Data for the Target Fabrication Facility

TFF activity levels are primarily determined by funding from fusion, energy, and other research-oriented programs, as well as funding from some defense-related programs. These programs, and hence operations at TFF, were at levels similar to those levels identified during preparation of the SWEIS and below levels projected by the SWEIS ROD. This summary is supported by the current workforce and by 2001 waste volumes, which were less than projected. Table 2.7.3-1 details operations data for 2001.

Table 2.7.3-1. Target Fabrication Facility (TA-35)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radiological Air Emissions	Ci/yr	Negligible	Not Measured [a]
NPDES Discharge:	MGY		
4A-127	MGY	0	0
Wastes:			
Chemical	kg/yr	3,800	668
LLW	m^3/yr	10	0.2
MLLW	m^3/yr	0.4	0
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	54 [b]	54 [b]

[a] The emissions continue to be sufficiently low that monitoring is not required.

[b] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.8 Machine Shops (TA-03)

The Machine Shops Key Facility consists of two buildings, the Nonhazardous Materials Machine Shop (Building 3-39) and the Radiological Hazardous Materials Machine Shop (Building 3-102). Both buildings are located within the same exclusion area. Activities consist of machining and fabrication of various materials in support of major LANL operations, principally those related to processing and testing of high explosives and weapons components.

In September 2001, Building 3-102 was placed on the Radiological Facility List (LANL 2001e).

2.8.1 Construction and Modifications at the Machine Shops

Consistent with SWEIS ROD projections, there were no new construction or major modifications to the shops in 2001. Beryllium operations conducted in Room 16 in the north wing of Building 3-39 were completely moved to Building 3-141, the Beryllium Technology Facility (part of the Sigma Key Facility). This move was started in 2000 and completed in 2001.

2.8.2 Operations at the Machine Shops

As shown in Table 2.8.2-1, the SWEIS identified three capabilities at the shops. These same three capabilities continue to be maintained. No new capabilities have been added to this Key Facility. All activities occurred at levels well below those projected by the SWEIS ROD. The workload at the Shops is directly linked with high explosives testing and processing operations. Much of the effort of staff for high explosive testing and processing in 2001 was directed to the development and instrumentation of the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility. This resulted in a significant decrease in high explosive testing and production and, subsequently, a significant reduction in workload for the Shops.

Table 2.8.2-1. Machine Shops (TA-03)/Comparison of Operations

CAPABILITY	SWEIS ROD	2001 OPERATIONS
Fabrication of Specialty Components	Provide fabrication support for the dynamic experiments program and explosives research studies. Support up to 100 hydrodynamic tests/yr. Manufacture up to 50 joint test assembly sets/yr. Provide general laboratory fabrication support as requested.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.
Fabrication Utilizing Unique Materials	Continue fabrication utilizing unique and unusual materials.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.
Dimensional Inspection of Fabricated Components	Provide appropriate dimensional inspection of above fabrication activities. Undertake additional types of measurements/inspections.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.

2.8.3 Operations Data for the Machine Shops

Since activities were well below projections by the SWEIS ROD, so too were operations data. Chemical waste generation was less than six percent of projected generation (26,474 kilograms generated in 2001, compared to a ROD projection of 474,000 kilograms per year). Table 2.8.3-1 provides details.

Table 2.8.3-1. Machine Shops (TA-03)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions:			
Thorium-230	Ci/yr	Not projected [a]	Not detected
Uranium-234	Ci/yr	Not projected [a]	2.1E-8
Uranium-235	Ci/yr	Not projected [a]	9.9E-10
Uranium-238	Ci/yr	1.50E-4	4.5E-10
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	474,000	26,474
LLW	m^3/yr	606	22
MLLW	m^3/yr	0	0.05
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	81 [b]	91 [b]

[a] The radionuclide was not projected by the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.

[b] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.9 High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, TA-37)

The High Explosives Processing Key Facility is located in all or parts of seven technical areas. Building types consist of production and assembly facilities, analytical laboratories, explosives storage magazines, and a facility for treatment of high explosive contaminated wastewaters. Activities consist primarily of manufacture and assembly of high explosives components for nuclear weapons and for Science-Based Stockpile Stewardship Program tests and experiments. Environmental and safety tests are performed at TA-11 and TA-9 while TA-8 houses radiography activities.

As identified in the SWEIS, this Key Facility has one Category 2 nuclear building in TA-8 (8-23) (Table 2.9-1). In September 2001, the LANL Radiological Facility List (LANL 2001e) was published and identified Buildings 8-22, 8-70, 11-30, 16-88, 16-300, 16-301, 16-302, 16-332, 16-410, 16-411, 16-413, 16-415, 37-10, 37-14, 37-22, 37-24, and 37-25 as radiological facilities.

Table 2.9-1. High Explosives Processing Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-08-0022	Radiography facility	2	2	
TA-08-0023	Radiography facility	2	2	2
TA-08-0024	Isotope Building	2		
TA-08-0070	Experimental Science	2		
TA-16-0411	Intermediate Device Assembly		2	

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)

Pressed high explosive simulant at TA-16-430.

Operations at this Key Facility are performed by two separate Divisions: the Dynamic Experimentation (DX) Division and the Engineering Sciences and Applications (ESA) Division. ESA performs the majority of the high explosives assembly work while DX assesses the parts produced by ESA.

The ESA Weapon Materials and Manufacturing group brings 99 percent of the explosives into LANL and stores it as raw material. ESA presses the raw explosives into solid shapes and machines these shapes to specifications. The completed shapes are shipped to DX for testing (detonation). The DX High Explosives Science and Technology group also creates a small quantity of high explosive during the year from basic chemistry. The DX Detonation Science and Technology group uses a small amount of the raw explosives for making detonators.

There are two major pathways for expending the explosives brought into LANL: wastes from the pressing and machining operations, which are burned, and completed shapes that are detonated as part of the testing program.

As a result, information from both Divisions must be combined to completely capture operational parameters for production of high explosives. To assist the reader, this information is presented both in separate and combined forms.

2.9.1 Construction and Modifications at High Explosives Processing

The ROD projected four facility modifications for this Key Facility. All four projects were completed before 1999. These four modifications were

- construction of the High Explosive Wastewater Treatment Facility–completed and in operation by 1997;
- modification of 17 outfalls and their elimination from the NPDES permit–completed with 19 outfalls actually eliminated during 1997-1998;
- relocation of the Weapons Components Testing Facility–completed before 1999; and
- the TA-16 steam plant conversion–completed.

The real time, small component radiography capability installed in Building TA-16-260 was completed and made fully operational in 2001. When this capability became fully operational, Buildings TA-16-220, -222, -223, -224, -225, and -226 were vacated (DOE 1997a).

Planning and modification work at TA-9 continued to allow consolidation of high explosives formulation operations previously conducted at TA-16-340 with other TA-9 high explosives operations (DOE 1999c).

2.9.2 Operations at High Explosives Processing

The SWEIS ROD identified six capabilities for this Key Facility. No new capabilities have been added, and none have been deleted. Activity levels during 2001 continued below those projected by the SWEIS ROD. These projections were based on the possibility that LANL would take over high explosives production work being performed at Pantex Plant. DOE decided, however, to keep high explosives production at Pantex Plant. However, the projections for high explosive processing were retained because DOE intends to keep LANL available as a back-up capability for Pantex Plant.

As seen in Table 2.9.2-1, high explosives and plastics development and characterization operations remained below levels projected in the SWEIS. Efforts continued in 2001 to develop protocols for obtaining stockpile returned materials, develop new test methods, and procure new equipment to support requirements for science-based studies on stockpile materials.

Table 2.9.2-1. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)/Comparison of Operations

CAPABILITY	SWEIS ROD[a, b]	2001 OPERATIONS
High Explosives Synthesis and Production	Continue synthesis research and development, produce new materials, and formulate explosives as needed. Increase production of materials for evaluation and process development. Produce material and components for directed stockpile production.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.
High Explosives and Plastics Development and Characterization	Evaluate stockpile returns. Increase (40%) efforts in development and characterization of new plastics and high explosives for stockpile improvement. Improve predictive capabilities. Research high explosives waste treatment methods.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.
High Explosives and Plastics Fabrication	Continue traditional stockpile surveillance and process development. Supply parts to Pantex for surveillance, stockpile rebuilds, and joint test assemblies. Increase fabrication for hydrodynamic and environmental testing.	DX Division fabricated approximately 2,000 high explosive parts, and ESA Division fabricated approximately 578 high explosives parts in 2001. Therefore, approximately 2,578 parts were fabricated in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.
Test Device Assembly	Increase test device assembly to support stockpile related hydrodynamic tests, joint test assemblies, environmental and safety tests, and increased research and development. Approximately 100 major assemblies per year.	ESA Division provided less than 100 major assemblies for Nevada Test Site subcritical and joint environmental test programs.
Safety and Mechanical Testing	Increase (50%) safety and environmental tests related to stockpile assurance. Improve predictive models. Approximately 15 safety and mechanical tests per year.	DX Division performed less than 15 stockpile related safety and mechanical tests during 2001.
Research, Development, and Fabrication of High-Power Detonators	Increase operations to support assigned stockpile stewardship management activities; manufacture up to 40 major product lines per year. Support DOE complex for packaging and transportation of electro-explosive devices.	High-power detonator activities by DX Division resulted in the manufacture of less than 40 product lines in 2001.

[a] The total amount of explosives and mock explosives used across all activities is an indicator of overall activity levels for this Key Facility. Amounts projected by the SWEIS ROD are 82,700 pounds of explosives and 2,910 pounds of mock explosives. Actual amounts used in 2001 were 10,411pounds of high explosive (DX Division, 5,581 pounds and ESA Division, 4,830 pounds), and 2,762 pounds of mock high explosive

[b] Includes construction of the High Explosives Wastewater Treatment Facility, the steam plant conversion, relocation of the Weapons Testing Facility, and outfall modifications.

In 2001, 10,411 pounds of high explosives (5,581 from DX Division and 4,830 from ESA Division), and 2,762 pounds of high explosives simulant material from DX and ESA Divisions were used in the fabrication of test components. The level of high explosives usage was significantly below the ROD projection of 82,700 pounds of high explosives, while the usage of high explosives simulant was about the same as the projection of 2,910 pounds. However, the high explosive simulant results in chemical waste that is shipped offsite for disposal and does not result in environmental impacts at LANL.

In 2001, 2,261 pounds of explosive scrap were burned at the high explosive waste treatment facility, called the Burning Ground. In addition, 998 pounds of explosive-contaminated combustible solid wastes were burned, 205 gallons of explosive-contaminated solvent-water solutions were burned, 4,670 pounds of explosive-contaminated metal were treated and salvaged, and 32,000 gallons of explosive-contaminated water were treated and released.

These levels were well below those projected by the SWEIS ROD. Three outfalls from High Explosives Processing remain on the NPDES permit: 03A-130, 05A-055 (the High Explosives Wastewater Treatment Facility), and 05A-097.

2.9.3 Operations Data for High Explosives Processing

The details of operations data are provided in Table 2.9.3-1. The NPDES discharge volume was about 32,000 gallons, compared to a projection of 12 million gallons. Waste quantities were well below projections made by the SWEIS ROD.

Table 2.9.3-1. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2000 OPERATIONS	2001 OPERATIONS
Radioactive Air Emissions:				
Uranium-238	Ci/yr	9.96E-7	[a]	[a]
Uranium-235	Ci/yr	1.89E-8	[a]	[a]
Uranium-234	Ci/yr	3.71E-7	[a]	[a]
NPDES Discharge: [b]				
Number of outfalls		22	3	3
Total Discharges	MGY	12.4	0.086	0.036
03A–130 (TA-11)	MGY	0.04	0.001	0.002
05A–055 (TA-16)	MGY	0.13	0.085	0.034
05A–097 (TA-11)	MGY	0.01	No discharge	No discharge
Wastes:				
Chemical	kg/yr	13,000	9,680	5,755
LLW	m^3/yr	16	3	1
MLLW	m^3/yr	0.2	0	0
TRU	m^3/yr	0	0	0
Mixed TRU	m^3/yr	0	0	0
Number of Workers	FTEs	96 [c]	92 [c]	107 [c]

[a] No stacks require monitoring; all non-point sources are measured using ambient monitoring.

[b] Outfalls eliminated before 1999: 02A-007 (TA-16), 04A-070 (TA-16), 04A-083 (TA-16), 04A-092 (TA-16), 04A-115 (TA-8), 04A-157 (TA-16), 05A-053 (TA-16), 05A-056 (TA-16), 05A-066 (TA-9), 05A-067 (TA-9), 05A-068 (TA-9), 05A-069 (TA-11), 05A-071 (TA-16), 05A-072 (TA-16), 05A-096 (TA-11), 06A-073 (TA-16), 06A-074 (TA-8), and 06A-075 (TA-8).

[c] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.10 High Explosives Testing (TA-14, TA-15, TA-36, TA-39, TA-40)

The High Explosives Testing Key Facility is located in all or parts of five technical areas, comprises about one-half (22 of 43 square miles) of the land area occupied by LANL, and has 16 associated firing sites. All firing sites are in remote locations and/or within canyons. Major buildings are located at TA-15, and include the DARHT facility (Building TA-15-312), PHERMEX (TA-15-184), and the TA-15-306 firing site. Building types consist of preparation and assembly facilities, bunkers, analytical laboratories, explosives storage magazines, and offices. Activities consist primarily of testing high explosives components for nuclear weapons and for Science-Based Stockpile Stewardship Program tests and experiments.

In September 2001, Building TA-15-R183 was placed on the LANL Radiological Facility List (LANL 2001e).

2.10.1 Construction and Modifications at High Explosives Testing

Construction of DARHT, the only high explosive testing facility projected for construction or modification by the SWEIS ROD, was completed in 1999. This facility was evaluated in a separate environmental impact statement (DOE 1995b). Installation and component testing of the accelerator and its associated control and diagnostics systems began in late 1999 and continued through 2001.

2.10.2 Operations at High Explosives Testing

The ROD identified seven capabilities for this Key Facility. None of these have been deleted, and no new capabilities have been introduced. Levels of research were below those predicted by the SWEIS ROD. Table 2.10.2-1 identifies the operational capabilities discussed in the SWEIS and presents 2001 operational data for comparative purposes. The total amount of depleted uranium expended during testing (all capabilities) is an indicator of overall activity levels at this Key Facility. A total of 536 kilograms were expended in 2001, compared to approximately 3,900 kilograms projected by the SWEIS ROD.

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Table 2.10.2-1. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
Hydrodynamic Tests	Conduct up to 100 hydrodynamic tests/yr. Develop containment technology. Conduct baseline and code development tests of weapons configuration. Depleted uranium use of 6,900 lb/yr (over all activities).	Hydrodynamic tests were conducted in 2001 at a level below those projected by the SWEIS ROD.
Dynamic Experiments	Conduct dynamic experiments to study properties and enhance understanding of the basic physics of state and motion for materials used in nuclear weapons including some experiments with SNM.	Dynamic experiments were conducted at a level below those projected by the SWEIS ROD.
Explosives Research and Testing	Conduct high explosives tests to characterize explosive materials.	Explosives research and testing were conducted at a level below those projected by the SWEIS ROD.
Munitions Experiments	Continued support of Department of Defense in conventional munitions. Conduct experiments with projectiles and study other effects on munitions.	Munitions experiments were conducted at a level below those projected by the SWEIS ROD.
High-Explosives Pulsed-Power Experiments	Conduct experiments and development tests.	Experiments were conducted at a level below those projected by the SWEIS ROD.
Calibration, Development, and Maintenance Testing	Conduct tests to provide calibration data, instrumentation development, and maintenance of image processing capability.	Calibration, development, and maintenance testing were conducted at a level below those projected by the SWEIS ROD.
Other Explosives Testing	Develop advanced high explosives or weapons evaluation techniques.	Other explosives testing was conducted at a level below explosive testing projected by the SWEIS ROD.

a Includes completion of construction for the DARHT facility and its operation.

2.10.3 Operations Data for High Explosives Testing

The operational data presented in Table 2.10.3-1 indicate that the materials used and effects of research during both 2000 and 2001 were considerably less than projections made by the SWEIS ROD. The 2000 SWEIS Yearbook noted that the Chemical Usage data for 2000 would be provided in the 2001 SWEIS Yearbook. The operational data show that both the chemical waste quantity in 2000 and the LLW quantity in 2001 exceeded the SWEIS ROD projections.

CN89-996

Sled track shot–Lower Slobbovia.

Table 2.10.3-1. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2000 OPERATIONS	2001 OPERATIONS
Radioactive Air Emissions:				
Depleted Uranium	Ci/yr	1.5E-1 [a]	[b]	[b]
Chemical Usage:[c]				
Aluminum[d]	kg/yr	45,450	394	78
Beryllium	kg/yr	90	2	52
Copper [d]	kg/yr	45,630	88	24
Depleted Uranium	kg/yr	3,930	419	536
Lead	kg/yr	240	5	0
Tantalum	kg/yr	300	1	12
Tungsten	kg/yr	300	19	0
NPDES Discharge:				
Number of outfalls [e]	----	14	2	2
Total Discharges	MGY	3.6	16	9
03A–028 (TA-15) [f]	MGY	2.2	5	4
03A–185 (TA-15) [f]	MGY	0.73	11	5
Wastes:				
Chemical	kg/yr	35,300	60,437[g]	1,337
LLW	m^3/yr	940	0.6	1,361 [h]
MLLW	m^3/yr	0.9	0	0
TRU [i]	m^3/yr	0.2	0	0
Mixed TRU [i]	m^3/yr	0	0	0
Number of Workers	FTEs	227 [j]	212 [j]	245 [j]

[a] The isotopic composition of depleted uranium is approximately 99.7 percent uranium-238, approximately 0.3 percent uranium-235, and approximately 0.002 percent uranium-234. Because there are no historic measurements of emissions from these sites, projections are based on estimated release fractions of the materials used in tests.

[b] No stacks require monitoring; all non-point sources are measured using ambient monitoring.

[c] Usage listed for the SWEIS ROD includes projections for expanded operations at DARHT as well as the other TA-15 firing sites (the highest foreseeable level of such activities that could be supported by the LANL infrastructure). No proposals are currently before DOE to exceed the material expenditures at DARHT that are evaluated in the DARHT Environmental Impact Statement (DOE 1995b). Data for 2000 were not available in time for the SWEIS Yearbook 2000. Therefore, both the 2000 and 2001 data are presented in the SWEIS Yearbook 2001.

[d] The quantities of copper and aluminum involved in these tests are used primarily in the construction of support structures. These structures are not expended in the explosive tests, and thus, do not contribute to air emissions.

[e] Outfalls eliminated before 1999: 04A-101 (TA-40), 04A-139 (TA-15), 04A-141 (TA-39), 04A-143 (TA-15), 04A-156 (TA-39), 06A-080 (TA-40), 06A-081 (TA-40), 06A-082 (TA-40), 06A-099 (TA-40), and 06A-123 (TA-15). Consolidation and removal of outfalls has resulted in projected NPDES volumes underestimating actual discharges from the existing outfalls.

[f] The annual quantity of discharge was calculated by using the average daily flow and multiplying by 365 days in the year; this results in an overestimate of volume. A totalizing water meter has been installed on 03A-185, which will allow for much more accurate water usage calculations for 2002 reporting. 03A-28 does not yet have a totalizing water meter and the water use will continue to be averaged.

[g] The 2000 chemical waste, as indicated in the 2000 SWEIS Yearbook exceeded the ROD due to cleanup following the Cerro Grande Fire.

[h] The LLW quantity for 2001 exceeds the SWEIS ROD due to cleanup of a mineral oil spill at DARHT. Shrapnel from a hydrotest punctured a portable X-ray machine and defeated the secondary containment in place. The cleanup debris was LLW due to the firing point being contaminated with depleted uranium.

[i] TRU waste (steel) will be generated as a result of DARHT's Phased Containment Option (see DARHT Environmental Impact Statement [DOE 1995b]).

[j] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.10.4 Cerro Grande Fire Effects at High Explosives Testing

The Cerro Grande Fire has had a long-term effect on the high explosives testing operations. Management has limited high explosives testing at TA-40 to tests within containment vessels because of adjacent steep canyon walls and excess forest fuels. This self-imposed restriction has created a hardship because these firing sites are no longer available for smaller experiments requiring open-air tests.

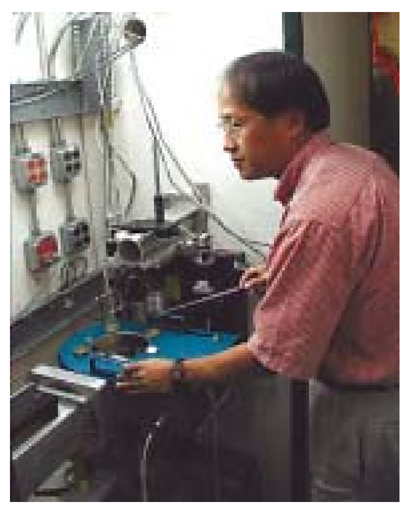
Approximately 14 facilities were destroyed and approximately 28 additional facilities were damaged within the DX controlled area of the Laboratory as a result of the fire. All of the destroyed facilities were transferred to decontamination and decommissioning in 2001. Any reusable items were salvaged and recycled.

The Water Quality and Hydrology group and CGRP staff continue to monitor the storm water control placements and re-vegetation efforts (best management practices) that were conducted immediately after the fire. To date these efforts appear to be successful to stabilize soils on DX property to prevent run-off and efforts to reduce storm flows on to DX property, all as a direct consequence of the fire. These inspection and monitoring efforts will continue through 2005.

In 2001, other fire related activities involved fuel wood mitigation efforts that included tree thinning throughout DX Division. The tree thinning is in support of the first phase of the LANL Wildfire Hazard Reduction Project Plan (LANL 2001o). This phase of the plan addresses forest vegetation treatments that provide the basis for direct programmatic and project-specific actions to reduce the risk of damage to Laboratory resources and facilities from catastrophic wildfire and its aftermath. The overall goals of the wildfire hazard reduction plan are to 1) protect the public, LANL workers, facilities, and the environment from catastrophic wildfire; 2) prevent interruptions of LANL operations from wildfire; 3) minimize impacts to cultural and natural resources while conducting fire management activities; and 4) improve forest health and wildlife habitat at LANL and, indirectly, across the Pajarito Plateau. These goals are accomplished through reducing fuel loads within LANL forests to decrease wildfire hazards, and decrease the risk of wildfire escapes at LANL designated firing sites by treating fuel, and improve wild land fire suppression capability through fire road improvements (LANL 2001o).

2.11 Los Alamos Neutron Science Center (TA-53)

The LANSCE Key Facility lies entirely within TA-53. The facility has more than 400 buildings, including one of the largest at LANL. Building 53-3, which houses the linac, has 315,000 square feet under roof. Activities consist of neutron science research, the development of accelerators and diagnostic instruments, and production of medical radioisotopes. The majority of the LANSCE Key Facility is composed of the 800-million-electron-volt linac, a Proton Storage Ring, and five experimental areas: the Manuel Lujan Neutron Scattering Center, the Weapons Neutron Research (WNR) facility, and Experimental Areas A/B/C. Experimental Area C is the location of proton radiography experiments for the Stockpile Stewardship Program. Experimental Area B is currently used for experiments with ultracold neutrons. Experimental Area A, formerly used for materials irradiation experiments and isotope production, is currently inactive; a new isotope production facility is under construction. A second accelerator located at LANSCE, the Low-Energy Demonstration Accelerator (LEDA), is also inactive.



Data collection following a beam-delivery experiment.

This Key Facility has three Category 3 nuclear activities (Table 2.11-1): experiments using neutron scattering by actinides in Experimental Area ER-1/ER-2, the 1L neutron production target in Building 53-7, and the A-6 beam stop in Building 53-3M (LANL 2001d). There are no Category 2 nuclear facilities at TA-53. In September 2001, TA-53-945 and 53-954 were placed on the LANL Radiological Facility List (LANL 2001e). Experimental Area ER-1/ER-2 is categorized as a Moderate Hazard facility.

Table 2.11-1. LANSCE Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-53-1L	1L Target		3	3
TA-53-3M	Experimental Science	3		
TA-53-A-6	Area A East		3	3
TA-53-ER1/ER-2	Actinide scattering experiments		3	3
TA-53-P3E	Pion Scattering Experiment		3	

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)

2.11.1 Construction and Modifications at Los Alamos Neutron Science Center

Projected: The ROD projected significant facility changes and expansion to occur at LANSCE by December 2005. Table 2.11.1-1 below indicates that one project has been completed and that three have been started.

Table 2.11.1-1. Status of Projected Facility Changes at LANSCE

DESCRIPTION	SWEIS ROD REF.	COMPLETED
Closure of two former sanitary lagoons	2-88-R	Started [a]
LEDA to become operational in late 1998	2-89-R	Yes - 1999 [b]
Short-Pulse Spallation Source enhancements	2-90-L	Started [c]
One-megawatt target/blanket	2-91-L	No
New 100-MeV Isotope Production Facility	2-92-L	Started [d]
Long-Pulse Spallation Source (LPSS), including decontamination and renovation of Area A	3-25-L	No
Dynamic Experiment Lab	3-25-R	No [e]
Los Alamos International Facility for Transmutation	3-25-R	No
Exotic Isotope Production Facility	3-27-L	No
Decontamination and renovation of Area A-East	3-27-L	No

[a] Characterization started in 1999 and continued into 2000. Clean-up at the south lagoon began in 2000 with the removal of the sludge and liner. Data analysis and sampling continued through 2001 for both lagoons and an Interim Action Plan was written for remediation of the north lagoon. Clean-up of the north lagoon is planned for 2002.

[b] LEDA started high-power conditioning of the radio-frequency quadrupole power supply in November 1998. The first trickle of proton beam was produced in March 1999, and maximum power was achieved in September 1999. It has been designed for a maximum energy of 12 million electron volts, not the 40 million electron volts projected by the SWEIS ROD. LEDA was shut down in December 2001 and will remain inactive until funding is resolved.

[c] Part of the Short-Pulse Spallation Source upgrades have been performed. Upon completion, the project will upgrade the Proton Storage Ring and 1L line to operate at 200 microamperes at 30 hertz (vs. 70 microamperes at 20 hertz present during preparation of the SWEIS); will install a brighter ion source; and will add three neutron-scattering instruments to the Lujan Center. Through the end of 2001, the upgrades to the Proton Storage Ring had been completed, and the three instruments have been installed and commissioned in the Lujan Center. Upgrades to the ion source and 1L line are still in progress.

[d] Preparations began in the spring of 1999 for construction of the new 100-million-electron-volt Isotope Production Facility. Construction started in 2000 and the facility was completed in 2001. Upgrades to the beam line are still in progress.

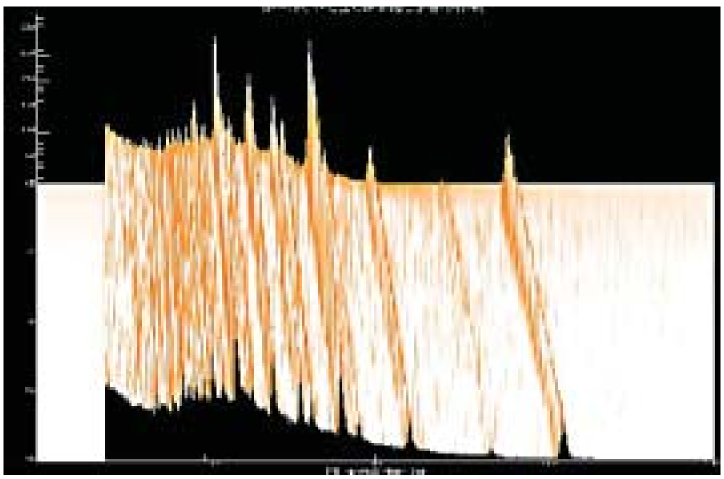
[e] The Stockpile Stewardship Program is currently using Experimental Area C, Building 53-3P, for proton radiography, and the Blue Room in Building 53-07 for neutron resonance spectroscopy. The concept of combining these experiments in a new Dynamic Experiment Laboratory has been replaced by the concept to construct a $1.6 billion Advanced Hydrotest Facility, which is currently in the conceptual phase. Conceptual planning for the Advanced Hydrotest Facility is being done consistent with the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (DOE 1996b) and ROD. Before DOE decides to build and operate the Advanced Hydrotest Facility at LANL or some other site, an environmental impact statement and ROD would be prepared.

Not Projected: In addition to these projected construction activities, a new warehouse was constructed in 1998 to store equipment and other materials formerly stored outside, a new waste treatment facility for radioactive liquids generated at LANSCE was constructed during 1999, and construction of a new cooling tower was completed in 2000. These projects received NEPA review through Categorical Exclusions LAN-98-110 (DOE 1998b), LAN-98-109 (DOE 1998c), and LAN-96-022 (DOE 1999d). The new cooling towers (structure #53-963, 53-952) replace cooling towers 53-60, 53-62, and 53-64, which have been taken off line. The new towers discharge through Outfall 03A-048, as had their predecessors.

2.11.2 Operations at Los Alamos Neutron Science Center

The SWEIS identified seven capabilities for the LANSCE Key Facility. No new capabilities have been added, and none have been deleted. During CY 2001, LANSCE operated both accelerators and four of the five experimental areas. (Area A has been idle for more than two years.)

As shown in Table 2.11.2-1, the SWEIS identified seven capabilities at LANSCE.



First data received from the new High-Pressure, Preferred Orientation Spectrometer.

Exterior view of the new ICE House Control Room.

Table 2.11.2-1. LANSCE (TA-53)/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
Accelerator Beam Delivery, Maintenance, and Development	Deliver LANSCE linac beam to Areas A, B, C, WNR facility, Manuel Lujan Center, Dynamic Experiment Facility, and new isotope production facility for 10 months/yr (6,400 hrs). Positive ion current 1,250 microampere and negative ion current of 200 microampere.	In 2001, H+ beam was not produced. H- beam was delivered as follows: (a) to the Lujan Center for 2,741 hours at an average current of 55 microamperes (b) to WNR Target 2 for 350 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere (c) to WNR Target 4 for 1,989 hours at an average current of five microamperes (d) through Line X to Lines B and C for 465 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere.
	Reconfigure beam delivery and support equipment to support new facilities, upgrades, and experiments.[a]	No major upgrades to the beam delivery complex.
	Commission/operate/maintain LEDA for 10 to 15 yrs; operate up to approximately 6,600 hrs/yr.	LEDA was shutdown in December, 2001.
Experimental Area Support	Full-time remote handling and radioactive waste disposal capability required during Area A interior modifications and Area A-East renovation.	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)
	Support of experiments, facility upgrades, and modifications.	Support activities were conducted per the projections of the SWEIS ROD.
	Increased power demand for LANSCE linac and LEDA radio-frequency operation.	No developments in 2001.
Neutron Research and Technology [b]	Conduct 1,000 to 2,000 experiments/yr using Manuel Lujan Center, WNR facility, and LPSS. Establish LPSS in Area A (requires modification).	113 experiments were conducted at the Lujan Center and 36 experiments at WNR. LPSS was not constructed.
	Construct Dynamic Experiment Laboratory adjacent to WNR Facility. Support contained weapons-related experiments: - With small quantities of actinides, high explosives, and sources (up to approximately 80/yr) - With nonhazardous materials and small quantities of high explosives (up to approximately 200/yr) - With up to 4.5 kilograms high explosives and/or depleted uranium (up to approximately 60/yr) - Shock wave experiments involving small amounts, up to (nominally) 50 grams plutonium.	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: - None with actinides - Some with nonhazardous materials and high explosives - Some with high explosives, but none with depleted uranium - Some shock wave experiments.
	Provide support for static stockpile surveillance technology research and development.	Support was provided for surveillance research and development.
Accelerator Transmutation of Wastes[c]	Conduct lead target tests for two years at Area A beam stop.	No tests.
	Implement the Los Alamos International Facility for Transmutation (Establish one-megawatt, then five-megawatt Accelerator Transmutation of Wastes target/blanket experiment areas adjacent to Area A.)	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation were constructed.

Table 2.11.2-1. LANSCE (TA-53)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
	Conduct five-megawatt experiments for 10 months/yr for four years using about three kilograms of actinides.	No experiments.
Subatomic Physics Research	Conduct 5 to 10 physics experiments/yr at Manuel Lujan Center, WNR facility, and LPSS.	Ultra-cold neutrons ran on 10 days in the "Blue Room" (Target 2).
	Conduct proton radiography experiments, including contained experiments with high explosives.	Less than 40 experiments involving contained high explosives were conducted in 2001.
Medical Isotope Production	Irradiate up to approximately 50 targets/yr for medical isotope production.	No production in 2001.
	Added production of exotic, neutron-rich, and neutron-deficient isotopes (requires modification of an existing target area).	No production in 2001.
High-Power Microwaves and Advanced Accelerators	Conduct research and development in these areas, including microwave chemistry research for industrial and environmental applications.	Research and development was conducted.

[a] Includes the completion of proton and neutron radiography facilities, the LEDA, the isotope production facility relocation, the Short-Pulsed Spallation Source, and the LPSS.

