SWEIS Yearbook — 2005

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Title

SWEIS Yearbook — 2005

Comparison of 2005 Data Projections of the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory

Author(s)

Risk Reduction Office
Environmental Protection Division

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

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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 (DOE 1999b).

Every five years, DOE performs a formal analysis of the adequacy of the SWEIS to characterize the environmental envelope for continuing operations at LANL. The Annual SWEIS Yearbook was designed to assist DOE in this analysis by comparing 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 approximately 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 1999, 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 2001, http://lib-www.lanl.gov/la-pubs/00818189.pdf).
- "SWEIS Yearbook – 2001," LA-UR-02-3143, September 2002 (LANL 2002, http://lib-www.lanl.gov/cgi-bin/getfile?00818857.pdf).
- "SWEIS Yearbook – 2002," LA-UR-03-5862, September 2003 (LANL 2003, http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-03-5862.htm)

[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.

- "SWEIS Yearbook – 2003," LA-UR-04-6024, September 2004 (LANL 2004, http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-04-6024.htm)
- "SWEIS Yearbook – 2004," LA-UR-05-6627, September 2005 (LANL 2005, http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-05-6627.htm)
- "SWEIS Yearbook – 2005," LA-UR-06-6020, September 2006 (LANL 2006, http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-06-6020.htm)

The 2005 Yearbook will present the seventh year of data compiled since the ROD for the LANL SWEIS was issued in September 1999. The Yearbook 2005 is an essential component in DOE's five-year evaluation of how accurately the SWEIS represents LANL current and projected operations. DOE regulations require this review, called a supplement analysis, of the SWEIS every five years, to determine if the SWEIS is adequate or needs to be supplemented or a new SWEIS should be written.

The collective set of Yearbooks contains data needed for trend analyses, identifies potential problem areas, and enables decision-makers to determine when and if an updated SWEIS or other National Environmental Policy Act analysis is necessary. This edition of the Yearbook summarizes the data from 2005, and, together with the previous editions of the Yearbook, provides trend analysis of these data to assist DOE in its decision-making process.

Previous editions of the Yearbook have incorporated photographs depicting important events that occurred during the calendar year under review. However, due to budgetary constraints this year, the 2005 Yearbook contains no photographs and a minimum of figures. In addition, this edition of the Yearbook will not be published as a stand-alone document but will be available on-line.

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Executive Summary

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

DOE and LANL implemented a program, the Annual Yearbook, making comparisons between SWEIS ROD projections and actual operations data for two reasons: first, to preserve and enhance the usefulness of the SWEIS as a "living" document, and second, to provide DOE with a tool to assist in determining the continued adequacy of the SWEIS in characterizing existing operations. The Yearbooks from calendar year (CY) 1998 through 2005, with the exception of CY 2002, focus on operations during one CY and specifically address the following:

- facility and/or process modifications or additions;
- types and levels of operations during the CY;
- operations data during the CY; and
- site-wide effects of operations for the CY.

The 2002 Yearbook was a special edition to assist DOE/National Nuclear Security Administration in evaluating the need for preparing a new SWEIS for LANL. This edition of the Yearbook summarized the data routinely collected from individual CYs as described above. It also contained additional text and tabular summaries as well as a trend analysis. The 2002 Yearbook also indicated LANL's programmatic progress in moving towards the SWEIS projections.

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 LANL 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 2005 Yearbook 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 (TA). Chapter 2 discusses each of the 15 Key Facilities from three aspects—significant facility construction and modifications that have occurred during 2005, the types and levels of operations that occurred during 2005, and the 2005 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 2005, construction of new facilities continued at one of the 15 Key Facilities. New structures completed and occupied during 2005 included the new High-Power Detonator Production Facility, Building 22-115, and magazine TA-22-118 at TA-22 and the new Hydrotest Design Facility, TA-22-120, also at TA-22. Additionally, one major construction project, construction of the Center for Integrated Nanotechnologies, continued in 2005 at the Non-Key Facilities.

The ROD projected a total of 38 facility construction and modification projects for LANL. Twenty projects have now been completed: six in 1998, eight in 1999, two in 2000, and four in 2002. The number of projects started or continued each year were 13 in 1998, 10 in 1999, seven in 2000, and six in both 2001 and 2002. One of these projects was completed in 2003 and one in 2004.

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 US Environmental Protection Agency (EPA) on December 29, 2000. This brings the total number of permitted outfalls up to 21. During 2005, only 17 of the 21 outfalls flowed.

As in the Yearbooks since 1999, 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 2005 chemical usage amounts were extracted from LANL's new chemical inventory system called ChemLog rather than the Automated Chemical Inventory System used in the past. The quantities used for this report represent chemicals procured or brought on site by CY from 1999 through 2005. 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 2004" (LANL 2005).

With a few exceptions, the capabilities identified in the SWEIS ROD for LANL have remained constant since 1998. The exceptions are the

- movement of the Nonproliferation Training/Nuclear Measurement School between Pajarito Site and the Chemistry and Metallurgy Research (CMR) Building during 2000 and 2002,

- relocation of the Decontamination Operations Capability from the Radioactive Liquid Waste Treatment Facility to the Solid Radioactive and Chemical Waste Facilities in 2001,
- transfer of part of the Characterization of Materials Capability from Sigma to the Target Fabrication Facility (TFF) in 2001, and
- loss of Cryogenic Separation Capability at the Tritium Key Facilities in 2001.

Also, following the events of September 11, 2001, LANL was requested to provide support for homeland security.

During CY 2005, 79 capabilities were active. The 17 inactive capabilities were the Cryogenic Separation at the Tritium Facilities; both the Destructive and Nondestructive Assay and the Fabrication and Metallography capabilities at CMR; Characterization of Materials at the TFF; the Accelerator Transmutation of Wastes at the Los Alamos Neutron Science Center (LANSCE); Size Reduction and Other Waste Processing at the Solid Radioactive and Chemical Waste Facilities; Radioactive Liquid Waste Pretreatment at TA-21 or in Room 60 at TA-50; and all nine TA-18 capabilities (Dosimeter Assessment and Calibration, Detector Development, Materials Testing, Subcritical Measurements, Fast-Neutron Spectrum, Dynamic Measurements, Skyshine Measurements, Vaporization, and Irradiation).

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 linear accelerator generated an H^- beam to the Lujan Center for 4,206 hours in 2005, at an average current of 125 microamps, compared to 6,400 hours at 200 microamps projected by the ROD. Similarly, no criticality experiments were conducted at Pajarito Site, compared to the 1,050 projected experiments.

Only three of LANL's facilities operated during 2005 at levels approximating those projected by the ROD—the Materials Science Laboratory (MSL), the Bioscience Facilities (formerly Health Research Laboratory), and the Non-Key Facilities. The two Key Facilities (MSL and Bioscience) 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 2005 totaled approximately 19,100 curies, just under 90 percent of the 10-year average of 21,700 curies projected by the SWEIS ROD. Maximum offsite dose for 2005 was the highest in recent years, due to the emissions controls system failure at LANSCE. The final dose is 6.45 millirem, still below the EPA air emissions limit of 10 millirem per year established for DOE facilities. This dose is calculated to the theoretical "maximum exposed individual" who lives at the nearest off-site receptor location 24 hours per day, eating food grown at that same site, etc. No actual person received a dose of this magnitude. As mentioned, offsite dose in 2006 is expected to return to the much lower levels measured before 2005.

Calculated NPDES discharges totaled 198.26 million gallons for CY 2005 compared to a projected volume of 278 million gallons per year. This is approximately 35.74 million gallons more than the CY 2004 total of 162.52 million gallons, due largely to resumption of normal laboratory operations after the LANL stand down that occurred in July 2004. The 2005 total volume of discharge is well below the maximum flow of 278.0 million gallons that was projected in the SWEIS ROD. In addition, the apparent decrease in flows compared to the SWEIS ROD 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.

Waste quantities from 2005 LANL operations were below SWEIS ROD projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities. Quantities of wastes generated in 2005 ranged from approximately 0.7 percent of the chemical waste projection to about 87 percent of the mixed transuranic waste projection.

The workforce has been above ROD projections since 1997. The 13,504 employees at the end of CY 2005 represent 2,153 more employees than projected and reflect an increase of 243 employees from CY 2004. Since 1998, the highest peak electricity consumption was 421 gigawatt-hours during 2005 and the maximum peak demand was 85 megawatts during 2001 compared to projections of 782 gigawatt-hours with a peak demand of 113 megawatts. The peak water usage was 461 million gallons during 1998 (compared to 759 million gallons projected), and the peak natural gas consumption was 1.49 million decatherms during 2001 (compared to 1.84 million decatherms projected). Between 1998 and 2005, the highest collective Total Effective Dose Equivalent for the LANL workforce was 155.6 person-rem during 2005, 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 low-level radioactive waste. As of 2005, this expansion had not become necessary.

Cultural resources remained protected, and no excavation of sites at TA-54 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.) However, a total of 10 cultural sites were excavated in Rendija Canyon from June to December 2005.

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 1995–2005 period, and water levels in the regional aquifer have continued a gradual decline that started in about 1977. Twenty-one additional characterization wells were complete by the end of 2005.

In addition, ecological resources are being sustained as a result of protection afforded by DOE administration 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.

In conclusion, LANL operations data mostly fell within projections. Operations data that exceeded projections, such as number of employees, produced a positive impact on the economy of northern New Mexico. Overall, the 2005 operations data indicate that LANL was operating within the SWEIS envelope and still ramping up operations towards the preferred Expanded Alternative in the ROD.

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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 Yearbook 2001. The Ecology Group of the Environmental Stewardship Division (ENV-ECO) completed Yearbooks 2001, 2002, and 2003. Ken Rea served as document manager for Yearbooks 2001 and 2002. Susan Radzinski, ENV-RRO, served as document manager for Yearbooks 2003, 2004, and 2005; chief contributor was Marjorie Wright, ENV-RRO.

Hector Hinojosa provided editorial support and served as the designer and electronic publication specialist. We would also like to thank Kathy Bennett for creating maps and figures.

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.

Area of Contribution	Contributor
Air Emissions	Margie Stockton
Air Emissions	David Fuehne
Air Emissions	Walter Whetham
Bioscience (Formerly Health Research Laboratory)	Kurt Beckman
Chemistry and Metallurgy Research Building	Robert Romero
Cultural Resources	Kari Garcia
Cultural Resources	Bruce Masse
Ecological Resources	Leslie Hansen
Ecological Resources	Sam Loftin
Environmental Remediation and Surveillance Program	Virginia Smith
Groundwater	Kim Birdsall
Groundwater	Jean Dewart
High Explosives Processing	Bart Olinger
High Explosives Processing	Kathy Smith
High Explosives Testing	Randy Johnson
Land Resources	Kirt Anderson
Liquid Effluents	Carla Jacquez
Liquid Effluents	Marc Bailey
Liquid Effluents	Mike Saladen
Los Alamos Neutron Science Center	Howard Nekimken
Los Alamos Neutron Science Center	Ben Poff
Machine Shops	Anthony Martinez
Materials Science Laboratory	Bryan Colby
National Pollutant Discharge Elimination System Data	Mike Saladen
National Pollutant Discharge Elimination System Data	Carla Jacquez
National Pollutant Discharge Elimination System Data	Marc Bailey
National Pollutant Discharge Elimination System Data	Steve Veenis
National Pollutant Discharge Elimination System Data	Robin Reynolds

Area of Contribution	Contributor
National Pollutant Discharge Elimination System Data	Shellie Winsemius
Non-Key Facilities–Atlas	Robert Reinovsky
Pajarito Site	Bruce White
Plutonium Complex	Harvey Decker
Radioactive Liquid Waste Treatment Facility	Chris Del Signore
Radiochemistry Facility	Bryan Colby
Sigma	Bryan Colby
Socioeconomics	John Pantano
Solid Radioactive and Chemical Waste Facilities	Bob Lechel
Solid Radioactive and Chemical Wastes	Tim Sloan
Target Fabrication Facility	Bryan Colby
Trend Analysis	Kirt Anderson
Tritium Facilities	Suzanne Kitten
Tritium Facilities	Richard Hemphill
Utilities	Jerome Gonzales
Utilities	Gilbert Mackey
Utilities	Jim Haugen
Worker Safety/Doses	Brian Colby
Worker Safety/Doses	Bob Bates

Acronyms

ACA	Accelerated Corrective Action
AFCI	Advanced Fuel Cycle Initiative
ALARA	as low as reasonably achievable
AO	Administrative Order
AOC	area of concern
ARTIC	Actinide Research and Technology Instruction Complex
BIO	Basis for Interim Operation
BMP	best management practice
BSL	Biosafety Level
CASA	Critical Assembly and Storage Area
CCP	Central Characterization Program
CDC	Centers for Disease Control
CINT	Center for Integrated Nanotechnology
CMR	Chemistry and Metallurgy Research
COPC	contaminant of potential concern
CRMP	Cultural Resources Management Plan
CY	calendar year
CRT	Cultural Resources Team
D&D	decontamination and demolition
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
DOE	US Department of Energy
DVRS	Decontamination and Volume Reduction System
DX	Dynamic Experimentation (Division)
EISU	Electrical Infrastructure Safety Upgrades
EMS	Environmental Management System
EPA	US Environmental Protection Agency
ERS	Environmental Remediation and Surveillance (Program)
ESA	Engineering Sciences and Application (Division)
ESM	Engineering Standards Manual
ETA	Eastern Technical Area
FFCA	Federal Facility Compliance Agreement
FIRP	Facility Infrastructure Recapitalization Program
FITS	Facility Improvement Technical Support (building)
FTE	full-time equivalent (employee)
FY	Fiscal Year
HAP	hazardous air pollutant
HEPA	high-efficiency particulate air (filter)
HIR	Historic Information Report
HRL	Health Research Laboratory
HSR-1	Health Physics Operations group
HSWA	Hazardous and Solid Waste Amendment
IAEA	International Atomic Energy Agency
IM	Information Management (Division)
ISO	International Organization of Standardization
IWP	Investigation Work Plan
KSL	KBR/Shaw/LATA
kV	kilovolts
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LASO	Los Alamos Site Office
LEDA	Low-Energy Demonstration Accelerator
linac	linear accelerator
LLW	low-level radioactive waste
LPSS	Long-Pulse Spallation Source
m	meter
MDA	Material Disposal Area

MeV	million electron volts
MGY	million gallons per year
MLLW	mixed low-level radioactive waste
MSGP	Multi-Sector General Permit
MSL	Materials Science Laboratory
MST	Material Science and Technology (Division)
NEPA	National Environmental Policy Act
NES	Nuclear Environmental Site
NFA	no further action
NMED	New Mexico Environment Department
NMSHPD	New Mexico State Historic Preservation Department
NMSSUP	Nuclear Materials Safety and Security Upgrades Project
NMT	Nuclear Materials Technology (Division)
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NRC	US Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NSSB	National Security Sciences Building
NTTL	Neutron Tube Target Loading
OSR	Offsite Source Recovery (Program)
PHERMEX	Pulsed High-Energy Radiographic Machine Emitting X-rays (facility)
PNM	Public Service Company of New Mexico
PP	Pollution Prevention
PRS	potential release site
PTLA	Protection Technology Los Alamos
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent man
RLWTF	Radioactive Liquid Waste Treatment Facility
ROD	Record of Decision
SA	Supplement Analysis
SHPO	State Historic Preservation Officer
SNM	special nuclear material
SST	Safe, Secure Trailer
STA	Southern Technical Area
SWEIS	Site-Wide Environmental Impact Statement
S-SWEIS	Supplemental Site-Wide Environmental Impact Statement
SWMU	solid waste management unit
SWPPP	stormwater pollution prevention plan
TA	Technical Area
TEDE	total effective dose equivalent
TFF	Target Fabrication Facility
TRU	transuranic
TSFF	Tritium Science and Fabrication Facility
TSR	Technical Safety Requirement
TSTA	Tritium Systems Test Assembly (facility)
TWISP	Transuranic Waste Inspectable Storage Project
TYCSP	Ten-Year Comprehensive Site Plan
UC	University of California
UF/RO	ultrafiltration/reverse osmosis
VOC	volatile organic compound
WCRR	Waste Characterization, Reduction, and Repackaging (facility)
WETF	Weapons Engineering Tritium Facility
WIPP	Waste Isolation Pilot Plant
WMin	Waste Minimization
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 the 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 Los Alamos National Laboratory (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, environmental assessments, or environmental impact statements) 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 and Non-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

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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 administrator of Federal lands.

- Trend analysis (Chapter 4). This includes analysis on land use, quantities of waste generated, utility consumption, and other long-term effects from LANL operations.

- Ten-Year Comprehensive Site Plan (TYSCP) (Chapter 5). This summary of LANL projections for the future is not included in this edition of the Yearbook.

- Summary and conclusion (Chapter 6). This chapter summarizes CY 2005 for LANL in terms of overall facility constructions and modifications, facility operations, and operations data and environmental parameters. These data form the basis of the conclusion for whether or not LANL is operating within the envelope of the SWEIS ROD.

- 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 through CY 2005.

- Radiological facilities list (Appendix C). These data identify the facilities considered as radiological in CY 2005 and indicate their categorization at the time the SWEIS was developed.

- Pollution Prevention Awards (Appendix D). This appendix provides a summary of the DOE 2005 Pollution Prevention Awards for LANL.

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 enable DOE to make decisions on when and if a new SWEIS is needed. The Yearbooks also provide facilities and managers at LANL with a guide 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 Yearbooks serve 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 LANL 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.

DOE regulations require a formal evaluation, called a supplement analysis (SA), of the SWEIS every five years following the issuance of the ROD, to determine if the SWEIS is adequate or needs to be supplemented or a new SWEIS should be written. Therefore, every fifth year after the issuance of the ROD, the Yearbook will not only report the previous years data on operations, but will also include summaries and trends of the data presented in the previous four editions.

1.3 This Yearbook

The ROD selected levels of operations, and the SWEIS provided projections for these operations. This Yearbook compares data from CY 2005 to the appropriate SWEIS ROD 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.

The SWEIS Yearbook 2002 represented the fifth year of data collection and comparison since the issuance of the SWEIS. It included summaries of data from 1998 through 2002, trends in the data across these years, and additional information as deemed necessary to enable DOE to use that document together with the SWEIS Yearbooks 2003 and 2004, as the primary source of information to determine the adequacy of the existing SWEIS. The Yearbook 2005 presents the eighth year of data compiled since the SWEIS ROD was issued in September 1999. The annual Yearbooks together are an essential component in DOE's five-year evaluation of how accurately the SWEIS represents LANL current and projected operations.

According to Federal regulations, the NNSA initiated preparation of a *Supplement Analysis for the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory* in mid-2004. The purpose of the SA was to determine if the existing SWEIS remains adequate. In addition to preparing the 2003 Yearbook, the Ecology group prepared a SA information document (LANL 2004) to provide the data to be analyzed in the SA. This information document presented the following data: (1) facility and process modifications and additions; (2) current and projected capabilities and levels of operation from 1998 through 2009 as compared to the

SWEIS ROD (DOE 1999b); (3) operations data for the Key and Non-Key Facilities, including waste volumes and air emissions from 1998 through 2003 as compared to the SWEIS ROD; (4) current, proposed, or modified projects with potential environmental consequences; (5) evaluation of the present LANL affected environment due to certain events, new regulatory or institutional requirements and guidelines, and expanded knowledge; (6) revised accident analysis based on current conditions and site boundary changes; and (7) a wildfire accident analysis.

During the development of the SA, NNSA identified the need to prepare a Supplemental SWEIS (S-SWEIS). Since the issuance of the Final SWEIS in 1999, DOE and NNSA have completed several environmental impact statements, environmental assessments, and a Special Environmental Analysis addressing LANL operations and actions taken immediately after the 2000 Cerro Grande Fire, which burned a part of LANL. These analyses document substantial developing changes to both LANL's environmental setting and LANL's programs since 1999.

In October 2004, NNSA (NNSA 2004) decided to update and supplement the original LANL SWEIS by preparing an S-SWEIS to consider

- impacts of proposed new activities;
- impacts resulting from changes in the environmental setting; and
- cumulative impacts associated with on-going activities on site.

In August 2005 a memo was issued to LANL from NNSA to prepare a new SWEIS (NNSA 2005). This new SWEIS was determined to be the appropriate level of analysis for compliance with the National Environmental Policy Act (NEPA) with regard to the required five-year adequacy review of the 1999 LANL SWEIS. The new SWEIS will tier from the 1999 SWEIS and will consider both reduced operations and expanded operations alternatives, in addition to the no action alternative. The period of analysis for future operations will be five years into the future (covering 2007 through 2011). Environmental impacts of specific projects for LANL facility replacements and refurbishments, as well as projects having to do with operational changes, will be analyzed in this new SWEIS.

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2.0 Facilities and Operations

LANL has about 2,000 structures with approximately eight million square feet under roof, spread over an area of approximately 40 square miles of land owned by the US Government and administered by DOE and the NNSA. Most of LANL is undeveloped to provide a buffer for security, safety, and expansion possibilities for future use. Approximately half of the square footage at LANL is considered laboratory or production space; the remaining square footage is considered administrative, storage, service, and other space. While the number of structures changes with time (there is frequent addition or removal of temporary structures and miscellaneous buildings), the current breakdown is about 952 permanent buildings, 373 temporary structures (trailers and transportables), and 897 miscellaneous structures such as sheds and utility structures. Collectively, between 2001 and 2005, 437,461 gross square feet have been removed from all technical areas (TAs) through a variety of funding initiatives.

In order to present a logical, comprehensive evaluation of the potential environmental impacts at LANL, the *1999 SWEIS* developed the Key Facility concept, a framework for analyzing the types and levels of activities performed across the entire site. This framework assisted in analyzing the impacts of activities in specific locations (TAs) and the impacts related to specific programmatic operations (Key Facilities and capabilities). Taken together, the 15 Key Facilities represent the great majority of environmental risks associated with LANL operations. The 15 Key Facilities identified 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).

In addition, the Key Facilities (as presented in the SWEIS) comprised 42 of the 48 Category 2 and Category 3 Nuclear Structures at LANL[1]. Subsequently, DOE and LANL have published nine lists identifying nuclear facilities at LANL [one in 1998 (DOE

[1] 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 DOE Los Alamos Site Office (LASO) as of December 2002 (LANL 2002a).

1998a), another in 2000 (DOE 2000a), two in 2001 (LANL 2001a and 2001b), one in 2002 (LANL 2002a), two in 2004 (LANL 2004a and 2004b)], and two in 2005 (LANL 2005a and 2005b)] that significantly changed the classification of some buildings. Appendix B provides a summary of the current nuclear facilities; a table has been added to each section of this chapter to explain the differences and identify the 27 nuclear facilities currently listed by DOE. Of these 27 facilities, all but six reside within a Key Facility. Appendix C provides a comparison of the facilities identified as radiological when the SWEIS was prepared and those identified as radiological in 2005 (LANL 2002b). The 2005 lists are shorter due to better guidance on the radiological designation[2].

With the issuance of 10 CFR 830 on January 10, 2001, on-site 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, on-site transportation was considered part of the affected environment in Section 4.10.3.1. The on-site transportation of nuclear materials greater than or equal to Hazard Category 3 quantities is addressed in a DOE-approved safety analysis (LANL 2002c, DOE 2002a, Steele 2002). The implementation of the analysis and associated controls is under development.

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

This chapter discusses each of the 15 Key Facilities from three aspects—significant facility construction and modifications, types and levels of operations, and operations data that have occurred during 2005. 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 10-year period 1996–2005. All construction activities may not be complete and projected operations may not have yet reached maximum levels.

This chapter also discusses Non-Key Facilities, which include all buildings and structures not part of a Key Facility, or the balance of LANL. The Non-Key Facilities represent a

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2 Since the publication of the SWEIS, only two radiological facility lists have been published. The first (LANL 2001c) was published in 2001 and the second (LANL 2002b) in 2002.

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.

significant fraction of LANL and comprise all or the majority of 30 of LANL's 49 TAs including TA-00 which comprises leased space within the Los Alamos town site and TA-57 at Fenton Hill, and approximately 14,224 of LANL's 26,480 acres. The Non-Key Facilities currently employ about 42 percent of the LANL workforce. The Non-Key Facilities include such important buildings and operations as the Nicholas C. Metropolis Center for Modeling and Simulation (formerly known as the Strategic Computing Complex), the Nonproliferation and International Security Center, the new National Security Sciences Building (NSSB) that is now the main administration building, and the TA-46 sewage treatment facility. 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 TAs. Figure 2-3 shows the locations of the Key Facilities.

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
Materials Science Laboratory (MSL)	TA-03	2
TFF	TA-35	3
Machine Shops	TA-03	8
High Explosives Processing	TAs 08, 09, 11, 16, 22, 37	1,115
High Explosives Testing	TAs 15, 36, 39, 40	8,691
LANSCE	TA-53	751
Bioscience 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	14,224 [a]
LANL		26,480

a 14,224 acres is a correction from the 2002 Yearbook that reported 14,244 acres for the Non-Key Facilities.

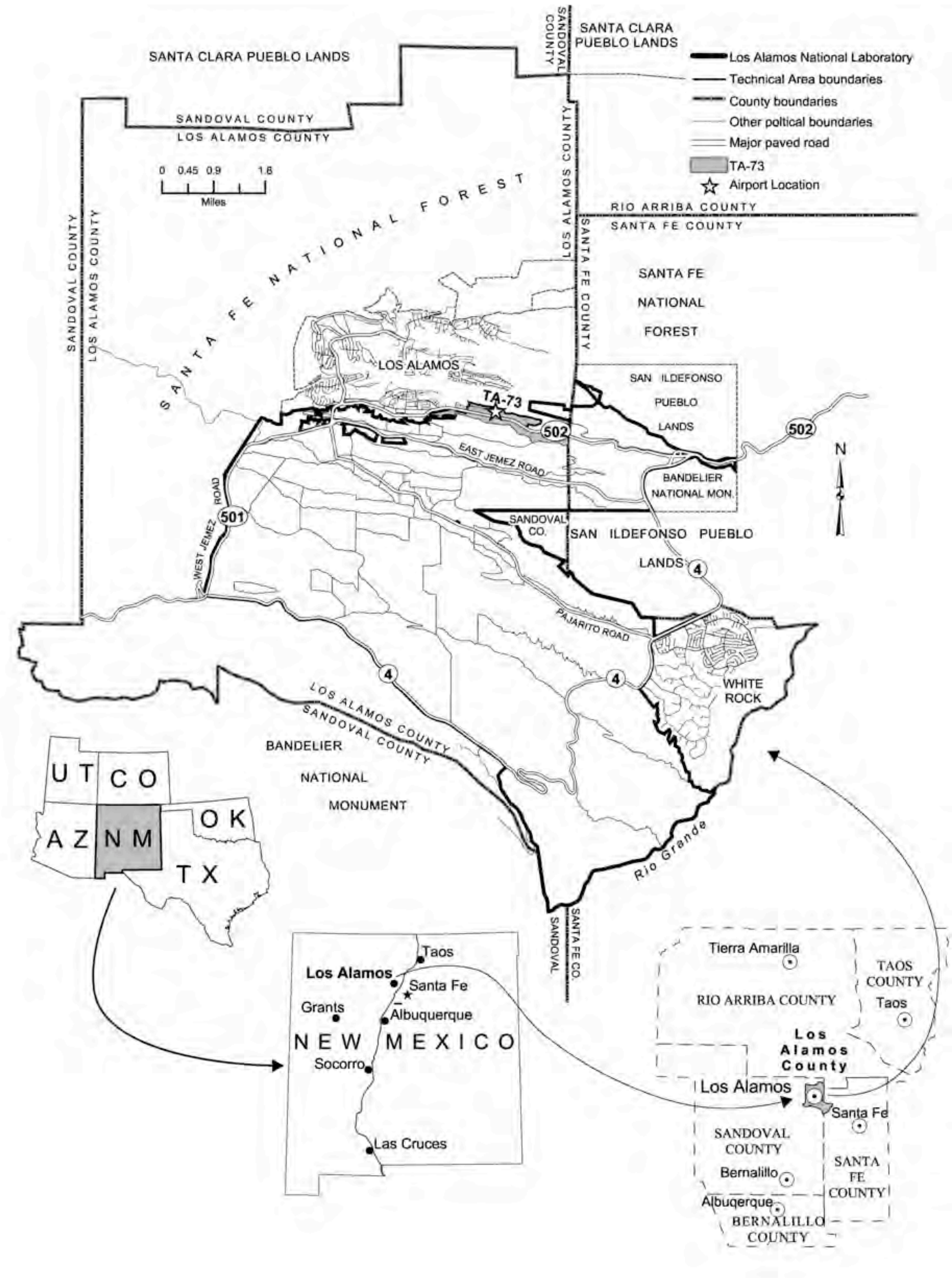

Figure 2-1. Location of LANL

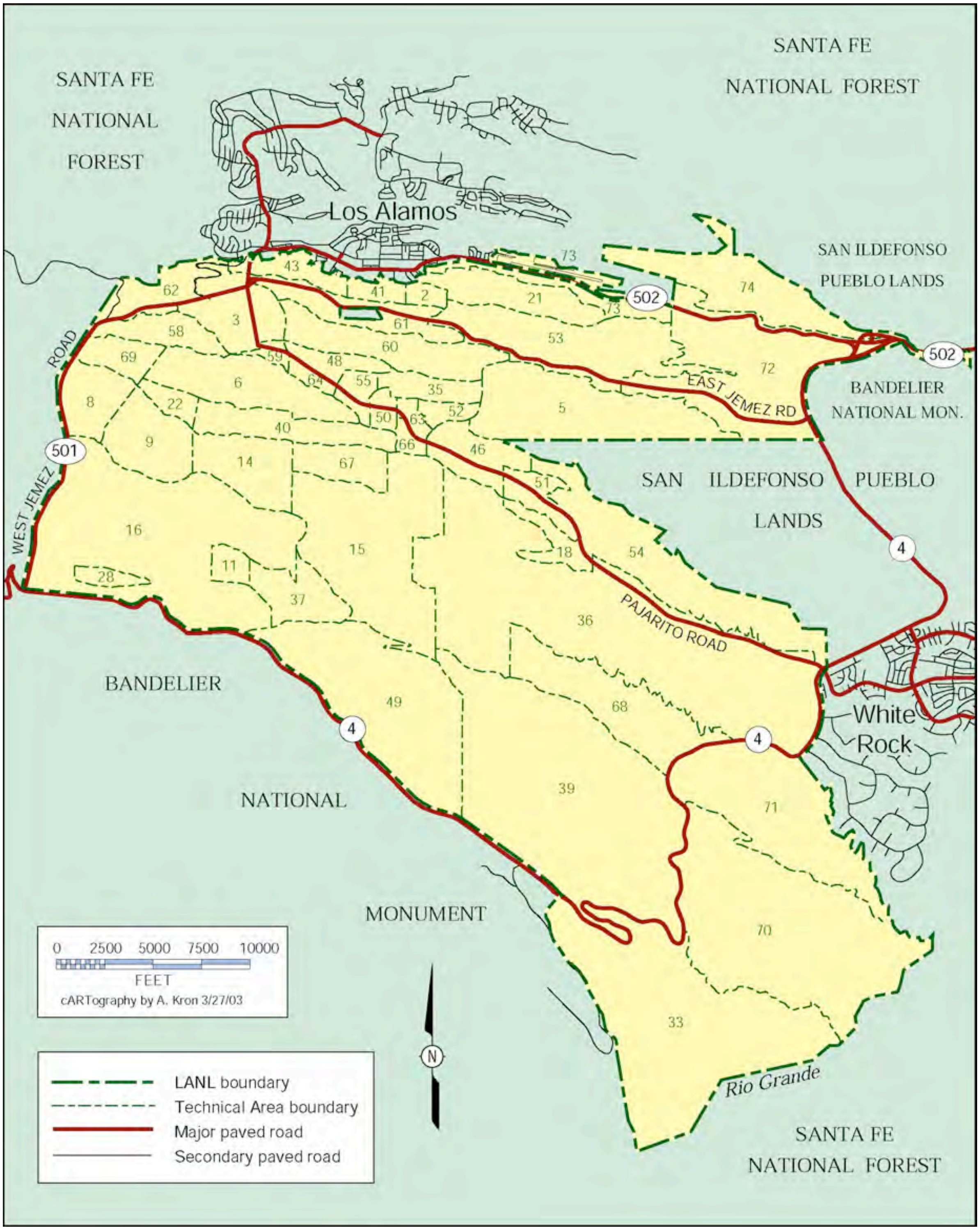

Figure 2-2. Location of TAs

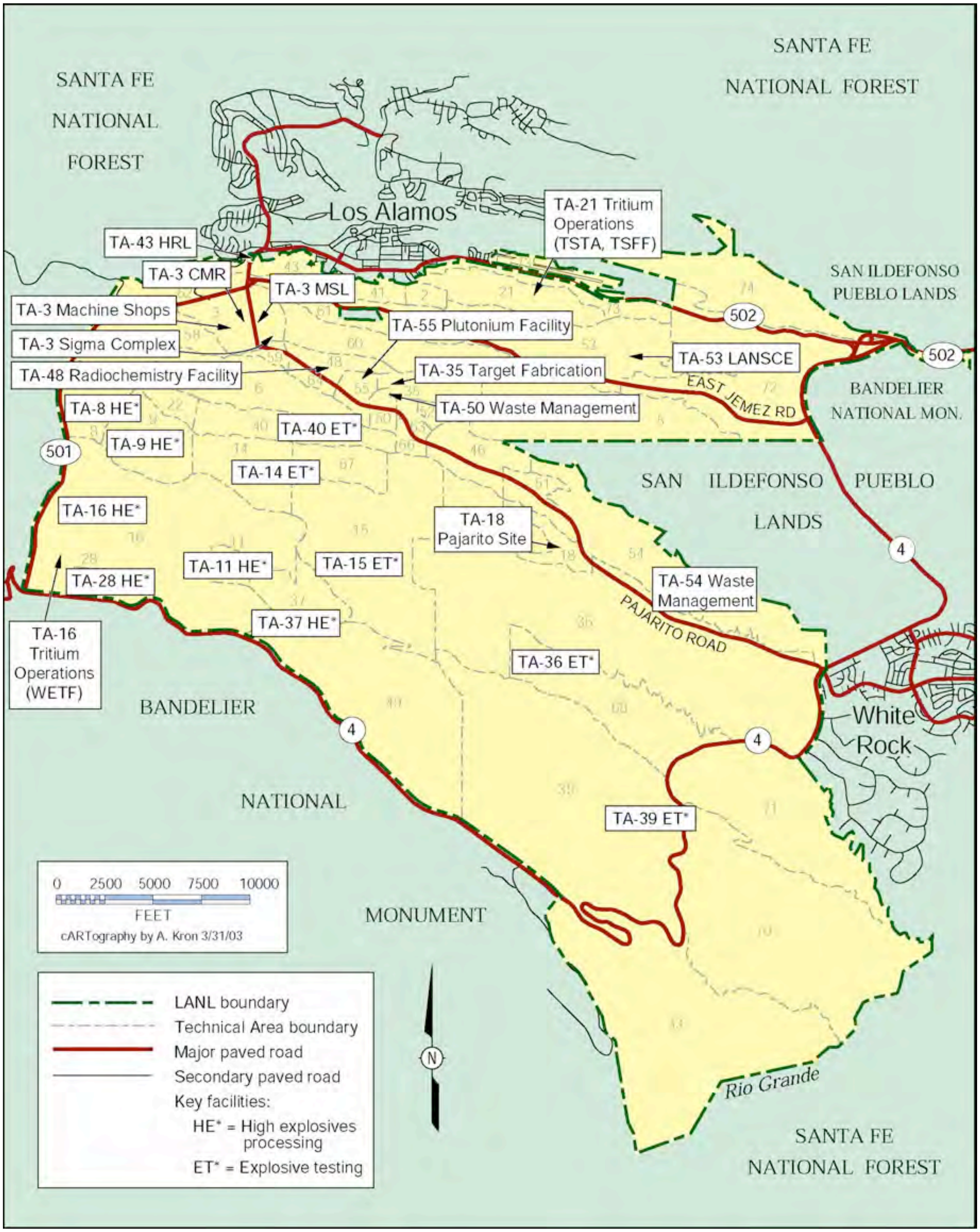

Figure 2-3. Location of Key Facilities

2.1 Plutonium Complex (TA-55)

As presented in the SWEIS, the Plutonium Complex Key Facility consists of six primary buildings and a number of lesser buildings and structures. 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) when the SWEIS was written. Additionally, Nuclear Materials Technology (NMT) Division acquired and took ownership of the TA-50-37 building, designated as the Actinide Research Training and Instruction Center (ARTIC) in CY 2003. A new structure for TA-55, the TA-55-314 Fire Safe Storage Building, was completed in October of 2004. In 2005, a third Category 2 nuclear facility, the Safe, Secure Trailer (SST) Pad, was constructed and became operational in November 2005.

The DOE listing of LANL nuclear facilities for both 1998 and 2005 (DOE 1998a, LANL 2005b) retained Building TA-55-4 as a Category 2 nuclear hazard facility. The LANL Nuclear Facilities list revised in October 2005 added Buildings TA-55-185 and -355 to the list of Nuclear Hazard Category 2 facilities (LANL 2005b) (Table 2.1-1).

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

Building	Description	NHC SWEIS ROD	NHC DOE 1998[a]	NHC LANL 2005[b]
TA-55-0004	Plutonium Processing	2	2	2
TA-55-0041	Nuclear Material Storage	2		
TA-55-185	Drum Storage Building			2
TA-55-355	Safe, Secure Trailer Pad			2

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a).
b DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b).

Note: *This table and the Nuclear Hazard Classification tables in the other sections of this Yearbook reflect the data in the published DOE listings of LANL nuclear facilities and LANL radiological facilities that applied during the CY under review, in this case CY 2005. Changes in the listings that have occurred during the year will not be reflected in this table if they are not yet published in these documents. However, changes in nuclear hazard classification will be noted in the text of this section.*

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). Building PF-41 is currently being analyzed in the new SWEIS as a potential long-term radiography facility or to be demolished and replaced by new construction for a long-term radiography facility;

- construction of a new administrative office building. Construction of the Facility Infrastructure Technical Support (FITS) building (PF-66) was completed in 1999; Construction of the 55-313 building (PF-313) immediately to the east of the 55-66 building was completed in 2003;
- upgrades within Building 55-4 to support continued manufacturing at the existing capacity of 14 pits per year (includes the 1996 installation of a new TA-55 Facility Control System); 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. If these projects have not yet been completed, their 2005 status is listed below:

CMR Replacement Project[4] DOE Pre-conceptual Design (LANL 2001d), on-going in CY 2005;
FRIT Transfer System (LANL 2001e; DOE 1996a), on-hold in CY 2005 due to funding deficiency;
TA-18 Relocation Project CATIII/IV at TA-55 (LANL 2001f and 2001g, DOE 2002b). At the end of CY 2005, this was still under consideration;
TA-18 Relocation Project CAT-I Piece (LANL 2001h, DOE 2002b). In 2005, LANL was directed to establish temporary certified secure storage repositories at TA-55 for intermediate storage of Security Category I/II special nuclear material (SNM) from TA-18 (DOE 2005, LANL 2005c). Construction occurred during spring of 2005; SNM was transferred to TA-55 in September 2005. Programmatic SNM is destined to be shipped off-site by September 2007 with all surplus SNM shipments to disposition locations by March 2008.

During CY 2002, there were several projects that were started for maintenance or replacement purposes. The projects are listed below with their CY 2005 status:

TA-55 Radiography/Interim (LANL 2001i), on-going in CY 2005;
TA-55 Radiography (LANL 2001j), complements TA-55 Radiography/Interim, on-going in CY 2005;
New Radioactive Liquid Waste collection system line tie-ins design phase is on-going in CY 2005 (DOE 2003a);
Installation of new liquid nitrogen lines and tank on west side of facility was completed in August/September of 2005 (DOE 2003b);
TA-55 New Parking Lot (LANL 2002d), still not started in CY 2005;
FITS Parking Lot (LANL 2002e), still not started during CY 2005; and
CMR Replacement Geotechnical Investigation (LANL 2002f), the first phase in determining the feasibility of constructing the CMR Replacement. Geotechnical

[4] The CMR Replacement Project was covered by an environmental impact statement (DOE 2003c).

surveys were performed in CY 2003; additional surveys continued in CY 2004 and 2005, but it appears this phase is complete and initial construction may commence in 2006.

In 2004, decontamination and demolition (D&D) and upgrades of equipment were initiated in order to upgrade small sample fabrication with a new machining line for plutonium samples. This upgrades work continued through 2005 and is expected to be completed in Fiscal Year (FY) 2007.

The procurement and installation of a new uranium decontamination system was initiated in 2004 and was on-going in 2005.

2.1.2 Operations at the Plutonium Complex

The SWEIS identified seven capabilities[5] for this Key Facility. No new capabilities have been added. One capability, SNM Storage, Shipping, and Receiving, had planned to use 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.

Table 2.1.2-1. Plutonium Complex/Comparison of Operations

Capability	SWEIS ROD[a]	2005 Operations
Plutonium Stabilization	Recover, process, and store the existing plutonium inventory in eight years.	Highest priority items have been stabilized. The implementation plan has been modified between DOE and the Defense Nuclear Facilities Safety Board to be complete by 2010. The project is funded to 2010 but may potentially extend beyond this time by a year or so.
Manufacturing Plutonium Components	Produce nominally 20 war reserve pits/yr. (Requires minor facility modifications.)	Fewer than 20 qualified pits were produced in CY 2005.
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.	Fewer than 65 pits were disassembled during CY 2005. Fewer than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in CY 2005.

5 As defined in the 1999 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. continued

Capability	SWEIS ROD[a]	2005 Operations
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 CY 2005. Fewer than 12 pits were processed through tritium separation in CY 2005.
	Process neutron sources up to 5,000 curies/yr. Process neutron sources other than sealed sources.	No new sources were processed in 2005.
	Process up to 400 kilograms/yr of actinides.[b] Provide support for dynamic experiments.	Fewer than 400 kilograms of actinides were processed in CY 2005. Support was provided for dynamic experiments.
	Perform decontamination of 28 to 48 uranium components per month.	In CY 2005,fewer than 48 uranium components were decontaminated per month.
	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 during CY 2005. Rocky Flats is officially closed.
	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 during CY 2005.
	Fabricate and study nuclear fuels used in terrestrial and space reactors. Fabricate and study prototype fuel for lead test assemblies.	The DOE/Office of Nuclear Energy Advanced Fuel Cycle and Mixed Oxide Fuel Initiative (AFCI) is fabricating actinide nitride fuels for irradiation in a reactor environment. NMT is working with Naval Reactor staff for development of fuel(s) for Space Nuclear Power Applications. The uranium nitride fabrication process was successfully recaptured in 2005. But, DOE/Naval Reactor withdrew from the space nuclear power program in 2005 and nothing more has been done.
	Develop safeguards instrumentation for plutonium assay.	Continued support of safeguards instrumentation development during CY 2005.
	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. continued

Capability	SWEIS ROD[a]	2005 Operations
Fabrication of Ceramic-Based Reactor Fuels	Build mixed oxide fuel test reactor fuel assemblies and continue research and development on fuels.	AFCI fuels are being fabricated for irradiation testing. In 2004, this activity was combined with the above space reactor fuels category since they are essentially the same. Mixed oxide fuel was assembled.
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.	Fewer than 25 kilograms of plutonium-238 were processed, evaluated, and/or tested in 2005.
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 during CY 2005.

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.

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 five percent of projections (about 45 curies in 2005 compared to 1,000 curies projected). No wastes generated during 2005 exceeded SWEIS ROD projections.

Table 2.1.3-1. Plutonium Complex/Operations Data

Parameter	Units[a]	SWEIS ROD	2005 Operations
Radioactive Air Emissions:			
Plutonium-239 [b]	Ci/yr	2.70E-5	None detected
Plutonium-238	Ci/yr	Not projected [c]	None detected
Americium-241	Ci/yr	Not projected [c]	None detected
Other actinides [d]	Ci/yr	Not projected [c]	1.91E-07
Strontium-90/Yttrium-90	Ci/yr	Not projected [c]	None detected
Tritium in Water Vapor	Ci/yr	7.50E+2	2.01E+00
Tritium as a Gas	Ci/yr	2.50E+2	4.25E+01
NPDES[e] Discharge 03A–181	MGY	14	2.40048

Table 2.1.3-1. continued

Parameter	Units[a]	SWEIS ROD	2005 Operations
Wastes:			
Chemical	kg/yr	8,400	1,286
LLW [f]	m^3/yr	754 [h]	290.5
MLLW [f]	m^3/yr	13 [h]	12.9
TRU [f]	m^3/yr	237 [i]	47.4
Mixed TRU	m^3/yr	102 [i]	95.3
Number of Workers	FTEs	589 [j]	739 [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 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 2005 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), KBR/SHAW/LATA (KSL), and other subcontractor personnel. The number of employees for 2005 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 10-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 in 2005 were conducted in two buildings: The Weapons Engineering Tritium Facility (WETF, Building TA-16-205), and the Tritium Science and Fabrication Facility (TSFF, Building TA-21-209). The Tritium Systems Test Assembly (TSTA) is in a Surveillance and Maintenance mode with only limited equipment removal.

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 tritium emissions from TA-55, however, are included in the Plutonium Complex Key Facility.

One facility, WETF, had a tritium inventory greater than 30 grams during the entire 2005 year and, thus, was listed as a Category 2 nuclear facility (Table 2.2-1). During 2005, the tritium inventory at TSFF was reduced to less than 30 grams. This facility was reclassified to a Category 3 nuclear facility in August 2004 and removed from the Nuclear Facility List in October 2005.

Programmatic activities at the TSFF have been reduced and are expected to be concluded in 2006. Neutron Tube Target Loading (NTTL) activities at the TSFF are expected to cease in early 2006 (DOE 1995a). After these activities are completed the TSFF will be placed in a Surveillance and Maintenance mode. When funding becomes available, the TSFF will be deactivated.

Table 2.2-1. Tritium Buildings with Nuclear Hazard Classification

Building	Description	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2005 [b]
TA-16-0205 [c]	WETF	2	2	2
TA-16-0205A [c]	WETF	2		2
TA-16-0450 [c]	WETF	2		
TA-21-0155 [d]	TSTA	2	2	
TA-21-0209	TSFF [e]	2	2	

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)

b DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b)

c In 2003, TA-16-205 and TA-16-205A were nuclear facilities while TA-16-450 was not operational with tritium. The three buildings were physically connected, but radiologically separated. When the WETF Documented Safety Analysis is approved and an operational readiness review is completed, TA-16-205, -205A, and -450 will be considered one facility.

d TSTA was removed from the nuclear facilities list in June of 2003 by DOE and LANL.

e TSFF was downgraded to a Category 3 nuclear facility in August 2004 and removed from the Nuclear Facility List in October 2005.

2.2.1 Construction and Modifications at the Tritium Facilities

During 2005, there were major construction activities and building modifications at WETF at TA-16. This included a new diesel generator and upgraded uninterruptible power supply unit. The inclusion of building 450 to the WETF nuclear boundary was postponed because of the LANL operations stand down and has yet to be included. In addition, DOE halted the implementation of NTTL tritium activities at WETF and transferred all NTTL activities and associated programmatic hardware to Sandia in 2005.

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 at TSTA, has been deleted. Table 2.2.2-1 lists the nine capabilities identified in the SWEIS and presents CY 2005 operational data for each of these capabilities. Operations in 2005 were below projections by the SWEIS ROD because of the LANL operations stand down and remained within the established environmental envelope. For example, 22 high-pressure gas fill operations were conducted in 2005 (compared to 65 fills projected by the SWEIS ROD), and approximately 11 gas boost system tests and gas processing operations were performed (compared to 35 projected).

Table 2.2.2-1. Tritium Facilities/Comparison of Operations

Capability	SWEIS ROD[a]	2005 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 22 high-pressure gas fills/processing operations were performed in 2005.
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 11 gas boost tests and operations were performed in 2005.
Cryogenic Separation: TSTA	Tritium gas purification and processing in quantities up to 200 grams. Capability used five to six times/yr.	No capability exists at LANL in 2005.
Diffusion and Membrane Purification: TSFF, WETF	Research on tritium movement and penetration through materials. Expect six to eight experiments/month. Capability also used continuously for effluent treatment.	Capability used in 2005.
Metallurgical and Material Research: TSFF, WETF	Capability involves materials research including metal getter research and application studies. Small quantities of tritium support tritium effects and properties research and development. Contributes less than 2% of LANL's tritium emissions to the environment.	Activities resulted in less than 1% tritium emissions from each facility.
Thin Film Loading: TSFF (WETF by 2006)	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:, TSFF, WETF	Analytical support to current capabilities. Operations estimated to contribute less than 5% of LANL's tritium emissions to the environment.	Gas analysis operations were continued at TSFF and WETF during 2005. No changes in facility emissions occurred from this activity.
Calorimetry: 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 less than 2% of LANL's tritium emissions to the environment.	Calorimetry activities were conducted at only WETF. 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. On-site 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 of tritium at TSTA and TSFF decreased. In June 2005, the TSFF storage was less than 1.6 grams.

a Includes the remodel of Building 16-450 to connect it to WETF in support of NTTL (DOE 1995a).

2.2.3 Operations Data for the Tritium Facilities

Data for operations at the Tritium Facilities were below levels projected by the SWEIS ROD. 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	2005 OPERATIONS
Radioactive Air Emissions:			
TA-16/WETF, Elemental tritium	Ci/yr	3.00E+2	5.30E+01
TA-16/WETF, Tritium in water vapor	Ci/yr	5.00E+2	3.17E+02
TA-21/TSTA, Elemental tritium	Ci/yr	1.00E+2	1.25E+00
TA-21/TSTA, Tritium in water vapor	Ci/yr	1.00E+2	2.28E+02
TA-21/TSFF, Elemental tritium	Ci/yr	6.40E+2	4.13E+00
TA-21/TSFF, Tritium in water vapor	Ci/yr	8.6E+2	5.71E+01
NPDES Discharge: [a]			
Total Discharges	MGY	0.3	32.977
02A-129 (TA-21)	MGY	0.1	32.585
03A-158 (TA-21)	MGY	0.2	0.392
Wastes:			
Chemical	kg/yr	1,700	9.1
LLW	m^3/yr	480	49.5
MLLW	m^3/yr	3	0.1
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	28 [c]	11 [c]

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 2005 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, KSL, and other subcontractor personnel. The number of employees for 2005 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 was designed and constructed in 1952 to house analytical chemistry, plutonium metallurgy, uranium chemistry, engineering design, and drafting. However, at the time the SWEIS ROD was issued in 1999, the CMR Building was described 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 LLW Storage and Transfer Facility (TA-3-154) that is no longer operational. The CMR Building consists of three floors: basement, first floor, and attic. It has seven independent wings connected by a common corridor. The CMR Building remains a Hazard Category 2 per DOE Standard 1027-92 (DOE 1997a).

As shown in Table 2.3-1, the CMR facility has been designated a Hazard Category 2 nuclear facility since the publication of the SWEIS ROD (DOE 1998a, LANL 2005b). CMR is also currently designated a security category 3 nuclear facility.

Table 2.3-1 CMR Buildings with Nuclear Hazard Classification

Building	Description	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2005 [a]
TA-03-0029	CMR	2		2
TA-03-0029	Radiochemistry Hot Cell		2	
TA-03-0029	SNM Vault		2	
TA-03-0029	Nondestructive analysis/nondestructive examination Waste Assay		2	
TA-03-0029	IAEA Classroom [c]			
TA-03-0029	Wing 9 (Enriched Uranium)		2	

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a).
b DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b).
c The IAEA (International Atomic Energy Agency) Classroom was used to conduct Nonproliferation Training. In CY 2001, this capability was moved to Pajarito Site (TA-18) and renamed the "Nuclear Measurement School." However, the capability was returned to and operated in CMR in CY 2002 and continued to operate at CMR in CY 2005.

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.

The projected modifications for production of targets for the molybdenum-99 medical isotope, recovery of sealed neutron sources, and the safety testing of pits were not done due to loss of program funding.

During the 1996–1998 time-period, only the Phase I Upgrades were in progress. By the end of 1998, all 11 of these upgrades had been started, but only five of the 11 Phase I Upgrades were completed. Concurrently, in August 1998, DOE approved the CMR Basis for Interim Operations (BIO), 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 and include only those upgrades needed to ensure compliance with the BIO. These upgrades were required for the facility to be reliable through 2010. The re-baseline was approved in October 1999. It included 16 upgrades necessary to ensure worker safety, public safety, environmental compliance, and reliability of services to safety systems. These 16 upgrades are listed below:

- Duct Wash-down System Upgrade;
- Heating, Ventilation, and Air Conditioning delta Pressure System Upgrade;
- Hood Wash-down System Upgrade;
- Hot Cell Delta Pressure System Upgrade;
- Hot Cell Controls Upgrade;
- Stack Monitors Phase A Upgrade;
- Emergency Personnel Accountability System Upgrade;
- Stack Monitors Phase B Upgrade;
- Compressor System Upgrade;
- Sprinkler Head Replacement Upgrade;
- Emergency Lighting System Upgrade;
- Emergency Notification Upgrade;
- Internal Power Distribution Upgrade;
- Operations Center Upgrade;
- Ventilation System Filter Replacement Upgrade; and
- Fire Protection System Upgrade.

All 16 upgrades were completed by March 2002; the Project submitted all Turnover/Closeout documentation to DOE in July 2002; and DOE approved Turnover/ Closeout in November 2002.

As discussed in the *1999 SWEIS*, extensive upgrades originally planned for the CMR Building would be much more expensive and time-consuming than originally anticipated and only marginally effective in providing the operational risk reduction and program capabilities required to support NNSA mission assignments at LANL. As a result, DOE reduced the number of CMR Building upgrade projects to those needed to ensure safe and reliable operations through about the year 2010. CMR Building operations and capabilities are currently restricted due to safety and security constraints; the CMR Building is not operational to the full extent needed to meet NNSA requirements established in the *1999 SWEIS* for the then foreseeable future over the next 10 years. In November 2003, NNSA issued an *Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project* (DOE 2003c), which evaluated the potential environmental impacts resulting from activities associated with consolidating and relocating the mission-critical CMR Building capabilities at LANL and replacement of the CMR Building. In its ROD issued in February 2004, the NNSA decided to replace the CMR Building with a new CMR Replacement Facility at TA-55 and to completely vacate and demolish the CMR Building (DOE 2004a). The ROD stated that the new facility would be established as a Hazard Category 2 nuclear facility.

During CY 2003, modifications to Wing 9 were started in support of the Bolas Grande Project. This project would provide for the disposition of large vessels previously used to contain experimental explosive shots involving plutonium. NEPA coverage for this project was provided by a *Supplement Analysis to the 1999 Site-Wide Environmental*

Impact Statement for Continued Operation of Los Alamos National Laboratory for the Proposed Disposition of Certain Large Containment Vessels, *DOE/EIS-0238-SA-03* (DOE 2003d). In 2005 implementation of this project was still pending approval.

CMR BIO/Technical Safety Requirements Update

An update to the CMR BIO/Technical Safety Requirements (TSRs) was submitted to DOE in April 2004. This submittal was rejected in April 2005 by NNSA who then directed that the Interim TSRs be updated by August 31, 2005. The Interim TSR submittal consolidated controls from all Unresolved Safety Question Determinations (USQDs) and hazard analyses performed since 1999. In addition, the Interim TSRs were updated to be compliant with the DOE Standard 1186 for Specific Administrative Controls and Design Feature In-Service Inspection requirements.

2.3.2 Operations at the CMR Building

Movement of the Nonproliferation Training and Nuclear Measurement School, which was briefly located at TA-18, returned to the CMR Building in 2004 and will stay there until the CMR Building is no longer available or until a new Security Category I and II facility is built at TA-48 as part of the proposed Radiological Sciences Institute.

The eight capabilities identified in the SWEIS for the CMR Facility are presented in Table 2.3.2-1.

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

Capability	SWEIS ROD[a]	2005 Operations
Analytical Chemistry	Sample analysis in support of a wide range of actinide research and processing activities. Approximately 7,000 samples/yr.	Approximately 600 samples were analyzed in CY 2005.
Uranium Processing	Activities to recover, process, and store LANL highly enriched uranium inventory by 2005. Includes possible recovery of materials resulting from manufacturing operations.	During CY 2005, 75.8 kilograms of highly enriched uranium were processed. The processing activity consisted of processing 23 batches of uranium nitrate solutions from TA-18, which were converted to uranium oxide.
Destructive and Nondestructive Analysis (Design Evaluation Project)	Evaluate 6 to 10 secondaries/yr through destructive/nondestructive analyses and disassembly.	No activity. Project is no longer active; capability has not been used since 1999.
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 activity was located at CMR in 1999 when the SWEIS was issued. In 2000, it was relocated to TA-18 and renamed the Nuclear Measurement School in an effort to reduce the CMR Building to a Category 3 nuclear facility. In 2002, this activity returned to CMR from TA-18 and was active in CYs 2002, 2003, 2004, and 2005. During CY 2005, three nuclear measurement schools were conducted.