[b] Numbers of neutron experiments represent plausible levels of activity. Bounding conditions for the consequences of operations are primarily determined by 1) length and power of beam operation and 2) maintenance and construction activities.

[c] Formerly Accelerator-Driven Transmutation Technology.

The most significant accomplishment in CY 2001 for LANSCE is the successful completion of a full run cycle for the three primary experimental facilities: the WNR, the Proton Radiography area, and, for the first time since 1997, the Manuel Lujan Jr. Neutron Scattering Center (Lujan Center). LANSCE hosted over 550 user visits this run cycle (July 1–December 24). The facility operated at an average 92 percent availability to the Lujan Center and WNR targets, allowing the completion of just under 150 experiments for internal and external neutron scattering and neutron nuclear physics users. Construction of the new Irradiation of Chips and Electronics (ICE) House began in July 2001, and its first users from industry arrived in September 2001. This new building, located on the 30°L flight path at WNR, is a welcome haven to many researchers who in the past had to hike from Building 7 to a tiny shed, braving the weather and ducking under steel pipes, to perform their experiments. Additionally, three new instruments entered the commissioning phase at the Lujan Center, with two actually taking significant data during their commissioning cycle. In August 2001, the first successful high-temperature loading experiment was performed in the midst of commissioning the Spectrometer for Materials Research at Temperature and Stress. The spectrometer's success came only three weeks after the first beam was taken on the instrument. The High-Pressure, Preferred Orientation Spectrometer took its first neutron beam related diffraction pattern on a sample of nickel in early July 2001.

2.11.3 Operations Data for Los Alamos Neutron Science Center

Since both construction activities, which contribute to waste quantities, and levels of operations were less than those projected by the SWEIS ROD, operations data were also less than projected. Radioactive air emissions are a key parameter since LANSCE emissions have historically accounted for more than 95 percent of the total LANL offsite dose. Emissions in 2001, however, totaled only about 6,000 curies (including diffuse emissions), about 40 percent of total LANL radioactive air emissions. The 2000 total was also less than projections of the ROD of 8,496 curies (Garvey and Miller 1996). These small emissions can be attributed to non-use of the Area A beam stop. Waste generation and NPDES discharge volumes were well below projected quantities. Table 2.11.3-1 provides details.

Table 2.11.3-1. Los Alamos Neutron Science Center (TA-53)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions:			
Argon-41	Ci/yr	7.44E+1	1.6E+1
Arsenic-73	Ci/yr	Not projected [a]	7.6E-4
Bromine-76	Ci/yr	Not projected [a]	1.4E-3
Bromine-82	Ci/yr	Not projected [a]	3.4E-3
Carbon-10	Ci/yr	2.65E+0	2.5E+0
Carbon-11	Ci/yr	2.96E+3	3.4E+3
Mercury-193	Ci/yr	Not projected [a]	6.9E-1
Mercury-195m	Ci/yr	Not projected [a]	2.4E-2
Mercury-197	Ci/yr	Not projected [a]	3.7E-1
Mercury-203	Ci/yr	Not projected [a]	8.6E-3
Nitrogen-13	Ci/yr	5.35E+2	1.3E+2
Nitrogen-16	Ci/yr	2.85E-2	2.8E-2
Oxygen-14	Ci/yr	6.61E+0	3.4E+1
Oxygen-15	Ci/yr	6.06E+2	2.4E+3
Tritium as Water	Ci/yr	Not projected [a]	6.4E+0
LEDA Projections (8-yr average):			
Oxygen-19	Ci/yr	2.16E-3	Not measured [b]
Sulfur-37	Ci/yr	1.81E-3	Not measured [b]
Chlorine-39	Ci/yr	4.70E-4	Not measured [b]
Chlorine-40	Ci/yr	2.19E-3	Not measured [b]
Krypton-83m	Ci/yr	2.21E-3	Not measured [b]
Others	Ci/yr	1.11E-3	Not measured [b]
NPDES Discharge: [c]			
Total Discharges	MGY	81.8	20.45
03A-047	MGY	7.1	0
03A-048	MGY	23.4	13.05
03A-049	MGY	11.3	5.9
03A-113	MGY	39.8	1.5
Wastes:			
Chemical [d]	kg/yr	16,600	4,057
LLW	m^3/yr	1,085 [e]	0.1
MLLW	m^3/yr	1	0.2
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	560 [f]	505

[a] The radionuclide was not projected by the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.
[b] Potential emissions from LEDA were sufficiently small that measurement systems were not necessary to meet regulatory or facility requirements.
[c] Outfalls eliminated before 1999: 03A-125 (TA-53), 03A-145 (TA-53), and 03A-146 (TA-53).
[d] About one-half of this waste (590 kilograms) was industrial solid waste (nonhazardous) and may be disposed in regular landfills.
[e] LLW volumes include decommissioning and renovation of Experimental Area A (Building 53-03M).
[f] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.12 Biosciences Facilities (TA-43, TA-03, TA-16, TA-35, and TA-46) (Previously Health Research Laboratory [TA-43])

Biosciences has evolved beyond operations addressed in the SWEIS for the HRL, requiring an expanded definition of this Key Facility. Bioscience Division was formed in 1999 from parts of the Life Science Division and existing projects within the Chemical Science and Technology, Theoretical, Materials Science and Technology, and Physics Divisions. The Biosciences Key Facility definition now includes the main HRL facility (Buildings 43-1, -37, -45, and -20) plus support buildings located at TA-35-85 and -2, TA-03-562 and -1698, and TA-46-158/161, -217, -218, -80, -24, and -31. Additionally, Biosciences has small operations located at TA-16. Operations at TA-43, TA-35-85 and -02, and TA-46-158/161 have chemical, laser, and limited radiological activities that maintain hazardous materials inventory and generate hazardous chemical wastes and very small amounts of LLW. Activities at TA-03-562, -03-1698, and TA-16 have relatively minor impacts because of low numbers of personnel and limited quantities of materials. Biosciences activities at TA-03-1698, the MSL, are accounted for with potential impacts of that Key Facility and are not double-counted here. Biosciences research capabilities focus on the study of intact cells (Biosafety Levels 1 and 2 [BSL-1 and -2]), cellular components (RNA, DNA, and proteins), instrument analysis (laser and mass spectroscopy), and cellular systems (repair, growth, and response to stressors). All Biosciences activities are classed as Low Hazard nonnuclear in all buildings within this Key Facility, there are no Moderate Hazard nonnuclear facilities or nuclear facilities (LANL 2001d).

The Biosciences Key Facility is a consolidation of bioscience functions and capabilities that were formerly scattered between the HRL and the Non-Key Facilities. It represents the dynamic nature of the Yearbook, responding to the growth and decline of research and development across LANL.

2.12.1 Construction and Modifications at the Biosciences Facilities (Previously Health Research Laboratory)

Buildings within TA-43 continue to have interior remodeling and rearranging to accommodate new and existing work. In 2001, only minor interior changes to accommodate operational changes have occurred. As in previous years, the volume of radioactive work at HRL has continued to diminish. This decline is attributed to technological advances and new methods of research, such as the use of laser-based instrumentation and chemiluminescense, which do not require the use of radioactive materials. For instance, DNA sequencing predominantly uses laser analysis of fluorescent dyes hooked onto DNA bases instead of radioactive techniques.

The HRL facility has BSL-1 and BSL-2 work, which includes limited work with potentially infectious microbes and low-toxicity biotoxins, as defined by the Centers for Disease Control (CDC). During 2001, Biosciences began investigating potential future needs for a Biosafety Level 3 facility (LANL 2000c), this activity has progressed substantially. An environmental assessment (DOE 2000) was prepared and public comments were collected. This facility will be located in the TA-3 area, south of the MSL and Sigma buildings. All biosafety activities are regulated by the CDC National Institutes of Health, LANL's Institutional Biosafety Committee, and the Institutional Biosafety Officer. BSL-2 work is expanding as part of LANL's growing Chemical and Biological Nonproliferation Program.

Biosciences relocated two aspects of Genomics work from TA-43-1 to TA-35-85 to alleviate crowding and allow work to expand. Development of TA-35-85 is a key effort for Bioscience Division. In 2001, a cell biology project was moved from TA-43, HRL-1 to TA-35-2 to alleviate crowding at HRL. Bioscience Division is planning to continue expansions at TA-35 as Nonproliferation and International Security work is relocated to new buildings. More instruments have been added to TA-35-85 in 2001 to support Genomics

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capabilities as sequencing work at the University of New Mexico was discontinued. This project is an international collaboration that provides biosciences resources at LANL to scientists all over the world. Continued growth in this capability is expected.

The addition of Computational Biology to Bioscience in 1999 continues to impact available office space at TA-43-1. This is a growth capability and will continue to require additional office space. This capability does not generate wastes nor use hazardous materials.

2.12.2 Operations at Biosciences Facilities (Previously Health Research Laboratory)

When formed in late 1999, Biosciences assimilated existing personnel and projects. Reorganization incorporated buildings and laboratory spaces at sites other than TA-43 (these operations were previously part of the Non-Key Facilities). Therefore, some operations within existing capabilities are now more visible and are being reported in this Yearbook for the first time. Bioscience Division has eight broad research capabilities:

1) Biologically Inspired Materials and Chemistry
2) Computational Biology
3) Environmental Biology
4) Genomics
5) Measurement Science and Diagnostics
6) Molecular and Cell Biology
7) Molecular Synthesis
8) Structural Biology

The In-Vivo monitoring facility and capability continues to be located in TA-43, HRL-1 and continues at the previously reported level.

Growth in Biosciences has resulted in addition of new personnel and expanded operations. While there have been increases in volumes of chemicals used and generation of chemical wastes, Biosciences continues to decommission unfunded work. BSL-2 work is expanding to include use of a non-pathogenic strain of anthrasis–delta Ames, low-toxicity biotoxins (defined by CDC), and DNA from other infectious microbes. The Institutional Biosafety Committee reviews all of this work. In addition, work with DNA from a subset of organisms (select agents) requiring registration with the CDC continues. BSL-2 work does not generate any infectious wastes. Expansion of sequencing efforts was most noticeable but does not generate new wastes or increased volumes of regulated wastes. Upgrades and remodeling have generated minimal construction debris as laboratory areas were cleaned out and equipment was replaced or upgraded. This trend in modernization is expected to continue through 2001. TA-43-1 is at capacity for both office and laboratory activities, and future Biosciences expansion is expected to occur at TA-35-85 and TA-46-158. Biosciences is pursuing a new building at LANL that will consolidate its work and remove activities from TA-43.

Table 2.12.2-1 compares 2001 operations to those predicted by the SWEIS ROD. The table includes the number of FTEs per capability to measure activity levels compared to the SWEIS ROD. These FTEs are not measured the same as the index shown in Table 2.12.3-1 and these numbers cannot be directly compared. All but two of the existing capabilities have activity levels greater than those projected by the SWEIS ROD. Neurobiology exists elsewhere at LANL, and Computational Biology was added. Computational Biology was previously part of the Non-Key Facilities, and therefore, not visible in the SWEIS ROD. Computational science is a very active part of the Non-Key Facilities, and this aspect of computational science has been growing and was co-located with biological research to strengthen the collaboration. Major activities in computational science continue to be conducted within the Non-Key Facilities.

Table 2.12.2-1. Biosciences Facilities/Comparison of Operations

CAPABILITIES	SWEIS ROD	2001 OPERATIONS
Genomics	Conduct research at current levels utilizing molecular and biochemical techniques to analyze the sequences of genomes (human and animal). Develop strategies to analyze the nucleotide sequence of individual genes, especially those associated with genetic disorders, infectious disease organisms, and to map genes and/or genetic diseases to locations on individual chromosomes. Part of this work is to map each nucleotide, in sequence, of chromosomes. (50 FTEs) [a]	In 2001, 47 FTEs were associated with Genomics.
Molecular and Cell Biology	Conduct research at current levels utilizing whole cells and cellular systems, both in-vivo and in-vitro, to investigate the effects of natural and catastrophic cellular events like response to aging, harmful chemical and physical agents, and cancer. The work includes using isolated cells to investigate DNA repair mechanisms. (35 FTEs)	In 2001, 42 FTEs were associated with Molecular Cell Biology.
Measurement Science and Diagnostics	Conduct research utilizing imaging systems to analyze the structures and functions of subcellular systems and components. (40 FTEs)	In 2001, 37 FTEs were associated with Measurement Science and Diagnostics.
Environmental Biology	Research identifies specific changes or differences that occur in DNA, RNA, and proteins in microorganisms, including infectious microbes or ones altered by stressors in the environment. (25 FTEs)	In 2001, 27 FTEs were associated with Environmental Biology.
Structural Biology	Conduct research utilizing chemical and crystallographic techniques to isolate and characterize the properties and three-dimensional shapes of DNA and protein molecules. (15 FTEs)	In 2001, 18 FTEs were associated with Structural Biology.
Molecular Synthesis	Generate biometric organic materials and construct synthetic biomolecules.	In 2001, 16 FTEs were associated with Molecular Synthesis.
In-Vivo Monitoring. This is not a Biosciences Division capability; however, it is located at TA-43-HRL-1. Therefore, it is a capability within this Key Facility and is included here.	Perform 3,000 whole-body scans per year as a service to the LANL personnel monitoring program, which supports operations with radioactive materials conducted elsewhere at LANL. (5 FTEs)	Conducted 1,083 whole-body scans and 766 other counts (detector studies, quality assurance measurements, etc.). In 2001, 2.5 FTEs were associated with this capability.
Computational Biology	Not in SWEIS ROD	In 2001, 16 FTEs were associated with Computational Biology.

[a] FTEs: full-time-equivalent scientists, researchers, and other staff supporting a particular research capability.

2.12.3 Operations Data for Biosciences Facilities (Previously Health Research Laboratory)

Table 2.12.3-1 presents the operations data as measured by radioactive air emissions, NPDES discharges, generated waste volumes, and number of workers. The generation of most waste (chemical, administrative, and MLLW) has decreased from historical levels and was smaller than projections.

Table 2.12.3-1. Biosciences Facilities/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions	Ci/yr	Not estimated	Not measured
NPDES Discharge: [a]			
03A-040	MGY	2.5 [b]	Eliminated in 1999
Wastes: [c]			
Chemical	kg/yr	13,000	1,359
Biomedical Waste	kg/yr	280 [d]	0
LLW	m^3/yr	34	0
MLLW	m^3/yr	3.4	0
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	98 [e]	116 [e]

[a] Outfall 03A-040 consisted of one process outfall and nine storm drains.
[b] Storm water only.
[c] Represents only the HRL contribution. Wastes from the other buildings were insignificant and are captured in the Non-Key Facilities totals.
[d] Animal colony and the associated waste. The animal colony was eliminated in 1999.
[e] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.13 Radiochemistry Facility (TA-48)

The Radiochemistry Key Facility includes all of TA-48 (116 acres). It is a research facility that fills three roles—research, production of medical radioisotopes, and support services to other LANL organizations, primarily through radiological and chemical analyses of samples. TA-48 contains five major research buildings: the Radiochemistry Laboratory (Building 48-1), the Isotope Separator Facility (48-8), the Diagnostic Instrumentation and Development Building (48-28), the Advanced Radiochemical Diagnostics Building (48-45), and the Analytical Facility (48-107). As shown in Table 2.13-1, the Radiochemistry Laboratory has remained a Category 3 nuclear facility (LANL 2001d).

Table 2.13-1. Radiochemistry Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-48-0001	Radiochemistry and Hot Cell	3	3	3

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)

2.13.1 Construction and Modifications at the Radiochemistry Facility

The SWEIS projected no facility changes through 2005. During 2001, only minor maintenance activities occurred with the exceptions of refurbishing the Diagnostic Instrumentation and Development Building (48-45; LANL 2001p, DOE 1996g) because of the Cerro Grande Fire and upgrading some of the basement ductwork in the Radiochemistry Laboratory (Building 48-1).

2.13.2 Operations at the Radiochemistry Facility

The SWEIS identified ten capabilities for the Radiochemistry Key Facility. No new capabilities have been added, and none have been deleted. The primary measure of activity for this Key Facility is the number of personnel conducting research. In 2001, approximately 170 chemists and scientists were employed, far below the 250 projected by the SWEIS ROD[7]. As seen in Table 2.13.2-1, only three of the ten capabilities were active at levels projected by the SWEIS ROD: Radionuclide Transport Studies, Actinide and TRU Chemistry, and Sample Counting.

LLW is packaged and surveyed before disposal.

[7] The 170 chemists and scientists listed cannot be directly compared to the FTEs shown in Table 2.13.3-1, because the two numbers represent two different populations of individuals. The 170 chemists and scientists listed include temporary staff, students, and visiting scientists, whereas, the 124 FTEs only includes full-time and part-time regular LANL staff.

Table 2.13.2-1. Radiochemistry Facility (TA-48)/Comparison of Operations

CAPABILITY	SWEIS ROD	2001 OPERATIONS
Radionuclide Transport Studies	Actinide transport, sorption, and bacterial interaction studies. Development of models for evolution of groundwater. Assessment of performance or risk of release for radionuclide sources at proposed waste disposal sites. (28 to 34 FTEs [a])	During 2001, operations continued at approximately twice the levels identified during preparation of the SWEIS. (36 FTEs [a])
Environmental Remediation Support	Background contamination characterization pilot studies. Performance assessments, soil remediation research and development, and field support. (34 FTEs [a])	During 2001, operations continued at approximately half the levels identified during preparation of the SWEIS. (10 FTEs [a])
Ultra-Low-Level Measurements	Isotope separation and mass spectrometry. (30 FTEs [a])	Level of operations was approximately the same as levels identified during preparation of the SWEIS. (14 FTEs [a])
Nuclear/ Radiochemistry	Radiochemical operations involving quantities of alpha-, beta-, and gamma-emitting radionuclides for non-weapons and weapons work. (44 FTEs [a])	Slightly decreased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (35 FTEs [a])
Isotope Production	Target preparation. High-level beta/gamma chemistry and target processing to recover isotopes for medical and industrial application. (15 FTEs [a])	Slightly increased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (11 FTEs [a])
Actinide/TRU Chemistry	Radiochemical operations involving significant quantities of alpha-emitting radionuclides. (12 FTEs [a])	Increased operations, approximately twice levels identified during preparation of the SWEIS. (14 FTEs [a])
Data Analysis	Re-examination of archive data and measurement of nuclear process parameters of interest to weapons radiochemists. (10 FTEs [a])	Slight increase from levels identified during preparation of the SWEIS to six FTEs [a], but less than projected by the SWEIS ROD.
Inorganic Chemistry	Synthesis, catalysis, actinide chemistry: Chemical synthesis of new organo-metallic complexes Structural and reactivity analysis, organic product analysis, and reactivity and mechanistic studies Synthesis of new ligands for radiopharmaceuticals Environmental technology development: Ligand design and synthesis for selective extraction of metals Soil washing Membrane separator development Ultrafiltration (49 FTEs [a] —total for both activities)	Same level of activity (35 FTEs[a]) as levels identified during preparation of the SWEIS, but below projections of the SWEIS ROD.
Structural Analysis	Synthesis and structural analysis of actinide complexes at current levels. X-ray diffraction analysis of powders and single crystals at current levels. (22 FTEs [a])	Decreased level of operations from levels identified during preparation of the SWEIS, and about one-third of those projected by the SWEIS ROD. (7 FTEs [a])
Sample Counting	Measurement of the quantity of radioactivity in samples using alpha-, beta-, and gamma-ray counting systems. (5 FTEs [a])	During 2001, slight increase in the number of samples projected by the SWEIS ROD. (6 FTEs [a])

[a] FTEs: full-time-equivalent. It is imperative that these FTE numbers are not confused with the FTEs identified in Table 2.13.3-1. Two different populations of individuals are represented. The FTEs in this table include students, visitors, and temporary staff. The FTEs in Table 2.13.3-1 only include full-time and part-time regular LANL staff.

2.13.3 Operations Data for the Radiochemistry Facility

The overall level of activity at the Radiochemistry Facility was below that projected by the SWEIS ROD. Three of the ten capabilities at this Key Facility were conducted at levels projected by the SWEIS ROD; the others were at or below activity levels identified during preparation of the SWEIS. As a result, operations data were also below those projected by the SWEIS ROD, as shown in Table 2.13.3-1. The large quantity of chemical wastes was industrial solid wastes resulting from the chemical cleanouts during 2001. These industrial solid wastes are nonhazardous, may be disposed in county landfills, and do not present a threat to the local environs.

Table 2.13.3-1. Radiochemistry Facility (TA-48)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions:			
Mixed Fission Products	Ci/yr	1.4E-4	Not reported [a]
Plutonium-239	Ci/yr	1.1E-5	None detected [b]
Uranium-235	Ci/yr	4.4E-7	None detected [b]
Mixed Activation Products	Ci/yr	3.1E-6	Not reported [a]
Arsenic-72	Ci/yr	1.1E-4	None detected [b]
Arsenic-73	Ci/yr	1.9E-4	4.2E-5
Arsenic-74	Ci/yr	4.0E-5	1.1E-5
Beryllium-7	Ci/yr	1.5E-5	None detected [b]
Bromine-77	Ci/yr	8.5E-4	None detected [b]
Germanium-68	Ci/yr	1.7E-5	1.1E-3
Gallium-68	Ci/yr	1.7E-5	1.1E-3
Rubidium-86	Ci/yr	2.8E-7	None detected [b]
Selenium-75	Ci/yr	3.4E-4	None detected [b]
NPDES Discharge:[c]			
Total Discharges	MGY	4.1	No discharge
03A-045	MGY	0.87	Eliminated – 1999
04A-016	MGY	None	Eliminated – 1997
04A-131	MGY	None	Eliminated – 1998
04A-152	MGY	None	Eliminated – 1997
04A-153	MGY	3.2	Eliminated - 1998
Wastes:			
Chemical [d]	kg/yr	3,300	17,731 [d]
LLW	m^3/yr	270	60
MLLW	m^3/yr	3.8	2.2
TRU [e]	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	128 [f]	122

[a] Emission categories of 'mixed fission products' and 'mixed activation products' are no longer used. Instead, where fission or activation products are measured, they are reported as specific radionuclides, e.g., Cs-137 or Co-60.

[b] Although stack sampling systems were in place to measure these emissions, any emissions were sufficiently small to be below the detection capabilities of the sampling systems.

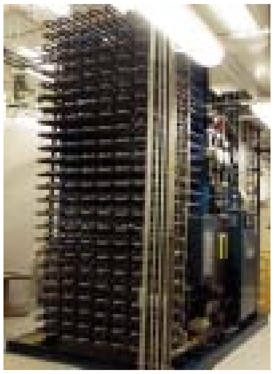
[c] Outfalls eliminated before 1999: 04A-016 (TA-48), 04A-131 (TA-48), 04A-152 (TA-48), and 04A-153 (TA-48).

[d] Approximately 8,861 kilograms of this waste was generated during chemical cleanouts of TA-48-01 during 2001.

[e] TRU waste was projected to be returned to the generating facility.

[f] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.14 Radioactive Liquid Waste Treatment Facility (TA-50)



Tubular ultra-filter after major rebuilding, September 2001.

The RLWTF is located at TA-50 and consists of the treatment facility (Building 50-1), support buildings, and liquid and chemical storage tanks. The primary activity is treatment of radioactive liquid wastes generated at other LANL facilities. The facility also houses analytical laboratories to support waste treatment operations.

As shown in Table 2.14-1, there are currently four Category 3 nuclear structures at this Key Facility–the RLWTF itself (Building 50-01), the tank farm and pumping station (50-2), the acid and caustic solution tank farm (50-66), and a 100,000-gallon influent holding tank (50-90). The SWEIS only identified the RLWTF main building as a nuclear facility and gave it a ranking of Category 2. There are no other nuclear facilities and no Moderate Hazard nonnuclear buildings within this Key Facility (LANL 2001d).

Table 2.14-1. Radioactive Liquid Waste Treatment Facility Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-50-0001	Main Treatment Plant	2	3	3
TA-50-0002	LLW Tank Farm		3	3
TA-50-0066	Acid and Caustic Tank Farm		3	3
TA-50-0090	Holding Tank		3	3

[a] DOE /LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE /LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)

2.14.1 Construction and Modifications at the Radioactive Liquid Waste Treatment Facility

Projected: The SWEIS ROD projected three modifications to the RLWTF Key Facility, and all three have been completed. The tank farm was upgraded in 1998. The new UF/RO (ultrafiltration and reverse osmosis) process was installed in 1998 and became operational March 22, 1999. Nitrate reduction equipment was installed in 1998 and became operational on March 15, 1999.

Not Projected: During 2001, the cross-country transfer line, dedicated to the transfer of radioactive liquid wastes from the TA-21 tritium facilities to the TA-50 RLWTF, was taken out of service, flushed, drained, and capped. Environmental protection was the primary reason for removing this pipeline from service; it was a single-walled pipe for its entire length (~two miles). Reduction of radioactive liquid waste volumes generated at the TA-21 facilities enabled the line to be taken out of service; the smaller volumes can now be transported from TA-21 to TA-50 by truck.

Also during 2001, nitrate reduction equipment was removed from service. Source evaluation had shown that more than 70 percent of the nitrates in LANL radioactive liquid waste was found in less than 1 percent of the waste volume. These low-volume, high-nitrate liquid wastes are now segregated by waste generators and shipped to commercial hazardous waste treatment facilities.

2.14.2 Operations at the Radioactive Liquid Waste Treatment Facility

The SWEIS identified five capabilities for the RLWTF Key Facility. No new capabilities were added in 2001, but decontamination operations were relocated during 2000 from Building 50-01 to TA-54. The primary measurement of activity for this facility is the volume of radioactive liquid waste processed through the main treatment equipment. In 2001, the RLWTF discharged 14 million liters of treated radioactive liquid waste to Mortandad Canyon, which is less than the discharge volume of 35 million liters per year projected in the SWEIS ROD. As seen in Table 2.14.2-1, other operations at the RLWTF were also below levels projected by the SWEIS ROD.

Two factors contributed to reduced waste volumes. Source reduction efforts re-routed two significant waste streams, nonradioactive discharge waters from boilers at TA-21 and at TA-48, to the LANL sewage plant during the summer of 2001. Internal recycling also reduced radioactive liquid waste volumes. During 2001, process waters were used instead of tap water for the first time for dissolution of chemicals needed in the treatment process. This recycle eliminated approximately two million liters of water. Process waters, instead of tap water, were also used for filter backwash operations. This modification reduced waste volumes by 200,000 liters.

Also during 2001, a lengthy study was conducted for the treatment of perchlorate in radioactive liquid wastes. Three alternative treatments were evaluated using pilot-scale treatment units from September 2000 through August 2001. Full-scale treatment units will be installed and become operational during 2002. These actions are being taken despite the fact that there are no EPA or New Mexico discharge standards for perchlorate.

Table 2.14.2-1. Radioactive Liquid Waste Treatment Facility (TA-50)/Comparison of Operations

CAPABILITY	SWEIS ROD [a]	2001 OPERATIONS
Waste Characterization	Support, certify, and audit generator characterization programs.	As projected.
Packaging, Labeling	Maintain waste acceptance criteria for radioactive liquid waste treatment facilities.	As projected.
Waste Transport, Receipt, and Acceptance	Collect radioactive liquid waste from generators and transport to TA-50.	As projected.
Radioactive Liquid Waste Pretreatment	Pretreat 900,000 liters/yr of radioactive liquid waste at TA-21.	Pretreated 457,000 liters at TA-21.
	Pretreat 80,000 liters/yr of radioactive liquid waste from TA-55 in Room 60.	Pretreated 22,000 liters in Room 60.
	Solidify, characterize, and package 3 cubic meters/yr of TRU waste sludge in Room 60.	No TRU waste sludge was solidified in Room 60.
Radioactive Liquid Waste Treatment	Install UF/RO equipment in 1997. Install equipment for nitrate reduction in 1999.	UF/RO equipment installed in 1998. Nitrate reduction equipment installed 1998.
	Treat 35 million liters/yr of radioactive liquid waste.	Treated 14 million liters of radioactive liquid waste.
	De-water, characterize, and package 10 cubic meters/yr of LLW sludge.	De-watered 60 cubic meters of LLW sludge.
	Solidify, characterize, and package 32 cubic meters/yr of TRU waste sludge.	Solidified 5 cubic meters/yr of TRU waste sludge
Decontamination Operations	Decontaminate LANL personnel respirators for reuse (approximately 700/month).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54. [b]
	Decontaminate air-proportional probes for reuse (approximately 300/month).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54. [b]
	Decontaminate vehicles and portable instruments for reuse (as required).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54. [b]
	Decontaminate precious metals for resale (acid bath).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54. [b]

Table 2.14.2-1. Radioactive Liquid Waste Treatment Facility (TA-50)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	2001 OPERATIONS
	Decontaminate scrap metals for resale (sandblast).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54. [b]
	Decontaminate 200 cubic meters of lead for reuse (grit blast).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54. [b]

[a] Includes installation of UF/RO and nitrate reduction processes in Building 50-01 and installation of aboveground tanks for the collection of influent radioactive liquid waste.
[b] Decontamination operations are reported as part of the Solid Radioactive and Chemical Waste Key Facility.

2.14.3 Operations Data for the Radioactive Liquid Waste Treatment Facility

Process modifications have improved effluent quality. For the second consecutive year, there were zero violations of the State of New Mexico discharge limit for nitrates, zero violations of NPDES permit limits, and zero exceedances of the DOE discharge standards for radioactive liquid wastes. Annual average nitrate discharges were reduced from 360 milligrams per liter in 1993 to less than 10 milligrams per liter in 2000 and remained at the less than 10 milligram level in 2001. Similarly, annual average radioactive discharges were reduced from greater than 250 picocuries alpha activity per liter during the period 1993–1999 to 13 picocuries per liter in 2000 and 18 picocuries per liter in 2001.

The SWEIS ROD did not project the quality of effluent, only quantity. This and other consequences of operation were less than projected in the SWEIS ROD. Radioactive air emissions continued to be negligible (less than one microcurie); NPDES discharge volume was 3.6 million gallons, compared to a projected 9.3 million gallons; and quantities of solid wastes were all less than projected. Table 2.14.3-1 provides details.

Table 2.14.3-1. Radioactive Liquid Waste Treatment Facility (TA-50)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions:			
Americium-241	Ci/yr	Negligible	Not detected
Plutonium-238	Ci/yr	Negligible	3.8E-8
Plutonium-239	Ci/yr	Negligible	4.5E-9
Thorium-230	Ci/yr	Negligible	Not detected
Uranium-234	Ci/yr	Negligible	Not detected
NPDES Discharge:			
051	MGY	9.3	3.6
Wastes:			
Chemical [a]	kg/yr	2,200	68,792
LLW [b]	m^3/yr	160	527
MLLW	m^3/yr	0	2.6
TRU	m^3/yr	30	0.4
Mixed TRU	m^3/yr	0	4.4
Number of Workers	FTEs	62 [c]	47

[a] Approximately 68,584 kilograms of the chemical waste were generated as a result of replacement of storage tanks and some associated plumbing at TA-50. The waste consisted of soil piles and asphalt associated with the pad the old tanks were sitting on.
[b] In an effort to be in compliance with the Water Quality standard of 20 picocuries, wastewater from tritium experiments is occasionally sent to the Evaporation Basins at TA-53. During CY 2001, approximately 380 cubic meters of water were transferred to TA-53.
[c] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.15 Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)

The Solid Radioactive and Chemical Waste Key Facility is located at TA-50 and TA-54. Activities are all related to the management (packaging, characterization, receipt, transport, storage, and disposal) of radioactive and chemical wastes generated at other LANL facilities.

It is important to note that the Laboratory's waste management operation captures and tracks data for waste streams (whether or not they go through the Solid Radioactive and Chemical Waste Facilities), regardless of their points of generation or disposal. This includes information on the waste generating process; quantity; chemical and physical characteristics of the waste; regulatory status of the waste; applicable treatment and disposal standards; and the final disposition of the waste. The data are ultimately used to assess operational efficiency, help ensure environmental protection, and demonstrate regulatory compliance.

There are four Category 2 nuclear buildings within this Key Facility: the Radioactive Materials Research Operations and Demonstration (RAMROD) Facility (Building 50-37); the Waste Characterization, Reduction, and Repackaging Facility (WCRRF; Building 50-69); the LLW disposal cells, shafts, and trenches and six fabric domes at Area G; and the Transuranic Waste Inspection Project (TWISP) for the retrieval of TRU wastes, including storage domes 226 and 229–232. There is also one Category 3 nuclear building, the Radioactive Assay and Nondestructive Test Facility, Building 54-38 (LANL 2001d).

As shown in Table 2.15-1, the SWEIS recognized 19 structures as having Category 2 nuclear classification (Area G was recognized as a whole and then individual buildings and structures were also recognized). RAMROD was only a potential nuclear facility in the SWEIS, but subsequently was characterized by DOE. The WCRRF was identified as a Category 2 in the SWEIS, but because of inventories and the newer guidelines, it was downgraded to a Category 3. Area G has remained a Category 2 facility when taken as a whole; however, several of the individual buildings have been downgraded to Category 3.