Table 2.3.2-1. continued

Capability	SWEIS ROD[a]	2005 Operations
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.	Mechanical or chemical processing of sources is not allowed in the CMR per the facility Authorization Basis. No work was done on this program in CY 2005.
	Introduce research and development effort on spent nuclear fuel related to long-term storage and analyze components in spent and partially spent fuels.	This project was completed in February 1997 when the final shipment of spent fuel from the Omega West Reactor that was in dry storage in Wing 9 was packaged and shipped to Savannah River Site for reprocessing.
	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.	In 2005, microstructural characterization tests were performed on 75 samples.
	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.	Project was completed in CY 2001.

Table 2.3.2-1. continued

Capability	SWEIS ROD[a]	2005 Operations
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]	Project was terminated in CY 1999.
	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.	Process activity was never initiated on this project.

a Includes completion of Phase I and Phase II Upgrades, except for seismic upgrades, modifications for the fabrication of molybdenum-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 Molybdenum-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 those projected by the SWEIS ROD. No wastes generated exceeded SWEIS ROD projections; the others remained low, ranging from less than 0.1 percent to about 16 percent of these projections. Table 2.3.3-1 provides details of these and other operational data.

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

Parameter	Units	SWEIS ROD	2005 Operations
Radioactive Air Emissions:			
Total Actinides[a]	Ci/yr	7.60E-4	1.47E-05
Strontium-90/Yttrium-90	Ci/yr	Not projected [b]	9.68E-09
Krypton-85	Ci/yr	1.00E+2	None detected
Germanium-68/Gallium-68	Ci/yr	Not projected [b]	1.09E-05
Xenon-131m	Ci/yr	4.50E+1	Not measured [c]
Xenon-133	Ci/yr	1.50E+3	Not measured [c]
Tritium Water	Ci/yr	Negligible	Not measured [c]
Tritium Gas	Ci/yr	Negligible	Not measured [c]
NPDES Discharge:			
03A–021	MGY	0.53	0.92
Wastes:			
Chemical	kg/yr	10,800	168.3
LLW	m^3/yr	1,820	180.9
MLLW	m^3/yr	19	4.6
TRU	m^3/yr	28 [d]	9.4
Mixed TRU	m^3/yr	13 [d]	2.7
Number of Workers	FTEs	204 [e]	196 [e]

a Includes uranium, plutonium, americium, and thorium.
b The radionuclide was not projected in the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.
c Potential emissions during the period were sufficiently small that measurement of these radionuclides was not necessary to meet facility or regulatory requirements.
d 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.
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 2005 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, KSL, and other subcontractor personnel. The number of employees for 2005 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 10-year window represented by the SWEIS ROD.

2.4 Pajarito Site (TA-18)

Pajarito Site is currently undergoing decommissioning in accordance with the ROD for the *Final Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory* (DOE 2002b, 2002c). Efforts are underway to remove the majority of SNM from this area and to relocate certain operations to the Nevada Test Site by 2008 (Security Category I and II nuclear materials have been removed from this TA).

In 2002, NNSA staff prepared the TA-18 environmental impact statement (DOE 2002c) for relocating the Pajarito Site Key Facility capabilities and materials. In the ROD, NNSA announced its decision to relocate Security Category I and II capabilities and related materials to the Device Assembly Facility at the Nevada Test Site, in effect initiating Pajarito Site Key Facility closure. However, no decision was made about relocation of Security Category III and IV materials and activities, including the Solution High Energy Burst Assembly. The ROD indicated that additional NEPA analysis would be required to support that decision. Implementation of the ROD for Security Category I and II removal activities was initiated in 2004.

The Pajarito Site Key Facility is located entirely at TA-18. This Key Facility has operated for many years as a major training facility for nuclear specialists in areas such as criticality management and safety, emergency response in support of counterterrorism activities, nonproliferation programs, and criticality experiments in support of stockpile stewardship. 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 (TA-18-30), three outlying, remote-controlled critical assembly buildings then known as “kivas” (TA-18, -23, -32, and -116), and a number of additional support buildings, including the hillside vault (TA-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 Nuclear Hazard Classification. 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. The IAEA schools were returned to CMR in 2002 where they remain today. All other schools remain at TA-18.

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

Building	Description	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2005 [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		2	2

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a).
b DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b).

The new Authorization Basis, comprised of a BIO document and TSRs, was submitted to NNSA on March 14, 2002, and approved by NNSA on July 31, 2002. The new Authorization Basis adds safety measures to TA-18 operations in the form of both engineered and administrative controls.

2.4.1 Construction and Modifications at the Pajarito Site

The SWEIS ROD projected replacement of the portable linac machine. This has not been performed. Construction projects for 2005 consisted of security and safety enhancements.

2.4.2 Operations at the Pajarito Site

The SWEIS identified nine capabilities for this Key Facility. No research capabilities have been deleted and none has been added. The major project at TA-18 in 2005 was the relocation of the Security Category 1 and 2 nuclear materials to the Nevada Test Site and other LANL sites in preparation for moving the TA-18 mission to Nevada. During 2005, the TA-18 facility did not conduct any criticality experiments. The SWEIS ROD projection is a maximum of 1,050 experiments in any given year. In addition, the nuclear material inventory level has decreased significantly below the SWEIS ROD projection and there was no increase in nuclear weapons components and materials at the facility. Table 2.4.2-1 provides details.

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

Capabilities	SWEIS ROD[a]	2005 Operations
Dosimeter Assessment and Calibration	Perform up to 1,050 criticality experiments per year.	No criticality experiments were performed in CY 2005.
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.	No Activity
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.	No Activity
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 less than 15 subcritical experiments, not using a critical assembly machine.

Table 2.4.2-1. continued

Capabilities	SWEIS ROD[a]	2005 Operations
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.	No Activity
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%.	No Activity
Skyshine Measurements	Perform up to 1,050 criticality experiments per year.	No Activity
Vaporization	Perform up to 1,050 criticality experiments per year.	No Activity
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%.	No Activity
Nuclear Measurement School (relocated from CMR and renamed. At CMR it was called "Nonproliferation Training") [b].	Not in SWEIS ROD (was located in CMR in 1999). IAEA schools are at CMR.	This activity now resides at the CMR Building. See Table 2.3.2-1.

a Includes replacement of the portable linac.

b This activity was located at CMR in 1999 when the SWEIS was issued. In 2000, it was relocated to TA-18 and renamed the Nuclear Measurement School in an effort to reduce the CMR Building to a Category 3 nuclear facility. In 2002, this activity returned to CMR from TA-18 and was active in CYs 2002, 2003, 2004, and 2005.

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 SWEIS ROD 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 activities was 0.0 millirem, compared to 28.5 millirem per year projected by the SWEIS ROD. Chemical waste generation at Pajarito Site was below

SWEIS ROD projections from 1998 through 2005. Operations data are detailed in Table 2.4.3-1.

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

Parameter	Units	SWEIS ROD	2005 Operations
Radioactive Air Emissions: Argon-41 [a]	Ci/yr	1.02E+2	0.00E+0
External Penetrating Radiation	mrem/yr	28.5 [b]	1.25
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	4,000	3.2
LLW	m^3/yr	145	0
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]	30 [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. There were no radiological operations at TA-18 in 2005.

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 2005 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, KSL, and other subcontractor personnel. The number of employees for 2005 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 10-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 (03-66), the Beryllium Technology Facility (03-141), the Press Building (03-35), and the Thorium Storage Building (03-159). 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, 03-66 and 03-159, identified in the SWEIS; however, in April 2000, Building 03-159 was downgraded from a Hazard Category 3 nuclear facility to a radiological facility and removed from the nuclear facilities list. In March 2001, Building 03-66 was downgraded from a Hazard Category 3 nuclear facility and removed from the nuclear facilities list (LANL 2002a). In September 2001, Buildings 03-35, 03-66, 03-159, and 03-169 were placed on the radiological facility list (LANL 2002b). Building 03-141 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 2005 [b]
TA-03-0066	depleted uranium storage	3	3	
TA-03-0159	thorium storage	3	3	

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b)

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.

In addition to the five planned upgrades, three additional upgrades were completed in 2003. These are

- replacement of liquid nitrogen Dewar;
- painting of the exterior of Sigma Building; and
- re-installation of the utilities to activate the Press Building.

Construction of the Beryllium Technology Facility (DOE 1993), formerly known as the Rolling Mill Building, was completed during CY 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 CY 2000. The authorization to begin operations in the Beryllium Technology Facility was granted by DOE in January 2001.

Beryllium Technology Facility upgrades include the following:

- Heating, ventilation, and air conditioning system damper replacements – complete;
- Cartridge Filter house enclosure – On hold due to hazard category change;

- PC-3 Vault – On hold due to hazard category change;
- Locker room expansion – complete;
- Facility Management System upgrade – On hold due to hazard category change.

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 has been deleted. As indicated in Table 2.5.2-1, activity levels for all capabilities during the 2005 timeframe were less than levels projected by the SWEIS ROD.

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

Capability	SWEIS ROD [a]	2005 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 153 assignments and 759 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 1,250 non-SNM materials samples and 1,250 non-SNM component samples stored in library.
Fabrication of Metallic and Ceramic Items	Fabricate stainless steel and beryllium components for about 80 pits/yr.	Fabricated approximately 66 stainless steel and beryllium pit components.
	Fabricate up to 200 tritium reservoirs per year.	Fewer than 25 reservoirs fabricated.
	Fabricate components for up to 50 secondaries per year.	Fabricated components for fewer than 50 secondaries.
	Fabricate nonnuclear components for research and development: about 100 major hydrotests and 50 joint test assemblies/yr.	Fabricated components for fewer than 100 major hydrotests and for less than 50 joint test assemblies.
	Fabricate beryllium targets.	Provided material for the production of inertial confinement fusion targets and fabricated fewer than 10 targets.

Table 2.5.2-1. continued

Capability	SWEIS ROD [a]	2005 Operations
Fabrication of Metallic and Ceramic Items, continued	Fabricate targets and other components for accelerator production of tritium research.	On hold.
	Fabricate test storage containers for nuclear materials stabilization.	Produced approximately 50 containers.
	Fabricate nonnuclear (stainless steel and beryllium) components for up to 20 pit rebuilds/yr.	Fabricated 30 stainless steel and beryllium components.

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	2005 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	3.805
03A–022	MGY	4.4	3.805
03A–024	MGY	2.9	0
Wastes:			
Chemical	kg/yr	10,000	2,220
LLW	m^3/yr	960	63.1
MLLW	m^3/yr	4	0
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	101[b]	107[b]

a Stack monitoring at Sigma was discontinued early in CY 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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-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 1998, 1999, and 2000, this Key Facility was categorized as a Low Hazard nonnuclear facility. In September 2001, MSL was placed on the Radiological Facility List (LANL 2002b) and remained on the list in CY 2005.

2.6.1 Construction and Modifications at the Materials Science Laboratory

Projected: 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.

Actual: To date, the completion of the top floor of the MSL remains unscheduled and unfunded. Construction of the Material Science and Technology (MST) Office Building was initiated in 2003 and completed in 2004 (DOE 2001a). This project is described in more detail in the previous Yearbook.

Center for Integrated Nanotechnologies
Description: The Center for Integrated Nanotechnologies (CINT) will contain laboratories and office space to accommodate state-of-the-art equipment and research. It will be located near the Materials Science Complex. The two-story, 36,500-square-foot building will house approximately 50 people. Occupants will be LANL staff plus collaborators from universities, other laboratories, and private industry. CINT will focus on five areas: 1) theory, modeling, and simulation; 2) nanoscale bio-microinterfaces research; 3) nanophotonics and nanoelectronics research; 4) complex functional nanomaterials research; and 5) nanomechanics research.

Status: The project received NEPA coverage through a DOE-approved categorical exclusion (DOE 2002d) issued March 28, 2002. The design-build subcontract was awarded in March 2004. Construction start was November 2004. This building is expected to be complete in December 2005. Initial operations are expected to start in April 2006, with full operations expected by May 2007.

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 has been deleted.

In CY 2005, there were approximately 102 total researchers and support staff at MSL, about 20 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.) Table 2.6.2-1 compares CY 2005 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]	2005 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. Single crystal growth, amorphous alloy research, powder processing, and materials characterization were expanded in CY 2005. Cold mock up of weapons assembly and processing as well as other technologies continued to be expanded in CY 2005.
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).	These two capabilities were maintained as projected by the SWEIS ROD and additional capabilities continued to be expanded as projected by the SWEIS ROD. Fabrication, assembly, and prototype experiments were expanded in CY 2005. Improvements were accomplished in the conduct of dynamic load and crack testing and measurement.
Advanced Materials Development	Maintain four research capabilities at levels identified during preparation of the SWEIS: • New materials • Synthesis and characterization • Ceramics • Superconductors	Capability was maintained as projected and improved. Capability for ion beam modification of materials was increased. Superconductivity capability has been expanded to include • Electron Beam Deposition and • Performance measurement capabilities including atomic force microscopy.

[6] This number should not be confused with the FTE index shown in Table 2.6.3-1 (52 FTEs) as the two numbers represent different populations of individuals. The 102 total researchers represent students, temporary employees, and visiting staff from other institutions. The 52 FTEs represents only regular full-time and part-time LANL staff.

Table 2.6.2-1. continued

Capability	SWEIS ROD [a]	2005 Operations
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.	Improvements occur on a continual basis including: Expansion of electron microscopy to include atomic scale microscopy. Improvement of x-ray capabilities.

a Includes completion of the second floor of MSL.

2.6.3 Operations Data for the Materials Science Laboratory

The overall size of the MSL workforce has fluctuated slightly during the years between 1998 and 2005 and is now about 57 workers in CY 2005, the same as that projected by the SWEIS ROD (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. Generally, waste quantities have been lower than projected by the SWEIS ROD. 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 projection	2005 Operations
Radioactive Air Emissions	Ci/yr	Negligible	Not Measured
NPDES Discharge Volume	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	600	176
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]	57 [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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-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 non-nuclear facility. Exhaust air from process equipment is filtered prior to exhaust to the atmosphere. Sanitary wastes are piped to the LANL sewage facility at TA-46, and radioactive liquid wastes are piped to the RLWTF at TA-50.

2.7.1 Construction and Modifications at the Target Fabrication Facility

In 1998, process discharges from Outfall 04A-127 were rerouted to the sewage facility at TA-46, and the outfall was eliminated from the NPDES permit (DOE 1996b). There were no other significant facility additions or modifications during the 1996–1998, 1999, 2000, 2001, 2002, 2003, 2004, or 2005 periods. 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 the 1998–2005 timeframe, the number of targets and specialized components fabricated for testing purposes was consistently less than the 6,100 targets per year projected by the SWEIS ROD. As seen in 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 listed only for the Sigma Key Facility.

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

Capability	SWEIS ROD	2005 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 800 tests. Provided components to Dynamic Experimentation (DX) and Physics Divisions for high-energy-density physics tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS.
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 400 tests. Did not support high-explosive pulsed-power tests or high-energy-density physics tests at levels identified during preparation of the SWEIS.

Table 2.7.2-1. continued

Capability	SWEIS ROD	2005 Operations
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 400 tests. Did not support high-explosive pulsed-power tests or high-energy-density physics tests at levels identified during preparation of the SWEIS.
Characterization of Materials [a]	Analyze up to 36 tritium reservoirs/yr. [a]	No 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 the 1998–2005 waste volumes, which were less than projected. Table 2.7.3-1 details operations data for CY 2005.

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

Parameter	Units	SWEIS ROD	2005 Operations
Radiological Air Emissions	Ci/yr	Negligible	Not Measured [a]
NPDES Discharge:	MGY		
4A-127	MGY	0	Eliminated
Wastes:			
Chemical	kg/yr	3,800	7,725 [b]
LLW	m^3/yr	10	0
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 [c]	43 [c]

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

b Chemical waste generation exceeded SWEIS ROD projections due to disposal of beryllium-contaminated waste from the disposal of excess equipment from Rocky Flats, decommissioning of beryllium operations in room A7, and the removal and replacement of a beryllium-contaminated machine from the machine shop. This machine went into a 1,360-ft^3 transportainer. Additional waste was generated from the cleanout of beryllium operations in Room A7 of the TFF, which included duct work, piping, equipment, and general lab trash. The remainder of the transportainer was filled with beryllium-contaminated items stored behind TFF from Rocky Flats. A second 1,360-ft^3 transportainer was filled with beryllium-contaminated Rocky Flats equipment.

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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-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 03-39) and the Radiological Hazardous Materials Machine Shop (Building 03-102). Both buildings are located within the same exclusion area. Activities consist of machining, welding, and assembly of various materials in support of major LANL programs and projects, principally those related to weapons manufacturing. In September 2001, Building 03-102 was placed on the Radiological Facility List (LANL 2001c).

2.8.1 Construction and Modifications at the Machine Shops

Projected: The SWEIS ROD projected no new construction or major modifications to the shops.

Actual: Manufacturing Science and Technology group has constructed modular units in the north side of SM-39 to conduct up grades on test equipment, tooling, CNC programming, and controls for TA-55 activities. These operations are prototype mock-ups for PF-4, TA-55. All Manufacturing Science and Technology group activities conducted in SM-39 are non-hazardous. Other minor activities conducted in this space include robotics testing, tensile testing, and welding activities.

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 to Research and Development and Production requirements.

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

Capability	SWEIS ROD	2005 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.

Table 2.8.2-1. continued

Capability	SWEIS ROD	2005 Operations
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 one-tenth of a percent of projected generation (387 kilograms generated in 2005, 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	2005 Operations
Radioactive Air Emissions:			
Americium-241	Ci/yr	Not projected [a]	None detected
Thorium-228	Ci/yr	Not projected [a]	None detected
Thorium-230	Ci/yr	Not projected [a]	None detected
Uranium-234	Ci/yr	Not projected [a]	4.42E-09
Uranium-235	Ci/yr	Not projected [a]	None detected
Uranium-238	Ci/yr	1.50E-4	None detected
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	474,000	386.7
LLW	m^3/yr	606	134
MLLW	m^3/yr	0	0
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	81 [b]	121 [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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-year window represented by the SWEIS ROD.

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

The High Explosives Processing Key Facility is located in all or parts of six TAs. Building types consist of production and assembly facilities, analytical laboratories, explosives storage magazines, and a facility for treatment of 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-09 while TA-08 houses radiography activities.

As identified in the SWEIS, this Key Facility has one Category 2 nuclear building in TA-08 (TA-08-0023) (see Table 2.9-1). In November 2002, the updated LANL Radiological Facility List (LANL 2002b) was published and identified Buildings TA-08-0022, TA-08-0070, TA-08-0120, TA-11-0030, TA-16-0088, TA-16-0202, TA-16-0207, TA-16-0300, TA-16-0301, TA-16-3020, TA-16-0332, TA-16-0410, TA-16-0411, TA-16-0413, TA-16-0415, TA-037-0010, TA-037-0014, TA-037-0016, TA-037-0022, TA-037-0024, and TA-037-0025 as radiological facilities (Table 2.9-2).

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

Building	Description	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2005 [b]
TA-08-0022	Radiography facility	2	2	
TA-08-0023	Radiography facility [c]	2	2	
TA-08-0024	Isotope Building	2		
TA-08-0070	Experimental Science	2		
TA-16-0411	Intermediate Device Assembly		2	

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a).
b DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b).
c In June 2005, TA-08-0023 was removed from the Nuclear Facility List and recategorized to a Less Than High Hazard Radiological Facility.

Table 2.9-2. High Explosives Processing Buildings Identified as Radiological Facilities

Building	Description	LANL 2002 [a]
TA-08-0022	Radiography	RAD
TA-08-0070	Nondestructive Testing and Evaluation	RAD
TA-08-0120	Radiography	RAD
TA-11-0030	Vibration Testing	RAD
TA-16-0088	Component Storage	RAD
TA-16-0202	Laboratory	RAD
TA-16-0207	Component Testing	RAD
TA-16-0300	Component Storage	RAD
TA-16-0301	Component Storage	RAD
TA-16-0302	Component Storage/Training	RAD
TA-16-0332	Component Storage	RAD
TA-16-0410	Assembly Building	RAD
TA-16-0411	Assembly Building	RAD
TA-16-0413	Component Storage	---
TA-16-0415	Component Storage	---
TA-037-0010	Storage Magazine	RAD
TA-037-0014	Storage Magazine	RAD
TA-037-0016	Storage Magazine	RAD
TA-037-0022	Magazine	---
TA-037-0024	Storage Magazine	RAD
TA-037-0025	Storage Magazine	RAD

a LANL Radiological Facility List (LANL 2002b).

Operations at this Key Facility are performed by two separate Divisions: the DX Division and the Engineering Sciences and Applications (ESA) Division. ESA performs the majority of the high explosives manufacturing and 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 produces a small quantity of high explosives 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.

Not Projected: Although not projected in the 1999 SWEIS, a real-time radiography capability was added to this Key Facility and became operational in 2001. Buildings 16-220, 16-222, 16-223, 16-224, 16-225, and 16-226 were vacated and demolished. Planning and modification work at TA-09 to consolidate high explosives formulation operations previously conducted at Building 16-340 continued. Explosives stored at TA-28 were moved to TA-37 for storage, and TA-28 is no longer used by the High Explosives Processing Key Facility. The Building 16-1409 incinerator associated with the burn operations of high explosives-contaminated combustible trash underwent Resource Conservation and Recovery Act (RCRA) clean-closure and was dismantled and scrapped. RCRA closure has also been obtained for TA-16-401 and -406, units at the TA-16 Burn Ground. The closure of Material Disposal Area (MDA) P, which began in 1997, was completed in 2002. An estimated total of about 20,800 cubic yards (15,900 cubic meters) of hazardous waste and 21,300 cubic yards (16,300 cubic meters) of other waste were excavated and shipped to a disposal facility. A total of 6,600 cubic yards (5,000 cubic meters) of material was shipped and used as clean fill at MDA J. The aboveground wastewater storage tank system was placed into service at TA-09 in 1998. The new High Explosives Wastewater Treatment Facility at TA-16 is a centralized treatment plant that became operational in 1997. It discharges approximately 35,000 gallons (132,000 liters) per year of treated effluent at an NPDES-permitted outfall. RCRA closure activities continued for the TA-16-387 flash pad and for the TA-16-394 burn tray, resulting in a total of about 860 cubic yards (660 cubic meters) of hazardous wastes being removed. A burn unit was upgraded, improving capacity and efficiency and minimizing environmental impacts. In 2000, the Cerro Grande Fire swept across TA-16, burning V-Site (an inoperable historic Manhattan Project era site), but all other buildings were placed into a safe closed condition, and fire personnel bulldozed a fire line around the Weapons Engineering Tritium Facility. No other high explosives processing facilities were destroyed, although some structures were damaged at TA-09, -11, and -37. All high explosives burning operations were consolidated at TA-16-388 and -399. Burning operations are generally limited to TA-16-388, although TA-16-399 is still available for burning of bulk high explosives.

In 2004, construction began on a new office building for the Hydrotest Design Facility, TA-22-120 (DOE 2002e, LANL 2002g). Beneficial occupancy occurred in March 2005.

In 2005, construction was completed on the new High-Power Detonator Production Facility, Building 22-115, and magazine TA-22-118. The proposed work is within the scope of a DOE-approved NEPA categorical exclusion (DOE 2000b). Construction was delayed because of the LANL shut down. Beneficial occupancy occurred in December 2005.

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 has been deleted. Activity levels during 2005 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 a result of the shut down of LANL operations, production of high explosives components was well below the projected quantities.

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 CY 2005 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.

In CY 2005, 3,454 pounds of high explosives and 1,226 pounds of high explosives simulant material were used in the fabrication of test components for DX and ESA Divisions. The level of high explosives usage was significantly below the SWEIS ROD projection of 82,700 pounds of high explosives, while the usage of high explosives simulant was about 42 percent of the SWEIS ROD projection of 2,910 pounds. Use of the high explosive simulant results in chemical waste that is shipped off-site for disposal and does not result in environmental impacts at LANL.

During CY 2005, ESA Division produced 528 pieces of explosives weighing 3,454 pounds. In machining experimental components, 1,889 pounds of water-saturated explosive scrap were generated and burned. The machined components were sent to DX Division and Lawrence Livermore National Laboratory for test detonations along with an additional 24,888 pounds of raw explosives. During the high explosive processing, 27,429 gallons of explosive-contaminated water were generated, treated, and released. Also, 528 pounds of explosive-contaminated combustible waste were burned. Explosive-contaminated metal is now cleaned and salvaged. Finally, 908 pounds of explosive-contaminated soils were treated.

Three outfalls from High Explosives Processing remain on the NPDES permit: 03A-130, 05A-055 (the High Explosives Wastewater Treatment Facility), and 05A-097.

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

Capability	SWEIS ROD[a, b]	2005 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 less than 5,000 high explosive parts, and ESA Division fabricated approximately 528 high explosives parts in CY 2005. Therefore, less than 7,000 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.

Table 2.9.2-1. continued

Capability	SWEIS ROD[a, b]	2005 Operations
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 fewer 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 fewer than 15 stockpile related safety and mechanical tests during CY 2005.
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 fewer than 40 product lines in CY 2005.

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 CY 2005 were 3,454 pounds of high explosive and 1,226 pounds of mock high explosives.

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

2.9.3 Operations Data for High Explosives Processing

The details of operations data for CY 2005 are provided in Table 2.9.3-1. The NPDES discharge volume was about 0.03 million 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	2005 Operations
Radioactive Air Emissions:			
Uranium-238	Ci/yr	9.96E-7	Not Measured [a]
Uranium-235	Ci/yr	1.89E-8	Not Measured [a]
Uranium-234	Ci/yr	3.71E-7	Not Measured [a]
NPDES Discharge: [b]			
Number of outfalls		22	3
Total Discharges	MGY	12.4	0.028886
03A–130 (TA-11)	MGY	0.04	0.001427
05A–055 (TA-16)	MGY	0.13	0.027459
05A–097 (TA-11)	MGY	0.01	0
Wastes:			
Chemical	kg/yr	13,000	4,126
LLW	m^3/yr	16	4.0
MLLW	m^3/yr	0.2	0
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	96 [c]	115 [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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-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 TAs, comprises more than one-half (22 of 40 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 Dual Axis Radiographic Hydrodynamic Test (DARHT) facility (Building TA-15-312), the Pulsed High-Energy Radiation Machine Emitting X-Rays (PHERMEX) (TA-15-184), and the TA-15-306 firing site. Building types consist of preparation and assembly facilities, bunkers, analytical laboratories, high 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 2001c).

2.10.1 Construction and Modifications at High Explosives Testing

Failing accelerator cells of DARHT Axis II were refurbished to bring them up to design specifications that will provide high-resolution radiographic imaging for hydrodynamic experiments in support of the Science-Based Stockpile Stewardship Program (DOE 1995b, LANL 2005d). Construction of an access door into DARHT Axis II and a concrete ramp to access this door began in 2005. This access door will facilitate the accelerator cell and equipment maintenance within DARHT Axis II (DOE 1995b, LANL 2004c).

Several facilities within the High Explosives Testing Key Facility were decommissioned and removed during 2005, these facilities include TA-15-8, TA-15-46, TA-15-138, TA-15-141, TA-40-4, TA-40-19, and TA-40-43 (DOE 2004b, 2004c, 2004d, LANL 2004d, 2004e, 2004f).

Close out of Outfall 03A-028 located at PHERMEX (TA-15-184) was initiated in 2005. Temporary closeout of aboveground storage tanks located at TA-15-306, TA-15-310 and TA-36-86 was initiated in 2005. These tanks, 15-324, 15-325, 15-473, 15-474, 36-141 and 36-142, previously contained dielectric mineral oil in support of radiographic experiments.

DX Division Strategic Plan for the Future

In 2002, NNSA determined that an environmental assessment would be required for the DX Division strategic plan including the new structures to be built at TA-22, and the subsequent D&D and replacement of old buildings located in TA-15. NEPA coverage for the strategic plan was provided by the *Environmental Assessment for the Proposed Consolidation of Certain Dynamic Experimentation Activities at the Two-Mile Mesa Complex, Los Alamos National Laboratory, Los Alamos, New Mexico*, and subsequent Finding of No Significant Impact issued in November 2003 (DOE 2003e).

2.10.2 Operations at High Explosives Testing

The ROD identified seven capabilities for this Key Facility. None of these has 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 2005 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 87.536 kilograms of depleted uranium were expended in 2005, compared to approximately 3,900 kilograms projected by the SWEIS ROD.

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	2005 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 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 explosives testing projected by the SWEIS ROD.

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 2005 were considerably less than projections made by the SWEIS ROD.