Table 2.15-1. Solid Waste Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-50-0037	RAMROD		2	
TA-50-0069	WCRRF Building	2	3	
TA-50-0069 Outside	Nondestructive Analysis Mobile Activities			
TA-50-0069 Outside	Drum Storage			
TA-54-Area G	LLW Storage/Disposal	2	2	2
TA-54	TWISP		2	2
TA-54-0002	TRU Storage Building		3	2
TA-54-0033	TRU Drum Preparation	2		2
TA-54-0038	Radioassay and Nondestructive Testing Facility	2	3	2
TA-54-0048	TRU Storage Dome	2	3	2
TA-54-0049	TRU Storage Dome	2	3	2
TA-54-0144	Shed	2		3
TA-54-0145	Shed	2		3
TA-54-0146	Shed	2		3
TA-54-0153	TRU Storage Dome	2	3	2
TA-54-0177	Shed	2		3
TA-54-0226	TRU Storage Dome	2		2
TA-54-0229	Tension Support Dome	2		2
TA-54-0230	Tension Support Dome	2		2
TA-54-0231	Tension Support Dome	2		2
TA-54-0232	Tension Support Dome	2		2

Table 2.15-1. Solid Waste Buildings with Nuclear Hazard Classification (continued)

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-54-0283	Tension Support Dome	2		2
TA-54-0375	TRU Storage Dome	2		2
TA-54-Pad2	Storage Pad	2		2
TA-54-Pad3	Storage Pad	2		2
TA-54-Pad4	TRU Storage	2		2

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)

2.15.1 Construction and Modifications at the Solid Radioactive and Chemical Waste Facility

Projected: The SWEIS ROD projected two construction activities for this Key Facility. The construction of four additional fabric domes for the storage of TRU wastes retrieved from earth-covered pads was completed in 1998. The expansion of Area G has not yet begun and is not anticipated to occur for at least another three years. Additionally, a new facility will be built over Pad 4 to house high-activity drums. This facility is currently under Title I and Title II design.

Not Projected: Construction of the Decontamination and Volume Reduction System began in 1999 and continued during 2001. This is a high-bay metal building with 13,000 square feet under roof. The Decontamination and Volume Reduction System is designed to segregate, decontaminate, and volume-reduce fiberglass-reinforced plywood crates of TRU waste retrieved from the TWISP storage pads. A major fraction of the resulting segregated wastes is anticipated to be decontaminated to LLW, which will both (a) allow these wastes to be disposed of at Area G and (b) decrease the volume of wastes that must be shipped to WIPP for disposal.

By the end of 2001, the Decontamination and Volume Reduction System was about 95 percent built. Although construction of this facility was not projected by the SWEIS ROD, NEPA coverage was provided through an environmental assessment (DOE 1999e) and subsequent Finding of No Significant Impact in June 1999.

Not Projected: In addition, decontamination operations were relocated during 2000 from the RLWTF, Building 50-01, to TA-54. Except for the lead decontamination trailer, activities were moved to the west end of TA-54. Rooms 103, 104, and 105 of Building 54-1009 will become the center of decontamination activities. Building 54-1014, an office trailer, has also become part of the operations.

To accommodate the relocation, radioactive liquid wastes will be collected in two holding tanks (1,000 gallons each) adjacent to 54-1009; they will be trucked to the RLWTF at TA-50. In addition, two transportainers have been installed. One will become a 90-day storage area for management of hazardous and mixed radioactive waste; the other will be used for storage of supplies. The lead decontamination trailer was removed from service. The trailer is currently stored inside Area G and will be decommissioned.

Not Projected: To control storm water runoff from TA-54, check dams were installed during 2000 at Area G and a sediment basin constructed in the canyon below Area G. NEPA review of this action was provided through a Categorical Exclusion #LAN-99-035 (DOE 1999f).

2.15.2 Operations at the Solid Radioactive and Chemical Waste Facility

The SWEIS identified eight capabilities for this Key Facility. No new capabilities have been added, and none have been deleted. The primary measurements of activity for this facility are volumes of newly generated chemical, low-level, and TRU wastes to be managed and volumes of legacy TRU waste and MLLW in storage. A comparison of CY 2001 to projections made by the SWEIS ROD can be summarized as follows:

Chemical wastes: A total of 503.96 metric tons were shipped for offsite treatment and/or disposal from the Solid Radioactive and Chemical Waste Facility, compared to an average quantity of 3,250 metric tons per year projected by the SWEIS ROD. (Note that overall LANL quantities of chemical wastes were higher. This is due to the fact that chemical wastes from the Environmental Restoration [ER] Project are nearly all shipped directly from the cleanup site to a commercial treatment and disposal facility. As mentioned earlier, not all wastes require handling through the Solid Radioactive and Chemical Waste Facility. However, the Laboratory's waste management operation captures and tracks data for waste streams [whether or not they go through the Solid Radioactive and Chemical Waste Facilities], regardless of their points of generation or disposal.)

LLW: A total of 1,817 cubic meters were placed into disposal cells and shafts at Area G, compared to an average volume of 12,230 cubic meters per year projected by the SWEIS ROD. This LLW volume is a decrease from the last year of operations but is consistent with the three years prior. No new disposal cells were constructed, and disposal operations did not expand into either Zone 4 or Zone 6 at TA-54. Operations are not expected to need the expansion area for at least another three years.

MLLW: Compared to an average volume of 632 cubic meters per year projected by the SWEIS ROD, 32.18 cubic meters were generated and delivered to TA-54 during 2001. This quantity is an increase from preceding years but still well under the projections in the SWEIS.

TRU wastes: There were no shipments to WIPP during 2001, and the entire quantity of newly generated TRU wastes (185 cubic meters) was added to storage. TWISP continued ahead of schedule and was completed December 2001. Retrieval of drums from the third and final pad, Pad 2, began on October 25, 2000, and more than 7,318 drums were retrieved from it by the end of December 2001. TWISP operations have recovered 4,700 cubic meters of TRU wastes three years ahead of the schedule projected by the SWEIS ROD. The SWEIS ROD projects that TWISP will retrieve all 4,700 cubic meters from underground pads by December 2004.

In summary, chemical and radioactive waste management activities were at levels below those projected by the SWEIS ROD and also below levels of 1998 and 1999 operations at this Key Facility. These and other operational details appear in Table 2.15.2-1.

Table 2.15.2-1. Solid Radioactive and Chemical Waste Facility (TA-50 and TA-54)/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
Waste Characterization, Packaging, and Labeling	Support, certify, and audit generator characterization programs.	As projected.
	Maintain waste acceptance criteria for LANL waste management facilities.	As projected.
	Characterize 760 cubic meters of legacy MLLW.	Characterized 59 cubic meters of legacy MLLW
	Characterize 9,010 cubic meters of legacy TRU waste.	Characterized 83 cubic meters of TRU waste in 2001
	Verify characterization data at the Radioactive Assay and Nondestructive Test Facility for unopened containers of LLW and TRU waste.	Verified characterization data at Radioactive Assay and Nondestructive Test Facility for TRU wastes, but not for LLW.
	Maintain waste acceptance criteria for offsite treatment, storage, and disposal facilities.	As projected.
	Over-pack and bulk waste as required.	As projected.

Table 2.15.2-1. Solid Radioactive and Chemical Waste Facility (TA-50 and TA-54)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
	Perform coring and visual inspection of a percentage of TRU waste packages.	Coring operations were suspended until homogenous analytical capabilities are added to the RAMROD Facility.
	Ventilate 16,700 drums of TRU waste retrieved during TWISP.	Ventilated 7,085 drums during 2001 and 16,133 drums in total as of December 2001.
	Maintain current version of WIPP waste acceptance criteria and liaison with WIPP operations.	As projected.
Compaction	Compact up to 25,400 cubic meters of LLW.	483 cubic meters of LLW was compacted into 108 cubic meters.
Size Reduction	Size reduce 2,900 cubic meters of TRU waste at WCRRF and the Drum Preparation Facility.	As proof-of-principle testing for the Decontamination and Volume Reduction System Facility, 40 cubic meters of waste were recharacterized and disposed of as LLW at TA-54, Area G.
Waste Transport, Receipt, and Acceptance	Collect chemical and mixed wastes from LANL generators and transport to TA-54.	Collected and transported chemical and mixed wastes.
	Begin shipments to WIPP in 1999.	Shipments to WIPP began 3/26/1999.
	Over the next 10 years, ship 32,000 metric tons of chemical wastes and 3,640 cubic meters of MLLW for offsite land disposal restrictions, treatment, and disposal.	504 metric tons of chemical waste and 46 cubic meters of MLLW were shipped for offsite treatment and disposal.
	Over the next 10 years, ship no LLW for offsite disposal.	No LLW was shipped for offsite disposal.
	Over the next 10 years, ship 9,010 cubic meters of legacy TRU waste to WIPP.	8 shipments of legacy TRU waste were shipped in 2001.
	Over the next 10 years, ship 5,460 m^3 of operational and environmental restoration TRU waste to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.
	Over the next 10 years, ship no environmental restoration soils for offsite solidification and disposal.	No environmental restoration soils were shipped for offsite solidification and disposal in 2001. [b]
	Annually receive, on average, 5 cubic meters of LLW and TRU waste from offsite locations in 5 to 10 shipments.	There were no LLW or TRU waste receipts from offsite locations.
Waste Storage	Stage chemical and mixed wastes before shipment for offsite treatment, storage, and disposal.	Chemical and mixed waste staged before shipment.
	Store legacy TRU waste and MLLW.	Legacy TRU waste and MLLW stored.
	Store LLW uranium chips until sufficient quantities have accumulated for stabilization.	There are no drums of uranium chips in storage awaiting stabilization.
Waste Retrieval	Begin retrieval operations in 1997.	Retrieval begun in 1997.
	Retrieve 4,700 cubic meters of TRU waste from Pads 1, 2, 4 by 2004.	Retrieved 1,463 cubic meters in 2001. Retrieved 4,700 cubic meters total through Dec. 2001.
Other Waste Processing	Demonstrate treatment (e.g., electrochemical) of MLLW liquids.	No activity.
	Land farm oil-contaminated soils at Area J.	Area J is undergoing closure.
	Stabilize 870 cubic meters of uranium chips.	8.3 cubic meters of uranium chips and turnings were stabilized at TA-3, Building 39.
	Provide special-case treatment for 1,030 cubic meters of TRU waste.	None.
	Solidify 2,850 cubic meters of MLLW (environmental restoration soils) for disposal at Area G.	No environmental restoration soils were solidified.

Table 2.15.2-1. Solid Radioactive and Chemical Waste Facility (TA-50 and TA-54)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	2001 OPERATIONS
Disposal	Over next 10 years, dispose of 420 cubic meters of LLW in shafts at Area G.	9 cubic meters of LLW were disposed of in shafts at Area G.
	Over next 10 years, dispose of 115,000 cubic meters of LLW in disposal cells at Area G. (Requires expansion of onsite LLW disposal operations beyond existing Area G footprint.)	1,808 cubic meters of LLW was disposed of in cells. Area G was not expanded.
	Over next 10 years, dispose 100 cubic meters /yr administratively controlled industrial solid wastes in pits at Area J.	Area J is undergoing closure.
	Over next 10 years, dispose non-radioactive classified wastes in shafts at Area J.	Area J is undergoing closure.

[a] Includes the construction of four new storage domes for the TWISP.
[b] The ER Project usually ships soils removed in remediation of a potential release site (PRS) directly to an offsite disposal facility. These wastes do not typically require processing at TA-54 and do not go through the TA-54 operations for shipment.

2.15.3 Operations Data for the Solid Radioactive and Chemical Waste Facility

Levels of activity in 2001 were less than projected by the SWEIS ROD and so were air emissions and most secondary wastes. Table 2.15.3-1 provides details.

Table 2.15.3-1. Solid Radioactive and Chemical Waste Facilities (TA-54 and TA-50)/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions: [a]			
Tritium	Ci/yr	6.09E+1	[a]
Americium-241	Ci/yr	6.60E-7	5.8E-11
Plutonium-238	Ci/yr	4.80E-6	3.6E-11
Plutonium-239	Ci/yr	6.80E-7	2.7E-10
Uranium-234	Ci/yr	8.00E-6	[a]
Uranium-235	Ci/yr	4.10E-7	[a]
Uranium-238	Ci/yr	4.00E-6	[a]
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes: [b]			
Chemical	kg/yr	920	449
LLW	M^3/yr	174	17
MLLW	M^3/yr	4	0
TRU	M^3/yr	27	0
Mixed TRU	M^3/yr	0	0
Number of Workers	FTEs	65 [c]	60

[a] Data indicate no measured emissions at WCRRF and the RAMROD facility at TA-50. No stacks require monitoring at TA-54. All non-point sources at TA-50 and TA-54 are measured using ambient monitoring.
[b] Secondary wastes are generated during the treatment, storage, and disposal of chemical and radioactive wastes. Examples include repackaging wastes from the visual inspection of TRU waste, high-efficiency particulate air filters, personnel protective clothing and equipment, and process wastes from size reduction and compaction.
[c] The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.16. Non-Key Facilities

The balance, and majority, of LANL buildings are referred to in the SWEIS as Non-Key Facilities. Non-Key Facilities house operations that do not have potential to cause significant environmental impacts. These buildings and structures are located in 30 of LANL's 49 technical areas and comprise approximately 15,500 of LANL's 27,820 acres. As expressed in Section 2.16.2 below, activities in the Non-Key Facilities encompass seven of the eight LANL direct-funded activities (DOE 1999a, page 2-2).

As shown in Table 2.16-1, the SWEIS identified six buildings within the Non-Key Facilities with NHCs. There is currently only one Category 2 nuclear facility–the High-Pressure Tritium Facility (Building TA-33-86)–and no Category 3 nuclear facilities among the Non-Key Facilities. TA-33-86 is in safe shutdown mode awaiting decontamination and decommissioning, but remains a Category 2 facility because of the inventory of nuclear materials.

Additionally, several Non-Key Facilities were identified as radiological facilities in September 2001 (LANL 2001e). These include the Omega West Reactor, Building 2-1; the Cryogenics Building B, 3-34: the Physics Building (HP), 3-40; the Lab Building, 21-5; Molecular Chemistry, 21-150; Nuclear Safeguards Research, 35-2; Nuclear Safeguards Lab, 35-27; the Underground Vault, 41-1; and the laboratory, 41-4.

Table 2.16-1. Non-Key Facilities with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2001 [b]
TA-03-0040	Physics Building	3		
TA-03-0065	Source Storage	2		
TA-03-0130	Calibration Building	3		
TA-33-0086	Former Tritium Research	3	2	2
TA-35-0002	Non-American National Standards Institute Uranium Sources	3	3	
TA-35-0027	Safeguard Assay and Research	3	3	

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001d)

The Los Alamos Research Park.

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2.16.1 Construction and Modifications at the Non-Key Facilities

The SWEIS ROD had projected just one major construction project (Atlas) for the Non-Key Facilities. In contrast, however, LANL plans for the next 10 years call for the construction or modification of many buildings that are not included in the 15 Key Facilities (LANL 1999b). Major projects are discussed in the following paragraphs.

a) Atlas

Description: Atlas was constructed in parts of five buildings at TA-35 (35-124, 125, 126, 294, and 301). Atlas is being used for research and development in the fields of physics, chemistry, fusion, and materials science that will contribute to predictive capability for the aging and performance of primary and secondary components of nuclear weapons. The heart of the Atlas facility is a pulsed-power capacitor bank that will deliver a large amount of electrical and magnetic energy to a centimeter-scale target in less than ten microseconds. Each experiment will require extensive preparation of the experimental assembly and diagnostic instrumentation (DOE 1996b).

View of the completed Atlas facility. RN01-056-21

The facility will require up to 5 megawatt hours of electrical energy annually (less than one percent of total LANL consumption); will have a peak electrical demand of 4 megawatts for about one minute per week; and will employ about 15 people. This facility has its own NEPA coverage provided by Appendix K of the Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management (DOE 1996b).

Status: Construction was completed in September 2000. Major testing of the capacitor banks (level of current) was successfully completed in December 2000. Critical Decision 4 (authorization to commence operation) was received from DOE in March 2001. An Independent Verification Panel process was completed to assure readiness for operations in July 2001, and the first experiments were performed in September 2001.

There is currently a project underway to construct a new building at the Nevada Test Site and relocate Atlas in FY 2002 or FY 2003. Atlas is expected to be operational in Nevada by the summer of 2003.

b) Los Alamos Research Park

Description: As described in the environmental assessment, a maximum of 44 acres will be developed along West Jemez Road, across from Otowi Building and the Wellness Center, and along West Road, in the vicinity of the ice rink. According to the Research Park Master Plan, up to five buildings and two parking structures may be constructed, with a total floor space of 300,000 square feet and parking for 1,400 cars (DOE 1997b).

If 10 buildings were to be constructed, the Research Park would consume an estimated 1.3 megawatts peak electric demand, 4,250 megawatt-hours of electricity, 39 billion BTU of natural gas, and 17 million gallons of water annually. These would represent approximate increases of 1 percent, 5 percent, 4 percent, and 18 percent in these utilities, respectively. The Park could also provide up to 1,500 new jobs and would increase traffic by up to 3,000 vehicle trips per day. Development would convert 30 undeveloped acres to office and light industrial use. This area, less than 0.25 percent of the vegetated landscape at LANL, currently provides a buffer for residential areas. This project has its own NEPA coverage provided by the Environmental Assessment for the Lease of Land for the Development of a Research Park at Los Alamos National Laboratory (DOE 1997b) along with a Finding of No Significant Impact.

Status: Construction of the first building in the Research Park began in February 2000 and was completed in March 2001. Occupancy of the building began in June 2001 and continues to the present. Operations at the Research Park are based on partnerships between industry collaborators and groups at Los Alamos that will benefit from industry-related research and to help foster economic development in Los Alamos County.

c) Strategic Computing Complex

Description: The Strategic Computing Complex (SCC) will house the world's fastest supercomputer. It will be a three-story structure with 267,000 square feet under roof. About 300 designers, computer scientists, code developers, and university and industrial scientists will occupy the building. The building will be connected to existing sewer, water, and natural gas lines, but will require a new 115/13.8-kilovolt substation transformer at the TA-03 Power Plant. Three cooling towers are to be constructed, expandable to six if needed.

The SCC will require an estimated 63 million gallons of cooling water per year. This water is proposed to come from treated waters from the sewage facility, which total more than 100 million gallons annually. The SCC is projected to have a maximum electricity load requirement of seven megawatts, or about 7 percent of total LANL demand. This project has its NEPA coverage provided by the Environmental Assessment for the Proposed Strategic Computing Complex, Los Alamos National Laboratory, Los Alamos, New Mexico (DOE 1998d). This proposal was an allowable interim action, and the NEPA review proceeded separately from the SWEIS. Based on the environmental assessment, DOE issued a Finding of No Significant Impact in December 1998.

Status: Construction of this new building got underway in 1999 and continued on schedule through 2000 and 2001. At the end of 2001, construction was complete and items on the final punch list were being addressed. Occupancy began in December 2001 and is planned to continue through 2002.

d) Nonproliferation and International Security Center

Description: The Nonproliferation and International Security Center will be a four-story building plus basement of 164,000 square feet with a capacity to house 465 people. It is being constructed adjacent to the new SCC within TA-03. The building will have laboratories, a machine shop for fabrication of satellite parts, a high-bay fabrication area, an area for the safe handling of sealed radioactive sources, and offices. Building heating and cooling will be by closed-loop water systems.

Because all occupants are to be relocated from other LANL buildings, there is no expected increase in quantities of sewage, solid wastes, or chemical wastes, nor should there be increased demand for utilities. To accommodate both the SCC and Nonproliferation and International Security Center, nearby parking lots are to be expanded to accommodate an additional 800 to 900 vehicles. NEPA coverage for this project was provided by the Environmental Assessment for Nonproliferation and International Security Center (DOE 1999g) and a Finding of No Significant Impact.

Status: Design of the building began in 1999 and continued through 2000. Construction started in March 2001, and the building will be enclosed by the spring of 2002. Interior work is progressing. Occupancy is scheduled for May 2003.

e) Emergency Operations Center and Multi-Channel Communications

The Cerro Grande Fire demonstrated several inadequacies within the current Emergency Operations Center (EOC) and Multi-Channel Communications (MCC) capabilities. The fire showed that the EOC has outlived its useful life. Further research showed that upgrading it would be neither economical nor practical, and the decision was made to have a new EOC designed and built. During CY 2001, the conceptual design was completed and the final design was initiated. With the current schedule, the EOC is expected to be operational by September 30, 2003.

The MCC Project addresses communication vulnerabilities made evident during the Cerro Grande Fire. These new communications and information systems will provide flexibility to communicate between the LANL EOC and external entities to respond to future emergencies with the most up to date information. The conceptual design was received in 2001 and procurement of long lead items was initiated.

Also during 2001, an environmental assessment (DOE 2001b) was prepared to address both the EOC and the MCC.

2.16.2 Operations at the Non-Key Facilities

Non-Key Facilities are host to seven of the eight categories of activities at LANL (DOE 1999a, pp. 2-2 through 2-9) as shown in Table 2.16.2-1 below. The eighth category, environmental restoration, is discussed in Section 2.17. During 2001, no new capabilities were added to the Non-Key Facilities and none of the eight were deleted.

The 12,380 employees at the end of CY 2001 are 1,029 more employees than SWEIS ROD projections of 11,351. SWEIS ROD projections were based on 10,593 employees identified for the index year (employment as of March 1996). About 60 percent of this increase is in the Non-Key Facilities as a result of increases in research and development, services, and administration.

Table 2.16.2-1. Operations at the Non-Key Facilities

CAPABILITY	EXAMPLES
1. Theory, modeling, and high-performance computing.	Modeling of atmospheric and oceanic currents. Theoretical research in areas such as plasma and beam physics, fluid dynamics, and superconducting materials.
2. Experimental science and engineering.	Experiments in nuclear and particle physics, astrophysics, chemistry, and accelerator technology. Also includes laser and pulsed-power experiments (e.g., Atlas).
3. Advanced and nuclear materials research and development and applications	Research and development into physical and chemical behavior in a variety of environments; development of measurement and evaluation technologies.
4. Waste management	Management of municipal solid wastes. Sewage treatment. Recycle programs.
5. Infrastructure and central services	Human resources activities. Management of utilities (natural gas, water, electricity). Public interface.
6. Maintenance and refurbishment	Painting and repair of buildings. Maintenance of roads and parking lots. Erecting and demolishing support structures.
7. Management of environmental, ecological, and cultural resources	Research into, assessment of, and management of plants, animals, cultural artifacts, and environmental media (groundwater, air, surface waters).

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2.16.3 Operations Data for the Non-Key Facilities

Even though the Non-Key Facilities occupy more than half of LANL and employ more than half the workforce, activities in these facilities typically contribute less than 10 percent of most operational effects. For example, the 10 cubic meters of MLLW constituted only 2 percent of the LANL total MLLW volume. Table 2.16.3-1 presents details.

Radioactive air emissions from stacks at the Non-Key Facilities (1,000 curies in 2001) were slightly above SWEIS ROD projections. This represents off gassing from inactive facilities and their cleanup activities and represents less than 5 percent of the 21,700 curies projected by the SWEIS ROD.

The combined flows of the sanitary waste treatment plant and the TA-3 Steam Plant account for about 99 percent of the total discharge from Non-Key Facilities and about 79.9 percent of all water discharged by the Laboratory. Section 3.2 has more detail. Operations data are summarized in Table 2.16.3-1.

Table 2.16.3-1. Non-Key Facilities/Operations Data

PARAMETER	UNITS	SWEIS ROD	2001 OPERATIONS
Radioactive Air Emissions: [a]			
Tritium	Ci/y	9.1E+2	1.0E+3
Plutonium	Ci/y	3.3E-6	None measured
Uranium	Ci/y	1.8E-4	None measured
NPDES Discharge:			
Total Discharges	MGY	142	99.01
001	MGY	114	98.75
013	MGY	[b]	[b]
03A-027	MGY	5.8	0.13
03A-160	MGY	5.1	0.13
03A-199	MGY	---	0 [c]
22 others	MGY	17	[d]
Wastes:			
Chemical [e]	kg/yr	651,000	1,255,000
LLW	m^3/yr	520	601
MLLW	m^3/yr	30	9.4
TRU	m^3/yr	0	25
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	4,601 [f]	4,816

[a] Stack emissions from previously active facilities (TA-33 and TA-41); these were not projected as continuing emissions in the future. Does not include non-point sources.

[b] Outfall 013 is from the TA-46 sewage plant. Instead of discharging to Mortandad Canyon, however, treated waters are pumped to TA-3 for re-use and ultimate discharge through Outfall 001 into Sandia Canyon. This transfer of water has resulted in projected NPDES volumes underestimating actual discharges from the exiting outfall.

[c] New Outfall 03A-199 was permitted by the EPA on 12/29/00. It had no discharge during either 2000 or 2001.

[d] The Non-Key Facilities formerly had 28 total outfalls (DOE 1999a, p. A-5). Twenty-two of these, with projected total flow of 17 million gallons per year, were eliminated from LANL's NPDES permit during 1998 and 1999.

[e] Approximately 73,449 kilograms of the chemical wastes are industrial solid wastes resulting from cleanup following the Cerro Grande Fire. Industrial solid waste is nonhazardous, may be disposed in county landfills, and does not represent a threat to local environs.

[f] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 2001 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 2001 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.17 Environmental Restoration Project

The ER Project may generate a significant amount of waste during cleanup activities; therefore, the project is included as a section of Chapter 2. The SWEIS ROD forecast that the ER Project would contribute 60 percent of the chemical wastes, 35 percent of the LLW, and 75 percent of the MLLW generated at LANL over the 10 years from 1996–2005. The ER Project will also affect land resources in and around LANL.

The DOE established the ER Project in 1989 to characterize and remediate over 2,100 PRSs known, or suspected, to be contaminated from historical operations. Many of the sites remain under DOE control; however, some have been transferred to Los Alamos County or to private ownership (at various locations within the Los Alamos town site). Remediation and cleanup efforts are regulated by and coordinated with the New Mexico Environment Department (NMED) and/or DOE.

In 2001, ER Project activities included drafting and finalizing several characterization/remediation reports for NMED, conducting characterization/remediation field work on numerous sites, and formally tracking all work performed.

Cleanups included, but were not limited to

- Resource Conservation and Recovery Act (RCRA) Closure at TA-16, Material Disposal Area (MDA) P;
- cleanup of contaminated sediments in the South Fork of Acid Canyon;
- source removal at TA-21, TA-51, and TA-54; and
- polychlorinated biphenyl (PCB)-contaminated soil removal at TA-3.

Continued field investigations included, but were not limited to

- the drilling and installation of monitoring wells;
- soil gas borehole installation and sampling at TA-54, MDA H;
- activities at the characterization well Cañon de Valle (CdV)-R-37-2; and
- investigations of a tributary canyon below TA-53.

2.17.1 Operations of the Environmental Restoration Project

The ER Project originally identified 2,124 PRSs, consisting of 1,099 PRSs administered by NMED and 1,025 PRSs administered by DOE. By the end of 2001, only 839 discrete PRSs remain. Approximately 604 units have been approved for no further action (NFA)[8], 139 units have been removed from the Laboratory's Hazardous Waste Facility Permit, and 17 units proposed for NFA in previous permit modification requests are pending approval by NMED.

Of the 139 total PRSs removed from the permit, 37 were removed in 2001. Additionally, in 2001, two new PRS were identified, 40 additional PRSs were proposed to the NMED for NFA, and supplemental information was provided to the NMED for 2 of the 17 PRSs pending approval.

[8] NFA means that the site is considered "clean" for its intended purpose. An industrial site would not be cleaned up to the same level as a residential site.

MDA P

MDA P continued as a major effort for the ER Project. MDA P is located at TA-16 on the south rim of Cañon de Valle on the western edge of the Laboratory. The MDA P Landfill began receiving waste from the S-Site Burning Grounds in 1950. Debris from World War II–era buildings was also disposed of at MDA P. Operation of the landfill was suspended in 1984. ER Project personnel began the closure process at the landfill in 1997.

The presence of detonable high explosives in the landfill required the use of a robotic excavator. Remote excavation of the landfill began in February 1999 and was completed on May 3, 2000, just before the Cerro Grande Fire. Excavation of contaminated soil beneath the landfill using non-remote excavation methods resumed after fire recovery and was completed in March 2001. Phase II confirmatory sampling and geophysics measurements began in June 2001. During Phase II sampling, additional contamination was found. This material was excavated and is staged for offsite disposal pending completion of waste characterization analysis. Additional confirmation sampling will be completed when the waste is shipped.

More than 52,500 cubic yards of soil and debris were excavated from MDA P (10,800 cubic yards during FY 2001). During FY 2001, more than 26,700 cubic yards of material were shipped for disposal. This includes hazardous and industrial waste and recycled material.

Waste types and amounts generated include

- 408 pounds of detonable high explosive,
- 820 cubic yards of hazardous waste with residual levels of radioactive contamination,
- 6,280 pounds of barium nitrate,
- 2,605 pounds of asbestos,
- 200 pounds of mixed waste,
- 235 cubic feet of LLW, and
- 888 containers that underwent hazardous categorization characterization.

South Fork of Acid Canyon

The cleanup of contaminated sediments in the South Fork of Acid Canyon, within the Pueblo Canyon watershed, was an interim action of the ER Project in FY 2001. The South Fork of Acid Canyon received untreated wastewater from laboratories at former TA-1 from 1944 until 1951 and treated wastewater from a radioactive liquid waste treatment facility at former TA-45 from 1951 until 1964. This area was transferred to Los Alamos County in 1967. It is open to the public and crossed by well-used trails. A dose assessment completed in FY 2000 indicated that no unacceptable levels of radionuclide contamination were present in the canyon. DOE directed the ER Project to prepare an "as low as reasonably achievable" (ALARA) analysis, which led to a decision to plan and implement sediment removal activities. Samples collected from the South Fork of Acid Canyon indicated the presence of plutonium-239, -240; cesium-137; and strontium-90; among others. Sample data also indicated the presence of various metals and organic compounds at levels above background. During FY 2001, ER Project personnel

- prepared an ALARA analysis for the South Fork of Acid Canyon, which evaluated the costs and benefits of different cleanup options;

- prepared an Interim Action Plan for the removal of contaminated sediment to reduce potential radiation doses to recreational users of the canyon;

- collected 48 sediment samples for analysis at offsite laboratories to help guide cleanup operations and improve waste characterization; and

- sediment removal operations utilizing vacuum technology. Approximately 200 cubic yards of sediment were excavated.

Source Removals

Six inactive septic tanks at TA-21, TA-51, and TA-54 were characterized and removed as part of voluntary corrective actions (VCAs) or interim actions during FY 2001. The contents of each septic tank and the tanks themselves were removed and disposed of in accordance with all applicable EPA, NMED, DOE, and Laboratory requirements. VCA completion reports were completed for the septic tanks at TA-51 and TA-54 and submitted to the appropriate administrative authority (NMED for Hazardous and Solid Waste Amendment [HSWA] PRSs, and DOE for non-HSWA PRSs) with a recommendation for NFA. NMED has concurred verbally with the recommendation for NFA for the two HSWA PRSs, based on a review of the VCA completion report. Confirmation sampling has been completed for the area adjacent to and beneath the two septic tanks at TA-21, and VCA/interim action completion reports are scheduled for submittal the second quarter of FY 2002.

PCB Cleanup

The ER Project continued a VCA to remove any soil that contained greater than 1 ppm PCBs from a storage area located northeast of the Johnson Controls Utilities Shop (Building 3-223). The Laboratory's electrical power-line maintenance contractor has used the area for storage of electric cable, used and unused dielectric oils, PCB-containing transformers, capacitors, and oil-filled drums. The contractor also stored drums containing waste and product solvents at the site from 1967 to 1992. During FY 2001, ER Project personnel

- removed and disposed of approximately 2,400 cubic yards of PCB-contaminated soil from the site, including the removal of all sediments from the stream banks on the west slope area and from two drainages in the north area (the west slope, mesa top, and north slope have been excavated down to bedrock);

- collected 86 verification samples from a predetermined hexagonal grid and analyzed for PCBs (a subset [20 samples] was also analyzed for volatile organic compounds and metals);

- completed site restoration activities; and

- prepared and submitted a VCA report to the EPA and the NMED recommending NFA for this site. The NFA was approved by the EPA.

Continued Field Investigations

The ER Project continued investigations in several areas during FY 2001, including the following:

- Continued the major effort of quarterly well sampling; wells with four quarters of sampling completed in FY 2001 include R-9, R-9i, R-12, R-15, and R-19.

- Completed the drilling and installation of three monitoring wells, including R-7, R-22, and MCOBT-4.4. MCOBT-8.5 was drilled and plugged. Additionally, the ER Project initiated the drilling of wells R-8 and R-13. The depth of the wells ranged from 767 ft to 1,489 ft.

- Completed the drilling and installation of CdV-R-37-2 well site (a nature-and-extent-of-contamination well that was installed to a depth of 1,664 ft to help determine if the high explosive contamination that has been detected in the perched and regional aquifers of well R-25 in TA-16 extends to the southeast); and completed hydrologic testing in the well.