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	2005 Operations
Radioactive Air Emissions:			
Depleted Uranium	Ci/yr	1.5E-1 [a]	Not Measured [b]
Chemical Usage:[c]			
Aluminum [d]	kg/yr	45,450	667.36
Beryllium	kg/yr	90	<90
Copper [d]	kg/yr	45,630	18.536
Depleted Uranium	kg/yr	3,130 [e]	87.536
Lead	kg/yr	240	0
Tantalum	kg/yr	300	4.2855
Tungsten	kg/yr	300	0
NPDES Discharge:			
Number of outfalls [f]	----	14	2
Total Discharges	MGY	3.6	0.46993
03A–028 (TA-15) [g]	MGY	2.2	0.00004
03A–185 (TA-15) [g]	MGY	0.73	0.46989
Wastes:			
Chemical	kg/yr	35,300	1,225
LLW	m^3/yr	940	0.2
MLLW	m^3/yr	0.9	0
TRU [h]	m^3/yr	0.2	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	227 [i]	279 [i]

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 evaluated in the DARHT environmental impact statement (DOE 1995b).

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 The SWEIS ROD projection for depleted uranium emission has been erroneously reported in previous Yearbooks (1998–2003) due to a discrepancy between the ROD and Table 3.6.1-20 in the SWEIS. The additive volume for depleted uranium in the table is 8,666 lbs/yr (3,930 kg/yr), however the ROD states the annual amount of depleted uranium will increase to 6,900 lbs/yr (3,130 kg/yr).

f Outfalls eliminated before 1999: 04A-101 (TA-40), 04A-139 (TA-15), 04A-141 (TA-039), 04A-143 (TA-15), 04A-156 (TA-039), 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.

g 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. Totalizing water meters have now been installed on both 03A-185 (TA-15) and 03A-28 (TA-15), which will allow for much more accurate water usage calculations for 2005 reporting.

h TRU waste (steel) will be generated as a result of DARHT's Phased Containment Option (see DARHT environmental impact statement [DOE 1995b]).

i 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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-year window represented by the SWEIS ROD.

2.10.4 Cerro Grande Fire Effects at High Explosives Testing

Continuing Effects

The Water Quality and Hydrology group continues 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, a direct consequence of the fire, appear to be successful in stabilizing soils on the DX-controlled area of LANL by preventing run-off and reducing storm flows onto DX property. These inspection and monitoring efforts will continue through 2006.

Other fire-related activities involved fuelwood mitigation efforts that included tree thinning throughout DX Division. The overall goals of the Wildfire Hazard Reduction Plan (LANL 2001k) 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, treating fuel to decrease the risk of wildfire escapes at LANL-designated firing sites, and improving wildland fire suppression capability through fire road improvements.

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 and nuclear physics research, proton radiography, the development of accelerators and diagnostic instruments, and production of medical radioisotopes. Isotope production had not occurred since 1998, however, the new Isotope Production Facility threw its first beam on December 23, 2003, as part of the facility commissioning activities that continued into 2004. The new Isotope Production Facility started full-time operations in 2005. The majority of the LANSCE Key Facility (the User Facility) is composed of the 800-million-electron-volt linac, a Proton Storage Ring, and three major experimental areas: the Manuel Lujan Neutron Scattering Center, the Weapons Neutron Research (WNR) facility, and Experimental Area C.

Experimental Area C is the location of proton radiography experiments for the Science-Based Stockpile Stewardship Program. A new experimental facility for the production of ultracold neutrons is nearing completion in Area B. Experimental Area A, formerly used for materials irradiation experiments and isotope production, is currently inactive; construction of a new isotope production facility was completed in CY 2002 and commissioning occurred in December 2003. A second accelerator facility located at TA-53, the Low-Energy Demonstration Accelerator (LEDA), is also inactive and is being decommissioned and dismantled.

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 Area A East in Building 53-3M (LANL 2001b), which is used for passive storage of activated materials. 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 2001c). Experimental Area ER-1/ER-2 is categorized as a Moderate Hazard facility. The remainder of the LANSCE User Facility is categorized as Low Hazard. DOE approved an Interim Safety Assessment Document for the LANSCE accelerator and experimental areas in May 2002. LANSCE began work on a two-year project to update and consolidate existing Authorization Basis documents for the User Facility.

Table 2.11-1. LANSCE Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2005 [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 list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b)

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	Yes [c]
One-megawatt target/blanket	2-91-L	No
New 100-MeV Isotope Production Facility	2-92-L	Yes [d]
Long-Pulse Spallation Source (LPSS), including decontamination and renovation of Area A	3-25-L	No
Dynamic Experiment Laboratory	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 CY 1999 and continued into CY 2000. Cleanup at the south lagoon began in CY 2000 with the removal of the sludge and liner. Data analysis and sampling continued through CY 2001 for both lagoons and an Interim Action Plan was written for remediation of the north lagoon. Cleanup of the north lagoon was done in CY 2002. The lagoons (SWMU 53-002[a]-99) have been remediated, with the complete removal of all contaminated sludge and liners; the nature and extent of residual contamination have been defined, and it has been shown that the residual contamination does not pose a potential unacceptable risk to humans or the environment. Currently the site is located within an industrial area under LANL (institutional) control. The site is expected to remain so for the reasonably foreseeable future. For these reasons, neither additional corrective action nor further characterization is warranted at the site. The report is in review by the New Mexico Environment Department (NMED) and comments have not been received to date.

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. [Note: The 2003 omnibus bill passed by Congress included funding for LEDA D&D. The plan is to remove all support equipment and leave the building and the accelerator itself in place.]

c The Short-Pulse Spallation Source project was completed in 2004. This project consisted of two components; Accelerator Enhancement and Spectrometer Enhancement. The Accelerator Enhancement portion completed in June 2003 provided a brighter H- ion source and upgrade to the Proton Storage Ring to handle the higher beam current. The Spectrometer E Enhancement completed in January 2004 subproject provided three new neutron scattering spectrometers to the Lujan Center and upgraded the capability of one instrument.

d Preparations began in the spring of CY 1999 for construction of the new 100-million-electron-volt Isotope Production Facility. Construction started in CY 2000 and the facility was completed in CY 2002. The Isotope Production Facility threw its first beam on December 23, 2003. Full production has not yet begun.

e The Science-Based 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 *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (DOE 1996c) and ROD (DOE 1996d). 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 CY 1998 to store equipment and other materials formerly stored outside, a new waste treatment facility for radioactive liquids generated at LANSCE was constructed during CY 1999, and construction of a new cooling tower was completed in CY 2000. These projects received NEPA review through Categorical Exclusions LAN-98-110 (DOE 1998b), LAN-98-109 (DOE 1998c), and LAN-96-022 (DOE 1999b). 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. Construction of two new instruments on Flight Paths 12 and 13 at the Lujan Center started in CY 2002. The cold neutron Flight Path 12 was commissioned February 2004, as was most of the NPD-Gamma experiment. (NPD is a nuclear reaction in which a neutron impinges on a proton and emits a deuteron plus a gamma ray.) The new liquid hydrogen target was fabricated, installed and tested in CY 2005. However, Flight Path 13 remains under construction due to delays in construction of the foundation exterior to Building MPF-30. Work is expected to be complete in CY 2006.

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 has been deleted. During CY 2001, LANSCE operated both accelerators and three of the five experimental areas. Area A has been idle for more than two years; Area B has been idle for several years but a new Ultracold Neutron Facility is under construction (DOE 2002f).

The primary indicator of activity for this facility is production of the 800-million-electron-volt LANSCE proton beam as shown in Table 2.11.2-1. These production figures are all less than the 6,400 hours at 1,250 microamps projected by the SWEIS ROD. In addition, there were no experiments conducted for transmutation of wastes. Table 2.11.2-1 provides details.

Table 2.11.2-1. Los Alamos Neutron Science Center (TA-53)/ Comparison of Operations

CAPABILITY	SWEIS ROD[a]	2005 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 Isotope Production Facility for 10 months/yr (6,400 hrs). Positive ion current 1,250 microampere and negative ion current of 200 microampere.	In 2005, H+ beam was delivered to the Isotope Production Facility for commissioning. H- beam was delivered as follows: (a) to the Lujan Center for 4,206 hours at an average current of 125 microamperes with 80% total availability. (b) to WNR Target 2 for 606 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere with 82% total availability. (c) to WNR Target 4 for 4,120 hours at an average current of 3.5 microamperes with 84% total availability. (d) through Line X to Lines B and C for 763 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere with 90% total availability.
	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 and is now being decommissioned and dismantled.
Experimental Area Support	Full-time remote handling and radioactive waste disposal capability required during Area A interior modifications and Area A-East renovation. Support of experiments, facility upgrades, and modifications.	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.) Support activities were conducted per the projections of the SWEIS ROD.
Experimental Area Support, continued	Increased power demand for LANSCE linac and LEDA radio-frequency operation.	Average beam current to the Lujan Center was increased to over 110 microamps.

Table 2.11.2-1. continued

Capability	SWEIS ROD[a]	2005 Operations
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).	298 experiments were conducted at the Lujan Center and 105 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: - Some with actinides - Some with nonhazardous materials and high explosives - Some with high explosives, and 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 in CY 2005. No lead tests are expected for at least five years unless funding becomes available from DOE-Office of Nuclear Energy.
	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.)	No Accelerator Transmutation of Waste tests are planned for the future.
	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.	No ultra-cold neutron experiments were run during CY 2005 LANSCE beam operations.
	Conduct proton radiography experiments, including contained experiments with high explosives.	38 experiments involving contained high explosives were conducted in CY 2005.
Medical Isotope Production	Irradiate up to approximately 50 targets/yr for medical isotope production.	A total of 64 targets were irradiated in 2005 (40 for production of strontium-82; 22 for production of germanium-68; 1 for production of sodium-22; and one for production of cadmium-109.

Table 2.11.2-1. continued

Capability	SWEIS ROD[a]	2005 Operations
Medical Isotope Production, continued	Added production of exotic, neutron-rich, and neutron-deficient isotopes (requires modification of an existing target area).	No production in 2005.
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 were 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 2005 for LANSCE is the successful completion of the run cycle for the three primary experimental facilities: the WNR, the Proton Radiography area, and the Manuel Lujan Center. LANSCE hosted over 1,400 user visits during the eight-month 2005 run cycle. The facility operated at an average 80 percent availability for the Lujan Center and 82 percent for WNR, allowing the completion of 403 experiments for internal and external neutron scattering and neutron nuclear physics users. Construction of two new instruments at the Lujan Center began in CY 2002. One, IN500, will be used for inelastic neutron scattering studies. The other is NPD-Gamma that will look for violations of the weak nuclear interaction.

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 off-site dose. Emissions of activation products from LANSCE were much higher than those in recent years. The total point source emissions were approximately 18,400 curies. As in recent years, the Area A beam stop did not operate during 2005; however, operations in Line D resulted in the majority of emissions reported for 2005. Projected emissions for 2005 were much lower than the final number; a failure in one component of the emissions control system contributed to the elevated levels. A fix implemented in late November 2005 returned emissions rates to their projected levels, and these reduced emissions rates are expected to continue through 2006. Waste generation and NPDES discharge volumes were well below projected quantities. Two outfalls at TA-53 were eliminated with completion of the cooling towers. 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	2005 OPERATIONS
Radioactive Air Emissions:			
Argon-41	Ci/yr	7.44E+1	2.76E+01
Arsenic-72	Ci/yr	Not projected [a]	None detected
Arsenic-73	Ci/yr	Not projected [a]	1.05E-05
Beryllium-7	Ci/yr	Not projected [a]	6.96E-06
Bromine-76	Ci/yr	Not projected [a]	3.23E-03
Bromine-77	Ci/yr	Not projected [a]	2.41E-04
Bromine-82	Ci/yr	Not projected [a]	3.56E-03
Carbon-10	Ci/yr	2.65E+0	8.98E-01
Carbon-11	Ci/yr	2.96E+3	1.56E+04
Mercury-193	Ci/yr	Not projected [a]	None detected
Mercury-197m	Ci/yr	Not projected [a]	4.41E-03
Mercury-197	Ci/yr	Not projected [a]	4.41E-03
Mercury-203	Ci/yr	Not projected [a]	None detected
Nitrogen-13	Ci/yr	5.35E+2	4.36E+01
Nitrogen-16	Ci/yr	2.85E-2	5.31E-01
Sodium-24	Ci/yr	Not projected [a]	4.62E-05
Osmium-191	Ci/yr	Not projected [a]	4.99E-05
Oxygen-14	Ci/yr	6.61E+0	2.33E+01
Oxygen-15	Ci/yr	6.06E+2	2.73E+03
Tritium as Water	Ci/yr	Not projected [a]	7.83E+00
LEDA Projections (8-yr average):			
Oxygen-19	Ci/yr	2.16E-3	No operations in 2005
Sulfur-37	Ci/yr	1.81E-3	No operations in 2005
Chlorine-39	Ci/yr	4.70E-4	No operations in 2005
Chlorine-40	Ci/yr	2.19E-3	No operations in 2005
Krypton-83m	Ci/yr	2.21E-3	No operations in 2005
Others	Ci/yr	1.11E-3	No operations in 2005
NPDES Discharge:			
Total Discharges	MGY	81.8	20.998545
03A-047	MGY	7.1	0
03A-048	MGY	23.4	20.6064
03A-049	MGY	11.3	0
03A-113	MGY	39.8	0.392145
Wastes:			
Chemical	kg/yr	16,600	897
LLW	m^3/yr	1,085	51.5
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 [c]	389 [c]

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 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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 Bioscience Facilities (TA-43, TA-03, TA-16, TA-35, and TA-46)

The Bioscience Key Facility definition includes the main HRL facility (Buildings 43-1, -37, -45, and -20) plus additional offices and labs located at TA-35-85, -254 and -2, TA-03-562 and -1076. Additionally, Bioscience has small operations located at TA-16-460. Operations at TA-43, TA-35-85 and -02, include 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 and TA-16 have relatively minor impacts because of low numbers of personnel and limited quantities of materials. Bioscience research capabilities focus on the study of intact cells (conducted at 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 Bioscience activities are classed as Low Hazard non-nuclear in all buildings within this Key Facility; there are no Moderate Hazard non-nuclear facilities or nuclear facilities (LANL 2005b). TA-43-1 is on the Radiological Facilities list (LANL 2002b).

The Bioscience Key Facility is a consolidation of bioscience functions and capabilities that represent 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 Bioscience Facilities

The continued growth of Computational Biology activities and the growth of the operations staff in Bioscience Division are impacting available office space at TA-43-1. This growth will continue to require additional office space. Buildings within TA-43 continued to undergo interior remodeling and rearranging to accommodate new and existing work. The Computational Biology capability does not generate hazardous wastes nor use hazardous materials.

In CY 2005, only minor interior changes to accommodate operational changes occurred (office reconfigurations; heating, ventilation, and air conditioning renovations; laser lab decommissioning; and the institutional Electrical Infrastructure Safety Upgrades [EISU] Project. 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 example, 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 very limited work with potentially infectious microbes. All activities involving infectious microorganisms are regulated by the Centers for Disease Control (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.

During CY 2004, Bioscience finalized construction on the BSL-3 facility and made progress on final engineering requirements, the Authorization Basis, and readiness assessments. BSL-3 is a 3,202-square-foot, stand-alone, containment facility located remotely from the Los Alamos town site, in the canyon west of Diamond Drive and south of Sigma Road (south of MSL and Sigma Buildings). The building will include two BSL-3 and one BSL-2 suites plus associated administrative space designed to safely handle and store infectious organisms. The mechanical system will accommodate directional airflow and negative pressure from the areas of lesser to greater risk, plus door interlocks and high-efficiency particulate air (HEPA) filtration.

Because of the building's small size and the small quantities of samples studied, there is no expected increase in quantities of sewage, solid wastes, or chemical wastes, nor should there be increased demand for utilities. NEPA coverage for this project was initially provided by the *Environmental Assessment for the Proposed Construction and Operation of a Bio-Safety Level 3 Facility at Los Alamos National Laboratory*, dated February 26, 2002, and a Finding of No Significant Impact (DOE 2002g). However, the Finding of No Significant Impact for this project was withdrawn by NNSA on January 22, 2004, due to the need to re-evaluate new circumstances concerning BSL-3 operations. Additional NEPA coverage for this project in the form of an environmental impact statement was ongoing in 2004 and 2005.

2.12.2 Operations at Bioscience Facilities

The SWEIS identified eight capabilities for the HRL (now called the Bioscience Facilities). In 1999, creation of Bioscience Division led to definitional changes in the existing capabilities. In addition, Bioscience Division developed three other operations in 1999 and one more in 2005.

Following these changes, Bioscience Division now has nine core research capabilities:

- Bio-Materials and Chemistry;
- Cell Biology;
- Computational Biology;
- Environmental Microbiology;
- Genomic and Proteomic Science;
- Measurement Science and Diagnostics;
- Molecular Synthesis;
- Structural Biology;
- Pathogenesis (added as a core capability in CY 2005).

The In-Vivo Monitoring facility and capability continue to be located in TA-43, HRL-1. At the onset of the July 2004 work suspension, the In-Vivo activities were approved as an essential activity and therefore the work level was not impacted.

Growth in Bioscience 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, Bioscience continues to decommission unfunded work. Additionally, the amount of unused and unspent chemicals was greatly reduced in 2004. BSL-2 work is expanding to include use of a non-pathogenic strain of Bacillus anthracis–delta Ames, low-toxicity biotoxins (defined by CDC), and DNA from other infectious microbes. The Institutional Biosafety Committee reviews all of this work. 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 continued through CY 2004. Bioscience Division continues with the expectation that a new facility will soon become available and that the Division will move into a new building in a few years. Thus, all modernization will be done in a way that can be moved into the new space. TA-43-1 is at capacity for both office and laboratory activities, and future Bioscience expansion is expected to occur at TA-35-85.

In addition to the above regulatory activities, Bioscience Division has implemented the Bioscience Division Oversight Review Board that reviews all new or modified activities. This board consists of members from various LANL divisions (Environmental Stewardship; Security and Safeguards; Health, Safety, and Radiation Protection; Performance Surety; Facility Maintenance [FMD]; and Bioscience) that provide oversight and guidance. Members of the recently created Threat Reduction Responsible Division Leader organization or its successor organization will eventually replace this board.

Table 2.12.2-1 compares CY 2005 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.

Table 2.12.2-1. Bioscience Facilities/Comparison of Operations

Capabilities	SWEIS ROD	2005 Operations
Bio-Materials and Chemistry	Not in SWEIS ROD	In CY 2005, 20 FTEs[a] were associated with Biologically Inspired Materials and Chemistry
Cell Biology	Conduct research 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 CY 2005, 40 FTEs were associated with Molecular Cell Biology.
Computational Biology	Not in SWEIS ROD	In CY 2005, 20 FTEs were associated with Computational Biology.

Table 2.12.2-1. continued

Capabilities	SWEIS ROD	2005 Operations
Environmental Microbiology	Research to characterize the extent of diversity in environmental microbes and to understand their functions and occurrences in the environment. (25 FTEs)	In CY 2005, 20 FTEs were associated with Environmental Microbiology.
Genomic and Proteomic Science	Conduct research at current levels utilizing molecular and biochemical techniques to determine and analyze the sequences of genomes (human, microbes, and animal). Develop strategies to analyze the nucleotide sequence of individual genes, especially those associated with genetic disorders and infectious disease organisms. (50 FTEs)	In CY 2005, 50 FTEs were associated with Genomic and Proteomic Science
Measurement Science and Diagnostics	Conduct research utilizing imaging and spectroscopy systems to analyze the structures and functions of subcellular systems and components. (40 FTEs)	In CY 2005, 35 FTEs were associated with Measurement Science and Diagnostics.
Molecular Synthesis	Generate biometric organic materials and construct synthetic biomolecules.	In CY 2005, 15 FTEs were associated with Molecular Synthesis.
Structural Biology	Conduct research utilizing chemical and crystallographic techniques to isolate and characterize the properties and three-dimensional shapes of protein molecules. (15 FTEs)	In CY 2005, 20 FTEs were associated with Structural Biology.
Pathogenesis	Not in SWEIS ROD. Perform genome-scale, focused and computationally enhanced experimental studies to gain a quantitative understanding of various aspects of pathogen lifecycle. The focus is on infections in humans, animals, and plants, as well as understanding the epidemiology and life cycle of pathogens in the environment. (15 FTEs)	New capability developed in 2005.
In-Vivo Monitoring. This is not a Bioscience Division capability; however, it is located at TA-43-HRL-1. Therefore, it is a capability within this Key Facility and is included here.	Performs whole-body scans as a service to the LANL personnel monitoring program, which supports operations with radioactive materials conducted elsewhere at LANL. (5 FTEs)	Conducted more than 1,140 lung and whole-body scans and about 750 other counts (detector studies, quality assurance measurements, etc.). In CY 2005, 3 FTEs were associated with this capability.

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

2.12.3 Operations Data for Bioscience Facilities

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. Bioscience Facilities/Operations Data

Parameter	Units	SWEIS ROD	2005 Operations
Radioactive Air Emissions	Ci/yr	Not estimated	Not measured
NPDES Discharge: [a]			
03A-040	MGY	2.5 [b]	Eliminated in 1999
Wastes:			
Chemical	kg/yr	13,000	1,531
Biomedical Waste	kg/yr	280 [c]	Eliminated in 1999
LLW	m^3/yr	34	6.4
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 [d]	119 [d]

a Outfall 03A-040 consisted of one process outfall and nine storm drains.
b Storm water only.
c Animal colony and the associated waste. The animal colony was eliminated in CY 1999.
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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-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 six major research buildings: the Radiochemistry Laboratory (Building 48-1), the Assembly Checkout Building (48-17), Diagnostic Instrumentation and Development Building (48-28), the Clean Chemistry/Mass Spectrometry Building (48-45), the Weapons Analytical Chemistry Facility (48-107), and the Machine and Fabrication Shop (48-8). During CY 2004, the Radiochemistry Laboratory, TA-48-1, was downgraded to a radiological Category C (low hazard) facility. TA-48, buildings 8, 17, 28, 45, and 107, are classified as low hazard chemical facilities (LANL 2005b).

2.13.1 Construction and Modifications at the Radiochemistry Facility

The SWEIS ROD projected no facility changes through CY 2005, although a few have occurred over the years (LANL 2003). During CY 2005 the fire notification system was upgraded under the institutional program. During CY 2006 the Building RC-1 roof replacement is expected to be completed. In addition, Building RC-1 is scheduled for electrical upgrades during 2006 and 2007 under the institutional EISU Project. A major upgrade to the building heating, ventilation, and air conditioning system is also planned for 2006 under the Facilities and Infrastructure Recapitalization Program. This includes an upgrade to the perchloric acid exhaust systems.

2.13.2 Operations at the Radiochemistry Facility

The SWEIS identified 10 capabilities for the Radiochemistry Key Facility. No new capabilities have been added, and none has been deleted. The primary measure of activity for this Key Facility is the number of personnel conducting research. In CY 2005, 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 four of the 10 capabilities were active at levels projected by the SWEIS ROD: Radionuclide Transport Studies, Isotope Production, Actinide/TRU Chemistry, and Sample Counting.

During 2005, work was initiated to validate a LANL procedure to measure beryllium on contaminated surfaces. This activity received NEPA coverage in the SWEIS. Most of the beryllium work involves solutions of wetted solids or one-piece solids such as coupons or articles and does not require participation in the LANL Chronic Beryllium Disease Prevention Program per LIR 402-560-01.0 (LANL 2004g), because there is no potential for airborne solids. The work includes analysis, ligand binding, materials characterization, field sampling, fundamental beryllium chemistry, and beryllium mitigation. There is a small amount of work done with beryllium solids that has the potential for airborne material including weighing of beryllium solids such as beryllium metal, beryllium carbonate, and beryllium oxide, and ashing of adhesive films used in sampling. Weighing and manipulation of dry powders are carried out in HEPA-filtered boxes and involve less than 10 grams of beryllium. Ashing of films is done in a HEPA-filtered hood and involves micrograms of beryllium per sample. Five-percent-acid baths up to 20 liters in volume are used in the cleaning process. This activity involved six FTEs in 2005.

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

Capability	SWEIS ROD	2005 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 CY 2005, operations continued at approximately twice the levels identified during preparation of the SWEIS. (36 FTEs)
Environmental Remediation Support	Background contamination characterization pilot studies. Performance assessments, soil remediation research and development, and field support. (34 FTEs)	During CY 2005, operations continued at approximately half the levels identified during preparation of the SWEIS. (10 FTEs)
Ultra-Low-Level Measurements	Isotope separation and mass spectrometry. (30 FTEs)	Level of operations increased during 2005 to 1.5 times the levels identified during preparation of the SWEIS. (20 FTEs)
Nuclear/ Radiochemistry	Radiochemical operations involving quantities of alpha-, beta-, and gamma-emitting radionuclides for non-weapons and weapons work. (44 FTEs)	Significant decrease in quantities of alpha-emitting radionuclides used in operations. (35 FTEs)

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 FTEs in Table 2.13.3-1include only full-time and part-time regular LANL staff.

Table 2.13.2-1. continued

Capability	SWEIS ROD	2005 Operations
Isotope Production	Target preparation. High-level beta/gamma chemistry and target processing to recover isotopes for medical and industrial application. (15 FTEs)	Slightly increased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (18 FTEs)
Actinide/TRU Chemistry	Radiochemical operations involving significant quantities of alpha-emitting radionuclides. (12 FTEs)	Significant decrease in quantities of alpha-emitting radionuclides used in operations. (14 FTEs)
Data Analysis	Re-examination of archive data and measurement of nuclear process parameters of interest to weapons radiochemists. (10 FTEs)	Slight increase from levels identified during preparation of the SWEIS to six FTEs, 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—total for both activities)	Same level of activity (35 FTEs) 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)	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)
Sample Counting	Measurement of the quantity of radioactivity in samples using alpha-, beta-, and gamma-ray counting systems. (5 FTEs)	During 2005, maintained slightly higher sample processing than the number of samples projected by the SWEIS ROD. (6 FTEs)

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. Two of the 10 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, most of the operations data were also below those projected by the SWEIS ROD, as shown in Table 2.13.3-1.

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

Parameter	Units	SWEIS ROD	2005 Operations
Radioactive Air Emissions:			
Mixed Fission Products	Ci/yr	1.4E-4	Not measured[a]
Plutonium-239	Ci/yr	1.1E-5	None detected[b]
Uranium-234 & U-235	Ci/yr	4.4E-7	6.52E-09
Mixed Activation Products	Ci/yr	3.1E-6	Not measured[a]
Arsenic-72	Ci/yr	1.1E-4	None detected[b]
Arsenic-73	Ci/yr	1.9E-4	None detected[b]
Arsenic-74	Ci/yr	4.0E-5	None detected[b]
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	1.50E-03
Gallium-68	Ci/yr	1.7E-5	1.50E-03
Rubidium-86	Ci/yr	2.8E-7	None detected[b]
Selenium-75	Ci/yr	3.4E-4	1.42E-05
NPDES Discharge:[c]			
Total Discharges	MGY	4.1	0
03A-045	MGY	0.87	Eliminated
04A-016	MGY	None	Eliminated
04A-131	MGY	None	Eliminated
04A-152	MGY	None	Eliminated
04A-153	MGY	3.2	Eliminated
Wastes:			
Chemical	kg/yr	3,300	479
LLW	m^3/yr	270	29.1
MLLW	m^3/yr	3.8	0.08
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	128 [d]	121 [d]

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., cesium-137 or cobalt-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); outfall 03A-045 was eliminated in 1999.

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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-year window represented by the SWEIS ROD.

2.14 Radioactive Liquid Waste Treatment Facility (TA-50)

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.

This Key Facility is a Nuclear Hazard Category 2 facility, and consists of the following structures (Table 2.14-1): 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) (Table 2.14-1).

There are no other nuclear facilities and no Moderate Hazard non-nuclear buildings within this Key Facility (LANL 2005b).

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 2005 [b]
TA-50-0001	Main Treatment Plant	2	3	2
TA-50-0002	LLW Tank Farm		3	2
TA-50-0066	Acid and Caustic Tank Farm		3	2
TA-50-0090	Holding Tank		3	2

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a).
b DOE /LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b).

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 in March 1999. Nitrate reduction equipment was installed in 1998, became operational in March 1999, and was subsequently removed from service during 2001. Engineering evaluation had shown that more than 70 percent of the nitrates in the LANL radioactive liquid waste were 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.

Not Projected: Facility personnel also installed an electrodialysis reversal unit in 1999 and an evaporator in 2000. Both units process the waste stream from the reverse osmosis unit. They received NEPA coverage through Categorical Exclusions #7428, approved 02/23/99 (DOE 1999c), and #7737, approved 10/29/99 (DOE 1999d). The SWEIS ROD projected neither of these modifications.

In addition, decontamination operations were relocated during 2000 from Building 50-01 to TA-54 and moved to the west end of TA-54. Radioactive liquid wastes generated during decontamination operations are collected in two holding tanks at TA-54 and are trucked to the RLWTF at TA-50. The lead decontamination trailer, formerly located between Buildings 50-83 and 50-02, has been decommissioned. The quantity of lead that needed decontamination had become so small that maintaining this operation was no longer cost effective.