- Conducted extensive characterization of sediments in the tributary to Los Alamos Canyon below the TA-53 surface impoundments to assess potential risk from contaminants in sediments located in a tributary to Los Alamos Canyon below the outfall from the impoundments at TA-53; collected 25 sediment samples from three different reaches in the tributary canyon; and performed geodetic surveys of the canyon and sampling locations.

2.17.2 Operations Data for the Environmental Restoration Project

Waste quantities generated during FY 2001 are shown in Table 2.17.2-1. The ER Project generated 5,102 cubic meters of chemical waste (including the categories RCRA, Toxic Substances Control Act [TSCA], and New Mexico Special Waste) in FY 2001—all below the projections made by the SWEIS ROD. This volume does not include an additional 18,845 cubic meters of nonhazardous municipal solid waste (sanitary waste).

Table 2.17.2-1. Environmental Restoration Project/Operations Data

WASTE TYPE	UNITS	SWEIS ROD	2001 OPERATIONS
Chemical [a]	m^3/yr	2,000,000	5,102
LLW	m^3/yr	4,260	364
MLLW	m^3/yr	548	22
TRU	m^3/yr	11	0
Mixed TRU	m^3/yr	0	0

[a] The chemical waste volume includes the categories of RCRA, TSCA, and New Mexico Special Waste and does not include an additional 18,845 cubic meters of sanitary waste.

2.17.3 ER Project/Cerro Grande Fire Effects

One year has passed since the Cerro Grande Fire impacted the Los Alamos town site and the Laboratory. Massive fire rehabilitation and flood mitigation efforts have been ongoing and will continue for several years until areas prone to erosion are stabilized. The Cerro Grande Fire put nearly 100 of the ER Project's PRSs at increased risk of contaminant release and/or transport, by virtue of either being directly burned, or vulnerable to increased surface water runoff or erosion. Since the fire, these sites have had controls installed and continue to be inspected and maintained as part of the Laboratory's overall storm water program (Table 2.17.3-1). For an update on the current status of the PRSs impacted by the Cerro Grande Fire go to http://lib-www.lanl.gov/cgi-bin/getfile?laur01-4122.htm.

Table 2.17.3-1. Evaluated and Stabilized PRSs following the Cerro Grande Fire

NO. OF PRSs	PRS LOCATIONS	START DATE	COMPLETION DATE
10	TA-11	5/21/00	5/24/00
29	TA-6, 9, 14, 15, 22, 36, 40, 49	6/14/00	7/15/00
34	TA-16, 46, 15, (R-44)	5/29/00	7/15/00
18	TA-4, 5, 42, 48	6/27/00	7/15/00

3.0 Site-Wide 2001 Operations Data

The Yearbook's role is to provide data that could be used to develop an impact analysis. However, in two cases, worker dose and dose from radioactive air emissions, the Yearbook specifically addresses impacts as well. In this chapter, the Yearbook summarizes operational data at the site-wide level. These impact assessments are routinely undertaken by LANL, using standard methodologies that duplicate those used in the SWEIS; hence, they have been included to provide the base for future trend analysis.

Chapter 3 compares actual operating data to projected effects for about half of the parameters discussed in the SWEIS, including effluent, workforce, regional, and long-term environmental effects. Some of the parameters used for comparison were derived from information contained in both the main text and appendices of the SWEIS. Many parameters cannot be compared because data are not routinely collected. In these cases, projections made by the SWEIS ROD resulted only from expenditure of considerable special effort, and such extra costs were avoided when preparing the Yearbook.

3.1 Air Emissions

3.1.1 Radioactive Air Emissions

Radioactive airborne emissions from point sources (i.e., stacks) during 2001 totaled approximately 15,400 curies, 70 percent of the 10-year average of 21,700 curies projected by the ROD. These low emissions result from operations at the Key Facilities not being performed at projected levels and from the conservative nature of the emissions calculations performed for the SWEIS.

As in 1999 and 2000, the two largest contributors to radioactive air emissions were tritium from the Tritium Facilities (both Key and Non-Key) and activation products from LANSCE. Stack emissions from the Tritium Key Facilities were about 8,400 curies and from Non-Key Facilities were about 1,000 curies. Tritium emissions from the Key Facilities were dominated by a single release from TA-16-205, the WETF. This release occurred in January 2001 and resulted in a puff release of tritium gas (HT or T_2) of 7,600 curies. Tritium emissions from the Non-Key Facilities were dominated, as in 1999 and 2000, by cleanup activities at TA-33 and TA-41. The emissions from these two facilities totaled slightly more than 1,000 curies.

Emissions of activation products from LANSCE were increased over 2000 levels. The total point source emissions were slightly less than 6,000 curies. As in 2000, the Area A beam stop did not operate during 2001; however, operations in Line D resulted in higher emissions for 2001.

Non-point sources of radioactive air emissions are present at LANSCE, Area G, TA-18, and other locations around the Laboratory. Non-point emissions, however, are generally small compared to stack emissions. For example, non-point air emissions from LANSCE were less than 160 curies. Additional detail about radioactive air emissions will be provided in the Laboratory's annual compliance report to the EPA on June 30, 2001, and in the 2001 Environmental Surveillance Report.

Maximum offsite dose will continue to be relatively small for 2001, although it will be higher than the 2000 dose of 0.64 millirem. The final dose is estimated to be approximately 1.9 millirem, with the final dose being reported to the EPA by June 30, 2001.

3.1.2 Non-Radioactive Air Emissions

3.1.2.1 Emissions of Criteria Pollutants

Criteria pollutants include nitrogen oxides, sulfur oxides, carbon monoxide, and particulate matter. LANL, in comparison to industrial sources and power plants, is a relatively small source of these non-radioactive air pollutants. As such, the Laboratory is required to estimate emissions, rather than perform actual stack sampling. As Table 3.1.2.1-1 illustrates, all emissions of criteria pollutants are within the estimated emissions presented in the SWEIS ROD.

Nearly 80 percent of the most significant criteria pollutant, NOx, results from the TA-3 steam plant. In late 2000, LANL received a permit from the NMED to install flue gas recirculation equipment on the steam plant boilers to reduce emissions of NOx up to 70 percent. This equipment is expected to become operational in 2002. The slight increase in NOx over 2001 operations is attributable to increased power demands from the extended LANSCE run cycle.

Table 3.1.2.1-1. Emissions of Criteria Pollutants

POLLUTANTS	UNITS	SWEIS ROD	2000 OPERATIONS	2001 OPERATIONS
Carbon monoxide	Tons/year	58	26	29.08
Nitrogen oxides	Tons/year	201	80	93.8
Particulate matter	Tons/year	11	3.8	5.5
Sulfur oxides	Tons/year	0.98	4.0	0.82

Criteria pollutant emissions from LANL's fuel burning equipment are reported in the annual Emissions Inventory Report as required by the New Mexico Administrative Code, Title 20, Chapter 2, Part 73 (20 NMAC 2.73). The report provides emission estimates for the steam plants, nonexempt boilers, the asphalt plant, and the water pump. In addition, emissions from the paper shredder, rock crusher, degreasers, and permitted beryllium machining operations are reported. For more information, refer to Los Alamos National Laboratory's 1999 and 2000 Emissions Inventory Report (Hurtle 2001).

3.1.2.2 Chemical Usage and Emissions

The 1999 edition of the Yearbook proposed to report chemical usage and calculated emissions for Key Facilities obtained from the Laboratory's Automated Chemical Inventory System. The quantities presented in this approach represent all chemicals procured or brought on site in the respective calendar year. This methodology is identical to that used by the Laboratory for reporting under Section 313 of the Emergency Planning Community Right-to-Know Act and for reporting regulated air pollutants estimated from research and development operations in the annual Emissions Inventory.

Air emissions shown in Tables A-1 through A-14 of Appendix A are divided into emissions by Key Facility. Emission estimates (expressed as kilograms per year) were performed in the same manner as that reported in the 1999 and 2000 Yearbooks. First, usage of listed chemicals was summed by facility. It was then estimated that 35 percent of the chemical used was released to the atmosphere. Emission estimates for some metals, however, were based on an emission factor of less than one percent. This is appropriate because these metal emissions are assumed to result from cutting or melting activities. Fuels such as propane and acetylene were assumed to be completely combusted; therefore, no emissions are reported.

Information on total volatile organic compounds and hazardous air pollutants estimated from research and development operations is shown in Table 3.1.2.2-1. Projections by the SWEIS ROD for volatile organic compounds and hazardous air pollutants were expressed as concentrations rather than emissions; direct comparisons cannot be made, and, therefore, projections from the SWEIS ROD are not presented. Hazardous air pollutant estimates for 1999 were presented in the annual Emissions Inventory for the first time, and, therefore, are presented here. The volatile organic compound emissions reported from research and development activities reflect quantities procured in each calendar year. The hazardous air pollutant emissions reported from research and development activities generally reflect quantities procured in each calendar year. In a few cases, however, procurement values and operational processes were further evaluated so that actual air emissions could be reported instead of procurement quantities.

Table 3.1.2.2-1 Emissions of Volatile Organic Compounds and Hazardous Air Pollutants

POLLUTANT	EMISSIONS (TONS/YEAR)		
	1999	2000	2001
Hazardous Air Pollutants	13.6	6.5	7.4
Volatile Organic Compounds	20	10.7	24

3.2 Liquid Effluents

The Laboratory discharges wastewater via 21 outfalls operating under its NPDES permit. On December 29, 2000, the EPA issued a new NPDES permit to the Laboratory with an effective date of February 1, 2001. Based on discharge monitoring reports as reported by the Laboratory's Water Quality and Hydrology group and on operational records when available, effluent flow through NPDES outfalls totaled an estimated 124.04 million gallons in CY 2001, compared to 278.0 million gallons projected by the SWEIS ROD; an apparent overall reduction of approximately 141 million gallons over CY 2000. However, the apparent decrease in flows reported on the discharge monitoring reports from CY 2000 to CY 2001 is primarily due to the methodology by which flow was measured and reported in the past.

Historically, instantaneous flow was measured during field visits as required in the NPDES permit. These measurements were then extrapolated over a 24-hour day/seven-day week. With implementation of the new NPDES permit on February 1, 2001, the Water Quality and Hydrology group is collecting and reporting actual flows being recorded by flow meters at most outfalls. At those outfalls that do not have meters, the flow is calculated as before, based on instantaneous flow. Details on all noncompliance will be provided in the 2001 Annual Environmental Surveillance Report.

Key Facilities accounted for approximately 25 million gallons of the total. This flow can be examined by watershed (Table 3.2-1) and by facility (Table 3.2-2) to understand differences from projections.

Table 3.2-1. NPDES Discharges by Watershed (Millions of Gallons)

WATERSHED	# OUTFALLS (SWEIS ROD)	# OUTFALLS (2001) [a]	DISCHARGE (SWEIS ROD)	DISCHARGE 2001
Cañada del Buey	3	1 [b]	6.4	0
Guaje	7	0	0.7	0
Los Alamos	8	5	44.8	19.34
Mortandad	7	5	37.4	4.21
Pajarito	11	0	2.6	0
Pueblo	1	0	1.0	0
Sandia	8	5	170.7	100.38 [b]
Water	10	5 [c]	14.2	0.102
Totals	55	21	278.0	124.04

[a] Twenty-one outfalls were permitted to discharge during 2001.
[b] Includes Outfall 13S from the Sanitary Wastewater Systems Consolidation, which is registered as a discharge to Cañada del Buey or Sandia. The discharge is actually piped to TA-3 and ultimately discharged to Sandia Canyon via Outfall 001.
[c] Includes 05A-055 discharge to Cañon de Valle, a tributary to Water Canyon.

Of the 21 outfalls listed in the new permit only 17 flowed during 2001. Table 3.2-2 compares NPDES discharges by facility. The Non-Key Facilities showed the largest differences between CY 2001 discharges and SWEIS ROD projections (99.01 million gallons versus 142.1 million gallons, respectively). For the Non-Key Facilities, discharge from Outfall 001 at the TA-3 Power Plant was lower (98.749 million gallons) than the projected discharge (114 million gallons). Approximately 94.7 million gallons of the discharge from Outfall 001 at the power plant was attributable to treated sanitary effluent piped from Outfall 13S at TA-46 to TA-3 to be used as "makeup water" in the cooling towers. While the volume contributed from 13S increased by almost 5 million gallons over what it was in 2000, the total discharged through Outfall 001 has decreased by about 71 million gallons. The combined flows of the sanitary waste treatment plant and the TA-3 Steam Plant account for about 99 percent of the total discharge from Non-Key Facilities and about 79.6 percent of all water discharged by the Laboratory.

LANSCE discharged approximately 20.4 million gallons for 2001, about 10 million gallons less than in 2000 (LANL 2000a), accounting for almost 82 percent of the total discharge from all Key Facilities, see Table 3.2-2. The reduced volume is attributed to overall reduced activity and fewer hours of "beam time" than anticipated. See Section 2.11 for more information.

Table 3.2-2. NPDES Discharges by Facility (Millions of Gallons)

FACILITY	# OUTFALLS (SWEIS ROD)	# OUTFALLS (2001)	DISCHARGE (SWEIS ROD)	DISCHARGE (2001)
Plutonium Complex	1	1	14.0	0.4053
Tritium Facility	2	2	0.3	0.3932
CMR Building	1	1	0.5	0.0209
Sigma Complex	2	2	7.3	0.0555
High Explosives Processing	11	3	12.4	0.036
High Explosives Testing	7	2	3.6	0.06638
LANSCE	5	4	81.8	20.45
Biosciences	1	0	2.5	0
Radiochemistry Facility	2	0	4.1	0
RLWTF	1	1	9.3	3.6
Pajarito Site	None	0	0	0
MSL	None	0	0	0
TFF	None	0	0	0
Machine Shops	None	0	0	0
Waste Management Operations	None	0	0	0
Non-Key Facilities	22	5	142.1	99.01
Totals	55	21	278.0	124.04

LANL has three principal wastewater treatment facilities—the sewage plant (sanitary wastewater system) at TA-46, the RLWTF at TA-50, and the High Explosives Wastewater Treatment Facility at TA-16. As discussed above, the sewage treatment plant at TA-46 processed about 94.7 million gallons of treated wastewater and sewage during 2001, all of which was pumped to the TA-3 Power Plant to provide make-up water for the cooling towers or to be discharged directly into Sandia Canyon via Outfall 001.

The RLWTF, Building 50-01, Outfall 051, discharges into Mortandad Canyon. During 2001, about 3.6 million gallons of treated radioactive liquid effluent, about 1.3 million gallons less than CY 2000, were released to Mortandad Canyon from the RLWTF, compared to 9.3 million gallons projected by the SWEIS

ROD. The TA-16 High Explosives Wastewater Treatment Facility discharged about 0.036 million gallons compared to 12.4 projected by the SWEIS ROD.

Treated wastewater released from the Laboratory's NPDES outfalls rarely leaves the site. However, the NPDES Permit Program also regulates storm water discharges from certain activities. During CY 2001, LANL operated about 75 stream-monitoring and partial-record storm water-monitoring stations located in 17 watersheds. Data gathered from these stations show that surface water, including storm water, occasionally flows off of DOE property. Flow measurements and water quality data for surface water are detailed in the Laboratory's annual reports, Environmental Surveillance at Los Alamos (an example is LANL 2000d) and Surface Water Data at Los Alamos National Laboratory (an example is LANL 2000e).

3.3 Solid Radioactive and Chemical Wastes

Because of the complex array of facilities and operations, the Laboratory generates a wide variety of waste types including solids, liquids, semi-solids, and contained gases. These waste streams are variously regulated as solid, hazardous, low-level radioactive, TRU, or wastewater by a host of State and Federal regulations. The institutional requirements relating to waste management at the Laboratory are located in a series of documents that are part of the Laboratory Implementation Requirements. These requirements specify how all process wastes and contaminated environmental media generated at the Laboratory are managed. Wastes are managed from planning for waste generation for each new project through final disposal or permanent storage of those wastes. This ensures that LANL meets all requirements including DOE Orders, Federal and State regulations, and Laboratory permits.

The Laboratory's waste management operation captures and tracks data for waste streams, regardless of their points of generation or disposal. This includes information on the waste generating process; quantity; chemical and physical characteristics of the waste; regulatory status of the waste; applicable treatment and disposal standards; and the final disposition of the waste. The data are ultimately used to assess operational efficiency, help ensure environmental protection, and demonstrate regulatory compliance.

LANL generates radioactive and chemical wastes as a result of research, production, maintenance, construction, and environmental restoration activities as shown in Table 3.3-1. Waste generators are assigned to one of three categories—Key Facilities, Non-Key Facilities, and the ER Project. Waste types are defined by differing regulatory requirements. No distinction has been made between routine wastes, those generated from ongoing operations, and non-routine wastes such as those generated from the decontamination and decommissioning of buildings.

Table 3.3-1. LANL Waste Types and Generation

WASTE TYPE	UNITS	SWEIS ROD	2000	2001
Chemical	10^3 kg/yr	3,250	27,687	24,425
LLW	m^3/yr	12,200	4,216	3,939
MLLW	m^3/yr	632	598	58
TRU	m^3/yr	333	125	108
Mixed TRU	m^3/yr	115	89	35

As shown in Table 3.3-1, quantities of MLLW, LLW, TRU, and mixed TRU wastes were appreciably below projections, and chemical waste quantities were far above projections. Nearly all quantities of chemical waste resulted from the remediation of MDA P. This major project, in its second year, resulted in 21.5 million kilograms of chemical wastes, or 88 percent of LANL totals for this waste type. Section 2.17 provides more information about this project, which continued in 2001.

In general, waste quantities from operations at the Key Facilities were below ROD projections for nearly all waste types at all Key Facilities, reflecting normal levels of operations at the Key Facilities. Waste minimization efforts put forth by the Environmental Stewardship Office are beginning to show a Laboratory-wide trend in overall waste reduction across most categories. There have been improvements made in various facility processes to try and minimize waste generation. Additionally, other processes are substituting non-hazardous chemicals for commonly used hazardous chemicals in an effort to improve effluent quality.

3.3.1 Industrial Solid Wastes

As projected by the SWEIS ROD, chemical waste includes not only industrial solid wastes, but also all other nonradioactive wastes passing through the Solid Radioactive and Chemical Waste Facility. In addition, industrial solid wastes are a component of those chemical wastes sent directly to offsite disposal facilities that do not pass through the Solid Radioactive and Chemical Waste Facility. For CY 2001, industrial solid wastes were a considerable component of the total chemical waste. Chemical wastes generated at Non-Key Facilities make up 5% of the LANL total for the year, almost exclusively generated by constrction activities at the Non-Key facilities in the form of industrial solid waste. Industrial solid wastes are disposed in solid waste landfills under regulations promulgated pursuant to Subtitle D of RCRA. (Note: Hazardous wastes are regulated pursuant to Subtitle C of RCRA.)

3.3.2 Chemical Wastes

Because of industrial solid wastes, chemical waste generation in 2001 exceeded waste volumes projected by the SWEIS ROD by a factor of about seven. Examination of the generator categories (Table 3.3.2-1) sheds some light on the differences.

Table 3.3.2-1. Chemical Waste Generators and Quantities

WASTE GENERATOR	UNITS	SWEIS ROD	2000	2001
Key Facilities	10^3 kg/yr	600	99	141
Non-Key Facilities	10^3 kg/yr	650	379	1,256
ER Project	10^3 kg/yr	2,000	27,209	23,028
LANL	10^3 kg/yr	3,250	27,687	24,425

ER Project cleanup at MDA P generated approximately 21.5 million kilograms of chemical wastes, nearly all in the form of barium-contaminated soils that were shipped offsite for treatment and disposal as RCRA waste. Another ER Project remediation, PRS 3-056(c) at the upper end of Sandia Canyon in TA-03, generated 1,098 metric tons of chemical wastes, primarily in the form of PCB-contaminated soils. Non-Key Facilities also contributed to high chemical wastes quantities, mostly due to the increased activity from new construction.

3.3.3 Low-Level Radioactive Wastes

LLW generation in 2001 was less than one-third of waste volumes projected by the SWEIS ROD. As can be seen in Table 3.3.3-1, Key Facilities accounted for most of the departure from projections.

Table 3.3.3-1. LLW Generators and Quantities

WASTE GENERATOR	UNITS	SWEIS ROD	2000	2001
Key Facilities	m^3/yr	7,450	1,172	2,776
Non-Key Facilities	m^3/yr	520	578	601
ER Project	m^3/yr	4,260	2,467	562
LANL	m^3/yr	12,230	4,217	3,939

Significant differences occurred at the CMR Building (448 cubic meters versus 1,820 cubic meters per year projected by the SWEIS ROD), the Sigma Complex (960 cubic meters projected versus 0.5 actual), and High Explosives Testing (940 cubic meters projected versus 1,361 actual). In addition, LANSCE generated lower volumes than projected (1,085 cubic meters projected versus less than 1 actual) because decommissioning and renovation of Experimental Area A did not occur. Normal to low workloads accounted for lower waste volumes at the other Key Facilities. LLW generation at Non-Key Facilities slightly exceeded the SWEIS ROD. This is explained by heightened activities and new construction at Non-Key Facilities.

3.3.4 Mixed Low-Level Radioactive Wastes

Generation in 2001 approximated one-tenth of the MLLW volumes projected by the SWEIS ROD. Table 3.3.4-1 examines these wastes by generator categories.

Table 3.3.4-1. MLLW Generators and Quantities

WASTE GENERATOR	UNITS	SWEIS ROD	2000	2001
Key Facilities	m^3/yr	54	11	20
Non-Key Facilities	m^3/yr	30	10	9
ER Project	m^3/yr	548	577	29
LANL	m^3/yr	632	598	58

3.3.5 Transuranic Wastes

Generation in 2001 approximated one-third of the TRU waste volumes projected by the SWEIS ROD. As projected in the SWEIS, TRU wastes are expected to be generated almost exclusively in four facilities (the Plutonium Facility Complex, the CMR Building, the RLWTF, and the Solid Radioactive and Chemical Waste Facility) and by the ER Project. Table 3.3.5-1 examines these wastes by generator categories.

Table 3.3.5-1. Transuranic Waste Generators and Quantities

WASTE GENERATOR	UNITS	SWEIS ROD	2000	2001
Key Facilities	m^3/yr	322	122	83
Non-Key Facilities	m^3/yr	0	3	25
ER Project	m^3/yr	11	0	0
LANL	m^3/yr	333	125	108

The ER Project did not produce any TRU wastes in 2001.

3.3.6 Mixed Transuranic Wastes

Generation in 2001 was less than one-third the mixed TRU waste volumes projected by the SWEIS ROD. As projected, mixed TRU wastes are expected to be generated at only two facilities–the Plutonium Facility Complex and the CMR Building. Table 3.3.6-1 examines these wastes by generator categories.

Table 3.3.6-1. Mixed Transuranic Waste Generators and Quantities

WASTE GENERATOR	UNITS	SWEIS ROD	2000	2001
Key Facilities	m^3/yr	115	89	35
Non-Key Facilities	m^3/yr	0	0	0
ER Project	m^3/yr	0	0	0
LANL	m^3/yr	115	89	35

Both the Plutonium Facility Complex (30 cubic meters actual versus 102 cubic meters per year projected by the SWEIS ROD) and the CMR Building (13 cubic meters projected versus one actual) produced less mixed TRU waste than projected because full-scale production of war reserve pits had not begun.

3.4 Utilities

Ownership and distribution of utility services continue to be split between DOE and Los Alamos County. DOE owns and distributes most utility services to LANL facilities, and the County provides these services to the communities of White Rock and Los Alamos. Routine data collection for both gas and electricity are done on a fiscal year basis, and keeping with the Yearbook goal of using routinely collected data, this information is presented by fiscal year. Water data, however, are routinely collected and summarized by calendar year.

3.4.1 Gas

Table 3.4.1-1 presents gas usage by LANL for FY 2001. Approximately 90 percent of the gas used by LANL continued to be used for heating (both steam and hot air). The remainder was used for electrical production. The electrical generation is used to fill the difference between peak loads and the electric contractual import rights.

As shown in Table 3.4.1-1, total gas consumption for FY 2001 was less than projected by the SWEIS ROD. During FY 2001, less natural gas was used for heating because of the warmer than normal weather pattern, but more natural gas was used for electric generation at the TA-03 Power Plant. Table 3.4.1-2 illustrates steam production for FY 2001.

Table 3.4.1-1. Gas Consumption (decatherms[a]) at LANL/Fiscal Year 2001

SWEIS ROD	TOTAL LANL CONSUMPTION	TOTAL USED FOR ELECTRIC PRODUCTION	TOTAL USED FOR HEAT PRODUCTION	TOTAL STEAM PRODUCTION
1,840,000	1,492,635	273,312	1,219,323	Table 3.4.1-2

[a] A decatherm is equivalent to 1,000 to 1,100 cubic feet of natural gas.

Table 3.4.1-2. Steam Production at LANL/Fiscal Year 2001

TA-3 STEAM PRODUCTION (klb [a])	TA-21 STEAM PRODUCTION (klb)	TOTAL STEAM PRODUCTION (klb)
531,763 [b]	29,195	560,958

[a] klb: Thousands of pounds

[b] TA-3 steam production has two components: that used for electric production (208,643 klb in 2001) and that used for heat (323,120 klb in 2001).

3.4.2 Electricity

LANL is supplied with electrical power through a partnership arrangement with Los Alamos County, known as the Los Alamos Power Pool, which was established in 1985. The DOE Albuquerque Operations Office and Los Alamos County have entered into a 10-year contract known as the Electric Coordination Agreement whereby each entity's electric resources are consolidated or pooled. The capacity rating of Los Alamos Power Pool resources, less losses and reserves, is 105 megawatts and 83 megawatts (summer and winter seasons, respectively). The transmission import capacity is contractually limited to 105 megawatts and 83 megawatts (summer and winter seasons, respectively).

The ability to accept additional power into the Los Alamos Power Pool grid is limited by the regional electric import capability of the existing northern New Mexico power transmission system. In recent years, the population growth in northern New Mexico, together with expanded industrial and commercial usage, has greatly increased power demands on the northern New Mexico regional power system. Several proposals for bringing additional power into the region have been considered. Power line corridor locations remain under consideration, but it is uncertain when any new regional power lines would be constructed and become serviceable. Another limitation to additional power is contractual rights held by the Los Alamos Power Pool for importing power from the regional transmission network.

Table 3.4.2-1 shows peak demand and Table 3.4.2-2 shows annual use of electricity for FY 2001. LANL's electrical energy use remains below projections in the ROD. The ROD projected peak demand to be 113,000 kilowatts with 63,000 kilowatts being used by LANSCE and about 50,000 kilowatts being used by the rest of the Laboratory. In addition, the ROD projected annual use to be 782,000 megawatt hours with 437,000 megawatt hours being used by LANSCE and about 345,000 megawatt hours being used by the rest of the Laboratory. Actual use has fallen below these values, and the projected periods of brownouts have not occurred. However, on a regional basis, failures in the Public Service Company of New Mexico system have caused blackouts in northern New Mexico and elsewhere.

In mid-2001, LANL broke ground for construction of the new Western Technical Area (WTA) 115/13.8-kV substation at TA-6. The main power transformer for WTA, rated at up to 56 MVA, was delivered in 2001. WTA will provide LANL and the Los Alamos town site with redundancy in bulk power transformation facilities to guard against losses of either the Eastern Technical Area Substation or the TA-03 Substation.

Operations at several of the large LANL loads changed during 2001.

Notably the SCC began commissioning operations resulting in about 1 MW of new load in 2001. Additional computing facilities are to be added to SCC in 2002, resulting in the addition of another 1 to 2 MW of load.

LANSCE operations were curtailed to lower power levels in 2001 due to programmatic reductions of direct operating funds. This represented a reduction of 5 to 10 MW in loading on the LANL power system in 2001. It is expected that operating funds will be restored in future years such that the LANSCE operations will be restored to the level of prior years operations at high power levels.

The LEDA funding was curtailed in 2001 resulting in the loss of 2 to 4 MW of load. LEDA will continue in mothballed maintenance mode until a new sponsor is secured, hopefully as early as 2004.

The National High Magnetic Field Laboratory continued to sit out operations during 2001. The 60-Tesla superconducting magnet which failed in 2000 is in redesign and reconstruction, and should be operational again by 2003. This represents a temporary reduction of approximately 2 MW load in 2001.

The DARHT facility began commissioning operations of its first axis in 2001. The load level is about 2 MW for the first axis. The second axis is expected to be operational in 2002, representing yet an additional 2 MW of new load to LANL.

Mitigation of the damage to LANL utilities from the Cerro Grande Fire was for the most part completed in 2001. Tree trimming clearance for the power line corridors will take many more years to bring areas up to the desired LANL standard.

Table 3.4.2-1. Electric Peak Coincident Demand/Fiscal Year 2001

CATEGORY	LANL BASE	LANSCE	LANL TOTAL	COUNTY TOTAL	POOL TOTAL
SWEIS ROD	50,000[a]	63,000	113,000	Not projected	Not projected
FY 2001	50,146	20,732	70,878	14,583	85,461

[a] All figures in kilowatts.

Table 3.4.2-2. Electric Consumption/Fiscal Year 2001

CATEGORY	LANL BASE	LANSCE	LANL TOTAL	COUNTY	POOL TOTAL
SWEIS ROD	345,000[a]	437,000	782,000	Not projected	Not projected
FY 2001	294,169	80,974	375,143	116,043	491,186

[a] All figures in megawatt-hours.

3.4.3 Water

In September 2001, DOE officially turned over the water production system to Los Alamos County. LANL is now considered a customer to Los Alamos County. Los Alamos County is continuing to pursue the use of San Juan-Chama water as a means of maintaining those water rights. Los Alamos County is also proceeding with an engineering study and will have more information after that is complete.

LANL is in the process of installing additional water meters and SCADA/ESS (Equipment Surveillance System) on the distribution system to keep track of water usage and to determine what the water use is for various applications. This gives a basis for conserving water. LANL continues to maintain the distribution system by replacing portions of the over 50 year old system and making improvements such as reducing surge problems. In remote areas, LANL is trying to automate the monitoring of the system to be more responsive during emergencies such as the Cerro Grande Fire.

Table 3.4.3-1 shows water consumption in thousands of gallons for CY 2001. LANL consumed 393 million gallons during CY2001. Under the expanded alternative, water use for LANL was projected to be 759 million gallons per year. Actual use by LANL in 2001 was about 366 million gallons less than the projected consumption and 149 million gallons less than the 542 million gallons/year under the agreement with the County. The calculated NPDES discharge of 124 million gallons (Table 3.2-2) was about 32 percent of the total LANL usage of 393 million gallons.

Table 3.4.3-1. Water Consumption (thousands of gallons) for Calendar Year 2001

CATEGORY	LANL	LOS ALAMOS COUNTY	TOTAL
SWEIS ROD	759,000	Not Projected	Not Applicable
CY 2001	393,123	Not Available [a]	Not Available [a]

[a] In September 2001, Los Alamos County acquired the water supply system and LANL no longer collects this information.

The County now bills LANL for water, and all future water use records maintained by LANL will be based on those billings. Along with this transfer, Los Alamos County accepted responsibility for all chlorinating stations, and the County now operates these stations. The distribution system remaining under LANL control, and being used to supply water to LANL facilities, now consists of a series of reservoir storage tanks, pipelines, and fire pumps. The LANL system is gravity fed with fire pumps for high-demand situations.

3.5 Worker Safety

Working conditions at LANL have remained essentially the same as those identified in the SWEIS. DARHT and Atlas—major construction activities—were reflected in the SWEIS analysis, and several other major facilities are also under construction for which separate NEPA documentation was prepared. More than half the workforce remains routinely engaged in activities that are typical of office and computing industries. Much of the remainder of the workforce is engaged in light industrial and bench-scale research activities. Approximately one-tenth of the general workforce at LANL continues to be engaged in production, services, maintenance, and research and development within Nuclear and Moderate Hazard facilities.

3.5.1 Accidents and Injuries

Occupational injury and illness rates for workers at LANL during CY 2001 continue to be small as shown in Table 3.5.1-1. These rates correlate to 195 reportable injuries and illnesses during the year, or less than 50 percent of the 507 cases projected by the SWEIS ROD.

Table 3.5.1-1. Total Recordable and Lost Workday Case Rates at LANL

CALENDAR YEAR	UC WORKERS ONLY		LANL (ALL WORKERS)	
	TRI [a]	LWC [b]	TRI	LWC
2001	1.62	0.55	1.96	0.91

[a] TRI: Total recordable incident rate, number per 200,000 hours worked.
[b] LWC: Lost workday cases, number of cases per 200,000 hours worked.

3.5.2 Ionizing Radiation and Worker Exposures

Occupational radiation exposures for workers at LANL during CY 2001 are summarized in Table 3.5.2-1. The collective Total Effective Dose Equivalent, or collective TEDE, for the LANL workforce during 2001 was 113 person-rem, considerably lower than the workforce dose of 704 person-rem projected for the ROD.

Table 3.5.2-1. Radiological Exposure to LANL Workers

PARAMETER	UNITS	SWEIS ROD	VALUE FOR 2001
Collective TEDE (external + internal)	person-rem	704	113
Number of workers with non-zero dose	number	3,548	1,332
Average non-zero dose: external + internal radiation exposure external radiation exposure only	 millirem millirem	 Not projected Not projected	 85 83

These reported doses in Table 3.5.2-1 for 2001 could change with time. Estimates of committed effective dose equivalent in many cases are based on several years of bioassay results, and as new results are obtained the dose estimates may be modified accordingly.

Of the 113 person-rem collective TEDE reported for 2001, external radiation and tritium exposure accounted for 110 person-rem. The remaining 3 person-rem are from internal exposure.

The highest individual dose from external radiation in CY 2001 was 1.284 rem. Five individual doses were greater than 1 rem, and all were less than or equal to 2 rem. Four of the doses were from external radiation only and one was from a combination of a 1.5 rem internal dose and a 0.5 rem external dose for a TEDE of 2 rem. These doses are well below the 5 rem legal limit.

Comparison with the SWEIS Baseline. The collective TEDE for CY 2001 is 54 percent of the 208 person-rem of 1993–1995 used as the baseline in the ROD. Several factors were responsible for this, the more important of which include the following:

Work and Workload: Changes in workload and types of work from 1993–1995 have resulted in a decreased collective TEDE. The SWEIS used the 1993–1995 time frame as its base. Of special importance is that the radionuclide power source for the Cassini spacecraft was being constructed at TA-55 during the baseline time period. This project incurred higher neutron exposure for the workers. After the project was completed in the 1995–1996 time frame, the LANL collective TEDE was reduced.

ALARA Program: Improvements from the ALARA program, such as the continuing addition of shielding at LANL workplaces, have also resulted in lower worker exposures and consequently a reduced collective TEDE for the Laboratory.

Improved Personnel Dosimeter: An improved personnel dosimeter was introduced on a Laboratory-wide basis in April 1998. The dosimeter's increased accuracy in measuring the external neutron dose removed some conservatism that had been previously used in estimating the dose, which resulted in lower reported doses. (The actual dose did not change, but the ability to measure it accurately improved.)

Comparison with the Projected TEDE in the ROD. In addition to being less than the collective TEDE levels in 1993–1995, the collective TEDE for 2001 is less than the TEDE projected in the ROD. The implementation of war reserve pit manufacture, which was approved in the ROD, has not become fully operational at LANL. This contributed to lower doses than projected. The collective dose may increase once the pit manufacture program is fully implemented.

Collective TEDEs for Key Facilities. In general, collective TEDEs by Key Facility or technical area are difficult to determine because these data are collected at the group level, and members of many groups and/or organizations receive doses at several locations. The fraction of a group's collective TEDE coming from a specific Key Facility or technical area can only be estimated. For example, personnel from the Health Physics Operations group and JCNNM are distributed over the entire Laboratory, and these two organizations account for a significant fraction of the total LANL collective TEDE. Nevertheless, the group working at TA-18 is well defined, and the 2001 collective TEDE for the Pajarito Site Key Facility is 1.1 person-rem.

Many of the groups working at TA-55 have been reorganized to include workers at other facilities. However, approximately 95 percent of the collective TEDE that these groups incur is estimated to come from operations at TA-55. The total collective TEDE for these groups in CY 2001, plus the estimated collective TEDE for the health physics personnel and JCNNM personnel working at TA-55, is 72 person-rem, which is 64 percent of the total Laboratory TEDE of 113 person-rem.

3.6 Socioeconomics

The LANL-affiliated workforce continues to include UC employees and subcontractors. As shown in Table 3.6-1, the number of employees has exceeded SWEIS ROD projections. The 12,380 employees at the end of CY 2001 are 1,029 more employees than SWEIS ROD projections of 11,351. SWEIS ROD projections were based on 10,593 employees identified for the index year (employment as of March 1996). However, the 12,380 employees reflect 32 less employees than the 12,412 total employees at the end of CY 1999 as reported in the 1999 Yearbook (LANL 2000a). This is the first year since 1996 that LANL has not shown an increase in number of employees.

Table 3.6-1. LANL-Affiliated Work Force

CATEGORY	UC EMPLOYEES	TECHNICAL CONTRACTOR	NON-TECHNICAL CONTRACTOR	JCNNM	PTLA	TOTAL
SWEIS ROD [a]	8,740	795	Not projected [b]	1,362	454	11,351
Calendar Year	9,179	1,024	197	1,487	493	12,380

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These employees have had a positive economic impact on northern New Mexico. Through 1998, DOE published a report each fiscal year regarding the economic impact of LANL on north-central New Mexico as well as the State of New Mexico (Lansford et al. 1997, 1998, and 1999). The findings of these reports indicate that LANL's activities resulted in a total increase in economic activity in New Mexico of about $3.2 billion in 1996, $3.9 billion in 1997, and $3.8 billion in 1998. Based on number of employees and payroll, it is expected that LANL's 2001 economic contribution was similar to the three years analyzed for DOE.

The residential distribution of UC employees reflects the housing market dynamics of three counties. As seen in Table 3.6-2, more than 90 percent of the UC employees continued to reside in the three counties of Los Alamos, Rio Arriba, and Santa Fe.

Table 3.6-2. County of Residence for UC Employees [a]

CALENDAR YEAR	LOS ALAMOS	RIO ARRIBA	SANTA FE	OTHER NM	TOTAL NM	OUTSIDE NM	TOTAL
SWEIS ROD [b]	4,279	1,762	1,678	671	8,390	350	8,740
calendar year 2001	4,669	1,615	1,828	571	8,683	496	9,179

Laboratory records contain the technical area and building number of each employee's office. This information does not necessarily indicate where the employee actually performs his or her work; but rather, indicates where this employee gets mail and officially reports to duty. However, for purposes of tracking the dynamics of changes in employment across Key Facilities, this information provides a useful index. Table 3.6-3 identifies UC employees by Key Facility based on the facility definitions contained in the SWEIS. The employee numbers contained in the category "Rest of LANL," were calculated by subtracting the Key Facility numbers from the calendar year total.

The numbers in Table 3.6-3 cannot be directly compared to numbers in the SWEIS. The employee numbers for Key Facilities in the SWEIS represent total workforce, and include PTLA, JCNNM, and other subcontractor personnel. The new index (shown in Table 3.6-3) is based on routinely collected information and only represents full-time and part-time regular UC employees. It does not include employees on leave of absence, students (high school, cooperative, undergraduate, or graduate), or employees from special programs (i.e., limited-term or long-term visiting staff, post-doctorate, etc.). Because the two sets of numbers do not represent the same entity, a comparison to numbers in the SWEIS is not appropriate. This new index will be used throughout the lifetime of the Yearbook; hence, future comparisons and trending will be possible. CY 1999 was selected as the reference year for this index because it represents the year the SWEIS ROD was published.

Table 3.6-3. UC Employee[a] Index for Key Facilities

KEY FACILITY	REFERENCE YEAR 1999 [b]	CALENDAR YEAR 2001
Plutonium Complex	589	635
Tritium Facilities	28	25
CMR	204	192
Pajarito Site	70	73
Sigma Complex	101	94
MSL	57	60
Target Fabrication	54	54
Machine Shops	81	91
High Explosive Testing	227	245
High Explosive Processing	96	107
LANSCE	560	505
Biosciences	98	116
Radiochemistry Laboratory	128	122
Waste Management – Radioactive Liquid Waste	62	47
Waste Management – Radioactive Solid and Chemical Waste	65	60
Rest of LANL	4,601	4,816
Total Employees	7,021	7,242

[a] Includes full-time and part-time regular employees; it does not include students who may be at the Laboratory for much of the year nor does it include special programs personnel. A similar index does not exist in the SWEIS, which used a very time-intensive method to calculate this index.
[b] CY 1999 was selected as the reference year for this index because it represents the year the SWEIS ROD was published.

3.7 Land Resources

LANL finished 2001 with the same land acreage it had at the start of the year, 27,816 acres. However, land resources were impacted by the Cerro Grande Fire, which burnt across approximately 7,500 acres or 27 percent of the Laboratory's land. Of the 332 structures affected by the fire, 236 were impacted, 68 damaged, and 28 destroyed (ruined beyond economic repair). Fire mitigation work such as flood retention facilities modified less than 50 acres of undeveloped land.

A number of projects are continuing to move forward, such as the SCC, the Nonproliferation and International Security Center, several General Plant Projects, and the related but non-Laboratory Los Alamos Research Park. Most of these projects are on previously developed or disturbed land (LANL 2000a). However, the Research Park occupies about 44 acres of previously undeveloped land along West Jemez Road.

During 2000, LANL's new Comprehensive Site Plan (CSP2000, LANL 2000f) was completed. CSP2000 is LANL's guide for land development. The CSP2000 geographic information system identified approximately 18,500 acres or two-thirds of LANL's land resources as undesirable for development because of physical and operational constraints. Of the remaining 9,300 acres (about one-third of the Laboratory's land) over 5,500 acres have been developed, leaving about 4,000 acres as undeveloped. The majority of this undeveloped land is located in TAs 58, 70, 71, and 74. Because of the remote locations and adjacent land uses of TAs 70, 71, and 74, they are not considered prime developable lands for Laboratory activities.

The ER Project is unique from a land use standpoint. Rather than using land for development, the project cleans up legacy wastes and makes land available for future use. Through these efforts, several large tracts of land will be made available for use by the Laboratory, Los Alamos County, or other adjacent landowners. For example, under Public Law 105-119, the DOE was directed to convey to Los Alamos County and transfer to the Department of Interior, in trust for the Pueblo of San Ildefonso, lands not required to meet the national security mission of DOE. Several tracts of land were identified for conveyance or transfer, and pending cleanup by the ER Project, will be made available for future use.

3.8 Groundwater

Water levels have been measured in wells tapping the regional aquifer since the late 1940s when the first exploratory wells were drilled by the US Geological Survey (McLin et al. 1998). The annual production and use of water increased from 231 million gallons in 1947 to a peak of 1,732 million gallons in 1976. Water use has declined since 1976 to 1,286 million gallons in 1997 (McLin et al. 1997; McLin et al. 1998). Trends in water levels in the wells reflect a plateau-wide decline in regional aquifer water levels in response to municipal water production. The decline is gradual and does not exceed 1 to 2 feet per year for most production wells (McLin et al. 1998). When pumping stops in the production wells, the static water level returns in about 6 to 12 months. Hence, these long-term declines are not currently viewed as a threat to the water supply system (McLin et al. 1998).

Sampling and analysis of water from water supply wells indicate that water in the regional aquifer beneath the Pajarito Plateau is generally of high quality and meets or exceeds all applicable water supply standards. There have been 15 characterization wells installed in the regional aquifer over the past four years and each has been sampled on a quarterly basis. Highlights of the regional aquifer water chemistry from these characterization wells are as follows:

- In the lower Los Alamos Canyon and Sandia Canyon area tritium was present in concentrations that are quite low with respect to the drinking water standard, but the presence indicates that water less than 60 years old is in the regional aquifer.

- In the TA-16 area, where high explosives were detected in characterization well R-25, two subsequent wells (wells CDV-R-15-3 and CDV-R-37) that were installed to define the extent of high explosives and one characterization well (R-19) did not have detectable high explosives compounds. Additionally, in well CDV-R-15-3 the tritium is very low, which implies the regional aquifer water is older than 60 years. In R-25, where the high explosives compounds were originally detected, the high explosives concentration continues to decrease in the regional aquifer, which suggests that the original detection of high explosives in the regional aquifer was the result of perched zone water mixing with the regional aquifer. Tritium was noted in the regional aquifer, but it is decreasing in the regional aquifer similar to the high explosives.

- In the Mortandad Canyon area, at well R-15, there was strontium indicated in the water samples, but it was near detection limit, and the measured activity of 1.51 pCi/L may not represent a detection of Sr-90. There was nitrate present in the regional aquifer water, it is similar to what is discharged to Mortandad Canyon and is present in the alluvial system. There was perchlorate measured in the regional aquifer (1.54 mg/L) but because it was below the reporting limit (4 mg/L), there is significant uncertainty in the detection. However, detection of perchlorate is consistent with the water chemistry in the alluvial and perched zones in Mortandad Canyon.

- In the TA-54 area one characterization well, R-22, has been installed. Tritium was detected in a sample taken before the well was installed at 109 pCi/L. In the samples collected after the well was installed the tritium has steadily decreased. Analysis of samples from the March 2001 sampling event indicated tritium at 0.11 to 77 pCi/L; in samples collected in June 2001, tritium was undetectable. A similar sequence occurred with the detection of technicium-99 in a borehole water sample. However, the June sampling indicates the technicium-99 is below detection. Uranium was detected in the borehole samples as well as elevated sodium and components of bentonite. Further analysis shows that the uranium has natural isotopic ratios and is most likely from the bentonite used in drilling. The bentonite was analyzed and it has uranium with the same natural isotopic ratio as the water sample. In subsequent water samples the uranium has decreased.

Work underway as part of the Hydrogeologic Characterization Program, and described in the Hydrogeologic Workplan, provided new information on the regional aquifer and details of the hydrogeologic conditions. By the end of 2001 two characterization wells were completed, wells R-5 and R-7 (Los Alamos/ Pueblo Canyon). Two characterization wells were started in FY 2001, R-13 (Mortandad Canyon) and R-8 (Los Alamos Canyon).

R-5 is located in lower Pueblo Canyon between the Los Alamos County Sewage Treatment Plant and water supply well O-1. Drilling started on May 5, 2001, and was completed on May 20, 2001. The stratigraphy encountered in the borehole was 35 feet of Guaje Pumice Bed at the surface, then nearly 500 feet of Puye Formation. Within the Puye Formation were about 75 feet of Cerros del Rio basalt near the top of the Puye Formation. Below the basalt are fanglomerate, river gravel, and pumiceous fanglomerate mixed with river gravels. The Santa Fe Group was encountered at a depth of 534 feet and consists of basalts interbedded with sediments. Water was encountered at a depth of 169 feet but dried up after a sample was collected. One saturated zone was encountered in the river gravel section of the Puye Formation from 350 feet to 387 feet. The regional aquifer was encountered at a depth of about 685 feet in the first Santa Fe Group sedimentary unit.

Well construction and development were completed on June 21, 2001. The well was developed by a combination of brushing, bailing, and pumping. Westbay sampling equipment was installed between June 13 and June 19, 2001. The ground surface elevation is 6,472.6 feet and the total depth of the borehole was 902 feet. R-5 was completed with four screened intervals. Two screens were installed in the perched zone at depths of 326 and 373 feet. Two screens were installed in the regional aquifer at depths of 677 and 859 feet. Samples of the regional aquifer collected from the borehole during drilling contained nitrate but no other contaminants were detected. The well completion report for this well is expected to be complete in June 2002.

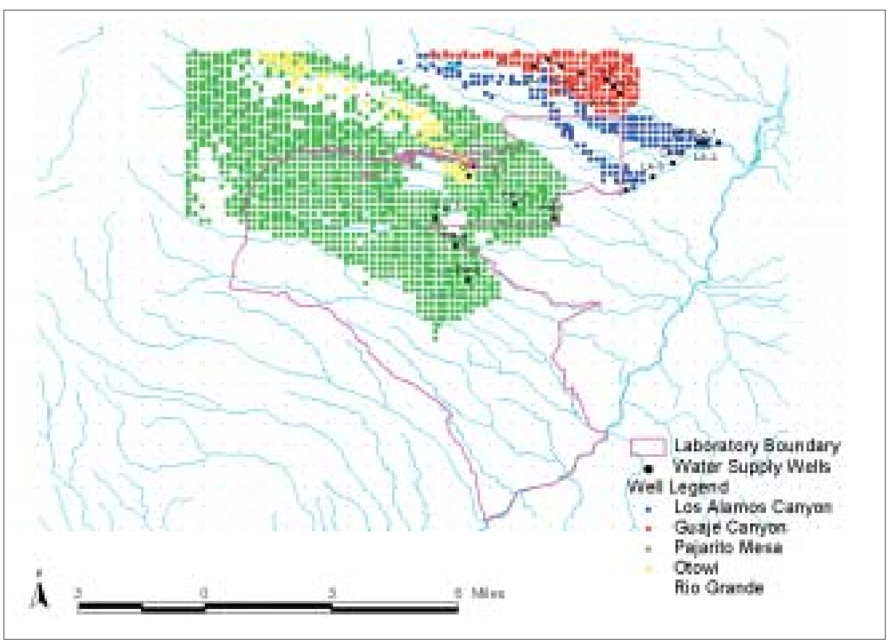
Well R-7 is located in upper Los Alamos Canyon. Drilling started on December 11, 2000, and was completed on January 16, 2001. The stratigraphy encountered in the borehole was 25 feet of alluvium at the surface and 300 feet of the Otowi Member of the Bandelier Tuff. Just above the contact with the Puye Formation was 25 feet of Guaje Pumice Bed. The remainder of the borehole encountered about 745 feet of Puye Formation; the bottom 13 feet of borehole was identified as Totavi lentil. A perched saturated zone, about 20 feet thick (362 to 382 feet), was encountered at the top of the Puye Formation. Beneath the perched zone, the Puye Formation was slightly to mostly saturated from the 362 to 382 feet perched saturated zone to the regional aquifer at a depth of 902.8 feet.

Well construction and development were completed on February 8, 2001. The well was developed by a combination of wire brushing, bailing, and pumping from screen 3 and the sump. Attempts to pump and bail water from screens 1 and 2 were unsuccessful because of insufficient water from these zones. Westbay sampling equipment was installed between February 21 and February 26, 2001. The ground surface elevation is 6,779.2 feet and the total depth of the borehole was 1,097 feet. The R-7 well is completed with three screened intervals: one in the perched saturated zone at a depth of 363 feet, one in the middle of the slightly to mostly saturated section at a depth of 730 feet, and one in the regional aquifer at a depth of 895 feet. Samples of water from the borehole were collected in the perched saturated zone (373 feet) and from the regional aquifer (903 feet). No contaminants were detected in either borehole sample. The well completion report for this well is expected to be complete in February 2002.

R-8 is located in Los Alamos Canyon near the confluence with DP Canyon. It was started in late FY 2001, and in FY 2001 the surface casing was set and drilling with open hole methods began.

R-13 is located in Mortandad Canyon. It was drilled to a total depth of 1,133 feet and was completed with a single 50-foot-long screen in the regional aquifer. At the end of FY 2001 the drilling and well construction were complete. In FY 2002 the well will be developed and completed.

Data collected from the hydrogeologic characterization wells are interpreted through the use of numerical models. The regional aquifer model (Figure 3-1) has been developed and refined over the past four years, and is now being used to assess the fate of contaminants reaching the regional aquifer. The simulation used the regional aquifer model, which incorporates all water supply wells pumping, and simulated particles from all points on the Laboratory as an analogy to contaminants in order to understand where contaminants would flow. Most of the water beneath the Pajarito Plateau is drawn into the Pajarito Mesa municipal well field. A small portion of water in the upper Los Alamos Canyon area is drawn toward the Otowi municipal well field. Water in the northern portion of the Pajarito Plateau is either drawn into the Los Alamos municipal well field in lower Los Alamos Canyon or to the Guaje municipal well field. The non-colored areas on Figure 3-1 indicate water that is not drawn into any of the wells and is eventually discharged to the Rio Grande.



Travel times have been calculated only for the Pajarito Mesa wells. The results of those calculations suggest that in the regional aquifer, short travel times only occur quite close to the well. Travel times of hundreds to thousands of years were calculated from areas that are not close to a water supply well. The porosity estimate used for these calculations is conservative. If "best guess" porosity estimates were used, the calculated travel times would be longer. Continued characterization work is planned that will help to refine estimates.

Data collected from these wells will continue to be incorporated into models of the vadose zone and regional aquifer. Modeling is the primary tool for interpreting data from wells installed across the Laboratory. Work continues under the Hydrogeologic Workplan to increase understanding of the hydrogeologic conditions and to ensure safety of the drinking water supply.

3.9 Cultural Resources

LANL has a large and diverse number of historic properties (Table 3.9-1). Approximately 80 percent of DOE land in Los Alamos County has been surveyed for prehistoric and historic cultural resources, and over 1,800 sites have been recorded. More than 85 percent of the archeological sites date from the 14th and 15th centuries. Most of the sites are found in the piñon-juniper vegetation zone, with 80 percent lying between 5,800 and 7,100 feet in elevation. Almost three-quarters of all sites are found on mesa tops. Buildings and structures from the Manhattan Project and the early Cold War period (1943–1963) are being evaluated for eligibility to the Natural Register of Historic Places (NRHP). Within LANL's limited access boundaries, there are ancestral villages, shrines, petroglyphs, sacred springs, trails, and traditional use areas that could be identified by Pueblo and Athabascan communities as traditional cultural properties.

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Ongoing site excavation for the Land Transfer Project.

Table 3.9-1. Acreage Surveyed, Prehistoric Cultural Resource Sites Recorded, and Cultural Resource Sites Eligible for the National Register of Historic Places at LANL Fiscal Year 2001[a]

FISCAL YEAR	TOTAL ACREAGE SURVEYED	TOTAL ACREAGE SYSTEMATICALLY SURVEYED TO DATE	TOTAL PREHISTORIC CULTURAL RESOURCE SITES RECORDED TO DATE[b] (CUMULATIVE)	TOTAL NUMBER OF ELIGIBLE & POTENTIALLY ELIGIBLE NRHP[c] SITES	NUMBER OF NOTIFICATIONS TO INDIAN TRIBES
LANL SWEIS ROD	Not reported	Not Reported	1295[d]	1092	23[f]
1998	1920	17,937	1369[d]	1304	10
1999	1074	19,011	1392[d]	1321	13
2000	119	19,428	1459[d]	1386	6
2001	4,112	19,790	1424[e]	1297[e]	2

[a] Source: The Secretary of Interior's Report to Congress on Federal Archaeological Activities. Information on LANL is from DOE/Los Alamos Area Office and LANL Cultural Resources Management Team (CRMT).

[b] In previous Yearbooks this column titled "Total Archaeological Sites Recorded to Date" was found to contain counts of traditional cultural properties and Historic cultural resources, including buildings. The information that was intended to be conveyed was only newly recorded prehistoric cultural resource sites. This information has been corrected in the 2001 SWEIS Yearbook.

[c] NRHP is National Register of Historic Places.

[d] In fiscal years 1998 through 2000 this number included historic period (AD 1600 to present) cultural resource sites. However, to keep in line with the way the sites were reported in the SWEIS ROD, prehistoric versus historic sites, this column has been corrected to remove historic period (AD 1600 to present) sites. Historic period (AD 1600 to present) sites are documented in a separate table (3.9-2).

[e] As LANL continually works to field verify sites recorded 20 to 25 years ago, the CRMT has identified sites that have been recorded twice and have two Laboratory of Anthropology (LA) site numbers. Therefore, the total number of recorded archaeological sites is less than indicated in FY 2000. This effort will continue over the next several years so it is anticipated that the CRMT will find more sites that have duplicate recordings.

[f] The number 23 represents the number of tribes contacted for the SWEIS and does not represent the number of notifications, which is 1. The rest of these numbers represent actual notifications of separate projects on an annual basis.

The SWEIS ROD lists 2,319 historic (AD 1600 to the present) cultural resource sites, including sites dating from the Historic Pueblo, US Territorial, Statehood, Homestead, Manhattan Project, and Cold War Periods (Table 3.9-2). To date LANL has not identified sites associated with the Spanish Colonial or Mexican Periods. Many of the 2,319 potential historic cultural resources are temporary and modular properties, sheds, and utility features associated with the Manhattan Project and Cold War Periods. Since the SWEIS ROD, these types of properties have been removed from the database counts because they are exempt from review under the terms of the Programmatic Agreement (MOU DE-GM32-00AL77152) between the DOE Los Alamos Area Office, the New Mexico State Historic Preservation Office, and the Advisory Council on Historic Preservation. Additionally, the CRMT is focusing on evaluating Manhattan Project and Early Cold War properties (AD 1942–1963) and those properties built after 1963 that are known to have historical significance, reducing the total number of potential historic cultural resource sites to 733. Most buildings built after 1963 are being evaluated on a case-by-case basis as projects arise that have the potential to impact the properties. Therefore, the number of buildings considered historic may increase. Six-hundred-twenty-four are LANL Manhattan Project and early Cold War Period buildings and the remaining 109 are sites that have been recorded and given unique New Mexico LA site numbers. Some of the 109 are experimental areas and artifact scatters dating from the Manhattan Project and early Cold War Periods. The majority, 94 sites, are structures or artifact scatters associated with the Historic Pueblo, US Territorial, Statehood, or Homestead Periods. Of the 109 sites 70 have been declared eligible. At this time LANL buildings are not assigned unique LA numbers by the New Mexico State Historic Preservation Division (NM SHPD). Of the 624 buildings 150 have been evaluated for eligibility status and inclusion on the NRHP. Of the 150 evaluated buildings 116 have been declared eligible and 34 declared not eligible. Twenty-four of the 116 eligible buildings have been fully documented by the CRMT in accordance with the terms of official Memoranda of Agreement between the DOE and the NM SHPD and subsequently decontaminated, decommissioned, and demolished through the Decontamination and Decommissioning Program. Of the 34 buildings declared not eligible eight have been demolished through this program.

Table 3.9-2. Historic Cultural Resource Sites Evaluated, Historic Sites Eligible for the National Register of Historic Places at LANL Fiscal Year 2001[a]

FISCAL YEAR	TOTAL POTENTIAL HISTORIC CULTURAL RESOURCE SITES[b]	TOTAL HISTORIC CULTURAL RESOURCE SITES RECORDED TO DATE[c]	TOTAL NUMBER OF ELIGIBLE & POTENTIALLY ELIGIBLE NRHP[d] SITES	TOTAL NRHP NOT ELIGIBLE TO DATE	TOTAL NUMBER OF EVALUATED BUILDINGS DEMOLISHED TO DATE
LANL SWEIS ROD	2319	164	98	Not Reported	Not Reported
1998	Not Reported	181	136	45	Not Reported
1999	Not Reported	240	170	70	Not Reported
2000	Not Reported	246	173	73	Not Reported
2001	733	259	186	73	33

[a] Source: The Secretary of Interior's Report to Congress on Federal Archaeological Activities. Information on LANL is from DOE/Los Alamos Area Office and LANL CRMT.
[b] This number includes historic sites that have not been evaluated, and therefore, may be potentially eligible as NRHP sites.
[c] This represents both eligible and non-eligible sites.

3.9.1 Compliance Overview

Section 106 of the National Historic Preservation Act, Public Law 89-665, implemented by 36 Code of Federal Regulations Part 800 (36 CFR 800), requires federal agencies to evaluate the impact of proposed actions on historic properties. Federal agencies must also consult with the State Historic Preservation Officer (SHPO) and/or the Advisory Council on Historic Preservation about possible adverse effects to NRHP eligible resources.

During 2001, CRMT evaluated 1,026 Laboratory proposed actions and conducted 20 new field surveys to identify cultural resources. DOE sent eight survey results to the SHPO for concurrence in findings of effects and determinations of eligibility for the NRHP of cultural resources located during the survey. The Governors of San Ildefonso, Santa Clara, Cochiti, and Jemez Pueblos and the President of the Mescalero Apache Tribe received for comment copies of two reports to identify any traditional cultural properties that a proposed action could affect. CRMP identified adverse effects to two historic buildings that were decommissioned and decontaminated in 2001. Historic building documentation and interpretation were conducted to resolve the adverse effects. The American Indian Religious Freedom Act of 1978 (Public Law 95-341) stipulates that it is federal policy to protect and preserve the right of American Indians to practice their traditional religions. Tribal groups must receive notification of possible alteration of traditional and sacred places.

The Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601) states that if burials or cultural objects are inadvertently disturbed by federal activities, work must stop in that location for 30 days, and the closest lineal descendant must be consulted for disposition of the remains. No discoveries of burials or cultural objects occurred in 2001. The Archaeological Resources Protection Act of 1979 (Public Law 96-95) provides protection of cultural resources and sets penalties for their damage or removal from federal land without a permit. No violations of this Act were recorded on DOE land in 2001.

3.9.2 Compliance Activities

Nake'muu. As part of the DARHT MAP, the CRMT is conducting a long-term monitoring program at the ancestral pueblo of Nake'muu. The team is implementing the program to assess the impact of LANL mission activities on cultural resources. Nake'muu is the only pueblo at the Laboratory that still contains its original standing walls. It dates from circa 1200–1325 AD and contains 55 rooms with walls standing up to 6 feet high. As such, it represents one of the best-preserved Ancestral Pueblo sites on the Pajarito Plateau. In 2001, preliminary seismic studies of the effects of explosive testing on the prehistoric architecture were conducted. Results support the conclusions from 2000 that the observed deterioration of the Nake'muu walls appears to be related more to natural freeze-thaw cycles than the effects of Laboratory activities. The site is ancestral to the people from San Ildefonso Pueblo who refer to it in their oral histories and songs. They are invited for annual visits to Nake'muu to personally view the ruins and consult on the long-term status of the site and possible stabilization options.

Traditional Cultural Properties Consultation Comprehensive Plan. In 2001, the CRMT assisted DOE in implementing the Traditional Cultural Properties Consultation Comprehensive Plan. This plan provides the framework to open government-to-government consultations between DOE and interested Native American tribal organizations on identifying, protecting, and gaining access to traditional cultural properties and maintaining confidentiality of sensitive information. Initial consultation meetings were held with Cochiti, Jemez, Santa Clara, and San Ildefonso Pueblos. Invitations to participate in the traditional cultural properties consultation process were sent out to 21 additional tribes in the Southwestern US.

Land Conveyance and Transfer. Public Law 105-119, November 1997, directs the DOE to convey and transfer parcels of DOE land in the vicinity of the Laboratory to the County of Los Alamos, New Mexico, and to the Secretary of the Interior, in trust for the San Ildefonso Pueblo. In support of this effort, the CRMT conducted historic property inventories and evaluations, as required under Section 106 of the National Historic Preservation Act, in preparation for the eventual conveyance or transfer of lands out of federal ownership. This effort has included the archaeological survey of 4,700 acres of Laboratory lands and the inventory and evaluation of 47 buildings and structures located on the parcels. In 2001, a draft Programmatic Agreement was developed in consultation with the Advisory Council on Historic Preservation and the SHPO. The draft Programmatic Agreement will be distributed in the spring of 2002 to the Incorporated County of Los Alamos, the Pueblo of San Ildefonso, and the interested public for comment. Implementation of the Programmatic Agreement will begin in the summer of 2002.

Cerro Grande Fire Recovery. The CRMT is conducting fire damage assessments of approximately 7,500 acres of LANL property burned during the May 2000 Cerro Grande Fire. It is estimated that 519 historic properties will be visited during the ongoing assessment activities. The assessments include photography, evaluation of fire impacts, global positioning system recording of site locations, site rehabilitation, and long-term monitoring. Preliminary results of the first phase of assessments indicate that the fire damaged the Homestead Period wooden structures most severely, completely destroying a number of homestead cabins. Reassessments of NRHP eligibility will be required at these sites.

3.9.3 Integrated Cultural Resources Management Plan

The Integrated Cultural Resource Management Plan (ICRMP) will provide a set of guidelines for managing and protecting cultural resources, in accordance with requirements of the National Historic Preservation Act, the Archaeological Resources Protection Act, and the American Indian Religious Freedom Act and in the context of UC/LANL's mission.

The Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites, issued in August 2000, presents a framework for collaborating with Native American Tribal organizations and other ethnic groups in identifying traditional cultural properties and sacred sites. The ICRMP will provide high-level guidance for implementation of this Comprehensive Plan.

Status:
ICRMP is due to be complete in 2004 and it will be updated every five years after issuance.

Relationship to Other Plans:
The Biological Resources Management Plan (particularly the Threatened and Endangered Species Habitat Management Plan) may limit access to certain cultural resource sites. Erosion control under the water plans will have a potential impact on cultural resource sites.

Cultural. Cultural resources include, but are not limited to, the following broad range of items and locations: (1) archaeological materials and sites dating to the prehistoric, historic, and ethnohistoric periods that are currently located on, or are buried beneath, the ground surface; (2) standing structures that are over 50 years of age or are important because they represent a major historical theme or era; (3) cultural and natural places, certain natural resources, and sacred objects that have importance for Native Americans; and (4) American folklife traditions and arts. Cultural resources can be grouped into three general types, archaeological sites and associated artifacts, historic buildings and structures, and traditional cultural places. Cultural resources are protected by federal and state law, Executive Orders, and federal regulations.

Archaeological Sites. Archeological sites represent the material remains of past human activities on the landscape encompassing the long history of settlement on the Pajarito Plateau. The occupation of the Pajarito Plateau generally follows the cultural chronology of the Northern Rio Grande Valley (Table 3.9.3-1).