During 2002, the RLWTF shop building, 50-83, was relocated to TA-54 to make room for the construction of a new 300,000-gallon influent storage facility funded by the Cerro Grande Rehabilitation Project. Construction of the new facility started during 2004.

2.14.2 Operations at the Radioactive Liquid Waste Treatment Facility

The SWEIS identified five capabilities for the RLWTF Key Facility. The primary measurement of activity for this facility is the volume of radioactive liquid processed through the main treatment equipment. From 1998 through 2005, all discharge volumes have been less than the projected discharge volume of 35 million liters per year in the SWEIS ROD:

- 1998: 23 million liters;
- 1999: 20 million liters;
- 2000: 19 million liters;
- 2001: 14 million liters;
- 2002: 11 million liters;
- 2003: 11 million liters;
- 2004: 8 million liters;
- 2005: 7 million liters.

Two factors have contributed to reduced waste volumes—source reduction and process improvements. Source reduction efforts, for example, included the re-routing of two significant waste streams, non-radioactive discharge waters from a cooling tower at TA-21 and a boiler at TA-48, to the LANL sewage plant during the summer of 2001. Process improvements included recycling of radioactive liquid waste within the RLWTF. For example, process waters are now used instead of tap water for the dissolution of chemicals needed in the treatment process, and for filter backwash operations. This recycle has eliminated approximately 2.5 million liters per year of fresh water use.

In March 2002, a perchlorate removal system was added to the main treatment plant at TA-50. Ion exchange resin columns were installed and placed in service. To date, the resins have effectively removed perchlorates to less than the 4 parts per billion detection limit in all waters discharged since installation. These actions were taken despite the fact that there are no EPA or New Mexico discharge standards for perchlorate. This project received NEPA review through Categorical Exclusion #8632 (DOE 2002h).

Table 2.14.2-1 provides details.

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

Capability	SWEIS ROD [a]	2005 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.

Table 2.14.2-1. continued

Capability	SWEIS ROD [a]	2005 Operations
Radioactive Liquid Waste Pretreatment	Pretreat 900,000 liters/yr of radioactive liquid waste at TA-21.	No pretreatment took place at TA-21.
	Pretreat 80,000 liters/yr of radioactive liquid waste from TA-55 in Room 60.	No pretreatment took place 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 Main Plant	Install UF/RO equipment in 1997. Install equipment for nitrate reduction in 1999.	UF/RO equipment installed in 1998. Nitrate reduction equipment installed in 1998 and subsequently removed in 2001. Ion exchange columns for perchlorate treatment installed in 2002 (not projected).
	Treat 35 million liters/yr of radioactive liquid waste.	Discharged 6.8 million liters of radioactive liquid waste.
	De-water, characterize, and package 10 cubic meters/yr of LLW sludge.	No de-watering of LLW sludge took place.
	Solidify, characterize, and package 32 cubic meters/yr of TRU waste sludge.	No TRU waste sludge was solidified as a result of main plant operations.
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]
	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

In 1998, liquid effluent from the RLWTF did not meet DOE's discharge criteria for water quality. In order to improve effluent quality, the treatment process was upgraded in 1999 to include UF/RO equipment. As a result, CY 2005 marked the sixth consecutive year that there were zero violations of the State of New Mexico discharge limit for nitrates and total dissolved solids, 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 have remained at the less-than-10-milligram-level through 2005. Similarly, annual average radioactive discharges were reduced from greater than 250 picocuries alpha activity per liter during the period 1993–1999 to less than 20 picocuries per liter since. In 2005, discharges averaged 18 percent of the limits set forth in DOE Order 5400.5 (40 CFR).

The SWEIS ROD did not project the quality of effluent, only quantity. Radioactive air emissions continued to be negligible (less than one microcurie), and NPDES discharge volume (6.8 million liters) continued to be less than the projected 35 million liters. The quantities of solid wastes varied from projections, but were overall less than projected quantities. Table 2.14.3-1 provides further details.

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

Parameter	Units	SWEIS ROD	2005 Operations
Radioactive Air Emissions:			
Americium-241	Ci/yr	Negligible	None detected
Plutonium-238	Ci/yr	Negligible	None detected
Plutonium-239	Ci/yr	Negligible	None detected
Thorium-228	Ci/yr	Negligible	None detected
Thorium-230	Ci/yr	Negligible	None detected
Uranium-234	Ci/yr	Negligible	None detected
NPDES Discharge:			
051	MGY	9.3	1.83
Wastes:			
Chemical	kg/yr	2,200	7.2
LLW	m^3/yr	160	259 [a]
MLLW	m^3/yr	0	0.004
TRU	m^3/yr	30	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	62 [b]	68 [b]

a LLW in 2005 exceeded the SWEIS ROD projection due to the generation of about 57.5 cubic meters of construction soil and debris from the Cerro Grande Rehabilitation Project to install additional influent storage tanks. An additional 73.0 cubic meters of aqueous evaporator bottoms were shipped to Tennessee for treatment of secondary radioactive liquid waste. Neither of these waste streams was foreseen when SWEIS 1999 was being developed.

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 2005 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, KSL, and other subcontractor personnel. The number of employees for 2005 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 10-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 LANL facilities.

It is important to note that LANL'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 is one Category 3 nuclear building within this Key Facility: the Waste Characterization, Reduction, and Repackaging (WCRR) Facility (Building 50-69). In addition, there are also several Category 2 nuclear facilities/operations; the LLW disposal cells, shafts, and trenches and fabric domes and buildings within Area G; the Radioactive Assay and Nondestructive Test Facility (Building 54-38), and outdoor operations at the WCRR Facility. In addition to the nuclear facilities, the Decontamination and Volume Reduction System (DVRS), TA-54-412, was added to the radiological facility list in CY 2002 (LANL 2002b). ARTIC, formerly the Radioactive Materials Research Operations and Demonstration facility, was downgraded from a Category 3 nuclear facility to a radiological facility.

As shown in Table 2.15-1, the SWEIS recognized 22 structures as having Category 2 nuclear classification (Area G was recognized as a whole and then individual buildings and structures were also recognized). The WCRR Facility 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.

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

Building	Description	SWEIS ROD	DOE 1998 [a]	LANL 2005 [b]
TA-50-0069	WCRR Facility Building	2	3	3
TA-50-0069 Outside	Nondestructive Analysis Mobile Activities			2
TA-50-0069 Outside [c]	Drum Storage			
TA-54-Area G [d]	LLW Storage/Disposal	2	2	2
TA-54-0002	TRU Storage Building		3	2
TA-54-0008	Storage Building			
TA-54-0033	TRU Drum Preparation	2		2
TA-54-0038	Radioassay and Nondestructive Testing Facility	2	3	2

Table 2.15-1. continued

Building	Description	SWEIS ROD	DOE 1998 [a]	LANL 2005 [b]
TA-54-0048	TRU Waste Management Dome	2	3	2
TA-54-0049	TRU Waste Management Dome	2	3	2
TA-54-0153	TRU Waste Management Dome	2	3	2
TA-54-0224	Mixed Waste Storage Dome			2
TA-54-0226	TRU Waste Management Dome	2		2
TA-54-0229	TRU Waste Management Dome	2		2
TA-54-0230	TRU Waste Management Dome	2		2
TA-54-0231	TRU Waste Management Dome	2		2
TA-54-0232	TRU Waste Management Dome	2		2
TA-54-0283	TRU Waste Management Dome	2		2
TA-54-0375	TRU Waste Management Dome	2		2
TA-54-1027	Hazardous, Chemical, Mixed, and Tritiated Waste Storage Dome			2
TA-54-1028	Hazardous, Chemical, Mixed, and Tritiated Waste Storage Dome			2
TA-54-1030	Hazardous, Chemical, Mixed, and Tritiated Waste Storage Dome			2
TA-54-1041	Hazardous, Chemical, Mixed, and Tritiated Waste Storage Dome			2
TA-54-Pad10[e]	Storage Pad	2		2

a DOE list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a).
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b).
c In the most recent Nuclear Facility List (LANL 2005b), "Drum Storage" includes drum staging/storage pad and waste container temperature equilibration activities outside TA-50-69.
d This includes LLW (including mixed waste) storage and disposal in domes, pits, shafts, and trenches; TRU waste storage in domes and shafts (does not include TRU Waste Inspection and Storage Program [TWISP]); TRU legacy waste in pits and shafts; low-level disposal of asbestos in pits and shafts. Operations building: TRU waste storage.
e Pad 10 was originally designated as Pads 2 and 4 in the SWEIS ROD.

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 and the expansion of Area G.

Actual: Only one of the two construction activities projected by the SWEIS ROD has been completed. The construction of four additional fabric domes for the storage of TRU wastes retrieved from earth-covered pads was completed in 1998. Although expansion of Area G has not yet begun, the possibility exists for initiation of radioactive and mixed waste storage and disposal operations in Zone 4 within the next year.

The Off-Site Source Recovery (OSR) Project recovers and manages unwanted radioactive sealed sources and other radioactive material that

- present a risk to public health and safety;

- present a potential loss of control by a US Nuclear Regulatory Commission (NRC) or agreement state licensee;
- are excess and unwanted and are a DOE responsibility under Public Law 99-240[8] (42 USC); or
- are DOE-owned.

The project is sponsored by DOE's Office of Technical Program Integration and the Albuquerque Operations Office Waste Management Division that operates from LANL. It focuses on the problem of sources and devices held under NRC or agreement state licenses for which there is no disposal option. The project was reorganized in 1999 to more aggressively recover and manage the estimated 18,000 sealed source devices that will become excess and unwanted over the next decade. This reorganization combined three activities, the Radioactive Source Recovery Program, the Off-Site Waste Program, and the Plutonium-239/Beryllium Neutron Source Project. Approximately 1,055 sources were collected for storage at TA-54 during CY 2005. Eventually, these sources will be shipped to the WIPP for final disposition. The OSR Project received NEPA coverage under an environmental assessment and subsequent Finding of No Significant Impact (DOE 1995c), Accession Numbers 6279 (DOE 1996c), 7405 (DOE 1999e), and 7570 (DOE 1999f), the 1999 SWEIS (DOE 1999a), and a Supplement Analysis to the 1999 SWEIS (DOE 2000c).

In CY 2002, LANL submitted a closure plan for three RCRA-regulated storage units at TA-50. These units were TA-50, Building 1, room 59, TA-50-114, and TA-50-37. The first two units are located at the RLWTF and the third is at ARTIC. NMED approved LANL's closure of these three units in CY 2004.

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 has 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 2005 to projections made by the SWEIS ROD can be summarized as follows:

Chemical wastes: Approximately 3,160 metric tons of chemical waste were generated at LANL during CY 2005. This compares to an average quantity of 3,250 metric tons per year projected by the SWEIS ROD.

LLW: Approximately 4,400 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. No new disposal cells were constructed, and disposal operations did not

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[8] Public Law 99-240: an act to amend the Low-Level Radioactive Waste Policy Amendments Act of 1985. Introduced in the Senate and House of Representatives of the United States of America in Congress assembled, Ninety-Ninth Congress, January 15, 1986. The Policy Act was designed to stimulate development of new facilities by encouraging states to form interstate compacts for disposal on a regional basis.

expand into either Zone 4 or Zone 6 at TA-54. Operations could expand into Zone 4 within the next year.

MLLW: 20 cubic meters were generated and delivered to TA-54 during CY 2005, compared to an average volume of 632 cubic meters per year projected by the SWEIS ROD. This volume is well under the projection in the SWEIS ROD.

TRU wastes: 66 cubic meters of TRU wastes were shipped to WIPP during CY 2005, and 75 cubic meters of newly generated TRU wastes (non-hazardous) were added to storage.

Mixed TRU Wastes: During CY 2005, 131 cubic meters of mixed TRU wastes shipped to WIPP in 2005, approximately 100 cubic meters of mixed TRU wastes were received for storage.

In summary, chemical and radioactive waste management activities were at levels below those projected by the SWEIS ROD 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 Facilities (TA-50 and TA-54)/Comparison of Operations

Capability	SWEIS ROD[a]	2005 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 three cubic meters of legacy MLLW.
	Characterize 9,010 cubic meters of legacy TRU waste.	Characterized approximately 416 cubic meters of TRU waste in 2005.
	Verify characterization data at the Radioactive Assay and Nondestructive Test Facility for unopened containers of LLW and TRU waste.	Did not verify characterization data at Radioactive Assay and Nondestructive Test Facility. Verification of characterization data for unopened TRU containers is currently occurring at TA-54 Area G, on Pad 10.
	Maintain waste acceptance criteria for off-site treatment, storage, and disposal facilities.	As projected.
	Over-pack and bulk waste as required.	As projected.
	Perform coring and visual inspection of a percentage of TRU waste packages.	Performed visual examinations on 64 TRU waste packages in CY 2005; no drums were cored in 2005.
	Vent 16,700 drums of TRU waste retrieved during TWISP.	Drums were not vented in CY 2005..
	Maintain current version of WIPP waste acceptance criteria and liaison with WIPP operations.	As projected.

Table 2.15.2-1. continued

Capability	SWEIS ROD[a]	2005 Operations
Compaction	Compact up to 25,400 cubic meters of LLW.	Approximately 430 cubic meters of LLW was compacted into approximately 84 cubic meters.
Size Reduction	Size reduce 2,900 cubic meters of TRU waste at WCRR Facility and the Drum Preparation Facility.	No waste was processed through the DVRS.
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 off-site land disposal restrictions, treatment, and disposal.	Approximately 640 metric tons of chemical waste and approximately 20 cubic meters of MLLW were shipped for off-site treatment and disposal from the Solid Radioactive and Chemical Waste Facility.
	Over the next 10 years, ship no LLW for off-site disposal.	Approximately 585 cubic meters of LLW was shipped for off-site disposal.
	Over the next 10 years, ship 9,010 cubic meters of legacy TRU waste to WIPP.	76 cubic meters of legacy TRU wastes were shipped to WIPP in 2005.
	Over the next 10 years, ship 5,460 cubic meters of operational and environmental restoration TRU waste to WIPP.	Approximately 28 cubic meters of operational (newly generated) TRU wastes were shipped to WIPP in CY 2005. No environmental restoration TRU wastes were shipped to WIPP.
	Over the next 10 years, ship no environmental restoration soils for off-site solidification and disposal.	No environmental restoration soils were shipped for off-site solidification and disposal in 2005. [b]
	Annually receive, on average, 5 cubic meters of LLW and TRU waste from off-site locations in 5 to 10 shipments.	33 cubic meters of LLW was received from off-site locations. Twenty eight cubic meters of the LLW were uranium chips received for storage and eventual stabilization.
Waste Storage	Stage chemical and mixed wastes before shipment for off-site treatment, storage, and disposal.	Chemical and mixed wastes were staged before shipment.
	Store legacy TRU waste and MLLW.	Legacy TRU waste and MLLW were stored.
	Store LLW uranium chips until sufficient quantities have accumulated for stabilization.	There were 28 cubic meters of uranium chips in storage awaiting stabilization in CY 2005.
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.	Retrieval activities completed in 2001. No retrieval occurred in 2005.
Other Waste Processing	Demonstrate treatment (e.g., electrochemical) of MLLW liquids.	No activity.
	Land farm oil-contaminated soils at Area J.	Closure of Area J is now complete.
	Stabilize 870 cubic meters of uranium chips.	No uranium chips were stabilized in CY 2005.

Table 2.15.2-1. continued

Capability	SWEIS ROD[a]	2005 Operations
Other Waste Processing, continued	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 in CY 2005.
Disposal	Over next 10 years, dispose of 420 cubic meters of LLW in shafts at Area G.	Approximately 56 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 on-site LLW disposal operations beyond existing Area G footprint.)	Approximately 4,345 cubic meters of LLW was disposed of in cells. Area G was not expanded.
	Over next 10 years, dispose of 100 cubic meters per year administratively controlled industrial solid wastes [c] in pits at Area J.	Closure of Area J is now complete.
	Over next 10 years, dispose of non-radioactive classified wastes in shafts at Area J.	Closure of Area J is now complete.
Decontamination Operations [d]	Decontaminate LANL personnel respirators for reuse (approximately 700/month).	In 2005, decontaminated approximately 250 personnel respirators per month at TA-54-1009.
	Decontaminate air-proportional probes for reuse (approximately 300/month).	In 2005, decontaminated 40 faces and 40 bodies per month at TA-54-1009.
	Decontaminate vehicles and portable instruments for reuse (as required).	No activity in 2005.
	Decontaminate precious metals for resale (acid bath).	No activity. [e]
	Decontaminate scrap metals for resale (sandblast).	No activity. [e]
	Decontaminate 200 cubic meters of lead for reuse (grit blast).	No activity. [e]

a Includes the construction of four new storage domes for the TWISP.

b The Environmental Restoration Project (now called the Environmental Remediation and Surveillance [ERS] Program) usually ships soils removed in remediation of a potential release site (PRS) directly to an off-site disposal facility. These wastes do not typically require processing at TA-54 and do not go through the TA-54 operations for shipment.

c In the SWEIS, the term “industrial solid waste” was used for construction debris, chemical waste, and sensitive paper records.

d The Decontamination Operations capability was identified with the Radioactive Liquid Waste Treatment Key Facility in the SWEIS. Activities prior to 2000 are reported in Section 2.14.2 of the Yearbook. In 2000, this capability was relocated to TA-54 and the Solid Radioactive and Chemical Waste Facility.

e Although there has been no activity in CYs 2001, 2002, 2003 and 2004, this decontamination operation is now part of the Solid Radioactive and Chemical Waste Facility capabilities.

2.15.3 Operations Data for the Solid Radioactive and Chemical Waste Facility

Levels of activity in CY 2005 were less than projected by the SWEIS ROD and so were air emissions. The exception is chemical waste generation at the Solid Chemical and Radioactive Waste Key Facility. SWEIS ROD projections for chemical waste generated at the Solid Chemical and Radioactive Waste Facility were exceeded during CY 2005 due to DVRS repackaging of legacy TRU waste for shipment to WIPP. 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	2005 Operations
Radioactive Air Emissions: [a]			
Tritium	Ci/yr	6.09E+1	Not monitored [a]
Americium-241	Ci/yr	6.60E-7	7.61E-10
Plutonium-238	Ci/yr	4.80E-6	2.64E-10
Plutonium-239	Ci/yr	6.80E-7	5.04E-09
Uranium-234	Ci/yr	8.00E-6	None detected [a]
Uranium-235	Ci/yr	4.10E-7	None detected [a]
Uranium-238	Ci/yr	4.00E-6	None detected [a]
Strontium-90/Yttrium-90	Ci/yr	Not projected [b]	None detected [a]
Thorium isotopes	Ci/yr	Not projected [b]	1.21E-09
NPDES Discharge	MGY	No outfalls	0
Wastes: [c]			
Chemical	kg/yr	920	2,830 [d]
LLW	m^3/yr	174	281 [e]
MLLW	m^3/yr	4	0
TRU	m^3/yr	27	0.6
Mixed TRU	m^3/yr	0	1.9
Number of Workers	FTEs	65 [f]	71 [f]

a Data shown are measured emissions from WCRR Facility and the ARTIC 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 These radionuclides were not projected in the SWEIS ROD because they were either dosimetrically insignificant or not isotopically identified.

c 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, HEPA filters, personnel protective clothing and equipment, and process wastes from size reduction and compaction.

d SWEIS ROD projections for both chemical waste and LLW generated at the Solid Chemical and Radioactive Waste Facility were exceeded during CY 2005 due to DVRS repackaging of legacy TRU waste for shipment to WIPP. The 2,830 kg of chemical wastes for the Solid Chemical and Radioactive Waste Facility are comprised of cutting fluids (non-hazardous, actually mineral oil) and water from 50-54, the machine shop. Since the 14 55-gal drums of liquid are quite heavy and non-hazardous, there wasn't a regulatory driver to move them out in a timely fashion. This amount had accumulated over time and was finally shipped for disposal in CY 2005.

e About 95 percent (1,300 drums) of the LLW wastes for the Solid Chemical and Radioactive Waste Facility is empty drums wrapped in plastic from repackaging of TRU waste at 50-69 WCRR Facility. These drums are typically sent to TA-54, Area G, for compaction and disposal.

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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-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 TAs and comprise approximately 14,224 of LANL's 26,480 acres.

As shown in Table 2.16-1, the SWEIS identified six buildings within the Non-Key Facilities with Nuclear Hazard Categories. The High-Pressure Tritium Facility (Building TA-33-86), classified in 2001 as a Category 2 nuclear facility, was removed from the Nuclear Facility List in March 2002 and downgraded to a radiological facility. The D&D of the formerly used tritium facility, TA-33-86, the High-Pressure Tritium Laboratory, was completed in 2002. In November 2003, five PRSs located within Non-Key Facilities were added to the Nuclear Facility List.

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

Building	Description	NHC SWEIS ROD	NHC DOE 1998 [a]	NHC LANL 2005 [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	
TA-35-0002	Non-American National Standards Institute Uranium Sources	3	3	
TA-35-0027	Safeguard Assay and Research	3	3	
TA-10 PRS 10-002(a)-00	Former Liquid Disposal Complex			3
TA-35 PRS 35-001	MDA W—Sodium Storage Tanks			3
TA-35 PRS 35-003(a)-99	Wastewater Treatment Plant			3
TA-35 PRS 35-003(d)-00	Wastewater Treatment Plant (Pratt Canyon)			3
TA-49 PRS 49-00(a)-00	MDA AB			2

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a).
b DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2005b).

Additionally, several Non-Key Facilities were identified as radiological facilities in September 2002 (LANL 2002b). 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; Nuclear Safeguards Research, 35-2; Nuclear Safeguards Lab, 35-27; and the Underground Vault, 41-1. Table 2.16-2 lists all the Non-Key Facilities identified as radiological in CY 2005.

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 due to programmatic requirements and replacement of damaged or destroyed facilities following the Cerro Grande Fire (LANL 2001k). Major projects that have been completed are listed in Table 2.16-3. Complete descriptions of these projects can be found in previous Yearbooks (LANL 2003, 2004h, 2005e).

Table 2.16-2. Non-Key Facilities with Radiological Hazard Classification

Building	Description	LANL 2001 [a]	LANL 2002 [b]
TA-2-1	Omega Reactor	RAD	RAD
TA-3-16	Ion Exchange	---	RAD
TA-3-34	Cryogenics Bldg. B	RAD	RAD
TA-3-40	Physics Bldg. (HP)	RAD	RAD
TA-3-169	Warehouse	---	RAD
TA-3-1819	Experiment Mat'l Lab	---	RAD
TA-21-5	Lab Bldg	RAD	RAD
TA-21-150	Molecular Chemical	RAD	---
TA-33-86	High Pressure Tritium	---	RAD
TA-35-2	Nuclear Safeguards Research	RAD	RAD
TA-35-27	Nuclear Safeguards Lab	RAD	RAD
TA-36-1	Laboratory and offices	---	RAD
TA-36-214	Central HP Calibration Facility	---	RAD
TA-41-1	Underground Vault	RAD	RAD
TA-41-4	Laboratory	RAD	---

a LANL Radiological Facility List (LANL 2001c).
b LANL Radiological Facility List (LANL 2002b).

Table 2.16-3. Non-Key Facilities Completed Construction Projects

Description	Year Completed	NEPA Review
Los Alamos Research Park	2001	DOE 1997b
Strategic Computing Complex	2001	DOE 1998d
Chemistry Division Office Building (Chemistry Technical Support Building)	2002	DOE 2001b
Security Truck Inspection Station	2002	DOE 2002i
Nonproliferation and International Security Center	2003	DOE 1999g
TA-72 Live Fire Shoot House	2003	DOE 2000d
Emergency Operations Center	2003	DOE 2001c
Multi-Channel Communications Project	2003	DOE 2001c
Security Systems Group Security Systems Support Facility	2003	DOE 2001d
Decision Applications Division Office Building	2003	DOE 2002j
LANL Medical Facility	2004	DOE 2001e
Facility and Waste Operations Division Office Building	2004	DOE 2001f
Pajarito Road Access Control Stations	2004	DOE 2002k
NSSB (TA-03) Parking Structure	2004	DOE 2003f

New projects that are still under construction 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 was designed 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 10 microseconds. Each experiment will require extensive preparation of the experimental assembly and diagnostic instrumentation.

The facility will require up to five megawatt-hours of electrical energy annually (less than one percent of total LANL consumption); will have a peak electrical demand of four 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 1996c).

Status: Construction was completed in September 2000. Major testing of the capacitor banks (about 30 mega-amps) 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 and continued through September 2002.

During 2002, a new building was constructed at the Nevada Test Site to accommodate the relocation of Atlas. The relocation of Atlas to the Nevada Test Site had its own NEPA coverage in the form of an environmental assessment and Finding of No Significant Impact issued 06/05/2001 (DOE 2001g). The physical transfer of the Atlas machine to Bechtel Nevada at the Nevada Test Site began in October 2002. The formal property transfer took place at about the same time. Reassembly of the machine began in November 2002 and continued through April 2004. NNSA/Nevada Site Office issued CD-4 to Bechtel Nevada for the relocated Atlas machine on April 26, 2004. In May 2004 LANL again assumed ownership and management of the Atlas facility at the Nevada Test Site from Bechtel Nevada; LANL personnel will continue to be involved in experimentation activities at the Nevada Test Site. Machine characterization testing began in May 2004 to evaluate performance (compared to experience at LANL), reliability, and reproducibility. After interruption due to the 2004 LANL operational stand-down, characterization testing resumed in March 2005. Atlas became technically fully operational in 2005 when the first Atlas implosion physics experiment was conducted in July 2005 and has been operational ever since. Atlas is currently scheduled to transition to "lukewarm" standby in June 2006 and be decommissioned in October 2006.

b) NPDES Outfall Project

The NPDES Outfall Project (DOE 1996b) is an on-going project and is described in detail in the 2002 SWEIS Yearbook (LANL 2003), section 2.16.

c) National Security Sciences Building

The NSSB within TA-03 will provide approximately 275,000 square feet of space for theoretical and applied physics, computation science and program, and senior-management functions. The NSSB will be an eight-story-high building to house about 700 personnel and their functions, which would move from building TA-03-0043. It also includes a one-story, 600-seat lecture hall and a separate multilevel parking structure that will provide 400 spaces. The facility will cost approximately $97 million dollars to build. When personnel are completely removed from building TA-03-0043 to the new NSSB, TA-03-0043 is scheduled to be demolished. This project has its own NEPA coverage provided by the *Environmental Assessment for Proposed Construction and Operation of the New Office Building and Related Structures within TA-03 at Los Alamos National Laboratory* (NNSA 2001) along with a Finding of No Significant Impact.

Because the use of energy-efficient lighting and equipment and the use of water-conservation measures were incorporated in the construction design, operation of the new office building is expected to use less water and electricity than building TA-03-0043.

Status: Senator Pete Domenici and LANL senior managers attended a groundbreaking ceremony on August 20, 2003, to turn the first yards of earth for the building. Construction on the NSSB began in February 2004 and is scheduled for completion in CY 2006. Beneficial occupancy is scheduled for March 2006. The subcontractor broke ground on the parking structure in April 2004; the parking structure was completed in May 2005.

d) Information Management Division Office Building

Description: Information Management (IM) Division Office Building is proposed to consolidate IM Division Office and Communication Arts and Services group personnel into a centralized and more efficient office building. This building will be located at the northeast corner of the intersection of Diamond Drive and Pajarito Road within TA-03. The facility will be two-story, and approximately 15,000 to 18,000 square feet. Electric, steam, water, sanitary sewer, and communication utilities will be required.

Status: This project received NEPA coverage through an existing DOE-approved categorical exclusion (DOE 2004e) and was also reviewed in the *Environmental Assessment for the Nonproliferation and International Security Center* (DOE 1999g). The design subcontract was awarded in March 2005; however, this project was subsequently cancelled due to lack of funding.

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) as shown in Table 2.16.2-1. The eighth category, environmental restoration, is discussed in Section 2.17. During CY 2004, no new capabilities were added to the Non-Key Facilities and none of the eight was deleted.

The 6,183 employees in the Non-Key Facilities at the end of CY 2005 reflect an increase of 428 employees over the employees reported in the 2004 SWEIS Yearbook (LANL 2005e).

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).

2.16.3 Operations Data for the Non-Key Facilities

The Non-Key Facilities occupy more than half of LANL and now employ about 42 percent of the workforce. In 2005, activities in these facilities contributed less than 20 percent of most operational effects. For example, in 2005, the Non-Key Facilities generated about 20 percent of the total LANL chemical waste volume; about 19 percent of the total LLW waste volume; and about 30 percent of the total TRU waste volume. Table 2.16.3-1 presents details of the operations data from CY 2005.

The combined flows of the sanitary waste treatment plant and the TA-03 Steam Plant account for about 82 percent of the total discharge from Non-Key Facilities and about 56 percent of all water discharged by LANL. Section 3.2 has more detail.