Table 3.9.3-1. Culture Historical Chronology for the Northern Rio Grande

CULTURE	PERIOD	DATES
Paleoindian	Clovis	9500–9000 BC
	Folsom	9000–8000 BC
	Late Paleoindian	8000–5500 BC
Archaic	Jay	5500–4800 BC
	Bajada	4800–3200 BC
	San Jose	3200–1800 BC
	Armijo	1800–800 BC
	En Medio	800 BC–AD 400
	Trujillo	AD 400–600
Ancestral Pueblo	Early Developmental	AD 600–900
	Late Developmental	AD 900–1200
	Coalition	AD 1200–1325
	Classic	AD 1325–1600
Native American, Hispanic, and Euro-American	Spanish Colonial	AD 1600–1821
	Mexican	AD 1821–1846
	US Territorial	AD 1846–1912
	Statehood to World War II	AD 1912–1945
	Recent	AD 1945–present

During the Paleoindian period (9500 to 5500 BC) small groups of hunter-gatherers may have followed bison herds up and down the Rio Grande, with trips onto the Pajarito Plateau to procure obsidian and other subsistence resources. This period is represented on LANL land by the discovery of a Folsom point on a mesa north of Ancho Canyon. Clovis, Folsom, and Planview points have also been identifed at other locations on the Plateau. Obsidian obtained from Jemez Mountains sources has been found on Paleoindian sites located as far away as northern Colorado.

The Archaic Period (5500 BC to AD 600) is represented by small campsites typical of hunter-gatherer groups that relied on a variety of small game and plant species. Piñon-juniper woodlands on LANL land contain evidence of these temporary campsites as scatters of obsidian lithic tools, chipping debris, and diagnostic projectile points. These sites presumably reflect the seasonal use of the upland settings during the fall for pine nut collecting, hunting, and lithic procurement activities. Winter sites with structures have been excavated at lower elevations near Otowi at the Rio Grande and at Abiquiu Reservoir. The Late Archaic period continues the hunting and gathering pattern with the addition to the subsistence base of maize cultivation.

Maize horticulturists who lived in semi-subterranean pithouses characterized the Early Developmental period (AD 600 to 900), while small adobe masonry structures are added to the residential architecture in the Late Developmental period (AD 900 to 1200). They made painted pottery with simple designs and used the bow and arrow. Most habitation sites are located at lower elevations near the Rio Grande, with the Plateau continuing to be used on a seasonal basis. There is no archaeological evidence for the Early Developmental period at LANL; however, by the Late Developmental period, a few pithouse sites appear.

The Coalition period (AD 1200 to 1325) saw a substantial increase in the number, size, and distribution of aboveground habitation sites, with year-round settlements expanding into upland areas on the Pajarito Plateau. The long-term process of site aggregation begins during this period, with early sites containing adobe and masonry rectangular structures with 10 to 20 rooms. These small rubble mound sites are the most common at LANL. In contrast, later sites of this period consist of large masonry enclosed plaza pueblos that contain over 100 rooms. The construction of agricultural features such as terraces, gravel mulch gardens, and dams suggests an even greater reliance on horticulture. Most researchers attribute the increase in site density to migration, but others see the increase in site numbers a result of local population growth.

The Classic period (AD 1325 to 1600) is characterized by intensive maize agriculture. Ancestral Pueblo settlements on the Pajarito Plateau are aggregated into three population clusters with outlying one- to two-room fieldhouses. The central site cluster consists of four temporally overlapping sites: Tsirege, Navawi, Tsankawi, and Otowi. Otowi and Tsirege are located on LANL land. The initial occupation of these pueblos probably occurred during the 14th century. Tsirege, Tsankawi, and Otowi continued to be occupied during the 15th century, with only Tsirege and Tsankawi remaining by the 16th century. Oral traditions at San Ildefonso indicate that Tsankawi was the last of the Plateau pueblos to be abandoned. This central group of four Classic period ruins is ancestral to the Tewa speakers now living at San Ildefonso Pueblo.

The Plateau was eventually abandoned after drought during the mid-1500s. New pueblos were occupied in the Rio Grande Valley. Although the historic period begins with Coronado's exploratory expedition up the Rio Grande in 1540–1541, most researchers date the period from about AD 1600. This date corresponds with Oñate's settlement in New Mexico and imposition of the Spanish *encomienda/estancia* system on Rio Grande populations. The Spanish controlled Pueblo pottery production requiring the manufacturing of European vessel forms and taxation jars. These jars were sized to provide specific volumes for grain taxation and often exhibited a distinctive shoulder at the mid-point of the vessel. The Pueblo Indians revolted against the Spanish in 1680, with some sites on the Plateau being reoccupied during this refugee period (e.g., Nake'muu).

With the reconquest and resettlement of New Mexico by de Vargas (1693–1696), the huge mission establishments disappeared as did the *estancias* of the *encomienderos*. In their place land was granted to dozens of Hispanic communities and individuals that worked the property themselves. Hundreds of these small landholdings were scattered throughout the *Rio Arriba* and *Rio Abajo*.

Athabaskans have been present in northwestern New Mexico since the 15th century; however, the ethnohistorical evidence for Navajos and Jicarilla Apaches in the northern Rio Grande begins with the Spanish Colonial period. The Navajos primarily resided in the *Gobernador* region, but made periodic visits to the Rio Grande Valley and Jemez Mountains. Two rock rings from the 18th or 19th centuries are located in Rendija Canyon and possibly represent the remains of a tipi or wickiup.

Mexico declared its independence from Spain in 1821, which brought about a more lenient land grant policy and expansion of trade. Trade along the Santa Fe Trail between Missouri and Santa Fe began soon after independence and dominated events in New Mexico for the next quarter-century. This introduced some comparatively inexpensive Euro-American goods to New Mexico, which is reflected in the increase of manufactured items found on sites from this period.

New Mexico remained a part of Mexico until war broke out with the United States. Troops led by Colonel Stephen W. Kearny raised the American flag at Santa Fe and took possession of New Mexico for the United States on August 18, 1846. Grazing and seasonal utilization of the Plateau occurred by non-Indians during the early historic periods, with the first homesteads being established on the Pajarito Plateau during the 1880s. New Mexico was provided with a territorial government in 1850, and it remained a territory until it was granted statehood in 1912.

Archeological surveys have been conducted of approximately 85 percent of the land within LANL boundaries (with 70 percent of the area surveyed receiving 100 percent coverage) to identify cultural resources. The majority of these surveys emphasized prehistoric Ancestral Puebloan cultural resources. Information on prehistoric cultural resources is maintained in the LANL cultural resources database, which is a listing of the cultural resources identified through surveys and excavations recorded over the last several decades. The database is organized primarily by site type and records 1,295 prehistoric sites. Of the 1,295 prehistoric sites in the LANL database, 1,192 have been assessed for potential nomination to the NRHP. Of these, 770 sites are eligible, 322 sites are potentially eligible, and 100 sites are ineligible. The remaining 103 sites, which have not been assessed for NRHP eligibility, are assumed to be eligible until a determination has been made.

Historic Buildings and Structures. There are 572 buildings and structures on LANL that are NRHP eligible or await significance evaluations. The Homestead Era, the Manhattan Project, and Laboratory activities of the Cold War are represented.

In the early 1900s, the Pajarito Plateau experienced settlement by homesteaders practicing traditional farming, cattle grazing, and timbering activities. Seasonal homesteading occurred on the Plateau, though mostly as a supplement to established year-round residences located in the Rio Grande Valley. Hispanic and Anglo homesteads are characterized by wooden cabin and corral structures, rock or concrete cisterns, and a scattering of debris associated with household and farming/grazing activities. Nearly all of the evidence for homesteading on LANL dates to the period of 1912–1945, likely reflecting response to the Enlarged Homestead Act of 1909 and the Grazing Homestead Act of 1916.

In 1942, Franklin D. Roosevelt gave the approval to develop the world’s first atomic bomb. Because of its isolated location, Los Alamos was selected as the site of the bomb’s design and construction. This project came to be known as Project Y of the Manhattan Project. The creation of a modern town in Los Alamos influenced surrounding communities in northern New Mexico. Lands owned by the Los Alamos Ranch School and mostly Hispanic homesteaders were appropriated for use by the Manhattan Project in 1942, thus effectively ending the homesteading era on the Pajarito Plateau. After World War II, the Laboratory has continued its National Security mission to the present. Many of the buildings at LANL were constructed between 1947 and 1963 in response to the expanding mission of the Laboratory during the Cold War. Many of those buildings are now being evaluated for NRHP eligibility.

Traditional Cultural Properties. A traditional cultural property is a significant place or object associated with historical and cultural practices or beliefs of a living community that is rooted in that community's history and is important in maintaining its continuing cultural identity. Traditional cultural properties are essential to preserving cultural identity through social, spiritual, political, and economic uses.

An area may have traditional cultural property significance depending upon a variety of factors, e.g., the site is remembered in prayers or tribal stories, traditional ritual knowledge of the site is passed on to other members of the community, or traditional customs continue to be practiced by members of a community. Traditional cultural properties that are considered culturally important by traditional communities include shrines, trails, springs, rivers, acequias, plant and mineral gathering areas (also referred to as ethnobotanical sites), traditional hunting areas, ancestral villages and gravesites, and petroglyphs. However, traditional cultural properties are not limited to ethnic minority groups. Americans of every ethnic origin have properties to which they ascribe traditional cultural value.

Within LANL's boundaries, there are ancestral villages, shrines, petroglyphs, sacred springs, trails, and traditional use areas that could be identified by Pueblo and Athabascan communities as traditional cultural properties. DOE and LANL have a program in place to manage onsite cultural resources for compliance with the Native American Graves Protection and Repatriation Act, American Indian Religious Freedom Act, and Executive Order 13007. When an undertaking is proposed, DOE and LANL arrange site visits by tribal representatives with San Ildefonso, Santa Clara, Jemez, and Cochiti Pueblos to solicit their concerns and to comply with applicable requirements and agreements. Provisions for coordination among these four Pueblos and DOE is contained in formal agreements called Accords that were entered into in 1992 for the purpose of improving communication and cooperation among federal and tribal governments. According to the DOE compliance with Executive Order 13007, American Indian tribes may request permission for visits to sacred sites within LANL boundaries for ceremonies.

3.10 Ecological Resources

LANL is located in a region of diverse landform, elevation, and climate—features that contribute to producing diversified plant and animal communities. Plant communities range from urban and suburban areas to grasslands, wetlands, shrublands, woodlands, and mountain forest. These plant communities provide habitat for a variety of animal life.

The SWEIS ROD projected no significant adverse impacts to biological resources, ecological processes, or biodiversity (including threatened and endangered species). Data collected for 2001 support this projection. These data will be reported in the 2001 Environmental Surveillance Report.

Probably the greatest ecological resource issue for LANL in 2001 was recovery and response to the Cerro Grande Fire of May 2000. A wildfire fuels reduction program was started and will continue to operate through 2003. Burned area rehabilitation and monitoring efforts are ongoing. Vegetation and wildlife monitoring efforts have been enhanced since the fire. LANL personnel are developing a biological resources management plan that will define management objectives and actions for sustainable stewardship of our natural resources.

3.10.1 Threatened and Endangered Species Habitat Management Plan

LANL's Threatened and Endangered Species Habitat Management Plan received US Fish and Wildlife Service concurrence on February 12, 1999. The plan is used in project reviews to provide guidelines to project managers for assessing potential impacts to federally listed threatened and endangered species, including the Mexican spotted owl, southwestern willow flycatcher, and bald eagle. The Threatened and Endangered Species Habitat Management Plan was incorporated into the NEPA, Cultural, and Biological Laboratory Implementation Requirement document developed during 1999. The implementation requirement program provides training to LANL personnel on the proper implementation of the Threatened and Endangered Species Habitat Management Plan.

The results of the Cerro Grande Fire will likely not cause a long-term change to the overall number of federally listed threatened and endangered species inhabiting the region. The results of the fire will likely change the distribution and movement of various species, including the Mexican spotted owl. However, it is estimated that 91 percent of the LANL Mexican spotted owl habitat remains suitable. The fire may also have long-term effects to the habitat of several state-listed species, including the Jemez Mountains salamander. Following the fire, LANL continued operating under the current Threatened and Endangered Species Habitat Management Plan guidelines. A project is underway to refine our knowledge of Mexican spotted owl habitat requirements. This information will be used to modify the Threatened and Endangered Species Habitat Management Plan and to reflect post-fire habitat changes.

In 2002, the Laboratory will continue several contaminant studies and risk assessment studies on the food chain for threatened and endangered species inhabiting Laboratory lands. These studies include potential impacts from the Cerro Grande Fire and are assessing organic chemical contamination in the food chain for selected endangered species and monitoring the PCBs and organochlorine pesticides in fish of the Rio Grande.

3.10.2 Biological Assessments

During 2001, the Laboratory reviewed approximately 400 proposed activities and projects for potential impact on biological resources including federal or state listed threatened and endangered species. These reviews evaluate the amount of previous development or disturbance at the proposed construction site to determine the presence of wetlands or floodplains in the project area and to determine whether habitat evaluations or species-specific surveys are needed. The Laboratory adhered to protocols set by the US Fish and Wildlife Service and to permit requirements of the New Mexico Department of Game and Fish.

Also during 2001, LANL began completing biological compliance packages for projects requiring an Endangered Species Act biological assessment. The compliance package includes the biological assessment, a wetlands and floodplains assessment, a migratory birds assessment, and an assessment of state-listed species. Approximately two complete compliance packages were developed for projects in 2001. In addition to the compliance packages, the Laboratory produced two biological assessments, one biological evaluation, and one informational document.

4.0 Trend Analysis

The 1999 Yearbook identified a new section that compares SWEIS ROD projections to LANL operations over multiple years. In preparing this section, it became obvious that not all data collected lend themselves to this analysis. First, some data consist mostly of estimates (i.e., NPDES outfall flows) where variations between years may be nothing more than an artifact of the methodology used to make estimates. These data do not depict environmental risk, and any evaluation between years would be meaningless. Second, some data are so far below SWEIS ROD projections (i.e., air quality and high explosive production), that even significant increases in measured quantities would not cause LANL to exceed the risks evaluated in the SWEIS, and such a comparison would serve no practical purpose for the development of a SWEIS in the future. Finally, some data do not represent site impacts, are inherently variable, and do not represent utilization of onsite natural resources (i.e., ER Project exhumed material shipped offsite).

The data conducive to analysis represent real numbers of two distinct types. First, data that demonstrate cumulative effects across years where summed quantities may approach or exceed SWEIS ROD projections or regulatory limits or create negative environmental impacts (i.e., waste generation disposed at LANL). Or second, data that represent, on an annual basis, measured quantities that approach limits established by agreement and/or regulation (i.e., gas, electric, and water consumption).

Where the 1999 Yearbook was restricted to waste data, subsequent Yearbooks also include land use and utilities information. Additional information may be added in the future as more data are collected and trends are identified that lend themselves to discussion.

4.1 Land Use

Land use at LANL is a high-priority issue. Most of the undeveloped land is either required as buffer zones for operations or is unsuitable for development. Therefore, loss of available lands through development or congressionally mandated land transfer has a significant impact on strategic planning for operations. Conversely, increases in available lands through clean-ups performed by the ER Project also affect strategic planning. To date, however, the ER Project has not significantly added to available land.

Though construction and modification usually result in land loss (development of previously undeveloped areas), to date, this has not been the case. Only 30 acres of partially developed land has been altered in this manner (e.g., the Los Alamos Research Park).

The following information relates to construction and modifications and project cancellations having taken place from 1998 through 2001. This information demonstrates that the land use projections of the SWEIS ROD remain valid.

The SWEIS ROD projected a total of 38 construction and facility modification projects for the 10-year period 1996–2005. As shown in Table 4.1-1, almost half of the projected construction activities are complete (15 completed and 6 started). DOE has also removed four projects from consideration. Projects no longer considered, as written in the SWEIS ROD, are

- Renovation of the Nuclear Material Storage Facility,
- Phase I Upgrades to CMR (rebaselined in October 1999),
- Phase II Upgrades to CMR (rebaselined in October 1999), and
- the Dynamic Experiment Laboratory at LANSCE (overtaken by the proton radiography concept).

These projects received full evaluation for land use impacts within the SWEIS ROD.

Table 4.1-1. Facility Construction and Modifications Projected by SWEIS ROD, 1998–2001

ACTION	ROD	THROUGH 1998	THROUGH 1999	THROUGH 2000	THROUGH 2001
Removed by DOE			1	4	4
Not yet started		19	16	13	13
Started, not completed		13	8	6	6
Completed		6	13	15	15
Totals	38	38	38	38	38

Other projects, having separate NEPA review, have been started at LANL. These are summarized in Table 4.1-2. Two such projects, the EOC and the associated MCC Center, were reviewed and approved through an environmental assessment; the balance received categorical exclusions. Some of these included replacement of office buildings and repairs or upgrades in response to damage from the Cerro Grande Fire.

Table 4.1-2. Facility Construction and Modifications with Separate NEPA Review, 1998–2001

ACTION	THROUGH 1998	THROUGH 1999	THROUGH 2000	THROUGH 2001
Started, not completed	6	6	5	6
Completed	12	22	28	13
Totals	18	28	33	19

4.2 Waste Quantities

Wastes have been generated at levels below quantities projected by the SWEIS ROD with the exception of ER Project chemical wastes. ER Project wastes are typically shipped offsite for disposal at EPA-certified waste treatment, storage, and disposal facilities and do not impact local environs. These wastes result from exhumation of materials placed into the environment during the early history of LANL and thus differ from the newly created wastes from routine operations.

Waste projections for the ER Project by the SWEIS ROD are uncertain at best. These projections were developed in the 1996–1997 time period. Estimates were based on the then current Installation Work Plan methodology. The ER Project office kept a continuously updated database of waste projections by waste type for each PRS. Estimates were made for the amount of waste expected to be generated by that PRS for the life of the ER Project. In 1996–1997, it was assumed that the life of the ER Project would be 10 years, but the schedule now projects cleanup will extend to 2020. This demonstrates the legitimate uncertainty in waste estimates and schedules developed for the ER Project caused by changing requirements and newly discovered information.

Waste quantity projections included three kinds of waste: waste generated during the investigation phase, waste generated during the remediation phase, and secondary waste generated during the remediation phase. Secondary waste and investigation phase waste are minimal compared to waste from the remediation phase. Technical staff in each of six field units made these projections, and methodologies varied from one field unit to another. In cases where both nature and extent of contamination were known, projections were based on estimated contaminated soil volume provided the PRS was slated for remediation. If the PRS was expected to be recommended for NFA, it was assumed that no waste would be generated.

In most cases, the nature and extent of contamination were not known. A worst-case scenario was usually developed, using estimated PRS boundaries, and assuming a depth of contamination based on historical operating parameters. Waste type was also projected based on best available historical information about the site.

Because of these uncertainties, adjustments to ER Project waste projections should be expected. One task of the ER Project is to characterize sites about which little is known and to make adjustments in waste quantity estimates based on new information. In addition, even the most rigorous field investigations cannot truly determine waste quantities with a high degree of certainty until remediation has progressed considerably. Remediation can often create more or less waste, or waste that was not anticipated, based on field sampling. Moreover, the administrative authority may not approve an NFA recommendation or may require additional sampling or an alternative corrective action than the one planned. All of these factors lead to waste projections that are highly uncertain.

An example of the latter is MDA P. The first closure plan for MDA P was submitted to EPA, and later NMED, in the early 1980s. This plan proposed closure in place, but was never approved. During the mid- to late-1980s, all parties (LANL, DOE, EPA, and NMED) decided that clean-closure was a more appropriate standard and the plan was rewritten to reflect risk-based clean-closure. All information in the closure plan, including waste estimates, was based on best available information (a combination of operating group records and data from field investigations). However, when remediation started, it quickly became apparent that early information was not reliable, and that there would be more waste generated than originally anticipated. The ER Project clean closure of MDA P began on November 17, 1997, and Phase I (i.e., waste management, handling, and disposal) and Phase II (i.e., confirmatory sampling) activities will be completed April 2002. A total of 20,812 cubic yards of hazardous waste and 21,354 cubic yards of industrial wastes were excavated, shipped, and disposed. A total of 6,600 cubic yards were shipped and used as clean fill at MDA J.

As a result of this uncertainty in ER Project waste estimates, the Yearbook presents totals for LANL waste generation both with and without the ER Project. As shown in Tables 4.2-1 through 4.2-5, except for chemical wastes, total generated amounts fall within projections made by the SWEIS ROD.

Chemical waste quantities are higher than projections for two reasons: ER Project cleanup activities during 1999, 2000, and 2001 and the Legacy Materials Cleanup Project during 1998. The variability in ER Project waste projections is discussed above. The Legacy Materials Cleanup Project, completed in September 1998,

Table 4.2-1. LANL Low Level Waste Generation (m^3)

CATEGORY	SWEIS ROD	1998	1999	2000	2001
Key Facilities	7,450	1,045	1,017	1,172	2,776
Non-Key Facilities	520	36	286	578	601
Sub-Total	7,970	1,081	1,303	1,750	3,377
ER Project	4,260	726	407	2,467	562
Total	12,230	1,807	1,710	4,217	3,939

Table 4.2-2. LANL Mixed Low-Level Waste Generation (m^3)

CATEGORY	SWEIS ROD	1998	1999	2000	2001
Key Facilities	54	8	17	11	20
Non-Key Facilities	30	55	3	10	9
Sub-Total	84	63	20	21	29
ER Project	548	9	1	577	29
Total	632	72	21	598	58

Table 4.2-3. LANL Transuranic Waste Generation (m^3)

CATEGORY	SWEIS ROD	1998	1999	2000	2001
Key Facilities	322	108	143	122	83
Non-Key Facilities	0	0	0	3	25
Sub-Total	322	108	143	125	108
ER Project	11	0	0	0	0
Total	333	108	143	125	108

Table 4.2-4. LANL Mixed Transuranic Waste Generation (m^3)

CATEGORY	SWEIS ROD	1998	1999	2000	2001
Key Facilities	115	34	72	89	35
Non-Key Facilities	0	0	0	0	0
Sub-Total	115	34	72	89	35
ER Project	0	0	0	0	0
Total	115	34	72	89	35

Table 4.2-5. LANL Chemical Waste Generation (10^3 kg/yr)

CATEGORY	SWEIS ROD	1998	1999	2000	2001
Key Facilities	600	158	129	99	141
Non-Key Facilities	650	1,465	765	379	1,256
Sub-Total	1,250	1,623	894	478	1,397
ER Project	2,000	144	14,548	27,209	23,028
Total	3,250	1,767	15,443	27,687	24,425

required facilities to locate and inventory all materials for which a use could no longer be identified. All such materials (more than 22,000 items) were characterized, collected, and managed. In 1999, the Non-Key Facilities also exceeded projections, and this was attributed to ER Project cleanups of PRSs within the Non-Key Facilities. When comparing the subtotal of Key and Non-Key Facilities, only the Legacy Program in 1998 pushes the quantities over SWEIS ROD projections. Regardless, these wastes (both ER and Legacy Program) were and are shipped offsite, do not impact the local environs, and do not hasten the need to expand the size of Area G. High amounts of chemical waste at Non-Key Facilities are mostly due to new construction and some expanded operations.

Table 4.2-2 for MLLW in 2001 shows a significant decrease from 2000. The total LANL MLLW volume for 2001 was 58 cubic meters. Total LANL MLLW volume for 2000 was 599 cubic meters; 575 of that came from the MDA P cleanup. The upward trend in TRU and mixed TRU waste volumes was the result of the expected slow, but increasing, levels of activity on pit production and related programs.

4.3 Utility Consumption

Consumption of gas, water, and electricity is not additive in the same context as waste generation. Rather, these commodities are restricted on an annual basis and should be compared to the SWEIS ROD projection for annual use. Table 4.3-1 presents these three sets of data (gas, water, and electricity) and demonstrates that none of these measured utilities exceeded SWEIS ROD projections, except for natural gas in 1993, which is before the 10-year window evaluated by the SWEIS ROD. Based on these data, it appears that utility usage remains within the SWEIS ROD environmental envelope for operations.

Table 4.3-1. LANL Utilities Consumption

LANL NATURAL GAS CONSUMPTION (DECATHERMS) BY FISCAL YEAR		LANL WATER CONSUMPTION (THOUSANDS OF GALLONS) BY CALENDAR YEAR	
FISCAL YEAR	**LANL TOTAL**	**CALENDAR YEAR**	**LANL**
SWEIS ROD	1,840,000	SWEIS ROD	759,000
1991	1,480,789	1991	Not Available
1992	1,833,318	1992	547,535
1993	1,843,936	1993	467,880
1994	1,682,180	1994	524,791
1995	1,520,358	1995	337,188
1996	1,358,505	1996	340,481
1997	1,444,385	1997	488,252
1998	1,362,070	1998	461,350
1999	1,428,568	1999	453,094
2000	1,427,914	2000	441,000
2001	1,492,635	2001	393,123

LANL ELECTRIC PEAK COINCIDENT DEMAND (KILOWATTS) BY FISCAL YEAR		ELECTRIC CONSUMPTION (MEGAWATT/HOURS) BY FISCAL YEAR	
FISCAL YEAR	**LANL TOTAL**	**FISCAL YEAR**	**LANL TOTAL**
SWEIS ROD	113,000	SWEIS ROD	782,000
1991	75,777	1991	372,213
1992	73,344	1992	381,787
1993	67,534	1993	366,894
1994	65,971	1994	352,468
1995	65,802	1995	372,145
1996	62,598	1996	368,785
1997	62,653	1997	397,715
1998	63,837	1998	327,305
1999	68,486	1999	369,321
2000	65,447	2000	381,153
2001	70,878	2001	375,143

4.4 Long-Term Effects

To date, LANL has continued to operate within the projections made by the SWEIS ROD. None of the measured parameters exceed SWEIS ROD projections or regulatory limits. Thus, long-term effects should remain within the projections made by the SWEIS ROD.

4.5 Cerro Grande Rehabilitation Project

The CGRP is a Lab-wide project that began in 2001. Under the Site-Wide Fire Mitigation Task, approximately 10,000 acres of LANL will be treated using forest thinning, access roads, and fuel breaks to protect critical facilities and infrastructure. The forest thinning treatments will reduce the tree density from an average of 800 trees per acre to between 50 and 150 trees per acre. Defensible space and firebreak thinning areas are designed to reduce tree density to between 25 to 50 trees per acre.

Along with the Site-Wide Fire Mitigation Task are the Erosion Control and the decontamination and demolition projects. The objective of the Erosion Control Task is to support mitigation activities related to flood and erosion controls necessary for the Cerro Grande Fire by modeling flood flows to assess the potential for flooding and offsite migration of contaminants, evaluating burned areas and providing recommended treatments and erosion controls, and preparing a Storm Water Pollution Prevention Plan to prevent erosion and movement of contaminants into watercourses and to meet the requirements of the Laboratory's Storm Water Permit and Clean Water Act. Field activities will restore vegetation and put in place measures to reduce erosion from the effects of the Cerro Grande Fire.

The project is to decontaminate and demolish a series of structures at LANL that were either damaged in the Cerro Grande Fire, are now at risk of flooding as a result of the fire, or are anticipated to be at risk in future wildfires. Under any of these three scenarios, the structures could release contaminants ranging from chemicals and asbestos to radionuclides into the environment. This may increase waste projections significantly within the next few years.

Tree thinning within LANL boundaries.

5.0 Ten-Year Comprehensive Site Plan

This chapter presents a brief overview of DOE/NNSA's long-range planning process at LANL (LANL 2001q). Because this planning process is used to address what happens to facilities and infrastructure at LANL, it ties into the SWEIS. The plan is updated annually and identifies what will be retained, maintained, modified, demolished, or replaced at LANL. Basically, the plan is the origin for some information recorded in the annual SWEIS Yearbook to show maintenance of the operating envelope established by the SWEIS ROD.

The following four sections parallel sections of the LANL TYCSP. Each section provides a brief overview of information pertinent to the SWEIS envelope.

5.1 Introduction/Site Description

5.1.1 Introduction

The TYCSP is a long-range site-planning document initially delivered to DOE in September 2001. This document serves as the link between long-range planning, proposed projects, and the budget. In doing so, the document connects the institutional plan, program plans, comprehensive site plans, and the SWEIS. The TYCSP provides information on eight areas:

- Condition Assessment,
- Facilities and Infrastructure Programs,
- Decommissioning and Demolition,
- Consolidation Planning/Strategic Facility Planning,
- Integrated Nuclear Planning,
- Vulnerable Office Buildings,
- NEPA, and
- Readiness in Technical Base and Facilities Integration.

5.1.2 Site Description

The site, i.e., LANL, has been described in the SWEIS (DOE 1999a). This description includes the physical location of LANL as well as the environment affected by LANL. The environment covers factors such as population, economy, land use, adjacent landowners, water availability, air quality, threatened and endangered species, and archeology and cultural resources.

The TYCSP describes LANL in terms of the

- regional overview,
- general description,
- regional factors affecting planning and development,
- physical constraints for development,
- operational constraints for development,

- utilities,
- security,
- transportation, and
- NEPA.

5.2 Mission Needs

The Laboratory's mission is to enhance global security by

- ensuring the safety and reliability of the US nuclear weapons stockpile;
- reducing threats to US security with a focus on weapons of mass destruction;
- cleaning up the legacy of the Cold War; and
- providing technical solutions to energy, environment, infrastructure, and health security problems.

To fulfill its mission, the Laboratory has the responsibility to understand and ensure that the tools required for its mission are available and maintained.

5.3 Current Facilities and Infrastructure Situation

This section addresses the condition of the facilities and infrastructure at the Laboratory as well as land identified as excess. The excess land designated for transfer to other entities is particularly pertinent for the Yearbook. All actions receive NEPA review before implementation.

5.3.1 LANL Facilities and Infrastructure

Many of the facilities and most of the infrastructure at LANL are aging. Both have been evaluated relative to their role in serving the Laboratory's mission and what maintenance each requires. Some facilities have been identified as excess. These will be converted for other use, decontaminated and demolished, or preserved for their historical value.

Table 5.3.1-1 provides a summary relative to structures.

Table 5.3.1-1. Summary of Proposed Future Condition by Gross Square Feet

PLANNED/ BUDGETED NEW (0 TO 3 YEARS)		EXISTING WITH LONG-TERM MISSION	BUILDING TO BE EXCESSED 5 TO 10 YEARS	BUILDING TO BE EXCESSED 0 TO 5 YEARS	TEMPORARY/ UTILITARIAN STRUCTURES	SPARE	LEASED
Engineering Facilities	20,000	405,069	188,151	251,983	17,564	0	0
Tritium Facilities	20,000	19,568	0	74,497	0	0	0
LANSCE	5,062	842,825	7,149	1,158	50,940	5,166	0
Dynamic Experiments	0	278,331	159,332	22,931	11,687	17,349	0

Table 5.3.1-1. Summary of Proposed Future Condition by Gross Square Feet (continued)

PLANNED/ BUDGETED	NEW (0 TO 3 YEARS)	EXISTING WITH LONG-TERM MISSION	BUILDING TO BE EXCESSED 5 TO 10 YEARS	BUILDING TO BE EXCESSED 0 TO 5 YEARS	TEMPORARY/ UTILITARIAN STRUCTURES	SPARE	LEASED
Materials Science/Laser	0	508,659	11,245	164	25,711	0	0
Waste Management	13,200	209,255	47,251	2,587	37,153	0	0
Computer Facilities	300,000	468,257	9,006	6,159	30,107	0	0
Nuclear (SNM)	7,500	397,205	667,727	840	18,340	0	0
NIS/D (TR)	165,000	215,841	83,658	53,865	29,606	40	0
SSR	21,000	913,335	113,638	13,754	165,847	1,055	12,082
Institutional (FWO)	35,600	475,723	386,844	405,208	96,547	0	310,485
Laboratory Total	587,362	4,734,068	1,674,001	833,146	483,502	23,610	322,567
Excess Facilities	0	0	0	391,808	0	0	0

For utilities, LANL is conducting a study to construct a new transmission line and a study to determine the feasibility and costs of replacing or supplementing the TA-3 Power Plant for onsite generation of electricity. The feasibility study will determine the required size and operating parameters of the potential replacement generator. A modern plant is desirable to increase efficiency, and a new transmission line will provide reliable power transmission.

5.3.2 Land Transfer

Under the Atomic Energy Community Act of 1955, the federal government recognized its responsibility to provide support for a period of time to towns that were strongly affected by proximity to portions of the nuclear weapons complex. The intent of the act was to move the towns to self-government and self-sufficiency by, among other actions, transferring land.

During the 1990s, informal discussions started between DOE's Los Alamos Area Office (now DOE's Office of Los Alamos Site Operations), the Laboratory, and representatives of Los Alamos County regarding the potential transfer of government properties to assist the county in becoming economically self-sufficient. Potential land transfer areas are shown in Figure 5-1.