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

Parameter	Units	SWEIS ROD	2005 Operations
Radioactive Air Emissions: [a]			
Tritium	Ci/y	9.1E+2	None measured
Plutonium	Ci/y	3.3E-6	None measured
Uranium	Ci/y	1.8E-4	None measured
NPDES Discharge:			
Total Discharges	MGY	142	135.03
001	MGY	114	110.606
013	MGY	[b]	[b]
03A-027	MGY	5.8	9.578
03A-160	MGY	5.1	7.884
03A-199	MGY	---	6.962 [c]
22 others	MGY	17	[d]

Table 2.16.3-1. continued

Parameter	Units	SWEIS ROD	2005 Operations
Wastes:			
Chemical	kg/yr	651,000	623,329
LLW	m^3/yr	520	1,046 [e]
MLLW	m^3/yr	30	2.3
TRU	m^3/yr	0	17.5 [f]
Mixed TRU	m^3/yr	0	0.2
Number of Workers	FTEs	4,601 [g]	6,183 [g]

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 CY 2005.
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 LLW generation at the Non-Key Facilities exceeded the SWEIS ROD projection due to heightened activities and new construction.
f TRU waste generated at the Non-Key Facilities during CY 2005 was the result of the OSR Project. Because this waste comes from Shipping and Receiving, it is attributed to that location as the point of generation.
g 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 CY 2005 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, KSL, and other subcontractor personnel. The number of employees for CY 2005 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 10-year window represented by the SWEIS ROD.

2.17 Environmental Remediation and Surveillance Program (previously the Environmental Restoration Project)

The ERS Program, previously called the Environmental Restoration Project, may generate a significant amount of waste during cleanup activities; therefore, the project is included as a section in Chapter 2. The SWEIS ROD forecasted that the ERS Program would contribute 60 percent of the chemical waste, 35 percent of the LLW, and 75 percent of the MLLW generated at the Laboratory over the 10 years from 1996–2005.

The DOE established the ERS Program in 1989 to characterize and, if necessary, remediate over 2,100 solid waste management units (SWMUs) and areas of concern (AOCs) known, or suspected, to be contaminated from historical Laboratory 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 NMED for chemical constituents and/or DOE for radionuclides.

In CY 2005, ERS Program activities included drafting and finalizing numerous characterization and remediation plans and reports for NMED in accordance with the Final Order on Consent signed on March 1, 2005, and the February 3, 2005, Federal Facility Compliance Agreement (FFCA). In addition, accelerated characterization and remediation activities were implemented at sites that could potentially be affected by upcoming infrastructure and construction projects. All work performed was formally tracked.

Some characterization and remediation plans and reports completed include the following:

- Investigation Work Plan (IWP) for the North Canyons (Guaje, Barranca and Rendija Canyons);
- Los Alamos and Pueblo Canyons Supplemental Investigation Report;
- Historic Information Report (HIR) and Aggregate Area IWP for Bayo Canyon;
- IWP for the Pueblo Canyon Aggregate Area;
- Corrective Action Work plan for SWMU 73-002 at the Los Alamos County Airport;
- Remedy Completion Report for Former TA-19/East Gate;
- IWP for MDA A at TA-21;
- HIR and IWP for Middle Los Alamos Canyon;
- IWP for the Characterization of Soils Underlying Structures at DP West at TA-21;
- Investigation Report for Middle Mortandad and Ten Site Canyon;
- Drilling Plan for the Sampling and Analysis of the Middle Mortandad/Ten Site Aggregate Nuclear Environmental Sites (NESs) associated with the TA-35 Waste Water Treatment Plant and Pratt Canyon;
- Corrective Measures Evaluation Plan and Soil Vapor Extraction Pilot Study for MDA L;
- MDA L Investigation Report;
- SWMU Assessment Report for SWMU 03-013(i);
- MDA G Investigation Report;
- Groundwater Investigation Report for SWMU 03-010(a);
- Revision of the IWP for SWMU 16-003(o), the Fish Ladder;
- IWP for the TA-16 90s Line (SWMU 16-008(a))-99 and SWMU 16-007(a)-99, the 30s Line Ponds;
- Revision 1 of the MDA P Closure Certification Report;
- Monthly Corrective Measures Study Progress Reports for the 260 Outfall (SWMU 16-021[c]);
- Annual Moisture Monitoring Report for MDA AB at TA-49;
- Accelerated Corrective Action (ACA) Work Plan for SWMU 33-013;
- Interim Facility-Wide Groundwater Monitoring Plan;
- Groundwater Background Investigation Report;
- Drilling Work Plans for Regional Monitoring Wells LAOI-7, R-23i, R-16aLADP-5, R-10, R-10a, R-17, R-24, and R-27;
- Drilling Work Plans for Intermediate Monitoring Wells CdV-16-2(i)r and LAOI-3,2a;
- Well Completion Reports for Intermediate Monitoring Well CdV-16-2(i)r and five regional Monitoring Wells;
- Quarterly FFCA Status Reports;
- Monthly Stormwater Screening Action Level Exceedance Reports;

- Remedy Completion Report for the Investigation and Remediation of AOC 03-001(i) and SWMUs 03-029 and 61-002.

Ongoing field activities included the following:

- Bimonthly moisture monitoring at MDA AB, a Category 2 NES, a site of underground nuclear safety tests in the early 1960s at TA-49;
- Monitoring well drilling, coring, development, and testing for the following groundwater monitoring wells: R-6, R-6i, R-11, R-18, R-33, R-34, Mortandad wells I4, I5 and I10;
- Mortandad Canyon Alluvial Drilling;
- Sediment investigations in Mortandad and Pajarito Canyons;
- Voluntary Corrective Action to complete the characterization and remediation of PRSs associated with the TA-16 340 Complex following D&D of the entire site;
- Subsurface investigations at MDA L, a 2.5-acre fenced area consisting of one inactive subsurface disposal pit; three inactive subsurface treatment and disposal impoundments; and 34 inactive disposal shafts;
- Abandonment of boreholes at Area G at TA-54;
- DP Canyon Quarterly Inspections;
- Quarterly sampling of the TA-16 260 Outfall in support of the Corrective Measures Study;
- Quarterly subsurface vapor monitoring at MDA H at TA-54.

2.17.1 Operations of the Environmental Remediation and Surveillance Program

The ERS Program originally identified 2,124 SWMUs and AOCs; 1,099 of these were listed in the Hazardous and Solid Waste Amendments (HSWA) Module of the Laboratory's Hazardous Waste Facility Permit and subject to HSWA corrective action requirements (originally under the authority of the EPA and later the NMED). The remaining 1,025 were identified by LANL as potentially requiring investigation and/or remediation, but were not regulated under the HSWA Module. In March 2005, the NMED, DOE, and UC entered into a Compliance Order on Consent (Consent Order) that replaces the HSWA Module and regulates all sites being addressed by the ERS Program[9]. From the beginning of the ERS Program through the end of CY 2005, 774 units had been approved for no further action (NFA) [10], including 146 units that have been removed from the Laboratory's Hazardous Waste Facility Permit. Of these, 125 non-HSWA Module sites previously had been approved for NFA by DOE and, under the terms of the Consent Order, the NFA determinations for these sites will be re-evaluated by NMED. Based on prior NFA approvals and consolidation of geographically proximate sites, a total of 829 sites remain within the ERS Program. During 2005, the ERS Program requested NMED to remove three sites from Hazardous Waste Facility Permit and is awaiting approval of this request. In addition, pursuant to the Consent Order, the ERS Program received

[9] The Consent Order does not regulate radionuclides, however; the investigation and remediation of radionuclide contamination by ERS is regulated by DOE under the Atomic Energy Act.

[10] NFA means that the ERS Program has no further regulatory requirements for the site. Requirements may exist under other LANL programs, however, and the site may not be suitable for unrestricted use.

certificates of completion (which will replace the former NFA determinations) for eight sites.

Security Perimeter Road Project

The ERS Program implemented the ACA Work Plan submitted to NMED in 2004 for the investigation and remediation of SWMUs 61-002 and 03-029 and AOC 03-001(i) in support of the Security Perimeter Road Project. The *Remedy Completion Report for the Investigation and Remediation of AOC 03-001(i), and SWMUs 03-029 and 61-002*, submitted to NMED in December 2005 describes the characterization and remediation activities conducted at these sites and presents the pre- and post-remediation analytical results. The data indicate that the nature and extent of contamination has been determined for storage area #2 of AOC 03-001(i) and LANL requested that this site be approved as "complete with controls." Additional characterization is required for SWMU 03-029 and further remediation is required to remove petroleum-contaminated soil and tuff discovered while remediating polychlorinated biphenyl contamination associated with SWMU 61-002. Remediation of petroleum contamination most likely associated with AOC C-03-016 discovered within storage area #1 of AOC 03-001(i) is also required. The ERS Program submitted a supplemental investigation and remediation work plan for these sites to NMED in early 2006 and fieldwork will resume in May 2006. Security Perimeter Road Project construction continues in and around these sites; D&D of the TA-03 Radio Shop was completed in April 2006 allowing the ERS Program access to the residual petroleum hydrocarbon contamination found while remediating SWMU 61-002. Work on these PRSs should be completed by September 2006.

SWMU 03-013(i)

SWMU 03-013(i) was identified by LANL in June 2004 and the corresponding SWMU assessment plan was submitted to NMED in September 2004. SWMU 03-013(i) is the location of historical (i.e., pre-1985) operational releases of hydraulic oil associated with the Pull Test Facility which consisted of former building 03-246, the cable control building, and former Building 03-247, the cable stress building. The ERS Program implemented the SWMU assessment plan in early 2005 and submitted the SWMU assessment report in December 2005. During the assessment of SWMU 03-013(i), all visibly stained soil and debris were removed from the site; however, confirmation sampling results indicate that the extent of contamination has not been determined. Additional sampling and remediation if necessary will be conducted during the Upper Sandia Canyon Aggregate Area Investigation required by the NMED Consent Order.

SWMU 19-001-99

SWMU 19-001-99, the former East Gate Laboratory, is now part of TA-72 east of the Los Alamos County airport. The former East Gate Laboratory was constructed in 1944 and used until 1947 to conduct spontaneous-fission experiments and to store radioactive source material. Most of the buildings at the site were removed in 1956 and DOE use of the property ceased in 1974 when the laboratory building was decommissioned.

Confirmation sampling data indicate that the investigation and removal activities conducted at the site were sufficient to mitigate potential risk and demonstrate that the site has been adequately characterized and does not pose an unacceptable risk to current or future human or ecological receptors.

MDA L, SWMU 54-006

MDA L is a 1,100- by 3,000-ft (2.5-ac) fenced area at TA-54. MDA L consists of one inactive subsurface disposal pit; three inactive subsurface treatment and disposal impoundments; and 34 inactive disposal shafts. The majority of the MDA L surface is paved with asphalt to house ongoing waste management activities. The objectives of the MDA L IWP implemented by the ERS Program in 2004-2005 were to complete the determination of the nature and extent of releases of hazardous waste constituents and/or radionuclides identified during the Phase RFI. Additional information on the hydrogeologic properties and other physical characteristics of the vadose zone beneath MDA L was also gathered during the investigation. The MDA L investigation report submitted to NMED September 2005 states that the nature and extent of contamination in surface and subsurface media have been determined and that MDA L poses no unacceptable present-day risk to human health and the environment. In May 2005, the ERS Program submitted the work plan for the implementation of an in situ soil vapor extraction pilot study at MDA L. The proposed pilot study entails the installation of an active soil vapor extraction system to evaluate the rate of reduction of the volatile organic compound (VOC) plume concentrations in the immediate vicinity of the source term. The pilot test will be implemented from mid-2005 through 2006. Continued subsurface monitoring of the VOC vapor plume concentrations will capture soil vapor concentration rebound and will determine when or if additional extraction should take place. Data from the pilot study will be used in the corrective measure evaluation for MDA L to assess the effectiveness of soil vapor extraction as a remedy for remediation of the subsurface vapor-phase plume at MDA L.

MDA G, SWMU 54-013(b)-99

Area G is a 65-acre fenced area containing both surface and subsurface waste management units. MDA G consists of inactive disposal units within Area G and includes 32 pits, 194 shafts, and 4 trenches with depths ranging from 10 to 65 feet below the original ground surface. Portions of the MDA G disposal units are covered with concrete to house ongoing waste management activities conducted at Area G; surface runoff from the site is controlled and discharges into drainages to the north (towards Cañada del Buey) and the south (towards Pajarito Canyon). Storm water and sediment monitoring stations are distributed throughout Area G and in the drainages around Area G. The objectives of the investigation implemented by the ERS Program in 2005 were to complete the determination of the nature and extent of releases of hazardous waste constituents and/or radionuclides identified during the Phase RFI. Additional information on the hydrogeologic properties and other physical characteristics of the vadose zone beneath MDA G was also gathered during the investigation. The MDA G investigation report submitted to NMED September 2005 states that the nature and extent of contamination in surface and subsurface media have been determined and that MDA G poses no unacceptable present-day risk to human health and the environment. The report recommended the completion of a corrective measures evaluation to ensure that future releases from the site pose no unacceptable risks to human and ecological receptors and the monitoring of subsurface vapor beneath MDA G in accordance with a long-term monitoring plan to be approved by NMED.

SWMU 33-013 at TA-33

The ERS Program implemented an ACA at SWMU 33-013, a former drum storage area at TA-33. This ACA was prompted by the planned construction of the LANL's new High Bay Complex at TA-33. SWMU 33-013 is located within the proposed construction design footprint of the TA-33 High Bay Complex and was investigated and remediated before the commencement of construction activities, as described in the ACA work plan for SWMU 33-013 at TA-33, submitted to and approved by NMED in April 2005. During the summer of 2005 the ERS Program implemented the ACA work plan at SWMU 33-013 by removing asphalt and potentially contaminated soil from the site and collecting confirmation samples to define the nature and extent of any residual contamination at SWMU 33-013 to support a request for a Certificate for Completion for the site. Results of this ACA to be presented in the remedy completion report in 2006 confirm that the site poses no present-day unacceptable risk to site workers.

SWMUs 03-010(a) and 03-001(e)

SWMUs 03-010(a) and 03-001(e) were investigated in 2005 to evaluate impacts to soil and groundwater from historic activities. SWMU 03-010(a) is the former area where vacuum pump oil was discharged from a repair shop in Building 03-0030. SWMU 03-001(e) is the former storage area from waste from the vacuum pump and repair shop. The investigation report submitted to NMED in August 2005 indicates that the nature and extent of chemicals of potential concern (COPCs) in soil and tuff have been defined. Investigation results also indicate that the shallow groundwater body beneath these sites is of limited extent and is most likely recharged from storm water runoff from roof drains and parking lots in the vicinity of the two SWMUs. Quarterly groundwater monitoring will be conducted at the sites for two years along with other studies to refine understanding of the sources of groundwater, establish temporal trends if COPC levels, and to evaluate the potential for natural attenuation of the COPCs.

Interim Facility-wide Groundwater Monitoring Plan

The Interim Facility-wide Groundwater Monitoring Plan submitted to NMED in May 2005 fulfilled a requirement of the NMED Consent Order. Four modes of water will be monitored: base flow, alluvial groundwater, intermediate perched groundwater, and regional aquifer groundwater. Monitoring within current LANL boundaries will take place in seven major watersheds or watershed groupings: Los Alamos/Pueblo Canyons, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, Water Canyon/Cañon de Valle, Ancho/Chaquehui/Frijoles Canyons, and White Rock Canyon. Monitoring outside LANL boundaries will be conducted in areas that LANL operations have affected in the past, and in areas that have not been affected by LANL operations thereby providing baseline data. Monitoring data will be published in routine reports in accordance with the Consent Order compliance schedule.

Canyons Projects

The Canyons Projects implemented in 2005 focused primarily on investigations in Mortandad Canyon. These investigations involved the characterization of sediment, biota, and groundwater to determine nature and extent of contamination in all affected media and to collect data sufficient to support assessment of human-health and ecological risk. This work was conducted in accordance with requirements of the NMED Consent Order and NMED-approved work plans. The investigation in Mortandad Canyon involved installation of several new regional and perched intermediate-depth groundwater monitoring wells, drilling of characterization coreholes, an infiltration investigation, and geochemical characterization of sediment and groundwater.

Additional investigations were ongoing in Pajarito Canyon with the main emphasis being on the first phase of the sediment characterization that uses a watershed-scale approach to evaluate nature and extent of contamination as well as distribution of contaminant inventory.

2.17.2 Cerro Grande Fire Effects on the Environmental Remediation and Surveillance Program

The Los Alamos and Pueblo Canyons Investigation Report was submitted to the NMED in 2004 and it addressed, among other things, the impact of the Cerro Grande fire on COPC concentrations in canyon media. The results of this investigation indicate that for contaminants released from LANL SWMUs and AOCs, the human health risks are below NMED's and DOE's target levels for present-day and foreseeable future land uses, and that adverse ecological effects have not been observed in terrestrial and aquatic systems in the watershed.

No new Environmental Sites were added to the DOE/LANL Nuclear Facility List (LANL 2005b) during CY 2005. The existing Environmental Sites that are categorized as Hazard Category 2 and Hazard Category 3 Nuclear Facilities are shown in Table 2.17.2-1.

Table 2.17.2-1. Environmental Sites with Nuclear Hazard Classification

Zone	SWMU/AOC	Description	HAZ CAT
TA-10	SWMU 10-0029(a)-99	PRS 10-002(a)-99 is associated with the former liquid disposal complex serving the radiochemistry laboratory at TA-10. The complex discharged to leach fields and pits. The entire complex underwent D&D in 1963. The remaining materials were placed in a pit that remains in place.	3

Table 2.17.2-1. continued

Zone	SWMU/AOC	Description	HAZ CAT
TA-21	SWMU 21-014	MDA A is a 1.25-acre site that was used intermittently from 1945 to 1949 and from 1969 to 1977 to dispose of radioactively contaminated solid wastes, debris from D&D activities, and radioactive liquids generated at TA-21. The area contains two buried 50,000-gal. storage tanks (the "General's Tanks") on the west side of MDA A, two rectangular disposal pits (each 18 ft long by 12.5 ft wide by 12.5 ft deep) on the east side of MDA A, and a large central pit (172 ft long by 134 ft wide by 22 ft deep).	2
TA-21	SWMU 21-015	MDA B is an inactive 6.03-acre disposal site. It was the first common disposal area for radioactive waste generated at LANL and operated from 1945 to 1952. The site runs along the fence line on DP Road and is located about 1,600 ft east of the intersection of DB (*sic*) Road and Trinity Drive. The site comprises four major pits (each 300 ft by 15 ft by 12 ft deep), a small trench (40 ft by 2 ft by 3 ft deep), and miscellaneous small disposal sites.	3
TA-21	SWMU 21-016(a)-99	MDA T, an area of about 2.2 acres, consists of four inactive absorption beds, a distribution box, a subsurface retrievable waste storage area disposal shafts (*sic*), a former waste treatment plant, and cement paste spills on the surface and within the retrievable waste storage area.	2
TA-35	AOC 35-001	MDA W consists of two vertical shafts or "tanks" that were used for the disposal of sodium coolant used in LAMPRE-1 sodium cooled research reactor. The two tanks are 125-ft-long stainless steel tubes that were half filled and inserted into carbon steel casings separated by approximately 3 ft. Until 1980, a metal control shed was located above the tanks, but this feature was removed and replaced with a concrete cover. The predominant radionuclide of concern in the sodium is plutonium-239 that may have been introduced from a breach of one or two fuel elements during the operational life of LAMPRE-1.	3
TA-35	SWMU 35-003(a)-99	The Waste Water Treatment Plant was located at the east end of Ten Site Mesa and operated from 1951 until 1963. It consisted of an array of underground waste lines, storage tanks, and chemical treatment precipitation tanks. The plant treated liquid waste that originated from the radiochemistry laboratories and operation of the radioactive lanthanum-140 hot cells in Bulding 35-2. The liquid wastes from the laboratories were acidic, and the radioactivity in the waste came from barium-140, lanthanum-140, strontium-89, strontium-90, and yttrium-90.	3

Table 2.17.2-1. continued

Zone	SWMU/AOC	Description	HAZ CAT
TA-35	SWMU 35-003(d)-00	The former structures associated with the Pratt Canyon component of the Waste Water Treatment Plant. All buildings, foundations, and structures were removed during D&D activities in 1981 and 1985, then backfilled with 20 ft of clean fill material.	3
TA-49	SWMU 49-001(a)-00	This underground, former explosive test site comprises four distinct areas, each with a series of deep shafts used for subcritical testing. Radioactively contaminated surface soil exists at one of the test areas [SWMU 49-001(g)].	2
TA-50	SWMU 50-009	MDA C was established in 1948 to replace MDA B. MDA C covers 11.8 acres and consists of 7 pits (four are 610 ft by 40 ft by 25 ft, one is 110 ft by 705 ft by 18 ft, one is 100 ft by 505 ft by 25 ft, and one is 25 ft by 180 ft by 12 ft), 107 shafts (each typically 2 ft diameter by 10 to 25 ft deep), and one unnumbered shaft used for a single strontium-90 source disposal. Pits and shafts were used for burial of hazardous chemicals, uncontaminated classified materials, and radioactive materials. TRU waste also was buried in unknown quantities in the pits. The landfill was used until 1974. COPCs included inorganic chemicals, VOCs, semi-volatile organic compounds, and radionuclides.	2
TA-53	SWMU 53-006(b)-99	Three inactive underground tanks exist and are associated with the former radioactive liquid waste system at TA-53. One tank (Structure 53-59) is 28 in diameter and 65 ft long and contains spent ion exchange resin. Two empty tanks are 6 ft in diameter and 12 ft long and are not included here.	2
TA-54	SWMU 54-004	MDA H is a 0.3-acre site on Mesita del Buey that contains nine inactive shafts that were used for disposal of LANL waste. Each shaft is 6 ft diameter by 60 ft deep.	3
TA-54	SWMU 54-013(b)-99	MDA G is located within a 63-acre area known as Area G. MDA G was established in 1957 for disposal of LLW, and later was also used for retrievable storage of TRU waste. The site is composed of 32 pits, 194 shafts, and 4 trenches that received waste until 1997. Other units at Area G continue to be used for LLW disposal, and storage and processing of TRU waste for disposal at the WIPP.	2

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3.0 Site-Wide 2005 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 (DOE 1999) 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 2005 totaled approximately 19,100 curies, just under 90 percent of the 10-year average of 21,700 curies projected by the ROD. While within the overall envelope projected by the SWEIS, LANL emissions in 2005 were dominated by the dramatic increase in LANSCE emissions relative to recent years. This situation is more fully described below.

As in recent years, 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 660 curies. Clean-up activities at TA-33 and TA-41 (both Non-Key Facilities) were completed, and neither of these facilities was monitored in 2005.

Emissions of activation products from LANSCE were much higher than those in recent years. The total point source emissions were approximately 18,400 curies. As in recent years, the Area A beam stop did not operate during 2005; however, operations in Line D resulted in the majority of emissions reported for 2005. Projected emissions for 2005 were much lower than the final number; a failure in one component of the emissions control system contributed to the elevated levels. A fix implemented in late November 2005 returned emissions rates to their projected levels, and these reduced emissions rates are expected to continue through 2006.

Non-point sources of radioactive air emissions are present at LANSCE, Area G, TA-18, and other locations around LANL. Non-point emissions, however, are generally small compared to stack emissions. For example, non-point air emissions from LANSCE were approximately 555 curies. Additional detail about radioactive air emissions is provided in LANL's 2005 annual compliance report to the EPA (LANL 2006a), submitted on June 30, 2005, and in the 2005 Environmental Surveillance Report, issued September 2006 (LANL 2006b).

Maximum off-site dose for 2005 was the highest in recent years, due to the emissions controls system failure at LANSCE. The final dose is 6.45 millirem, still below the EPA air emissions limit of 10 millirem per year established for DOE facilities. This dose is calculated to the theoretical "maximum exposed individual" who lives at the nearest off-site receptor location 24 hours per day, eating food grown at that same site, etc. No actual person received a dose of this magnitude. As mentioned, off-site dose in 2006 is expected to return to the much lower levels measured before 2005.

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, LANL is required to estimate emissions, rather than perform actual stack sampling. As Table 3.1.2.1-1 illustrates, CY 2005 emissions of criteria pollutants are within the estimated emissions presented in the SWEIS ROD.

Table 3.1.2.1-1. Emissions of Criteria Pollutants as Reported on LANL's Annual Emissions Inventory[a]

Pollutants	Units	SWEIS ROD	2001 Operations	2002 Operations	2003 Operations	2004 Operations	2005 Operations
Carbon monoxide	Tons/year	58	29.1	28.1	31.9	17.1	17.5
Nitrogen oxides	Tons/year	201	93.8	64.7	49.6	24.5	24.5
Particulate matter	Tons/year	11	5.5	15.5 [b]	22.1[b]	3.0	3.2
Sulfur oxides	Tons/year	0.98	0.82	1.3 [b]	1.3[b]	0.3	0.3

a Emissions included on the annual emission inventory report do not include insignificant sources.
b The increased emissions are attributed to operation of three air curtain destructors used to burn wood and slash from fire mitigation activities around LANL. Operation of the air curtain destructors ceased in 2003.

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 (20.2.73 NMAC). The report provides emission estimates for the steam plants, nonexempt boilers, and the asphalt plant. In addition, emissions from the data disintegrator, carpenter shops, degreasers, oil storage tanks, and permitted beryllium machining operations are reported. For more information, refer to LANL's 2002 and 2003 Emissions Inventory Reports (LANL 2003a, 2005a). In CY 2005, approximately one-half of the most significant criteria pollutants, nitrogen oxides, and carbon monoxide resulted from the TA-03 steam plant.

In April 2004, LANL received a Title V Operating Permit from the NMED. This permit included facility-wide emission limits and additional recordkeeping and reporting requirements. Table 3.1.2.1-2 summarizes the facility-wide emission limits in the Title V Operating permit and the SWEIS ROD emissions and presents the 2005 emissions from all sources included in the permit. *Note that emissions from insignificant sources of boilers, heaters, and emergency generators are included in these totals.* All emissions are below the levels evaluated in the SWEIS ROD except sulfur oxides. The slightly higher sulfur oxide emissions in the Title V Operating Permit emissions report are due to over 200 small boilers and heaters located throughout the LANL facility.

Table 3.1.2.1-2. 2004 and 2005 Emissions for Criteria Pollutants as Reported on LANL's Title V Operating Permit Emissions Report[a]

Pollutants	Units	SWEIS ROD	Title V Operating Permit Facility-Wide Emission Limits	2004 Emissions	2005 Emissions
Carbon monoxide	Tons/year	58	225	35.4	35.1
Nitrogen oxides	Tons/year	201	245	50.5	50.5
Particulate Matter	Tons/year	11	120	4.8	5.0
Sulfur oxides	Tons/year	0.98	150	1.5	1.9

a The Title V Operating Permit Emissions report includes two categories of sources not required in the annual emission inventory: small, exempt boilers and heaters; and exempt stand-by emergency generators.

3.1.2.2 Chemical Usage and Emissions

The 1999 edition of the Yearbook (LANL 2000a) proposed to report chemical usage and calculated emissions for Key Facilities obtained from the LANL's Automated Chemical Inventory System. (*Note: In CY 2002, LANL transitioned to a new chemical inventory system called ChemLog and no longer uses the Automated Chemical Inventory System.)* The quantities presented in this approach represent all chemicals procured or brought on site in the respective CY. This methodology is identical to that used by LANL for reporting under Section 313 of the Emergency Planning Community Right-to-Know Act (42 USC) and for reporting regulated air pollutants estimated from research and development operations in the annual Emissions Inventory Report (LANL 2003a, 2005a).

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 through 2004 Yearbooks (LANL 2000a, 2001a, 2002a, 2003b, 2004a, and 2005b, respectively). 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 VOCs and hazardous air pollutants (HAPs) estimated from research and development operations is shown in Table 3.1.2.2-1. Projections by the SWEIS ROD for VOCs and HAPs were expressed as concentrations rather than emissions; therefore, direct comparisons cannot be made, and projections from the SWEIS ROD are not presented. The VOC emissions reported from research and development activities reflect quantities procured in each CY. The HAP emissions reported from research and development activities generally reflect quantities procured in each CY. 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 VOCs and HAPs from Chemical Use in Research and Development Activities

Pollutant	Emissions (Tons/year)					
	2000	2001	2002	2003	2004	2005
Hazardous Air Pollutants	6.5	7.4	7.74	7.32	5.71	5.4
Volatile Organic Compounds	10.7	18.6	14.9	11.2	7.95	11.2

Emissions of VOCs and HAPs from chemical use in research and development activities in 2005 are similar to previous years. VOC emissions in 2004 were somewhat lower due to a Laboratory-wide shutdown in July 2004.