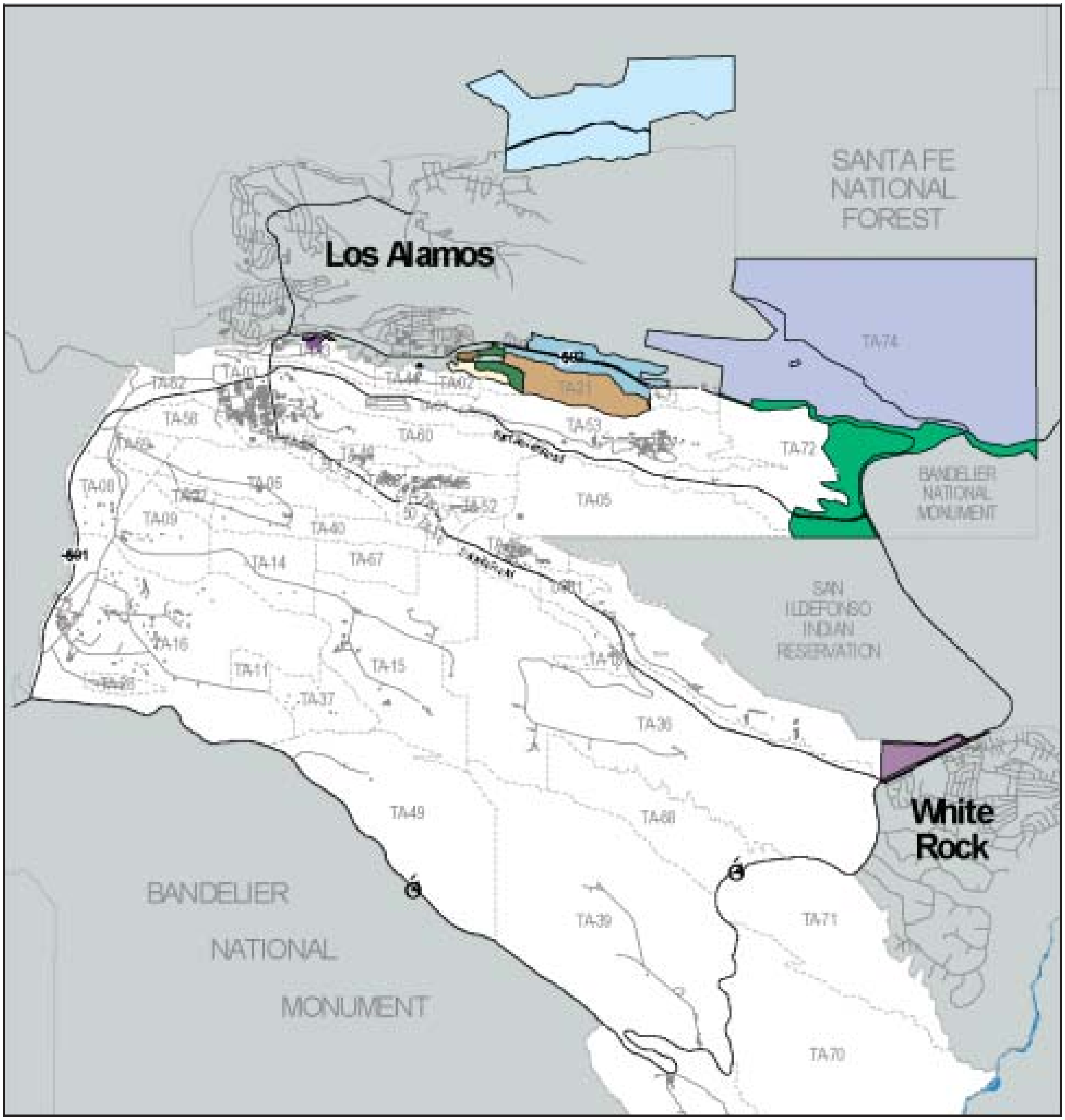

Figure 5-1. Potential areas (colors) designated for conveyance to Los Alamos County or transfer to San Ildefonso.

On November 26, 1997, Congress passed Public Law 105-119. Section 632 of the Act directs the Secretary of Energy (the Secretary) to convey to the Incorporated County of Los Alamos, New Mexico, or to the designee of the County, and transfer to the Secretary of the Interior, in trust for the Pueblo of San Ildefonso, parcels of land under the jurisdictional administrative control of the Secretary at or in the vicinity of LANL. Such parcels, or tracts, of land must meet suitability criteria established by the Act.

Ten such tracts of land were identified by DOE for potential conveyance to the County of Los Alamos or transfer to the Department of the Interior to be held in trust for San Ildefonso Pueblo. The 10 tracts, which total approximately 4,600 acres, are the following:

- TA-21 tract, 244 acres - located on the eastern end of the same mesa on which the central business district of Los Alamos is located.
- DP Road tract, 50 acres - located between the western boundary of TA-21 and the major commercial districts of the Los Alamos town site.
- DOE Los Alamos Area Office tract, 13 acres - located within the Los Alamos town site between Los Alamos Canyon and Trinity Drive.
- Airport tract, 198 acres - located east of the Los Alamos town site, close to the East Gate Business Park.
- White Rock tract, 99 acres - located north of Pajarito Acres residential development and west of the White Rock town site.
- Rendija Canyon tract, 909 acres - located north of and below Los Alamos town site's Barranca Mesa residential subdivision.
- White Rock Y tract, 435 acres - a complex area that incorporates the alignments and intersections of State Routes 502 and 4 and the easternmost part of Jemez Road.
- Site 22 tract, 0.3 acres - located at the edge of the Los Alamos town site mesa, south of Trinity Drive and above Los Alamos Canyon.
- Manhattan Monument tract, a fraction of an acre in size - located adjacent to Ashley Pond and consists of a plaque covered by a small pavilion.
- TA-74 tract, 2,698 acres - located east of the Los Alamos town site and includes much of Pueblo Canyon.

5.4 The Plan

The TYCSP defines what LANL believes is required over the next 10 years, in terms of facilities and supporting infrastructure, to fulfill its mission. This plan and its associated program are formally integrated to accomplish the management of assets, lands, and facilities of the Laboratory. The program directs that new and existing assets, lands, and facilities be identified, planned, initiated, supported, and implemented to protect the safety of the public. The Laboratory produces and develops a comprehensive site plan and related supporting area development plans, strategic facility plans, and consolidation plans. Each of these plans address core planning elements: land use, transportation, utilities, facilities, security, space, urban design, and environment.

A summary of future projects developed from this planning is presented in Appendix D.

Black Mesa. CN86-3998

6.0 Summary and Conclusion

6.1 Summary

The 2001 SWEIS Yearbook reviews CY 2001 operations for the 15 Key Facilities (as defined by the SWEIS) at LANL and compares those operations to levels projected by the ROD. The Yearbook also reviews the environmental parameters associated with operations at the same 15 Key Facilities and compares this data with ROD projections. In addition, the Yearbook presents a number of site-wide effects of those operations and environmental parameters. The more significant results presented in the Yearbook are as follows:

Facility Construction and Modifications. The ROD projected a total of 38 facility construction and modification projects for LANL facilities. Ten of these projects were listed only in the Expanded Operations Alternative, such as modifications at CMR for safety testing of pits in the Wing 9 hot cells, expansion of the LLW disposal area at TA-54, Area G, and the LPSS at TA-53. These 10 projects could not proceed until DOE issued the ROD in September 1999. However, the remaining 28 construction projects were projected in the No Action Alternative. These included facility upgrades (e.g., safety upgrades at the CMR Building and process upgrades at the RLWTF), facility renovation (e.g., conversion of the former Rolling Mill, Building 03-141, to the Beryllium Technology Facility), and the erection of new storage domes at TA-54 for TRU wastes. Since these projects had independent NEPA documentation, they could proceed while the SWEIS was still in process.

The ROD projected a total of 38 facility construction and modification projects for LANL. Fifteen projects have now been completed: six in 1998, seven in 1999, and two in 2000. Six additional projects were started and/or continued in 2001. None of these projects was completed in 2001.

During 2001, planned construction and/or modifications continued at 11 of the 15 Key Facilities. Most of these activities were modifications within existing structures. New structures completed and occupied during 2001 included the Weapons Engineering Facility office building and the ICE House Control Room for LANSCE. Additionally, three major construction projects were either completed or continued for the Non-Key Facilities. Construction of the first building in the Los Alamos Research Park was completed in March 2001 and occupancy began in June 2001. Construction of the SCC was completed in late 2001 and occupancy began in December 2001. Construction of the Nonproliferation and International Security Center began in March 2001.

Facility Operations. The SWEIS grouped LANL into 15 Key Facilities, identified the operations at each, and then projected the level of activity for each operation. These operations were grouped in the SWEIS under 96 different capabilities for the Key Facilities. Capabilities across LANL changed during 2001. The Cryogenic Separation Capability at the Tritium Key Facilities was lost. Also, following the events of September 11, 2001, the Laboratory was requested to provide support for homeland security.

During 2001, 89 of the 96 identified capabilities were active. No activity occurred under seven capabilities: Fabrication of Ceramic-Based Reactor Fuels at the Plutonium Complex, Cryogenic Separation at the Tritium Key Facilities, Diffusion and Membrane Purification at the Tritium Key Facilities, Destructive and Nondestructive Analysis at the CMR Facility, Fabrication and Metallography at the CMR Facility, Transmutation of Waste at LANSCE, Medical Isotope Production at LANSCE, and Other Waste Processing at the Solid Radioactive and Chemical Waste Facility.

While there was activity under nearly all capabilities, the levels of these activities were mostly below levels projected by the ROD. For example, the LANSCE linac generated an H^- beam to the Lujan Center for 2,741 hours in 2001, at an average current of 55 microamps, compared to 6,400 hours at 200 microamps projected by the ROD. Similarly, a total of 140 criticality experiments were conducted at Pajarito Site, compared to the 1,050 projected experiments.

As in 1998 through 2000, only three of LANL's facilities operated during 2001 at levels approximating those projected by the ROD—the MSL, the Biosciences Facilities (formerly HRL), and the Non-Key Facilities. The two Key Facilities (MSL and Biosciences) are more akin to the Non-Key Facilities and represent the dynamic nature of research and development at LANL. More importantly, none of these facilities are major contributors to the parameters that lead to significant potential environmental impacts. The remaining 13 Key Facilities all conducted operations at or below projected activity levels.

Operations Data and Environmental Parameters. This 2001 Yearbook evaluates the effects of LANL operations in three general areas—effluents to the environment, workforce and regional consequences, and changes to environmental areas for which the DOE has stewardship responsibility as the owner of a large tract of land.

Effluents include air emissions, liquid effluents regulated through the NPDES program, and solid wastes. Radioactive airborne emissions from point sources (i.e., stacks) during 2001 totaled approximately 15,400 curies, 70 percent of the 10-year average of 21,700 curies projected by the SWEIS ROD. The final dose is estimated to be approximately 1.9 millirem per year (compared to 5.44 projected), with the final dose being reported to the EPA by June 30, 2001. Calculated NPDES discharges totaled 124 million gallons compared to a projected volume of 278 million gallons per year. However, the apparent decrease in flows is primarily due to the methodology by which flow was measured and reported in the past. Historically, instantaneous flow was measured during field visits as required in the NPDES permit. These measurements were then extrapolated over a 24-hour day/seven-day week. With implementation of the new NPDES permit on February 1, 2001, data are collected and reported using actual flows recorded by flow meters at most outfalls. At those outfalls that do not have meters, the flow is calculated as before, based on instantaneous flow. Quantities of solid radioactive and chemical wastes ranged from 9 percent (MLLW) to 752 percent (chemical waste) of projections. The extremely large quantities of chemical waste (24.4 million kilograms) are a result of ER Project activities. (The remediation of MDA P resulted in 21.5 million kilograms or 88 percent of the 24.4 million kilograms of chemical waste generated.) Most chemical wastes are shipped offsite for disposal at commercial facilities; therefore, these large quantities of chemical waste will not impact LANL environs.

A closure plan for MDA J was submitted to NMED in 1999. However, after the Cerro Grande Fire, it became evident that LANL required disposal capacity for the solid wastes generated from rehabilitation. Through negotiation, NMED agreed to allow MDA J to continue to accept waste until late-spring 2001.

The workforce was above ROD projections. The 12,380 employees at the end of CY 2001 represent 1,029 more employees than projected. Thus, regional socioeconomic consequences, such as salaries and procurements, also should have exceeded projections.

Electricity use during 2001 totaled 375 gigawatt-hours with a peak demand of 71 megawatts compared to projections of 782 gigawatt-hours with a peak demand of 113 megawatts. Water usage was 393 million gallons (compared to 759 million gallons projected), and natural gas consumption totaled 1.49 million decatherms (compared to 1.84 projected).

The collective TEDE for the LANL workforce during 2001 was 113 person-rem, which is considerably lower than the workforce dose of 704 person-rem projected by the ROD.

Measured parameters for ecological resources and groundwater were similar to ROD projections, and measured parameters for cultural resources and land resources were below ROD projections. For land use, the ROD projected the disturbance of 41 acres of new land at TA-54 because of the need for additional disposal cells for LLW. As of 2001, this expansion had not become necessary. However, construction continued on 44 acres of land that are being developed along West Jemez Road for the Los Alamos Research

Park. This project has its own NEPA documentation (an environmental assessment), and the land is being leased to Los Alamos County for this privately owned development.

Cultural resources remained protected, and no excavation of sites at TA-54 or any other part of LANL has occurred. (The ROD projected that 15 prehistoric sites would be affected by the expansion of Area G into Zones 4 and 6 at TA-54.)

As projected by the ROD, water levels in wells penetrating into the regional aquifer continue to decline in response to pumping, typically by several feet each year. In areas where pumping has been reduced, water levels show some recovery. No unexplained changes in patterns have occurred in the 1995–2001 period, and water levels in the regional aquifer have continued a gradual decline that started in about 1977.

In addition, ecological resources are being sustained as a result of protection afforded by DOE ownership of LANL. These resources include biological resources such as protected sensitive species, ecological processes, and biodiversity. The recovery and response to the Cerro Grande Fire of May 2000 has included a wildfire fuels reduction program, burned area rehabilitation and monitoring efforts, and enhanced vegetation and wildlife monitoring.

6.2 Conclusions

In conclusion, LANL operations data mostly fell within projections. Operations data that exceeded projections, such as number of employees or chemical waste from cleanup, either produced a positive impact on the economy of northern New Mexico or resulted in no local impact because these wastes were shipped offsite for disposal. Overall, the 2001 operations data indicate that the Laboratory was operating within the SWEIS envelope.

The 2001 data indicate that LANL operations typically remained below levels projected by the SWEIS ROD. There are two main reasons for this fact. The ROD was not issued until September 1999; consequently, operations were more likely to be at levels consistent with pre-ROD conditions. Moreover, data in the SWEIS were presented for the highest level projected over the 10-year period 1996–2005. Thus, the data from early years in the projection period (1996–2001) would be expected to fall below the maximum.

One purpose of the 2001 Yearbook is to compare LANL operations and resultant 2001 data to the SWEIS ROD to determine if LANL was still operating within the environmental envelope established by the SWEIS and the ROD. Data for 2001 indicate that positive impacts (such as socioeconomics) were greater than SWEIS ROD projections, while negative impacts, such as radioactive air emissions and land disturbance, were within the SWEIS envelope.

6.3 To the Future

The Yearbook will continue to be prepared on an annual basis, with operations and relevant parameters in a given year compared to SWEIS projections for activity levels chosen by the ROD. The presentation proposed for the 2002 Yearbook will follow that developed for the previous Yearbooks—comparison to the SWEIS ROD.

The 2001 Yearbook is an important step forward in fulfilling a commitment to make the SWEIS for LANL a living document. Future Yearbooks are planned to continue that role.


Bald eagle.

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Appendix A. Chemical Usage and Emissions Data

Table A-1. Chemical and Metallurgy Research Building Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
CMR Building	Acetonitrile	75-05-8	kg/yr	0.27	0.79
	Arsenic, el.&inorg.,exc. Arsine, as As	7440-38-2	kg/yr	0.20	0.56
	Diethylene Triamine	111-40-0	kg/yr	0.17	0.48
	Ethanol	64-17-5	kg/yr	2.95	8.43
	Ethyl Acetate	141-78-6	kg/yr	0.16	0.45
	Hydrogen Bromide	10035-10-6	kg/yr	0.74	2.10
	Hydrogen Chloride	7647-01-0	kg/yr	11.43	32.64
	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.60	1.73
	Mercury numerous forms	7439-97-6	kg/yr	0.01	1.36
	Methyl Alcohol	67-56-1	kg/yr	8.86	25.33
	Nitric Acid	7697-37-2	kg/yr	54.48	155.65
	Pentane (all isomers)	109-66-0	kg/yr	0.22	0.63
	Phosphoric Acid	7664-38-2	kg/yr	8.02	22.93
	Propane	74-98-6	kg/yr	0.00	551.69
	Rhodium Metal	7440-16-6	kg/yr	3.26	9.31
	Sulfuric Acid	7664-93-9	kg/yr	7.89	22.54
	Tetrahydrofuran	109-99-9	kg/yr	0.31	0.89
	Tin numerous forms	7440-31-5	kg/yr	0.01	0.50
	Yttrium	7440-65-5	kg/yr	0.16	0.45

Table A-2. Biosciences Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
HRL	Acetic Acid	64-19-7	kg/yr	10.65	30.43
	Acetone	67-64-1	kg/yr	0.41	1.18
	Acetonitrile	75-05-8	kg/yr	39.32	112.36
	Acrylamide	79-06-1	kg/yr	0.39	1.12
	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.35	1.00
	Chloroform	67-66-3	kg/yr	3.93	11.24
	Diethanolamine	111-42-2	kg/yr	0.18	0.50
	Ethanol	64-17-5	kg/yr	54.56	155.88
	Ethyl Ether	60-29-7	kg/yr	1.96	5.60
	Ethylene Dichloride	107-06-2	kg/yr	0.22	0.62
	Formamide	75-12-7	kg/yr	0.20	0.57
	Formic Acid	64-18-6	kg/yr	0.64	1.83
	Hydrogen Chloride	7647-01-0	kg/yr	5.23	14.96
	Hydrogen Peroxide	7722-84-1	kg/yr	0.25	0.70
	Hydrogen Sulfide	7783-06-4	kg/yr	0.08	0.23
	Isopropyl Alcohol	67-63-0	kg/yr	16.91	48.31
	Methyl Alcohol	67-56-1	kg/yr	25.73	73.52
	Methylene Chloride	75-09-2	kg/yr	0.98	2.79
	n,n-Dimethylformamide	68-12-2	kg/yr	0.17	0.47
	Nitric Acid	7697-37-2	kg/yr	2.67	7.63
	Phenol	108-95-2	kg/yr	0.68	1.95
	Phosphoric Acid	7664-38-2	kg/yr	0.32	0.92
	Potassium Hydroxide	1310-58-3	kg/yr	0.18	0.53
	Sulfuric Acid	7664-93-9	kg/yr	0.64	1.84
	Trichloroacetic Acid	76-03-9	kg/yr	0.53	1.50

Table A-3. High Explosive Processing Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
High Explosive Processing	Acetone	67-64-1	kg/yr	113.08	323.07
	Ethanol	64-17-5	kg/yr	60.22	172.06
	Ethyl Acetate	141-78-6	kg/yr	65.92	188.34
	Ethylene Dichloride	107-06-2	kg/yr	0.43	1.24
	Fluorine	7782-41-4	kg/yr	2.52	7.20
	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	0.12	0.33
	Hydrogen Chloride	7647-01-0	kg/yr	6.23	17.81
	Isobutyl Alcohol	78-83-1	kg/yr	0.53	1.52
	Isopropyl Alcohol	67-63-0	kg/yr	2.20	6.28
	Lead, el.&inorg.compounds, as Pb	7439-92-1	kg/yr	0.05	4.54
	Methyl Ethyl Ketone (MEK)	78-93-3	kg/yr	33.83	96.65
	Pentane (all isomers)	109-66-0	kg/yr	0.18	0.50
	Propane	74-98-6	kg/yr	0.00	86.41
	Tetrahydrofuran	109-99-9	kg/yr	0.16	0.44
	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.96	96.07
	VM & P Naphtha	8032-32-4	kg/yr	0.50	1.42

Table A-4. High Explosive Testing Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
High Explosive Testing	Acetone	67-64-1	kg/yr	7.19	20.54
	Iron Oxide Fume, as Fe	1309-37-1	kg/yr	1.05	3.00
	Methyl Alcohol	67-56-1	kg/yr	3.88	11.08
	Methyl n-Amyl Ketone	110-43-0	kg/yr	0.57	1.64
	Paraffin Wax Fume	8002-74-2	kg/yr	0.35	1.00
	Propane	74-98-6	kg/yr	0.00	53.18

Table A-5. LANSCE Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
LANSCE	Acetic Acid	64-19-7	kg/yr	0.18	0.52
	Acetic Anhydride	108-24-7	kg/yr	0.95	2.71
	Acetone	67-64-1	kg/yr	64.42	184.05
	Acetonitrile	75-05-8	kg/yr	0.27	0.79
	Acetylene	74-86-2	kg/yr	0.12	0.33
	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.18	0.50
	Chlorodifluoromethane	75-45-6	kg/yr	41.28	117.94
	Chloroform	67-66-3	kg/yr	2.60	7.42
	Ethanol	64-17-5	kg/yr	12.96	37.04
	Ethyl Bromide	74-96-4	kg/yr	0.26	0.73
	Ethyl Ether	60-29-7	kg/yr	0.98	2.80
	Hydrogen Chloride	7647-01-0	kg/yr	2.44	6.98
	Hydrogen Fluoride, as F	7664-39-3	kg/yr	1.21	3.45
	Hydrogen Peroxide	7722-84-1	kg/yr	0.25	0.70
	Hydroquinone	123-31-9	kg/yr	0.18	0.50
	Isopropyl Alcohol	67-63-0	kg/yr	4.40	12.57
	Kerosene	8008-20-6	kg/yr	2.24	6.40
	Lead, el.&inorg.compounds, as Pb	7439-92-1	kg/yr	0.01	0.50
	Mercury numerous forms	7439-97-6	kg/yr	1.36	136.08
	Methyl Alcohol	67-56-1	kg/yr	5.40	15.43
	Methyl Formate	107-31-3	kg/yr	0.35	1.00
	Nitric Acid	7697-37-2	kg/yr	16.47	47.04
	Propane	74-98-6	kg/yr	0.00	810.92
	Sulfuric Acid	7664-93-9	kg/yr	0.32	0.92
	Tetrahydrofuran	109-99-9	kg/yr	0.31	0.89
	Toluene	108-88-3	kg/yr	6.99	19.98
	Zinc Chloride Fume	7646-85-7	kg/yr	0.18	0.50

Table A-6. Machine Shops Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
Machine Shops	Chlorodifluoromethane	75-45-6	kg/yr	52.39	149.69
	Ethanol	64-17-5	kg/yr	1.57	4.48

Table A-7. Materials Science Laboratory Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
MSL	1,1,2-Trichloroethane	79-00-5	kg/yr	0.50	1.44
	Acetone	67-64-1	kg/yr	8.43	24.09
	Hydrogen Chloride	7647-01-0	kg/yr	2.08	5.94
	Hydrogen Peroxide	7722-84-1	kg/yr	0.98	2.81
	Isopropyl Alcohol	67-63-0	kg/yr	3.30	9.43
	Kerosene	8008-20-6	kg/yr	1.06	3.03
	Methyl Alcohol	67-56-1	kg/yr	7.76	22.16
	Propane	74-98-6	kg/yr	0.00	24.37
	Silver (metal dust & soluble comp., as Ag)	7440-22-4	kg/yr	0.88	2.50
	Sulfuric Acid	7664-93-9	kg/yr	1.61	4.60

Table A-8. Pajarito Site Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
Pajarito Site	Propane	74-98-6	kg/yr	0.00	250.37

Table A-9. Plutonium Facility Complex Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
Plutonium Facility Complex	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	kg/yr	8.76	25.02
	2-Ethoxyethanol (EGEE)	110-80-5	kg/yr	0.33	0.93
	Acetic Acid	64-19-7	kg/yr	0.18	0.52
	Chlorine	7782-50-5	kg/yr	12.70	36.29
	Chloroform	67-66-3	kg/yr	2.60	7.42
	Diacetone Alcohol	123-42-2	kg/yr	3.73	10.66
	Diethylene Triamine	111-40-0	kg/yr	0.67	1.92
	Ethanol	64-17-5	kg/yr	6.27	17.93
	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	0.92	2.64
	Hydrogen Chloride	7647-01-0	kg/yr	282.72	807.77
	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.43	1.23
	Methyl Alcohol	67-56-1	kg/yr	2.49	7.12
	n,n-Dimethylformamide	68-12-2	kg/yr	3.32	9.49
	n-Heptane	142-82-5	kg/yr	1.20	3.42
	Nitric Acid	7697-37-2	kg/yr	15.76	45.02
	Phosphoric Acid	7664-38-2	kg/yr	1.60	4.59
	Potassium Hydroxide	1310-58-3	kg/yr	262.64	750.39
	Propane	74-98-6	kg/yr	0.00	77.55
	Sulfuric Acid	7664-93-9	kg/yr	2.25	6.44
	Tetrahydrofuran	109-99-9	kg/yr	0.31	0.89
	Tributyl Phosphate	126-73-8	kg/yr	1.36	3.89
	Zinc Chloride Fume	7646-85-7	kg/yr	0.70	2.00

Appendix A. Chemical Usage and Emissions Data (continued)

Table A-10. Radiochemistry Site Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
Radiochemistry Site	1,1,1-Trichloroethane	71-55-6	kg/yr	1.87	5.36
	2-Methoxyethanol (EGME)	109-86-4	kg/yr	0.51	1.45
	Acetic Acid	64-19-7	kg/yr	0.18	0.52
	Acetic Anhydride	108-24-7	kg/yr	0.54	1.54
	Acetone	67-64-1	kg/yr	55.85	159.56
	Acetonitrile	75-05-8	kg/yr	4.78	13.67
	Acrylic Acid	79-10-7	kg/yr	0.10	0.28
	Aluminum numerous forms	7429-90-5	kg/yr	0.08	7.57
	Arsenic, el.&inorg.,exc. Arsine, as As	7440-38-2	kg/yr	0.20	0.56
	Benzene	71-43-2	kg/yr	1.33	3.79
	Beryllium	7440-41-7	kg/yr	0.13	0.38
	Cadmium, el.&compounds, as Cd	7440-43-9	kg/yr	0.31	0.87
	Chlorobenzene	108-90-7	kg/yr	0.19	0.55
	Chlorodifluoromethane	75-45-6	kg/yr	63.50	181.44
	Chloroform	67-66-3	kg/yr	0.13	0.37
	Copper	7440-50-8	kg/yr	0.01	0.90
	Cyclohexanone	108-94-1	kg/yr	0.83	2.37
	Ethanol	64-17-5	kg/yr	0.55	1.58
	Ethyl Acetate	141-78-6	kg/yr	2.52	7.20
	Ethyl Bromide	74-96-4	kg/yr	0.26	0.73
	Ethyl Ether	60-29-7	kg/yr	27.93	79.80
	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	2.31	6.60
	Hydrogen Bromide	10035-10-6	kg/yr	11.42	32.63
	Hydrogen Chloride	7647-01-0	kg/yr	176.67	504.78
	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.90	2.57
	Hydrogen Peroxide	7722-84-1	kg/yr	7.04	20.12
	Isobutyl Alcohol	78-83-1	kg/yr	0.14	0.40
	Isopropyl Alcohol	67-63-0	kg/yr	7.97	22.78
	Methyl Alcohol	67-56-1	kg/yr	11.63	33.24
	Methyl Iodide	74-88-4	kg/yr	0.14	0.40
	Methylene Chloride	75-09-2	kg/yr	8.85	25.30
	Molybdenum	7439-98-7	kg/yr	11.83	33.81
	n,n-Dimethylformamide	68-12-2	kg/yr	0.70	1.99
	n-Butyl Alcohol	71-36-3	kg/yr	0.28	0.81
	n-Heptane	142-82-5	kg/yr	0.48	1.37
	Nitric Acid	7697-37-2	kg/yr	623.41	1781.17
	Nitromethane	75-52-5	kg/yr	0.20	0.57
	Nitrous Oxide	10024-97-2	kg/yr	0.08	0.23
	o-Dichlorobenzene	95-50-1	kg/yr	0.91	2.61
	Pentane (all isomers)	109-66-0	kg/yr	1.53	4.38
	Phosphoric Acid	7664-38-2	kg/yr	609.71	1742.03
	Phosphorus Trichloride	7719-12-2	kg/yr	0.09	0.25
	Propane	74-98-6	kg/yr	0.00	2663.99
	Pyridine	110-86-1	kg/yr	0.20	0.56
	Silica, Quartz	14808-60-7	kg/yr	1.09	3.10
	Silver (metal dust & soluble comp., as Ag)	7440-22-4	kg/yr	0.74	2.11
	Sulfur Hexafluoride	2551-62-4	kg/yr	2.06	5.90
	Sulfuric Acid	7664-93-9	kg/yr	3.38	9.66
	Tetrahydrofuran	109-99-9	kg/yr	19.98	57.09
	Toluene	108-88-3	kg/yr	10.07	28.77
	Triethylamine	121-44-8	kg/yr	0.41	1.16
	Trimethylamine	75-50-3	kg/yr	0.11	0.32
	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.23	22.68
	VM & P Naphtha	8032-32-4	kg/yr	5.78	16.50
	Yttrium	7440-65-5	kg/yr	0.31	0.89
	Zinc Chloride Fume	7646-85-7	kg/yr	0.09	0.25
	Zirconium Compounds, as Zr	7440-67-7	kg/yr	0.01	1.30

Table A-11. Sigma Complex Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
Sigma Complex	Acetone	67-64-1	kg/yr	6.64	18.96
	Diethylene Triamine	111-40-0	kg/yr	0.67	1.92
	Ethanol	64-17-5	kg/yr	1.11	3.16
	Hydrogen Chloride	7647-01-0	kg/yr	6.86	19.59
	Hydrogen Fluoride, as F	7664-39-3	kg/yr	25.56	73.03
	Hydrogen Peroxide	7722-84-1	kg/yr	2.26	6.47
	Isopropyl Alcohol	67-63-0	kg/yr	3.30	9.43
	Methyl Alcohol	67-56-1	kg/yr	3.60	10.29
	Nitric Acid	7697-37-2	kg/yr	63.46	181.31
	Phosphoric Acid	7664-38-2	kg/yr	82.16	234.76
	Propane	74-98-6	kg/yr	0.00	387.74
	Tantalum Metal	7440-25-7	kg/yr	0.73	2.08
	Zirconium Compounds, as Zr	7440-67-7	kg/yr	0.00	0.30

Table A-12. Target Fabrication Facility Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
Target Fabrication Facility	2-Methoxyethanol (EGME)	109-86-4	kg/yr	0.34	0.96
	Acetone	67-64-1	kg/yr	17.83	50.95
	Aluminum numerous forms	7429-90-5	kg/yr	0.01	1.00
	Benzene	71-43-2	kg/yr	0.31	0.88
	Divinyl Benzene	1321-74-0	kg/yr	0.53	1.50
	Ethanol	64-17-5	kg/yr	3.14	8.96
	Ethyl Ether	60-29-7	kg/yr	1.47	4.20
	Ethylene Dichloride	107-06-2	kg/yr	0.22	0.62
	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	0.49	1.39
	Hydrogen Chloride	7647-01-0	kg/yr	0.10	0.30
	Isopropyl Alcohol	67-63-0	kg/yr	11.00	31.42
	Methyl Alcohol	67-56-1	kg/yr	18.84	53.82
	Methyl Ethyl Ketone (MEK)	78-93-3	kg/yr	2.26	6.44
	Methylene Bisphenyl Isocyanate (MDI)	101-68-8	kg/yr	0.18	0.50
	n,n-Dimethylformamide	68-12-2	kg/yr	10.63	30.36
	Nitric Acid	7697-37-2	kg/yr	25.10	71.72
	o-Dichlorobenzene	95-50-1	kg/yr	1.00	2.87
	Potassium Hydroxide	1310-58-3	kg/yr	2.29	6.54
	Pyridine	110-86-1	kg/yr	0.33	0.93
	Styrene	100-42-5	kg/yr	1.90	5.44
	Sulfuric Acid	7664-93-9	kg/yr	1.42	4.05
	Tetrahydrofuran	109-99-9	kg/yr	1.56	4.45

Table A-13. Tritium Operations Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
Tritium Operations	Ethanol	64-17-5	kg/yr	0.28	0.79
	Propane	74-98-6	kg/yr	0.00	73.12

Table A-14. Waste Management Operations Air Emissions

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2001 ESTIMATED AIR EMISSIONS	2001 USAGE
Waste Management Operations	Acetone	67-64-1	kg/yr	1.11	3.16
	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.25	0.71
	Benzene	71-43-2	kg/yr	0.31	0.88
	Cyclohexanone	108-94-1	kg/yr	0.10	0.28
	Ethanol	64-17-5	kg/yr	10.77	30.78
	Hydrogen Chloride	7647-01-0	kg/yr	285.24	814.97
	Mercury numerous forms	7439-97-6	kg/yr	0.01	1.36
	Methyl Alcohol	67-56-1	kg/yr	1.11	3.17
	Nitric Acid	7697-37-2	kg/yr	12.07	34.49
	Phenol	108-95-2	kg/yr	0.18	0.50
	Propane	74-98-6	kg/yr	0.00	121.86
	Pyridine	110-86-1	kg/yr	0.33	0.93
	Sulfuric Acid	7664-93-9	kg/yr	3.86	11.04
	Uranium (natural) Sol.&Unsol.Comp. as U	7440-61-1	kg/yr	0.67	1.90

Appendix B. Nuclear Facilities List

Table B-1. Comparison of Nuclear Facilities Lists

SWEIS ROD				DOE 1998	FWO-OAB-401 LANL NUCLEAR FACILITY LIST			
					REV. 1 (JUNE 2001)		REV. 2 (DECEMBER 2001)	
SECTION/ TABLE	BUILDING	DESCRIPTION	HAZ CAT	HAZ CAT	DESCRIPTION	HAZ CAT	DESCRIPTION	HAZ CAT
2.1		Plutonium Complex						
2.1-1	TA-55-0004	Pu-238 Processing	2	2	TA-55 Plutonium Facility	2	TA-55 Plutonium Facility	2
					Pu glovebox line; Pu-238 processing	2	Pu glovebox line; processing of isotopes of Pu	2
2.1-1	TA-55-0041	Nuclear Material Storage	2					
2.2		Tritium Facilities						
2.2-1	TA-16-0205	WETF	2	2	TA-16 Weapons Engineering Tritium Facility (WETF)	2	TA-16 Weapons Engineering Tritium Facility (WETF)	2
					Weapons related tritium research	2	Tritium research	2
2.2-1	TA-16-0205A	WETF	2					
2.2-1	TA-16-0450	WETF	2					
2.2-1	TA-21-0155	TSTA	2	2	Tritium System Test Assembly (TSTA)	2	Tritium System Test Assembly (TSTA)	2
					Tritium research	2		
							Stabilization and Deactivation Activities	2
2.2-1	TA-21-0209	TSFF	2	2	TA-21 Tritium Science and Fabrication Facility (TSFF)	2	TA-21 Tritium Science and Fabrication Facility (TSFF)	2
					Support for underground testing program (tritium)	2		
							Stabilization activities and NTTL support	2
2.3		Chemistry and Metallurgy Research Building						
2.3-1	TA-03-0019 (Building number should be -0029)	CMR	2		TA-3 Chemistry and Metallurgy Research (CMR) Bldg.	2	TA-3 Chemistry and Metallurgy Research Facility (CMR)	2
2.3-1	TA-03-0029	Radiochemistry Hot Cell		2	Radiochemistry Hot Cell facility	2		
							Actinide chemistry and metallurgy research and analysis	2
2.3-1	TA-03-0029	SNM Vault		2	CMR SNM Vault	2		
2.3-1	TA-03-0029	Nondestructive analysis/nondestructive examination Waste Assay		2	CMR Nondestructive analysis/nondestructive examination waste assay; inspection of waste drums	2		
2.3-1	TA-03-0029	IAEA Classroom			Classroom for IAEA inspectors; a.k.a. "School House"	2		
2.3-1	TA-03-0029	Wing 9 (Enriched Uranium)		2	Enriched Uranium foundry & machining; operation shutdown; (Wing 9)	2		
2.4		Pajarito Site						
2.4-1	TA-18	Site Itself		2	TA-18 LANL Critical Experiment Facility and Hillside	2	TA-18 LANL Critical Experiment Facility and Hillside	2
					Critical Experiment Site	2	Critical Experiment Site	2
2.4-1	TA-18-0023	SNM Vault (CASA 1)	2	2	Category 1 SNM Vault (CASA 1)	2	Category 1 SNM Vault (CASA 1)	2
2.4-1	TA-18-0026	Hillside Vault	2	2	Hillside Vault (Pajarito Site); contains SNM>HC-2 threshold	2	Hillside Vault (Pajarito Site); contains SNM>HC-2 threshold	2
2.4-1	TA-18-0032	SNM Vault (CASA 2)	2	2	Category 1 SNM Vault (CASA 2)	2	Category 1 SNM Vault (CASA 2)	2
2.4-1	TA-18-0116	Assembly Building (CASA 3)	2	2	Assembly Building (CASA 3)	2	Assembly Building (CASA 3)	2
2.4-1	TA-18-0127	Accelerator used for weapons x-ray		2	Accelerator used for weapons x-ray	2	Accelerator used for weapons x-ray	2
2.4-1	TA-18-0129	Calibration Laboratory		2	Calibration laboratory	2	Calibration laboratory	2
2.4-1	TA-18-0247	Sealed Sources		3				
2.4-1	TA-18-0258	IAEA Classroom (Trailer)		2				
2.5		Sigma Complex						
2.5-1	TA-03-0066	44 metric tons of depleted uranium storage	3	3				
2.5-1	TA-03-0159	Thorium storage	3	3	*			
2.6 (NA)		Materials Science Laboratory						
2.7 (NA)		Target Fabrication Facility						
2.8 (NA)		Machine Shops						

Table B-1. Comparison of Nuclear Facilities Lists

SWEIS ROD				DOE 1998	FWO-OAB-401 LANL NUCLEAR FACILITY LIST			
					REV. 1 (JUNE 2001)		REV. 2 (DECEMBER 2001)	
SECTION/ TABLE	BUILDING	DESCRIPTION	HAZ CAT	HAZ CAT	DESCRIPTION	HAZ CAT	DESCRIPTION	HAZ CAT
2.9		High Explosives Processing						
2.9-1					TA-8 Radiography Facility	2	TA-8 Radiography Facility	2
	TA-08-0022	Radiography facility	2	2				
	TA-08-0023	Radiography facility	2	2	Betatron Building	2	Betatron Building	2
	TA-08-0024	Isotope Building	2					
	TA-08-0070	Experimental Science	2					
	TA-16-0411	Intermediate Device Assembly		2				
2.10 (NA)		High Explosives Testing						
2.11		Los Alamos Neutron Science Center			TA-53 Nuclear Activities at Los Alamos Neutron Science Center (LANSCE)	3	TA-53 Nuclear Activities at Los Alamos Neutron Science Center (LANSCE)	3
2.11-1	TA-53-1L	Manual Lujan Neutron Scattering Center		3	Manual Lujan Neutron Scattering Center	3	Lujan Center Neutron Production Target	3
	TA-53-3M	Experimental Science	3					
	TA-53-A-6	Accelerator Production of Tritium target beam stop		3	APT target, isotope production, beam stop	3	In-place storage DU and A-6 beam stop	3
	TA-53-ER1	Actinide scattering experiment		3	TA-53 ERI Actinide scattering experiment	3	Lujan Center ER-1/2 Actinide scattering experiment	3
	TA-53-P3E	Pion Scattering Experiment		3				
							TA-53 Target 4 WNR Neutron Production target	3
2.12 (NA)		Biosciences Facilities						
2.13		Radiochemistry Facility						
2.13-1	TA-48-0001	Radiochemistry and Hot Cell	3	3	TA-48 Radiochemistry and Hot Cell Facility	3	TA-48 Radiochemistry and Hot Cell Facility	3
					Radiochemistry and hot cell facility; multiple small sources	3	Radiochemistry and hot cell facility; multiple small sources	3
2.14		Radioactive Liquid Waste treatment Facility			TA-50 Radioactive Waste Treatment Facility (RLWTF)	3	TA-50 Radioactive Waste Treatment Facility (RLWTF)	3
2.14-1	TA-50-0001	Main Treatment Plant	2	3	Main treatment plant, pretreatment plant, decontamination operation	3	Main treatment plant, pretreatment plant, decontamination operation	3
	TA-50-0002	LLW Tank Farm		3	Low level liquid influence tanks, treatment effluent tanks, low level sludge tanks	3	Low level liquid influence tanks, treatment effluent tanks, low level sludge tanks	3
	TA-50-0066	Acid and Caustic Tank Farm		3	Acid and Caustic waste holding tanks	3	Acid and Caustic waste holding tanks	3
	TA-50-0090	Holding Tank		3	Holding tank	3	Holding tank	3
2.15		Solid Radioactive and Chemical Waste Facilities			TA-50 Radioactive Materials, Research, Operations, and Demonstration (RAMROD)	2	TA-50 Radioactive Materials, Research, Operations, and Demonstration (RAMROD)	2
2.15-1	TA-50-0037	RAMROD		2	Radioactive materials, research, operations, and demonstration facility	2	Radioactive materials, research, operations, and demonstration facility	2
	TA-50-0069	WCRRF Building	2	3	TA-50 Waste Characterization, reduction, and Repackaging Facility (WCRRF)	2	TA-50 Waste Characterization, reduction, and Repackaging Facility (WCRRF)	2
					Waste characterization, reduction, and repackaging facility	3	Waste characterization, reduction, and repackaging facility	3
	TA-50-0069 Outside	Nondestructive Analysis Mobile Activities			TA-50 External NDA mobile activities outside TA-50-69	2	TA-50 External NDA mobile activities outside TA-50-69	2
	TA-50-0069 Outside	Drum Storage			TA-50 External Drum staging/storage pad and waste container temperature equilibration activities outside TA-50-69	2	TA-50 External Drum staging/storage pad and waste container temperature equilibration activities outside TA-50-69	2
	TA-54-Area G	LLW Waste Storage/ Disposal	2	2	TA-54 Waste Storage and Disposal Facility (Area G)	2	TA-54 Waste Storage and Disposal Facility (Area G)	2

Appendix B. Nuclear Facilities List (continued)

Table B-1. Comparison of Nuclear Facilities Lists

SWEIS ROD				DOE 1998	FWO-OAB-401 LANL NUCLEAR FACILITY LIST			
					REV. 1 (JUNE 2001)		REV. 2 (DECEMBER 2001)	
SECTION/ TABLE	BUILDING	DESCRIPTION	HAZ CAT	HAZ CAT	DESCRIPTION	HAZ CAT	DESCRIPTION	HAZ CAT
					Low level waste (LLW) (including mixed waste) storage and disposal in Domes, pits, shafts, and trenches. TRU waste storage in domes and shafts (does not include TWISP). TRU legacy waste in pits and shafts. Low level disposal of asbestos in pits and shafts. Operations building; TRU waste storage	2	Low level waste (LLW) (including mixed waste) storage and disposal in Domes, pits, shafts, and trenches. TRU waste storage in domes and shafts (does not include TWISP). TRU legacy waste in pits and shafts. Low level disposal of asbestos in pits and shafts. Operations building; TRU waste storage	2
	TA-54	TWISP		2	TA-54 Transuranic Waste Inspectable Storage Project (TWISP)	2	TA-54 Transuranic Waste Inspectable Storage Project (TWISP)	2
					Pit 2 Recovery of buried TRU waste (Note: TWISP)	2		
	TA-54-0002	TRU Storage Dome		3	Radioactive and chemical waste storage; fabric dome with TRU waste drum storage	3		
	TA-54-0033	TRU Drum Preparation	2		TRU waste storage, fabric dome with TRU waste drum (Note: TWISP)	2	TRU waste storage, fabric dome with TRU waste drum (Note: TWISP)	2
	TA-54-0038	RANT	2	3	TA-54 Radioactive Assay Nondestructive Testing (RANT) Facility	3	TA-54 Radioactive Assay Nondestructive Testing (RANT) Facility	3
					Nondestructive assay and examination of waste drums, WIPP certification of TRU waste drums, TRUPACT loading of drums	3	Nondestructive assay and examination of waste drums, WIPP certification of TRU waste drums, TRUPACT loading of drums	3
	TA-54-0048	TRU Storage Dome	2	3	Radioactive and chemical waste storage; fabric dome with TRU waste drum storage	3		
	TA-54-0049	TRU Storage Dome	2	3	Radioactive and chemical waste storage; fabric dome with TRU waste drum storage	3		
	TA-54-0144	Shed	2					
	TA-54-0145	Shed	2					
	TA-54-0146	Shed	2					
	TA-54-0153	TRU Storage Dome	2	3	Radioactive and chemical waste storage; fabric dome with TRU waste drum storage	3		
	TA-54-0177	Shed	2					
	TA-54-0226	Temporary Retrieval Dome	2					
	TA-54-0229	Tension Support Dome	2					
	TA-54-0230	Tension Support Dome	2					
	TA-54-0231	Tension Support Dome	2					
	TA-54-0232	Tension Support Dome	2					
	TA-54-0283	Tension Support Dome	2					
	TA-54-Pad2	Storage Pad	2				Recovery of buried TRU waste (Note: TWISP)	2
	TA-54-Pad3	Storage Pad	2					
	TA-54-Pad4	TRU Storage	2					
2.16		Non-Key Facilities						
2.16-1	TA-03-0040	Physics Building	3					
	TA-03-0065	Source Storage	2					
	TA-03-0130	Calibration Building	3					
	TA-33-0086	Former Tritium Research	3	2	TA-33 High Pressure Tritium Facility	2	TA-33 High Pressure Tritium Facility	2
					Former tritium research facility	2	Former tritium research facility	2
	TA-35-0002	Non-American National Standards Institute Uranium Sources	3	3				
	TA-35-0027	Safeguard Assay and Research	3	3				
2.17 (NA)		Environmental Restoration Project						
		(Note: on-site transportation was evaluated under 4.10.3.1 as part of the Affected Environment)			Site Wide Transportation	TBD	Site Wide Transportation	TBD
							Laboratory nuclear materials transportation that is not DOT certified is now included in the scope of 10CFR830	TBD

* TA-03-0159 removed from list 4/00.

Appendix C. Radiological Facility List

Table C-1. Radiological Facility List

SWEIS ROD				FWO-OAB-403, REV. 0	
SWEIS YEARBOOK	BUILDING	DESCRIPTION	HAZ CAT	DESCRIPTION	HAZ CAT
2.1		Plutonium Complex [a,b]			
2.2		Tritium Facilities [a,b]			
2.3		Chemistry and Metallurgy Research Building [a,b]			
2.4		Pajarito Site [a,b]			
2.5		Sigma Complex [b]			
2.5	TA-3-35	Press Building	L/RAD	Sigma Press Building	RAD
2.5	TA-3-66	Sigma Building	NHC 3	Sigma Building	RAD
2.5	TA-3-159	Thorium Storage	NHC 3	Sigma Thorium Storage	RAD
2.6		Materials Science Laboratory			
2.6	TA-3-1698	Materials Science Lab	L/CHEM	Material Science Lab	RAD
2.7		Target Fabrication Facility [a]			
2.8		Machine Shops			
2.8	TA-3-102	Tech Shops Addition	L/RAD	Tech Shop Add	RAD
2.9		High Explosives Processing [b]			
2.9	TA-8-22	X-Ray Facility	NHC 2	X ray Facility [c]	RAD
2.9	TA-8-70	Nondestructive Testing	NHC 2	Nondestructive Testing	RAD
2.9	TA-11-30	Vibration Test Building	L/ENS	Vibration Test [c]	RAD
2.9	TA-16-88	Casting Rest House	L/CHEM	RAM Machine Shop	RAD
2.9	TA-16-300		NA	Component Storage [c]	RAD
2.9	TA-16-301	Rest House	L/ENS	Component Storage [c]	RAD
2.9	TA-16-302	Process Building	L/ENS	Component Storage Training [b]	RAD
2.9	TA-16-332		NA	Component Storage	RAD
2.9	TA-16-410	Assembly Building	L/ENS	Assembly Building	RAD
2.9	TA-16-411	Rest House	NHC 2	Assembly Building [c]	RAD
2.9	TA-16-413	Rest House	L/ENS	Component Storage [c]	RAD
2.9	TA-16-415	Rest House	L/ENS	Component Storage [c]	RAD
2.9	TA-37-10	Magazine	L/ENS	Storage Magazine [c]	RAD
2.9	TA-37-14	Magazine	L/ENS	Storage Magazine [c]	RAD
2.9	TA-37-22	Magazine	L/ENS	Storage Magazine [c]	RAD
2.9	TA-37-24	Magazine	L/ENS	Storage Magazine [c]	RAD
2.9	TA-37-25	Magazine	L/ENS	Storage Magazine [c]	RAD
2.10		High Explosives Testing			
2.10	TA-15-R183		NA	Vault	RAD
2.11		Los Alamos Neutron Science Center [b]			
2.11	TA-53-945		NA	RLW Treatment Facility	RAD
2.11	TA-53-954		NA	RLW Basins	RAD
2.12		Biosciences Facilities [a]			
2.13		Radiochemistry Facility [a,b]			
2.14		Radioactive Liquid Waste Treatment Facility [a,b]			
2.15		Solid Radioactive and Chemical Waste Facilities [a,b]			
2.16		Non-Key Facilities [b]			
2.16	TA-2-1	Omega West Reactor	L/RAD	Omega Reactor [d]	RAD
2.16	TA-3-34	Cryogenics Bldg B	L/CHEM	Cryogenics Bldg B	RAD
2.16	TA-3-40	Physics Bldg	NHC 3	Physics Bldg (HP)	RAD
2.16	TA-8-120		NA	Radiography [c]	RAD
2.16	TA-16-207		NA	Component Testing [c]	RAD
2.16	TA-21-5	Laboratory Building	L/RAD	Lab Bldg [d]	RAD
2.16	TA-21-150	Molecular Chemistry Building	L/RAD	Molecular Chemical [d]	RAD
2.16	TA-35-2	Nuclear Safeguards Research	NHC 3	Nuclear Safeguards Research	RAD
2.16	TA-35-27	Nuclear Safeguards Lab	NHC 3	Nuclear Safeguards Lab	RAD
2.16	TA-35-125	Laser Building	L/RAD		
2.16	TA-41-1	Underground Vault	L/RAD	Undergound Vault [c]	RAD
2.16	TA-41-4	Laboratory Building	M/RAD	Laboratory [c]	RAD
2.17		Environmental Restoration Project [a]			

[a] No radiological facilities identified in September 2001.
[b] Refer to Appendix B Nuclear Facilities List.
[c] Could contain radiological material on an interim basis.
[d] Scheduled for decontamination and decommissioning.

Indian paintbrush.

Appendix D. Future Projects

Table D-1. Future Projects

ITEM	NEPA	CON-STRUCTION STATUS	FUNDING CATEGORY				
			TEC FOR EXISTING LINE ITEMS	OPC FOR EXISTING LINE ITEMS	PE&D FOR PROPOSED CAPITAL PROJECTS	PROPOSED CAPITAL PROJECTS - TEC	PROPOSED CAPITAL PROJECTS - OPC
CMR Upgrades	EA-FONSI	Started	Into FY 2001	Into FY 2002			
APT/Triple A Project	EIS-TBD	Started	Into FY 2002	Into FY 2002			
DARHT (Phase 2)	EIS-ROD	Started	Into FY 2001	Into FY 2002			
Spallation Neutron Source Line Accelerator	EA-TBD	-	-	-			
NMSSUP, Phase I	CX	Started	Into FY 2005	Into FY 2006			
TA-53 Isotope Production Facility	EA-CX	Started	Into FY 2002	Into FY 2003			
Strategic Computing Complex (SCC)	EA-FONSI	Started	Into FY 2002	Into FY 2002			
NISC	EA-FONSI	Started	Into FY 2003	Into FY 2004			
TA-18 Relocation	EIS Draft	-			Into FY 2002	Into FY 2010	Into FY 2010
Los Alamos CINT Gateway	EA-TBD	-			Into FY 2002	Into FY 2004	Into FY 2005
SM-43 Replacement	EA-FONSI	-			-	Into FY 2005	Into FY 2006
CMR Replacement	EIS-TBD	-			Into FY 2003	Into FY 2010	Into FY 2011
Fuel Cell Facility	EA-TBD	-			-	Into FY 2004	Into FY 2002
NMSSUP, Phase IIa	CX	-			-	Into FY 2006	Into FY 2007
TA-55 Infrastructure Reinvestment	EIS-TBD	-			Into FY 2004	Into FY 2012	Into FY 2012
DX Consolidation	CX	-			Into FY 2006	Into FY 2008	Into FY 2005
Central Campus Bypass Road	EA-TBD	-			Into FY 2004	Into FY 2007	-
Advanced Hydrotest Facility	EIS-TBD	-			Into FY 2007	Into FY 2010	Into FY 2010
Support Services Consolidation	CX	-			Into FY 2005	Into FY 2008	Into FY 2005
Power Grid Infrastructure Upgrade	EA-FONSI	-			-	Into FY 2007	Into FY 2005
Rad Liquid Waste Upgrade	EA-TBD	-			Into FY 2006	Into FY 2009	Into FY 2004
LANSCE Support Complex	EA-TBD	-			Into FY 2006	Into FY 2009	Into FY 2006
Infrastructure Roof Upgrades	CX-TBD	-			-	Into FY 2012	Into FY 2005
Vulnerable Facility Replacement Program	CX-TBD	-			Into FY 2007	Into FY 2010	Into FY 2007
LANL Infrastructure Revitalization	CX-TBD	-			Into FY 2007	Into FY 2012	Into FY 2012
Radiography Facility	EA-TBD	-			Into FY 2008	Into FY 2010	Into FY 2010
On-Site Generation #1 20MW	EA-TBD	-			Into FY 2009	Into FY 2009	Into FY 2009

Table D-2. Future Projects

ITEM	NEPA	CON-STRUCTION STATUS	FUNDING CATEGORY			
			CERRO GRANDE REHABILITATION LINE ITEMS - TEC	CERRO GRANDE REHABILITATION LINE ITEMS - OPC	CERRO GRANDE REHABILITATION GPPS	CAPITAL EQUIPMENT PROJECTS
DARHT (BCP)	EIS-ROD	Started	Into FY 2001	-		
Emergency Operations Center	EA-FONSI	Started	Into FY 2001	Into FY 2001		
Two Office Buildings (TA-46 and TA-16)	CX	Started	Into FY 2001	Into FY 2001		
Site-wide Fire Alarm Replacement	CX	Started	Into FY 2001	Into FY 2001		
Multi-Channel Communication System	EA-FONSI	Started	Into FY 2001	Into FY 2001		
TA-50/54 Waste Management Risk Mitigation	CX	Started	Into FY 2001	Into FY 2001		
TA-41 GTS Relocation to S Site	CX	Started			Into FY 2001	
Water SCADA	CX	Started			Into FY 2002	
Emergency Generator and Motor Control Center	EA-FONSI	Started			Into FY 2002	
Pajarito Road Gas Line	CX	Started			Into FY 2002	
WTA Substation	EA-FONSI	Started			Into FY 2001	
Building 202 Upgrade	EA-Draft	-			Into FY 2001	
Well-Head Protection	CX	-			Into FY 2001	
Internal Connectivity	EA-FONSI	-			Into FY 2001	
Replacement of Destroyed/ Damaged Program Equipment	CX	Started			Into FY 2001	
High Activity Waste Storage Facility	CX	-			Into FY 2001	
Short Pulse Spallation Source (SPSS) Enhancement	CX	-				Into FY 2003
Switch Yard Kicker	CX	-				Into FY 2003

Appendix D. Future Projects (continued)

Table D-3. Future Projects

ITEM	NEPA	CON-STRUCTION STATUS	FUNDING CATEGORY			
			EXPENSE PROJECTS	GENERAL PLANT PROJECTS	INSTITU-TIONAL PROJECTS	MAIN-TENANCE
Fire Suppression Yard Main Replacement (TA-55)	CX	Started	Into FY 2002			
Monitoring Well Project (DP)	CX	Started	Into FY 2004			
Monitoring Well Project (ER)	CX	Started	Into FY 2004			
TA-15 Electrical Distribution Upgrade	CX	Started		Into FY 2002		
TA-53-62 Cooling Tower Replacement	CX	-		Into FY 2002		
TA-53-64 Cooling Tower	CX	-		Into FY 2002		
Electrical Infrastructure Upgrade (TA-03-40)	CX	-		Into FY 2002		
Electrical Infrastructure Upgrade (TA-48-01)	CX	-		Into FY 2003		
Electrical Infrastructure Upgrade (TA-46-31)	CX	-		Into FY 2003		
High Power Detonator Facility	SWEIS	-		Into FY 2002		
Site Prep for ASCI30T Initial and Phase I Installs	EA-FONSI	-		Into FY 2001		
TSE Office Building	CX	Completed		Into FY 2001		
WETF Public Address/Intercom System	CX	-		Into FY 2001		
Water Treatment (TA-03)	CX	-		Into FY 2002		
TA-16-202 Room 107 Modifications	CX	-		Into FY 2001		
PTLA Live Fire House	CX	-		Into FY 2001		
Beryllium Technology Facility – Cartridge Filter House Install	CX-TBD	-		Into FY 2002		
Electrical Infrastructure Safety Upgrade (TA-16-200)	CX	-		Into FY 2002		
Bioscience Laboratory 3	EA-Prep	-		Into FY 2002		
TA-55 Unclassified Office Building	CX	-		Into FY 2002		
LAAO Office Building	CX	-		Into FY 2002		
TA-03 Gateway Infrastructure	CX-TBD	-		Into FY 2002		
Badge Office Building	CX	-		Into FY 2002		
Electrical Infrastructure Safety Upgrade (TA-3-261)	CX	-		Into FY 2003		
Electrical Infrastructure Safety Upgrade (TA-3-30)	CX	-		Into FY 2003		
ESA-TA-16-200 HVAC and Electrical Upgrades	CX-TBD	-		Into FY 2002		
TA-08 Division Entrance Project	CX	-		Into FY 2003		
MX Cold Shop	EA-Prep	-		Into FY 2002		
Vulnerable Office Building Replacement #02-1	CX-TBD	-		Into FY 2002		
Vulnerable Office Building Replacement #02-2	CX-TBD	-		Into FY 2002		
Vulnerable Office Building Replacement #02-3	CX-TBD	-		Into FY 2002		
Vulnerable Office Building Replacement #02-4	CX-TBD	-		Into FY 2002		
Vulnerable Office Building Replacement #02-5	CX-TBD	-		Into FY 2002		
LANSCE Chiller Replacement	CX	-		Into FY 2002		
Building 260 Reconfiguration	EA-Prep	-		Into FY 2002		
Electrical Infrastructure Safety Upgrade (TA-8-21)	CX-TBD	-		Into FY 2004		
Electrical Infrastructure Safety Upgrade (TA-46-1)	CX-TBD	-		Into FY 2004		
Electrical Infrastructure Safety Upgrade (TA-53-2)	CX-TBD	-		Into FY 2004		
Electrical Infrastructure Safety Upgrade (TA-59-1)	CX-TBD	-		Into FY 2004		
Electrical Infrastructure Safety Upgrade (TA-15-40)	CX-TBD	-		Into FY 2004		
Electrical Infrastructure Safety Upgrade (TA-15-183)	CX-TBD	-		Into FY 2004		
TA-9-38, 40, 42, 46 Steam to Hot Water Heating Conversion	CX-TBD	-		Into FY 2003		
Upgrade R Site Road (Access Safety Improvement)	CX-TBD	-		Into FY 2003		
TA-21 HIC Move to TA-16-202	CX-TBD	-		Into FY 2003		
TA-16 Site Utilities and Roads	EA-TBD	-		Into FY 2003		
WETF 1.6 MVA Generator Installation	CX-TBD	-		Into FY 2003		
ESA-FM Weapons Support Building	EA-TBD	-		Into FY 2003		
TA-48 Rad Liquid Waste Line Replacement	CX-TBD	-		Into FY 2003		
TA-46 Air Exhaust System	CX-TBD	-		Into FY 2003		
TA-15 Firing Sites Support Facility	CX-TBD	-		Into FY 2003		
DP-20 Safety/Infrastructure GPPs	CX-TBD	-		Into FY 2003		
DP-10 Safety/Infrastructure GPPs	CX-TBD	-		Into FY 2003		
Sigma GPP	CX-TBD	-		Into FY 2003		
Electrical Infrastructure Safety Upgrade (TA-3-32)	CX-TBD	-		Into FY 2005		
Electrical Infrastructure Safety Upgrade (TA-35-2)	CX-TBD	-		Into FY 2005		
Electrical Infrastructure Safety Upgrade (TA-35-27)	CX-TBD	-		Into FY 2005		
Electrical Infrastructure Safety Upgrade (TA-33-114)	CX-TBD	-		Into FY 2005		
Vulnerable Office Building Replacement #04-1	CX-TBD	-		Into FY 2004		
Vulnerable Office Building Replacement #04-2	CX-TBD	-		Into FY 2004		
Vulnerable Office Building Replacement #04-3	CX-TBD	-		Into FY 2004		
WETF Systems Refurbishment	CX-TBD	-		Into FY 2005		
Central Auditorium Building 200	CX-TBD	-		Into FY 2004		
ESA Landscaping	EA-Prep	-		Into FY 2004		
Relocate JNETF and R&R NDE	EA-Prep	-		Into FY 2005		
Shock and Vibration Laboratory	EA-Prep	-		Into FY 2004		
TA-16-450 Gas Transfer System	CX-TBD	-		Into FY 2005		
Reconfigure TA-39-98, Close TA-39-2, 39-103, 39-07	CX-TBD	-		Into FY 2004		
SM-66 Electroplating Labs Renovation	CX	-		Into FY 2004		
TA-50-37 RAMROD Upgrade For Actinide Chemistry	CX-TBD	-		Into FY 2004		
TA-16 Security Upgrade	CX-TBD	-		Into FY 2004		
TA-03-1698 Offices Above Microscope Labs	CX	-		Into FY 2004		
TA-53 Replace Roofs	CX	-		Into FY 2004		
TA-35 TSL-189 Trident Laser HVAC Upgrades	CX	-		Into FY 2004		
Lujan Center Neutron Production Target System	SWEIS	-		Into FY 2004		
Communication Shop Building	CX	-		Into FY 2004		
Royal Crest Intersection Improvements	CX	-		Into FY 2004		

Appendix D. Future Projects (continued)

Table D-3. Future Projects (continued)

ITEM	NEPA	CON-STRUCTION STATUS	FUNDING CATEGORY			
			EXPENSE PROJECTS	GENERAL PLANT PROJECTS	INSTITU-TIONAL PROJECTS	MAIN-TENANCE
TA-53 Substation 115kV Ring Bus Update	CX-TBD	-			Into FY 2006	
Replace TA-53 (2) 115kV Transformers	CX-TBD	-			Into FY 2008	
Uncross NL and RL 115kV Lines	CX-TBD	-			Into FY 2010	
PP-Cooling Tower Piping Replacement	CX-TBD	-			Into FY 2010	
Reconductor Norton Line	CX-TBD	-			Into FY 2011	
TA-3 South Sewer Relief Project	CX-TBD	-			Into FY 2002	
Express Feeder	CX-TBD	-			Into FY 2002	
New Border Station-East Jemez Road	CX-TBD	-			Into FY 2002	
90 MVAR SVC Capacitor	CX-TBD	-			Into FY 2004	
LAC Sewer Project	EA-TBD	-			Into FY 2003	
Add 3rd 115kV Transformer TA-3	CX-TBD	-			Into FY 2005	
TA-3/58 Gravity Line	CX-TBD	-			Into FY 2005	
345kv Ring Bus Norton	CX-TBD	-			Into FY 2007	
100psi Natural Gas Lines, TA-3	CX-TBD	-			Into FY 2008	
Add 2nd 115kV Transformer TA-5 (ETA)	CX-TBD				Into FY 2007	
TA-70 115/13.8kV Substation	CX-TBD	-			Into FY 2008	
TA-70 345/115kV Substation	CX-TBD	-			Into FY 2009	
TA-3 Power Plant Backpressure Turbine	CX-TBD	-			Into FY 2009	
100psi Natural Gas Lines, TA-16	CX-TBD	-			Into FY 2012	
F&I Initiatives Maintenance	-	-				Into FY 2004
Preventive Maintenance – Included in General Maintenance						
Predictive Maintenance – Included in General Maintenance						
Corrective Maintenance – Included in General Maintenance						
Maintenance Management – Included in General Maintenance						
General Maintenance	-	-				Into FY 2012

Table D-4. Future Projects

ITEM	NEPA	CONSTRUCTION STATUS	FUNDING CATEGORY		
			DECOMMISSIONING AND DEMOLITION CHARGES	POTENTIAL D&D TRANSFER OF RESPONSIBILITY TO EM	FACILITIES MANAGEMENT & SITE PLANNING
Cerro Grande Rehabilitation Project	CX	Started	Into FY 2001		
Sherwood Building and Adjacent Structures	CX	Started	Into FY 2001		
TA-53 Cooling Towers	CX	-	-		
NISC Funded D&D	EA-FONSI	-	-		
FY 02 RTBF Funded D&D	CX-TBD	-	Into FY 2002		
FY 02 F&I Funded D&D	CX-TBD	-	Into FY 2002		
FY 03 RTBF Funded D&D	CX-TBD	-	Into FY 2003		
FY 03 F&I Funded D&D	CX-TBD	-	Into FY 2003		
FY 04 RTBF Funded D&D	CX-TBD	-	Into FY 2004		
FY 04 F&I Funded D&D	CX-TBD	-	Into FY 2004		
FY 05 RTBF Funded D&D	CX-TBD	-	Into FY 2005		
FY 05 F&I Funded D&D	CX-TBD	-	Into FY 2005		
SM-43 D&D	CX-TBD	-	-		
FY 06 RTBF Funded D&D	CX-TBD	-	Into FY 2006		
FY 06 F&I Funded D&D	CX-TBD	-	Into FY 2006		
TSTA	CX-TBD	-		Into FY 2003	
DP-West Ion Beam Facility	CX-TBD	-		Into FY 2003	
TSFF	CX-TBD	-		-	
Engineering	-				Into FY 2012
Rental of Buildings and Land	-				Into FY 2012
Facility Startup and Project Support	-				-
Other	-				Into FY 2012
Utilities	-				Into FY 2012
Ten Year Site Plans (All of Site Planning)	-				Into FY 2012

Frijoles Canyon.