3.2 Liquid Effluents

LANL may discharge wastewater from its activities via 21 outfalls that are regulated under NPDES Permit No. NM0028355. The current NPDES permit expired on January 31, 2005. LANL applied for a renewed permit in August 2004. The EPA is allowing LANL to continue discharging industrial wastewater under the current permit until a new permit is issued in CY 2006. Based on discharge monitoring reports prepared by LANL's Water Quality and Hydrology group, only 17 of the 21 permitted outfalls had recorded flows in CY 2005. Effluent flow through the 17 NPDES outfalls totaled an estimated 198.26 million gallons in CY 2005. This is approximately 35.74 million gallons more than the CY 2004 total of 162.52 million gallons, due largely to resumption of normal Laboratory operations after the LANL stand down that occurred in July 2004. The 2005 total volume of discharge is well below the maximum flow of 278.0 million gallons that was projected in the SWEIS ROD. Treated wastewater released from LANL's NPDES outfalls rarely leaves the site.

Historically, instantaneous flows were measured in the field and then extrapolated over a 24-hour day/seven-day week. Pursuant to the current NPDES permit requirements, actual flows are now being recorded by flow meters at most outfalls. At those outfalls that do not have meters, flows continue to be calculated from instantaneous flow measurements as before. Details on NPDES noncompliance during 2005 will be provided in the 2005 Annual Environmental Surveillance Report to be issued after October 1, 2006.

CY 2005 discharges are summarized by watershed and compared with watershed totals projected in the SWEIS ROD in Table 3.2-1. The bulk of the CY 2005 discharges came from Non-Key Facilities (see Table 3.2-2).

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

Watershed	# Outfalls (SWEIS ROD)	# Outfalls 2005 [a]	Discharge (SWEIS ROD)	Discharge 2005
Cañada del Buey	3	1 [b]	6.4	0
Guaje	7	0	0.7	0
Los Alamos	8	5	44.8	53.5834
Mortandad	7	5	37.4	16.83948
Pajarito	11	0	2.6	0
Pueblo	1	0	1.0	0
Sandia	8	5	170.7	127.538145
Water	10	5 [c]	14.2	0.498816
Totals	**55**	**21**	**278.0**	**198.459841**

a Twenty-one outfalls were permitted to discharge during 2005.
b Includes Outfall 13S from the Sanitary Wastewater System, which is registered as a discharge to Cañada del Buey or Sandia. The effluent is actually piped to TA-03 and ultimately discharged to Sandia Canyon via Outfall 001.
c Includes 05A-055 discharge to Cañon de Valle, a tributary to Water Canyon.

Several Key Facilities accounted for approximately 63 million gallons of the 2005 total. LANSCE discharged approximately 21.0 million gallons in 2005, about 12.9 million gallons more than in 2004, accounting for about 33.1 percent of the total discharge from all Key Facilities (see Table 3.2-2). The increased discharge for 2005 is attributed to increased activity at LANSCE overall. Table 3.2-2 compares NPDES discharges by Key and Non-Key Facilities. See Section 2.11 for more information.

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. The sewage treatment plant at TA-46, one of the Non-Key Facilities, is discussed below.

The RLWTF (one of the Key Facilities), Building 50-01, Outfall 051discharges into Mortandad Canyon. During CY 2005, about 1.8 million gallons of treated radioactive liquid effluent, about 0.35 million gallons less than CY 2004, were released to Mortandad Canyon from the RLWTF, compared to 9.3 million gallons projected in the SWEIS ROD.

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

Facility	# Outfalls (SWEIS ROD)	# Outfalls 2005	Discharge (SWEIS ROD)	Discharge 2005
Key Facilities				
Plutonium Complex	1	1	14.0	2.40048
Tritium Facility	2	2	0.3	32.977
CMR Building	1	1	0.5	0.92
Sigma Complex	2	2	7.3	3.805

Table 3.2-2. continued

Facility	# Outfalls (SWEIS ROD)	# Outfalls 2005	Discharge (SWEIS ROD)	Discharge 2005
Key Facilities continued				
High Explosives Processing	11	3	12.4	0.028886
High Explosives Testing	7	2	3.6	0.46993
LANSCE	5	4	81.8	20.998545
Biosciences	1	0	2.5	0
Radiochemistry Facility	2	0	4.1	0
RLWTF	1	1	9.3	1.83
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	135.03
Totals	**55**	**21**	**278.0**	**198.459841**

The TA-16 High Explosives Wastewater Treatment Facility (one of the Key Facilities) discharged about 0.03 million gallons in CY 2005. This is significantly less than the 12.4 million gallons projected in the SWEIS ROD.

Discharges from the Non-Key Facilities made up the majority of the total CY 2005 discharge from LANL. This total, 135.03 million gallons, was about 7.07 million gallons less than the 142.1-million-gallon total discharge from the Non-Key Facilities that was projected in the SWEIS ROD. Two Non-Key Facilities, the TA-46 sanitary waste treatment plant and the TA-03 steam plant, account for about 81.7 percent of the total discharge from Non-Key Facilities and about 56 percent of all water discharged by LANL. The Sanitary Wastewater System at TA-46 processed about 106.9 million gallons of treated wastewater during CY 2005, all of which was pumped to TA-03, to be either recycled at the TA-03 power plant (as make-up water for the cooling towers), or discharged into Sandia Canyon via Outfall 001. The discharge of 3.31 million gallons from the TA-03 power plant to Outfall 001 was less than the 2004 discharge of 4.78 million gallons. While the 2005 contribution from TA-46 (Outfall 13S) to the Outfall 001 discharge increased by about 3.23 million gallons over the 2004 value, the total discharge from Outfall 001 increased by 1.82 million gallons.

The NPDES Industrial Storm Water Permit Program regulates storm water discharges from identified industrial activities (including runoff from inactive SWMUs). The UC and the DOE are co-permittees under LANL's NPDES Multi-Sector General Permit 2000. This permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) to ensure that LANL surface waters that receive storm water runoff meet state water-quality standards. Currently, LANL maintains and implements 13 SWPPPs for its industrial activities.

During CY 2005, LANL and the DOE entered into a compliance agreement with the EPA to protect surface water quality at LANL through a FFCA. The purpose of the FFCA is to establish a compliance program for the regulation of storm water discharges from SWMUs and AOCs until such time as those sources are regulated by an individual storm water permit pursuant to the NPDES Permit Program. All SWMUs and AOCs (collectively, Sites) are covered by this agreement. On March 30, 2005, EPA issued an Administrative Order (AO) to the UC that coincides with the FFCA.

The FFCA/AO establishes a schedule for monitoring and reporting requirements and requires the Laboratory to minimize erosion and the transport of pollutants or contaminants from Sites in storm water runoff. The FFCA also requires DOE/UC to comply with all requirements of the Laboratory's Multi-Sector General Permit (MSGP).

The FFCA/AO requires two types of monitoring at specified sites, pursuant to two monitoring management plans, including 1) watershed sampling at approximately 60 automated gaging stations at various locations within the Laboratory canyons pursuant to a Storm Water Monitoring Plan; and, 2) site-specific sampling at approximately 294 Sites, on a rotating basis pursuant to a SWMU/SWPPP over a four-year period. The purpose of storm water monitoring is to determine if there is a release or transport of pollutants/contaminants into surface water that could cause or contribute to a violation of applicable surface water quality standards. If a release or transport occurs, it may be necessary to implement best management practices (BMPs) to reduce erosion or to re-examine, repair, or modify existing BMPs to reduce erosion. The SWMU/SWPPP must also describe an erosion control program to control and limit contamination migration and transport from Sites and to monitor the effectiveness of controls at the Sites.

To achieve compliance with both the MSGP and the FFCA during CY 2005, LANL operated about 75 stream monitoring and partial-record storm water-monitoring stations located in nine watersheds. Data gathered from these stations show that surface water, including storm water, occasionally flows off DOE property. LANL is currently conducting stream monitoring and storm water monitoring at the confluence of major canyons, in certain segments of these canyons, and at a number of specific facilities as well. In addition, LANL conducts voluntary monitoring in the major canyons that enter and leave LANL property. Flow-discharge information is reported in discharge monitoring reports, and flow measurements and water quality data for surface water are published annually in three reports, Environmental Surveillance at Los Alamos (an example is LANL 2004b), SWPPP for SWMUs and AOCs, and *Surface Water Data at Los Alamos National Laboratory* (an example is LANL 2005c).

LANL also has a NPDES Storm Water Construction Activities Permit Program, which is responsible for compliance with the NPDES Construction General Permit regulations for storm water discharges from large and small construction activities. This permit requires the development and implementation of a project-specific SWPPP to ensure that storm water runoff from LANL construction sites meets Federal and state water-quality standards. In CY 2005, LANL maintained and implemented SWPPPs covering 72 active and inactive construction sites. Also during CY 2005, 833 compliance inspections were conducted at LANL construction sites. Approximately 392 required storm water inspections were conducted following rain events of 0.5 inch or greater. Approximately 289 storm water compliance inspections were conducted for active construction sites. For inactive construction sites, approximately 152 inspections were completed in CY 2005.

During CY 2004, LANL also completed a revision of the civil section of the LANL Engineering Standards Manual (ESM) and Construction Specification 01560, Compliance Requirements. The ESM revision included NPDES storm water compliance, and appropriate BMP selection and design criteria for storm water management and sediment and erosion control. Specification 01560 identifies environmental requirements associated with construction activities. These documents will provide guidance to engineers, designers, and contractors. It is anticipated that the result of these revisions will be increased environmental compliance, improved storm water management and sediment and erosion control, and a reduction in construction contractor Change Order requests.

3.3 Solid Radioactive and Chemical Wastes

Because of the complex array of facilities and operations, LANL generates a wide variety of waste types including solids, liquids, semi-solids, and contained gases. These waste streams are variously regulated as solid, hazardous, LLW, TRU, or wastewater by a host of State and Federal regulations. The institutional requirements relating to waste management at LANL 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 LANL 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 LANL permits.

LANL'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 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 the ERS Program, formerly called the Environmental Restoration Project, as shown in Table 3.3-1. Waste generators are assigned to one of three categories—Key Facilities, Non-Key Facilities, and the ERS Program. 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 D&D of buildings.

Table 3.3-1. LANL Waste Types and Generation

Waste Type	Units	SWEIS ROD Projection	2004	2005
Chemical	10^3 kg/yr	3,250	1,210	1,968
LLW	m^3/yr	12,200	14,838	5,410
MLLW	m^3/yr	632	32.9	70.8
TRU	m^3/yr	333	40.1	74.9
Mixed TRU	m^3/yr	115	23.9	100.1

Waste quantities from 2005 LANL operations were below SWEIS ROD projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities.

3.3.1 Pollution Prevention Program

The Pollution Prevention (PP) Program improves LANL operations by minimizing environmental damage and adverse regulatory findings (LANL 2004c). LANL's commitment to PP and broader environmental stewardship arises from two goals: (1) maintaining a good environmental and ecological condition for present and future employees, residents, and neighbors and (2) remaining in compliance with the many regulatory requirements required to operate LANL. To attain these goals, LANL's Waste Minimization (WMin)/PP Program approach focuses on the following:

- ensuring that LANL policies and procedures highlight prevention as the preferred methodology to address waste issues;
- integrating waste minimization principles into the planning process;
- supporting the development of new technologies to minimize waste;
- working with waste generators to identify waste minimization opportunities;
- using appropriate material substitution and process improvements;
- recycling and reusing materials; and
- tracking, projecting, and analyzing waste data to improve waste management.

The WMin/PP approach is consistent with LANL's site-wide waste minimization plan that recognizes the severe limitations of on-site disposal capacity for LLW and on-site storage capacity MLLW. In addition, this approach was adopted to address the variable and nonrecurring nature of wastes coming from the ERS Program activities.

In 2004, LANL began development and implementation of an Environmental Management System (EMS) to comply with DOE Order 450.1 (DOE 2003). EMS is a systematic method for assessing mission activities, determining the environmental impacts of those activities, prioritizing improvements, and measuring results. DOE Order 450.1 defines an EMS as "a continuous cycle of planning, implementing, evaluation, and improving processes and actions undertaken to achieve environmental missions and goals."

While several EMS frameworks are available, LANL has chosen to implement the one described by the International Organization for Standardization (ISO) 14001. This choice was made on the basis of the widespread use of the ISO 14001 standard in government and private sector and the availability of resources and training materials.

The EMS is extremely important to pollution prevention at Los Alamos because both DOE Order 450.1 and the ISO 14001 standard stress pollution prevention as a primary mechanism to achieve continual improvement. Implementation of this system will extend PP Program principles to a much broader set of LANL activities.

In 2005, DOE presented 39 awards to LANL employees for waste minimization innovations. Details are provided in Appendix D.

3.3.2 Chemical Wastes

As projected by the SWEIS ROD, chemical waste includes not only construction and demolition debris, but also all other non-radioactive wastes passing through the Solid Radioactive and Chemical Waste Facility. In addition, construction and demolition debris is a component of those chemical wastes that in most cases are sent directly to off-site disposal facilities. Construction and demolition debris consists primarily of asbestos and construction debris from D&D projects. Construction and demolition debris is disposed of in solid waste landfills under regulations promulgated pursuant to Subtitle D of RCRA. (Note: Hazardous wastes are regulated pursuant to Subtitle C of RCRA.)

Chemical waste generation in CY 2005 was about 97 percent of the chemical waste volumes projected by the SWEIS ROD. Table 3.3.2-1 summarizes chemical waste generation during CY 2005.

ERS Program wastes accounted for about 80 percent of the total chemical wastes generated. All of this volume was generated at Non-Key Facilities.

Table 3.3.2-1. Chemical Waste Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	2004	2005
Key Facilities	10^3 kg/yr	600	188	23.1
Non-Key Facilities	10^3 kg/yr	650	929 [a]	623.3
Environmental Remediation and Surveillance Program	10^3 kg/yr	2,000	94	1,322
LANL	10^3 kg/yr	3,250	1,210	1,968 [b]

a Chemical waste generation at the Non-Key Facilities exceeded the SWEIS ROD projection due to heightened activities and new construction.
b Discrepancy in the additive chemical waste volumes is due to round-off error.

3.3.3 Low-Level Radioactive Wastes

LLW generation in 2005 exceeded LLW volumes projected by the SWEIS ROD (Table 3.3.3-1). This is due to the large volume of waste generated as a result of heightened activities and new construction at the Non-Key Facilities.

Table 3.3.3-1. LLW Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	2004	2005
Key Facilities	m^3/yr	7,450	875	1,349
Non-Key Facilities	m^3/yr	520	13,963 [a]	1,046
Environmental Remediation and Surveillance Program	m^3/yr	4,260	0.76	3,016
LANL	m^3/yr	12,230	14,838	5,410 [b]

a LLW generation at the Non-Key Facilities slightly exceeded the SWEIS ROD projection due to heightened activities and new construction.
b Discrepancy in the additive LLW volumes is due to round-off error.

Significant differences from SWEIS ROD projections occurred at the Sigma Complex (960 cubic meters projected versus 63 actual) and High Explosives Testing (940 cubic meters projected versus 0.2 actual). In addition, LANSCE generated lower volumes than projected (1,085 cubic meters projected versus 51 actual) because decommissioning and renovation of Experimental Area A did not occur. LLW generation at Non-Key Facilities was about twice the volume projected in the SWEIS ROD due to heightened activities and new construction at Non-Key Facilities.

3.3.4 Mixed Low-Level Radioactive Wastes

Generation in 2005 approximated 11 percent of the MLLW volumes projected by the SWEIS ROD. ERS Program produced only about 51 cubic meters of MLLW in 2005. 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 Projection	2004	2005
Key Facilities	m^3/yr	54	22.9	17.9
Non-Key Facilities	m^3/yr	30	32.9	2.3
Environmental Remediation and Surveillance Program	m^3/yr	548	0.02	50.6
LANL	m^3/yr	632	32.95	70.8

3.3.5 Transuranic Wastes

During CY 2005, the LANL TRU waste volumes slightly exceeded the SWEIS ROD projections. As projected in the SWEIS, TRU wastes are expected to be generated almost exclusively in four Key Facilities (the Plutonium Facility Complex, the CMR Building, the RLWTF, and the Solid Radioactive and Chemical Waste Facility) and by the ERS Program that did not produce any TRU wastes in 2005. TRU waste generated at the Non-Key Facilities during CY 2005 was the result of the OSR Project. Because this waste comes through Shipping and Receiving, it is attributed to that location as the point of generation. Table 3.3.5-1 examines TRU wastes by generator categories.

Table 3.3.5-1. Transuranic Waste Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	2004	2005
Key Facilities	m^3/yr	322	18.7	57.4
Non-Key Facilities	m^3/yr	0	40.1 [a]	17.5
Environmental Remediation and Surveillance Project	m^3/yr	11	0	0
LANL	m^3/yr	333	40.14	74.9[b]

a TRU waste generated at the Non-Key Facilities during CYs 2004 and 2005 was the result of the OSR Project. Because this waste comes through Shipping and Receiving, it is attributed to that location as the point of generation.

3.3.6 Mixed Transuranic Wastes

LANL mixed TRU waste generation in 2005 was below the mixed TRU waste volume projected by the SWEIS ROD. In 2005 mixed TRU wastes were generated at only three facilities–the Plutonium Facility Complex, the CMR Building, and the Solid Radioactive and Chemical Waste Facility. Table 3.3.6-1 examines mixed TRU wastes by generator categories.

Note: The 5.9 cubic meters of mixed TRU waste reported in the 2003 Yearbook as having been generated by the Off-Site Source Recovery Project was, in fact, not generated by this project. This waste was generated as a result of recovery operations at Area G that involved non-compactable fiber-glass-reinforced crates. Although this waste was generated at the Solid Radioactive and Chemical Waste Key Facility, it was not generated at any of the buildings listed within the Key Facility, but at another location within TA-54. Consequently, this volume was listed as coming from the Non-Key Facilities, rather than from the Solid Radioactive and Chemical Waste Key Facility.

Table 3.3.6-1. Mixed Transuranic Waste Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	2004	2005
Key Facilities	m^3/yr	115	23.9	99.9
Non-Key Facilities	m^3/yr	0	0	0.2
Environmental Remediation and Surveillance Project	m^3/yr	0	0	0
LANL	m^3/yr	115	23.9	100.1

3.4 Utilities

Ownership and distribution of utility services continue to be split between NNSA and Los Alamos County. NNSA 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 FY basis, and keeping with the Yearbook goal of using routinely collected data, this information is presented by FY. Water data, however, are routinely collected and summarized by CY.

3.4.1 Gas

There was a change in ownership to the DOE Natural Gas Transmission Line in August 1999. DOE sold 130 miles of gas pipeline and metering stations to the Public Service Company of New Mexico (PNM). This gas pipeline traverses the area from Kutz Canyon Processing Plant south of Bloomfield, New Mexico, to Los Alamos. Approximately 4 miles of the gas pipeline are within LANL. Table 3.4.1-1 presents gas usage by LANL for FY 2005. Approximately 98 percent of the gas used by LANL was used for heating (both steam and hot air). The remainder was used for electrical production. LANL electrical generation is used to fill the difference between peak loads and the electric import capability and is also used for training of the power plant operators in turbine operation.

As shown in Table 3.4.1-1, total gas consumption for FY 2005 was less than projected by the SWEIS ROD. During FY 2005, slightly more natural gas was used for heating than in FY 2004, and there was less electric generation at the TA-03 power plant than in FY 2004. Table 3.4.1-2 illustrates steam production for FY 2005.

Table 3.4.1-1. Gas Consumption (decatherms [a]) at LANL/Fiscal Year[b] 2005

SWEIS ROD	Total LANL Consumption	Total Used for Electric Production	Total Used for Heat Production	Total Steam Production
1,840,000	1,187,855	20,086	1,167,768	Table 3.4.1-2

a A decatherm is equivalent to 1,000 to 1,100 cubic feet of natural gas.
b Routine data collection for both gas and electricity are done on a FY basis, and keeping with the Yearbook goal of using routinely collected data, this information is presented by FY. Water data, however, are routinely collected and summarized by CY.

Table 3.4.1-2. Steam Production at LANL/Fiscal Year[a] 2005

TA-03 Steam Production (klb [b])	TA-21 Steam Production (klb)	Total Steam Production (klb)
333,042 [c]	24,299	357,341

a Routine data collection for both gas and electricity are done on a FY basis, and keeping with the Yearbook goal of using routinely collected data, this information is presented by FY. Water data, however, are routinely collected and summarized by CY.
b klb: Thousands of pounds
c TA-03 steam production has two components: that used for electric production (16,571 klb for FY 2005) and that used for heat (316,471 klb in FY 2005).

3.4.2 Electrical

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 NNSA 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. Recent changes (as of August 1, 2002) in transmission agreements with PNM have resulted in the removal of contractual restraints on Power Pool resources import capability. Import capacity is now limited only by the physical capability (thermal rating) of the transmission lines that is approximately 110 to 120 megawatts from a number of hydroelectric, coal, and natural gas power generators throughout the western United States.

On-site electric generating capability for the Power Pool is limited by the existing TA-03 Co-generation Complex (the power plant generates both steam and power), which is capable of producing up to 20 megawatts of electric power that is shared by the Pool under contractual arrangement. The #3 steam turbine at the Co-generation Complex is currently a 10-megawatt unit. Rewinding of this unit began in CY 2003; it is expected that after this is completed, the turbine's new output will be approximately 17 megawatts. Rewinding should be finished and the unit re-installed about September 2006. To get the maximum benefit from this refurbishment, the steam path and cooling tower for the unit need to be improved; this upgrade is scheduled to be completed in FY 2006. Due to cooling water restrictions, the total capacity of the plant will not increase.

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. In CY 2002, LANL completed construction of the new Western Technical Area (WTA) 115/13.8-kV substation at TA-06. The main power transformer for WTA, rated at up to 50 megavolt amperes, was delivered in CY 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 (ETA) substation or the TA-03 Substation.

Several proposals for bringing additional power into the region have been considered. One of these proposals is construction of a new transmission line and substation (DOE 2000a). The line would be constructed in two segments: from PNM's Norton substation to a newly constructed substation, Southern Technical Area (STA), to be constructed near White Rock, and from the STA substation to the WTA substation. The segment from Norton to WTA would be constructed at 345 kilovolts but operated at 115 kilovolts. Large pulse power loads at LANL will need this higher voltage in the future. The segment from STA to WTA would be constructed and operated at 115 kilovolts. If completed, this would be a third transmission line to LANL; it will add much needed reliability and security to the electric transmission system that serves LANL. Construction of the transmission line and uncrossing of the two existing 115-kilovolt lines within LANL is projected to start in the spring of 2005 and take approximately a year to complete. The transmission line from the WTA substation to the STA substation and the STA substation construction was finished in February of 2006. The uncrossing of the transmission lines and refurbishment of the ETA substation should begin in March of 2006 and probably take about two or three months. The construction of the portion of the line from the Norton substation to STA is still being negotiated.

The reliability of the Norton Line and the Reeves Line that serve the Power Pool is compromised because they cross at one location within LANL. In doing so, they do not provide physically separate avenues for the delivery of power from independent power supply sources. The crossing of power lines results in a situation where a single outage event, such as a conductor or structural failure, could potentially cause a major power loss to the Power Pool (the uncrossing of these transmission lines should be done by June of 2006). If such an event occurred when the TA-03 Co-generation Complex was not operating or was being serviced or repaired, there would be no power available to the Power Pool. A single outage event could have serious and disruptive consequences to LANL and to the citizens of Los Alamos County. This vulnerability was noted by the Defense Nuclear Facilities Safety Board (DOE 2002).

In CY 2002, an *Environmental Assessment for Installation and Operation of Combustion Turbine Generators at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE 2002) was written to analyze the effects of increasing the TA-03 Co-generation Complex's generating capability by an additional 40 megawatts of power in the near future. Based on this environmental assessment, DOE issued a Finding of No Significant Impact in December 2002. Installation of the first combustion turbine generator at the TA-03 power plant is expected to be completed by the end of FY 2007.

Table 3.4.2-1 shows peak demand and Table 3.4.2-2 shows annual use of electricity for FY 2005. LANL's electrical energy use remains below projections in the SWEIS 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 LANL). 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 LANL. Actual use has fallen below these values, and the projected periods of brownouts have not occurred. However, on a regional basis, failures in the PNM system have caused blackouts in northern New Mexico and elsewhere.

Table 3.4.2-1. Electric Peak Coincident Demand/Fiscal Year[a] 2005

Category	LANL Base	LANSCE	LANL Total	County Total	Pool Total
SWEIS ROD	50,000[b]	63,000	113,000	Not projected	Not projected
FY 2005	47,586	21,874	69,460	18,319	87,779

a Routine data collection for both gas and electricity are done on a FY basis, and keeping with the Yearbook goal of using routinely collected data, this information is presented by FY. Water data, however, are routinely collected and summarized by CY.

b All figures in kilowatts.

Table 3.4.2-2. Electric Consumption/Fiscal Year[a] 2005

Category	LANL Base	LANSCE	LANL Total	County	Pool Total
SWEIS ROD	345,000[b]	437,000	782,000	Not projected	Not projected
FY 2005	328,371	93,042	421,413	129,457	550,870

a Routine data collection for both gas and electricity are done on a FY basis, and keeping with the Yearbook goal of using routinely collected data, this information is presented by FY. Water data, however, are routinely collected and summarized by CY.

b All figures in megawatt-hours.

Operations at several of the large LANL loads changed during 2004. In FY 2004 LANSCE changed their operating schedule. For the past several years their electric demand peaked with the rest of LANL, usually in July or August. But, now LANSCE's peak demand has been shifted to the winter (around January). This will change the overall electric demand for LANL. Since LANSCE's load is such a large part of LANL's total load (about 46 percent), the peak demand for LANL will change from summer to winter. This was true for LANSCE's operation until about November of 2005. Due to budgetary constraints, LANSCE has since returned to their old schedule of running in the spring and summer and may have to reduce their electric demand of annual energy consumption in FY 2006.

The National High Magnetic Field Laboratory sat out operations during FY 2001 and FY 2002. This represents a temporary reduction of approximately 2 megawatts load in FY 2001 and FY 2002. The 60-Tesla superconducting magnet that failed in 2000 has been redesigned and reconstructed and is now back in operation in 2004 at about 2 megawatts of load.

The DARHT facility began commissioning operations of its first axis in FY 2001. The load level is about 1 megawatt for the first axis. The second axis has been tested and is expected to become fully operational in May 2008 at a load level of about 1 to 2 megawatts.

It is expected that in January 2006 ground will be broken on the CMR Replacement building near TA-55 off Pajarito Road. This building will replace the old CMR building, which is served by the TA-03 substation. The CMR Replacement building will be served by a new 115/13.8-kV substation. The load will be switched from the TA-03 substation to this new substation so that very little new load will be added to the system.

Mitigation of the damage to LANL utilities from the Cerro Grande Fire was for the most part completed in FY 2002. Tree trimming clearance for the power line corridors will take many more years to bring areas up to the desired LANL standard.

Electrical Infrastructure Safety Upgrades Project

Project Overview

The EISU Project seeks to upgrade the electrical infrastructure in buildings throughout LANL to improve electrical safety. Typically, the project seeks to correct National Electrical Code violations; replace aging, unsafe equipment; and improve equipment and facility grounding.

The Conceptual Design Report for the EISU Project was completed in 1998. Thirty-one buildings were identified for upgrades and were prioritized based on the safety hazards they presented. Since then, the EISU Project has been coordinated with the LANL TYCSP and subprojects have been removed from the list as the buildings have been identified for D&D. To date, five subprojects have been removed from the list for a new total of 26 General Plant Projects. An evaluation of the LANL electrical safety maintenance backlog may increase the number of subprojects under the EISU Project. As of 2005, five EISU projects have been completed (TA-03-43, TA-16-200, TA-40-1, TA-

03-40 N&E, and TA-03-40 S&W), four projects are in construction (TA-03-261, TA-43-1, TA-46-31, TA-8-21), and four projects were scheduled for design (TA-46-1, TA-53-2, TA-48-1, and TA-35-2).

3.4.3 Water

Before September 8, 1998, DOE supplied all potable water for LANL, Bandelier National Monument, and Los Alamos County, including the towns of Los Alamos and White Rock. This water was obtained from DOE's groundwater right to withdraw 5,541.3 acre-feet per year or about 1,806 million gallons of water per year from the main aquifer. On September 8, 1998, DOE leased these water rights to Los Alamos County. This lease also included DOE's contractual annual right obtained in 1976 to 1,200 acre-feet per year of San Juan-Chama Transmountain Diversion Project water. The lease agreement was effective for three years until September 8, 2001. In September 2001, DOE officially turned over the water production system and transferred 70 percent of the water rights to Los Alamos County. Los Alamos County has continued to lease the remaining 30 percent of the water rights from DOE. LANL is now considered a customer of 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 has completed a preliminary engineering study and is currently negotiating a convert contract, which will provide more stability, prior to further investment.

LANL is in the process of installing additional water meters and has a Supervisory Control and Data Acquisition/Equipment Surveillance System on the distribution system to keep track of water usage and to determine the specific water use for various applications. Data are being accumulated to establish a basis for conserving water. LANL continues to maintain the distribution system by replacing portions of the over-50-year old system as problems arise. 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 2005. Under the 1999 SWEIS Expanded Operations Alternative, water use for LANL was projected to be 759 million gallons per year. LANL consumed about 359 million gallons during CY 2005. Actual use by LANL in 2005 was about 400 million gallons less than the SWEIS ROD projected consumption. A 10-year agreement with Los Alamos County, which started in 1998, has an escalating estimated LANL water consumption. Actual use by LANL in CY 2005 was about 184 million gallons less than the estimated CY 2005 consumption of 543 million gallons. The calculated NPDES discharge of 198.5 million gallons (see Table 3.2-2) in CY 2005 was about 53 percent of the total LANL usage of 359 million gallons.

Table 3.4.3-1. Water Consumption (thousands of gallons) for Calendar Year 2005

Category	LANL	Los Alamos County	Total
SWEIS ROD	759,000	Not Projected	Not Applicable
CY 2005	359,252	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. The distribution system used to supply water to LANL facilities now consists of a series of reservoir storage tanks, pipelines, and fire pumps. The LANL distribution system is gravity fed with pumps for high-demand fire situations at limited locations.

3.5 Worker Safety

In 2004 the work suspension from July 16 through most of the year stopped all but essential medium- and high-risk work activities performed at LANL during this time period. In 2005, working conditions resumed to more normal operations and remained essentially the same as those identified in the SWEIS baseline. More than half the workforce is routinely engaged in office work activities that are typical of service industries. Much of the remainder of the workforce performs light industrial and bench-scale research activities. Approximately one-tenth of the workforce at LANL continues to be associated with production, operations, maintenance, research and development, or support services within Nuclear and Moderate Hazard facilities.

3.5.1 Accidents and Injuries

Table 3.5.1-1 summarizes occupational injury and illness rates during CY 2000–CY 2005. Occupational injury and illness rates for workers in CY 2005 decreased from CY 2004 in all categories with the largest decrease occurring in DART cases (Days Away, Restricted, or Transferred) for all LANL workers as shown in Table 3.5.1-1. These rates correlate to reportable injuries and illnesses during the year for 200,000 hours worked or roughly 100 workers.

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

Calendar Year	UC Workers Only		LANL (all workers)	
	TRC[a]	DART[b]	TRC	DART
2000	1.53	0.62	1.97	0.94
2001	1.62	0.55	1.96	0.91
2002	2.16	1.24	2.39	1.46
2003	2.11	1.08	2.30	1.26
2004	2.93	1.3	2.86	1.35
2005	**2.86**	**1.22**	**2.80**	**0.99**

a Total recordable cases, number per 200,000 hours worked. Formerly called TRI: Total Recordable Incident rate

b Days Away, Restricted, or Transferred, number of cases per 200,000 hours worked. Formerly called LWC: Lost workday cases

3.5.2 Ionizing Radiation and Worker Exposures

Occupational radiation exposures for workers at LANL during CY 2005 are summarized in Table 3.5.2-1. The collective Total Effective Dose Equivalent, or collective TEDE, for the LANL workforce during CY 2005 was 155.6 person-rem, which is considerably lower than the collective dose of 704 person-rem projected by the ROD and 1.25 times higher than the collective dose of 124.6 person-rem in CY 2004. These reported doses in Table 3.5.2-1 could change with time because estimates of committed effective dose equivalent from inhalation of radioactive material in many cases are based on several years of bioassay results, and as new results are obtained the dose estimates may be modified accordingly. The increase in collective worker dose from CY 2004 to CY 2005 resulted from the resumption of work at nuclear facilities. Data in Table 3.5.2-1 show 459 additional radiation workers received measurable dose in CY 2005 as compared to CY 2004, while the average dose per worker remained constant during these periods. Of the 155.6 person-rem collective TEDE reported for CY 2005, 5.6 person-rem was from internal exposures to radioactive materials, primarily from small plutonium uptakes.

Table 3.5.2-1. Radiological Exposure to LANL Workers

Parameter	Units	SWEIS ROD	CY 2004	CY 2005
Collective TEDE (external + internal)	person-rem	704	124.6	155.6
Number of workers with non-zero dose	number	3,548	1,710	2,169
Average non-zero dose:				
• external + internal radiation exposure	millirem	Not projected	73	72
• external radiation exposure only	millirem	Not projected	68	69

The highest individual doses in CY 2005 were typical of doses received since CY 2000. No worker's dose exceeded the DOE's 5 rem/year Radiation Protection Standard and one worker's dose in 2005 was slightly above the 2 rem/year performance goal set by the ALARA (as low as reasonably achievable) Steering Committee in accordance with LANL procedures. Table 3.5.2-2 summarizes the highest individual dose data for CYs 2000–2005.

Table 3.5.2-2. Highest Individual Annual Doses (TEDE) to LANL Workers (rem)

CY 2000	CY 2001	CY 2002	CY 2003	CY 2004	CY 2005
1.048	1.284	2.214	10.197	1.539	2.051
1.013	1.225	1.897	8.097	1.510	1.603
0.905	1.123	1.813	1.710	1.500	1.398
0.828	1.002	1.644	1.569	1.148	1.285
0.815	0.934	1.619	1.214	1.061	1.146

Comparison with the SWEIS Baseline. The collective TEDE for CY 2005 is about 75 percent of the 208 person-rem per year baseline in the ROD. The baseline collective TEDE in the ROD was established using CY 1993–CY 1995 data.

Work and Workload: Changes in workload and types of work at nuclear facilities, and particularly at TA-55, tend to increase or decrease the collective TEDE. Of special importance to the baseline ROD is that the radionuclide (plutonium-238) power source for the Cassini spacecraft was being constructed at TA-55 during the baseline time period. Workers incurred much higher neutron exposures during this project. After the project was completed during CY 1995–CY 1996, the LANL collective TEDE was reduced. Plutonium-238 programs at TA-55 remain active today and accounted for 18.7 person-rem or about 12 percent of the LANL collective TEDE. Long-term plans are to shift this mission to Idaho National Engineering Laboratory. Pit production at TA-55 is planned to increase to 10 pits per year in 2007 and 50 pits per year by 2012, which should result in higher collective doses in future years. The baseline pit production rate in the ROD was nominally 20 pits per year.

ALARA Program: Improvements in maintaining radiation exposures As Low As Reasonably Achievable (ALARA), such as improved dose tracking during work activities, additional shielding, and better radiological safety designs that are being implemented during the replacement of aged production lines in TA-55, should result in lower worker exposures and justify collective TEDE for LANL plutonium workers.

Comparison with the Projected TEDE in the ROD. The CY 2005 collective TEDE is less than the baseline collective TEDE levels in CYs 1993–1995, and significantly less than the 704 person-rem collective TEDE projected in the ROD. The implementation of war reserve pit manufacturing, which was approved in the ROD, has not become fully operational causing lower collective doses than projected. The collective dose will increase once the pit manufacturing production schedule is fully implemented.

Collective TEDEs for Key Facilities. In general, collective TEDEs by Key Facility or TA 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 TA can only be estimated. For example, personnel from the Health Physics Operations group (HSR-1) and KSL are distributed over the entire Laboratory, and these two organizations account for a significant fraction of the total LANL collective TEDE. 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 NMT Division, HSR-1, Actinide Analytical Chemistry group, and KSL groups in CY 2005 was approximately 105 person-rem or about 67 percent of the total LANL collective TEDE of 155.6 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 13,504 employees at the end of CY 2005 are 2,153 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). The 13,504 total employees at the end of CY 2005 reflect an *increase* of 243 employees over the 13,261 employees reported in the 2004 Yearbook (LANL 2005b).

Table 3.6-1. LANL-Affiliated Work Force

Category	UC Employees	Technical Contractor	Non-Technical Contractor	KSL	PTLA	Total
SWEIS ROD [a]	8,740	795	Not projected [b]	1,362	454	11,351
Calendar Year 2005	10,734	477	274	1,350	669	13,504

a Total number of employees was presented in the SWEIS, the breakdown had to be calculated based on the percentage distribution shown in the SWEIS for the base year.
b Data were not presented for non-technical contractors or consultants.

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 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. The publication of this report was discontinued after FY 1998 due to funding deficiencies. However, based on number of employees and payroll, it is expected that the LANL 2005 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, 88 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 2005	5,079	1,706	2.407	862	10,054	680	10,734

a Includes both Regular and Temporary employees, including students who may not be at LANL for much of the year.
b Total number of employees was presented in the SWEIS, the breakdown had to be calculated based on the percentage distribution shown in the SWEIS for the base year.

LANL records contain the TA 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 CY total.

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

Key Facility	Reference Year 1999 [b]	Calendar Year 2005
Plutonium Complex	589	739
Tritium Facilities	28	11
CMR	204	196
Pajarito Site	70	30
Sigma Complex	101	107
MSL	57	57
TFF	54	43
Machine Shops	81	121
High Explosive Testing	227	279
High Explosive Processing	96	115
LANSCE	560	389
HRL	98	119
Radiochemistry Laboratory	128	121
Waste Management–Radioactive Liquid Waste	62	68
Waste Management–Radioactive Solid and Chemical Waste	65	71
Rest of LANL	4,601	6,183
Total Employees	7,021	8,648

a Includes full-time and part-time regular employees; it does not include students who may be at LANL 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.

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, KSL, 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.

3.7 Land Resources

Land resources were examined in 1996–1998 during the development of the SWEIS. From then until CY 2005, the land resources (i.e., undeveloped and developed lands) available for use at LANL remained constant. In CY 2002, approximately 2,209 acres of land were transferred to private ownership under Public Law 105-119[11] (42 USC 2391). No lands were transferred during CY 2003 or CY 2004. In CY 2005, three tracts of land were transferred for a total of 45.7 acres.

During 2000, land resources were impacted by the Cerro Grande Fire, which burned across approximately 7,500 acres or 27 percent of LANL. 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 structures, modified fewer than 50 acres of undeveloped land.

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

Projects under construction in CY 2005 included the Sigma Mesa KSL Roads and Grounds complex, TA-46 Facility Infrastructure Replacement Program (FIRP) office complex, TA-48 Nuclear Materials Safety and Security Upgrades Project (NMSSUP) office complex, new parking lot at TA-63, Detention Pond at TA-16, TA-54 Central Characterization Program (CCP) complex, and a new 12-inch gas transmission line with a 100-foot easement on previously undeveloped or disturbed land. Additional development included an asphalt plant, Sigma Mesa evaporative ponds, a TA-60 Radio Shop, and new parking lot on the D&D'ed former Health Clinic site. Most of these projects are on previously developed or disturbed land (LANL 2000b). At TA-06 the bunkers were D&D'ed with the intent to return the land to an undeveloped condition.

CY 2005 was similar to the previous CYs: the land acreage (Table 3.7-1) remained constant; the ongoing construction projects from CY 2003–CY2005 continued; and the mitigation efforts and repairs from the Cerro Grande Fire of 2000 continued. The

[11] On November 26, 1997, Congress passed PL 105-119 (42 USC 2391). Section 632 of this Act directed the Secretary of Energy 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 DOE at or in the vicinity of LANL. Such parcels, or tracts, of land must meet suitability criteria established by the Act.

The Act sets forth the criteria, processes, and dates by which the tracts will be selected, titles to the tracts reviewed, environmental issues evaluated, and decisions made as to the allocation of the tracts between the two recipients. DOE's responsibilities under the Act included identifying potentially suitable tracts of land, identifying any environmental restoration and remediation that would be needed for those tracts of land, and conducting NEPA review of the proposed conveyance or transfer of the land tracts. Under this Act, those land parcels identified suitable for conveyance and transfer must have undergone any necessary environmental restoration or remediation.

developed projects occurred within land designated by the Comprehensive Site Plan for the land use developed.

Table 3.7-1. Site-wide Land Use

Land Use Category	Acreage in CY 2004 and CY 2005
Service/Support	184
Experimental Science	705
High Explosives Research and Development	1,297
High Explosives Testing	7,209
Nuclear Materials Research and Development	131
Physical/Technical Support	452
Public/Corporate Interface	31
Theoretical/Computational	7
Waste Management	196
Reserve	15,355
Total	25,590

The ERS Program is unique from a land use standpoint. Rather than using land for development, this program 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 LANL, 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 (42 USC 2391). Several tracts of land were identified for conveyance or transfer and, pending cleanup by the ERS Program, will be made available for future use.

CY 2002 marked the first land transfers under Public Law 105-119 (42 USC 2391). In CY 2004, no land was transferred to private ownership. In CY 2005 three tracts of land were transferred for a total of 45.7 acres. Parts of the airport tract (A-5-1, A-7), and TA-21 (A-15-1) were transferred. Table 3.7-2 provides a summary of the potential land parcels remaining to be transferred

Table 3.7.2. Potential Land Transfer Tracts

Land Tract	Acreage	Location
TA-21	244	On the eastern end of the same mesa on which the central business district or Los Alamos is located.
DP Road	50	Between the western boundary of TA-21 and the major commercial districts of the Los Alamos town site.
DOE LASO	13	Within the Los Alamos town site between Los Alamos Canyon and Trinity Drive.
Airport	198	East of the Los Alamos town site, close to the East Gate Business Park.
Rendija Canyon	909	North of and below Los Alamos town site's Barranca Mesa residential subdivision.
White Rock Y	435	A complex area that incorporates the alignments and intersections of State Routes 4 and 502 and the easternmost part of Jemez Road.

Because of the land transfers, the distance to some site boundaries has decreased and a preliminary assessment of the impact of the boundary changes on the accident analyses in the SWEIS has been performed. The full assessment is in Appendix E of the SWEIS Yearbook 2003 (LANL 2004a).

The basic conclusion of the assessment is that the decrease in distances between assumed accident locations and previously analyzed receptor locations will have little or no impact on estimated doses in the SWEIS. On this basis there appears to be no need to revise accident analyses in the SWEIS because of land transfers from the DOE to public entities. The conclusion is based on a review of several facilities and postulated accidents, especially risk-dominant accidents in the SWEIS. Very few or minimal changes in predicted effects are expected to occur. One exception, a hydrogen cyanide accident at the Sigma Facility, has been noted. The SWEIS still serves the purpose of characterizing LANL operations, differentiating among alternatives, and presenting a baseline that is suitable for tiering and bounding of potential accidents at LANL. A recommendation in the conclusion is that site boundary changes be considered in future NEPA reviews as appropriate.

3.8 Groundwater

Groundwater occurs in three settings beneath the Pajarito Plateau: alluvium, intermediate saturated zones, and the regional aquifer. The major source of recharge to the regional aquifer beneath the Pajarito Plateau is precipitation within the Sierra de los Valles. However, alluvial groundwater on the Pajarito Plateau is also a source of recharge to underlying intermediate saturated zones and to the regional aquifer.

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 (LANL 1998a). 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 1,506 million gallons in 2000. LANL used between about 50 percent and 27 percent of the total water pumped from 1999 to 2001 (LANL 2003c). 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 one to two feet per year for most production wells. When pumping stops in the production wells, the static water level returns in about six to 12 months. Hence, the water level trends suggest no adverse impacts on long-term water supply production from groundwater withdrawals (LANL 1998a, 2003c).

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 35 hydrogeologic characterization wells installed that monitor the regional aquifer and 28 that monitor the intermediate saturated zones since 1998 and each of the wells has been sampled (Figure

3-1). The chemistry of regional aquifer water ranges from calcium-sodium bicarbonate composition (Sierra de los Valles) to sodium-calcium bicarbonate composition (White Rock Canyon springs) (LANL 1995, 2001b, 2002b, 2002c). Silica is the second most abundant solute found in surface water and groundwater because of reactions between soluble silica glass in the rock and water. Trace metals including barium, strontium, and uranium vary within the different saturated zones (alluvial, intermediate, and regional aquifer) depending on how long the water has been in contact with the host rock. Older groundwater within the regional aquifer tends to have higher concentrations of trace elements.

The conceptual model with regard to interconnection between alluvial groundwater, intermediate saturated zones, and the regional aquifer has been refined based on the data collected in the drilling, sampling, and testing of new wells. The conceptual model is that contaminants are transported in surface water or alluvial groundwater from source areas to areas where infiltration occurs. Infiltration is most likely to occur where the Bandelier Tuff thins or is not present (for example, Los Alamos Canyon near the low-head weir on State Route 4) or where a structure pools water (for example, in Mortandad Canyon at the sediment traps). Infiltration carries contaminants to intermediate saturated zones and to the regional aquifer.

Based on analysis of water samples, the source terms correlate reasonably well with chemical data for mobile solutes collected at downgradient characterization wells (LANL 2001b, 2002b). Non-adsorbing contaminants (perchlorate, nitrate, and tritium) are among the most mobile and travel the greatest distances along flow paths**.** Groundwater impacted by LANL-derived effluent is characterized by elevated concentrations of major ions (calcium, magnesium, potassium, sodium, chloride, bicarbonate, nitrate, and sulfate); trace solutes (for example, chromium, molybdenum, perchlorate, barium, boron, and uranium); high explosive compounds and other VOCs; and radionuclides (tritium, americium-241, cesium-137, plutonium isotopes, strontium-90, and uranium isotopes) (LANL 2001b, 2002b, 2002c, 2002d, 2002e, 2002f, 2002g, 2004d).

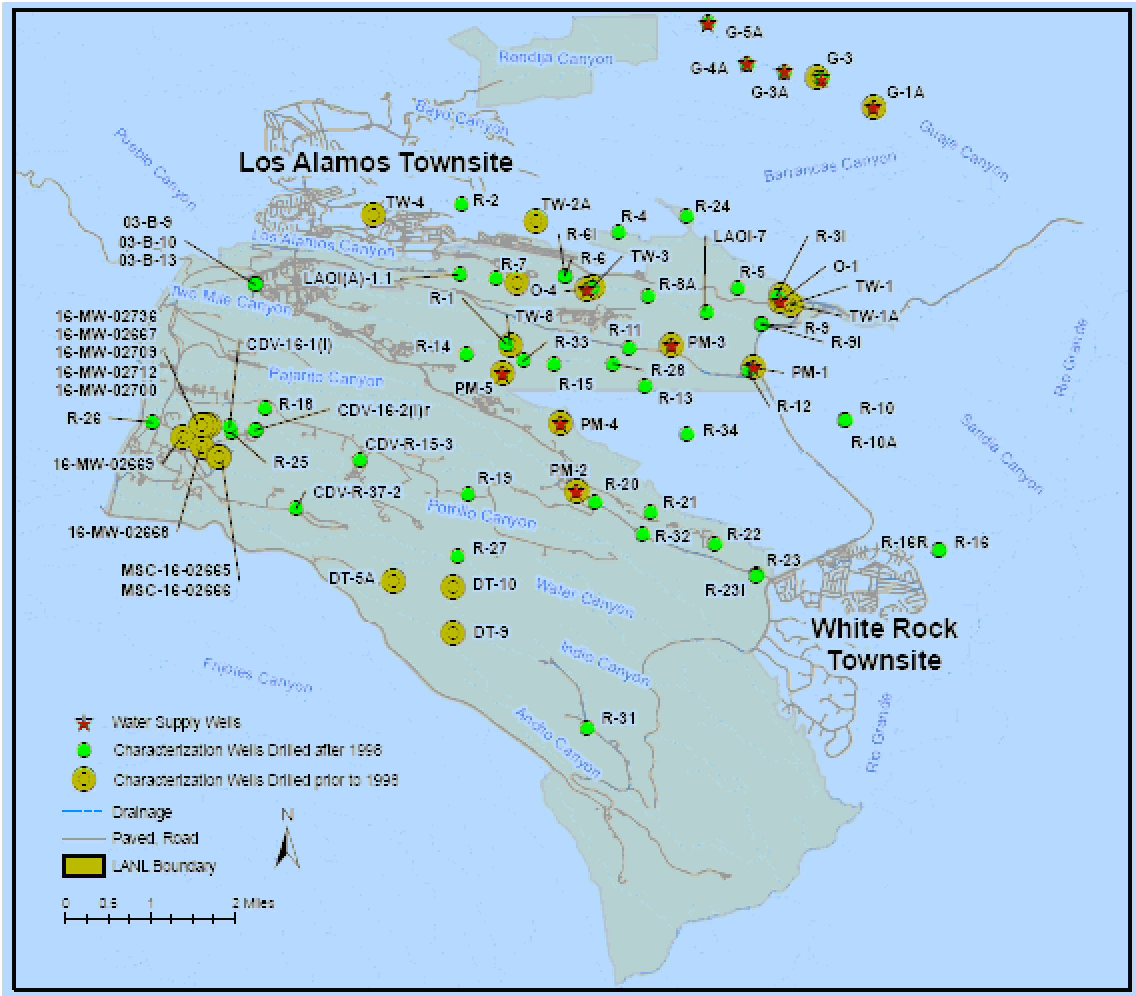

Figure 3-1. Regional and intermediate-perched aquifer characterization wells within LANL and vicinity.

Early in 2005, work was conducted as part of the Hydrogeologic Characterization Program, and described in the Hydrogeologic Workplan (LANL 2001c). However, most of the work in 2005 was performed pursuant to the Compliance Order on Consent, which was signed by NMED, DOE and UC in March 2005 (NMED 2005). By the end of 2005, 21 additional characterization wells were installed. The characterization wells were drilled using air rotary in the vadose zone and rotary with water, foam, mud, or EZ-MUD (a polymer) in the saturated zone. Geologic core was collected in the upper vadose zone in some of the wells and geologic cuttings were collected at defined intervals during the drilling operations and described to record the stratigraphy encountered. Geophysical logging was conducted in each well to enhance the understanding of the stratigraphy and rock characteristics. The characterization borehole and wells include the following:

- CdV-16-2(i)r in Cañon de Valle;
- LADP-5 in DP Canyon;
- LAOI-3.2 in Los Alamos Canyon;

- LAOI-7 in Los Alamos Canyon;
- R-3i in Los Alamos Canyon;
- R-10 and R-10A in Sandia Canyon;
- R-16A in Cañada del Buey;
- R-17 on a Pajarito Canyon bench;
- R-23i in Pajarito Canyon;
- R-24 in Bayo Canyon; and
- R-27 in Water Canyon.

Intermediate well CdV-16-2(i)r is located on the mesa top in TA-16. It replaces well CdV-16-2(i), which was drilled and installed in December 2003 but did not sustain water in the well. CdV-16-2(i)r was drilled in an attempt to complete a monitoring well at the same location to evaluate water quality in the deep intermediate perched zone. It was drilled approximately 50 feet northwest of the original well. The primary COPCs in the area are high explosives that have been discharged from TA-16 and possibly from other nearby sites. The single-screened well was installed within the upper portion of the Puye Formation. The depth to water remained steady at approximately 840 feet after the well was completed at a total depth of 863.2 feet.

Intermediate borehole LADP-5 was drilled in November 2005 on the south rim of DP Canyon within TA-21. LADP-5 was drilled to identify the western extent of tritium, nitrate, and perchlorate contamination found in monitoring wells R-6/6i and production well Otowi-4. However, measurable groundwater was not encountered in either the corehole or borehole. Therefore, a monitoring well was not installed at the LADP-5 location. Subsequently, both the borehole and corehole were plugged and abandoned.

Intermediate well LAOI-3.2 is located in Los Alamos Canyon in the northern portion of the Laboratory. Well LAOI-3.2 was drilled to define the lateral extent of the deeper perched groundwater found in the Puye Formation at wells Otowi-4 (O-4) and R-6i. LAOI-3.2 was drilled in February 2005 with a target depth of 300 feet below ground surface; however, drilling was halted at 165 feet below ground surface to install a perched intermediate zone monitoring well for groundwater encountered in the Guaje Pumice Bed. LAOI-3.2 was installed to 165 feet below ground surface with a single-screened interval from153.3 to 162.8 feet below ground surface; the water level after well installation was approximately 136 feet below ground surface.

Intermediate well LAOI-7 was drilled in August and September 2005 in lower Los Alamos Canyon within TA-72. The well was drilled to identify the western extent of perched-intermediate groundwater within the Cerros del Rio basalt found at wells R-9/R-9i and to help define the eastern extent of contamination in the vadose zone in lower Los Alamos Canyon. The well was constructed with a single screen approximately 20 feet below the perched-intermediate water zone at a total completed depth of 264.9 feet.

Regional well R-3i is located in Los Alamos Canyon, west of the White Rock "Y." The primary purpose of the well is to target the zone(s) within the regional aquifer that contain the same contaminants (nitrate, perchlorate, and tritium) as well O-1. Drilling started in August 2005 and was completed in the Puye Formation at a total of 268.3 feet. The regional aquifer table is at a depth of 190.9 feet in the Cerros del Rio basalt. The well was constructed with a single-screened interval from 215.2 to 220 feet below ground surface.

Regional wells R-10a and R-10 are located in lower Sandia Canyon on San Ildefonso Pueblo property. R-10a was installed to monitor water quality in the upper portion of the regional aquifer; R-10 was installed to monitor water quality and to evaluate the effects of nearby water supply pumping on the deeper portions of the regional aquifer. The majority of the fieldwork for these wells was conducted between June 27 and November 4, 2005. R-10a was drilled to a total depth of 765 feet using air rotary and fluid-assisted air rotary techniques. A well was installed with one screened interval from 690 to 700 feet below ground surface. The depth to water after the installation of R-10a was 623.83 feet below ground surface. R-10 was drilled 56 feet east of R-10a to a total depth of 1,165 feet below ground surface using air rotary and mud rotary drilling techniques; it was completed with two screened intervals, one between 874 and 897 feet below ground surface and one between 1,042 and 1,065 feet below ground surface.

Regional well R-16A (also known as R-16R) was drilled in September 2005 south of Cañada del Buey, approximately 3,000 feet northwest of the Rio Grande and near the town of White Rock. R-16A was drilled to monitor the upper portion of the regional aquifer, replacing the blocked upper screened interval in R-16. The purpose of R-16 (and R-16A) was to determine the depth of the water table and vertical gradients for the regional aquifer near the Rio Grande, serve as monitoring points between TA-54 and the Rio Grande, and aid in determining the relationship between the regional water table and springs in White Rock Canyon. The well was constructed with a single screen at the water table at a total completed depth of 631.4 feet.

Regional well R-17 is located in Pajarito Canyon and was installed to evaluate perched intermediate and regional groundwater in the west-central region of the Laboratory downstream of release sites in TA-03, -06, -59, and -69. A corehole was advanced to 300.9 feet below ground surface and the R-17 borehole was drilled to a total depth of 1,167 feet below ground surface. A well was installed with two screened intervals, one from 1,124 to 1,134 feet below ground surface and one from 1,057 to 1,080 feet below ground surface, in the regional aquifer within the Puye Formation. The depth to water for the isolated upper screen is approximately 1,036.2 feet below ground surface and for the isolated lower screen it is 1,037.7 feet below ground surface.

Intermediate well R-23i was drilled in October 2005 in lower Pajarito Canyon south of Pajarito Road. The well was drilled to sample perched-intermediate groundwater encountered during the drilling of R-23. The 550.7-foot well was constructed with a dual-screened inner well, and a shallow single-screened well in the annular space. Perched intermediate water in the inner wells was at 405.8 feet after well completion.

Regional well R-24 was drilled in August 2005 in Bayo Canyon near the northeastern portion of LANL. The purpose of R-24 is to determine if perched intermediate water occurs beneath Bayo Canyon and what the water quality is at the top of the regional aquifer. The well was constructed with a single screen approximately 100 feet below the water table at a total completed depth of 861 feet.

Regional well R-27 was drilled in October 2005 in Water Canyon within TA-36 in the south-central portion of the Laboratory. The purpose of R-27 is to provide information about water quality in the intermediate-perched zones and in the regional aquifer downgradient of TAs -11, -16, and -49. The well was constructed with a single screen approximately 40 feet below the water table at a total completed depth of 878.7 feet.

In addition to the site-wide hydrogeologic characterization wells, substantial progress was made in 2005 on investigating groundwater in Mortandad Canyon and at two SWMUS at TA-03 (see the *Mortandad Canyon Groundwater Work Plan* [LANL 2003d] and *Investigation Report for Solid Waste Management Units 03-010(a) and 03-001(e) at Technical Area 3* [LANL 2005d]).

Seven wells were installed within LANL adjacent to Mortandad Canyon under the Mortandad Canyon Groundwater Investigation. The purpose of these intermediate wells was to improve the conceptual model of the geology, hydrogeology, and hydrochemistry of the area and to provide data for numerical models that address contaminant migration in the vadose (unsaturated) zone. The alluvial wells were planned to characterize groundwater flow and determine contaminant distributions within alluvial perched water systems, and the piezometers were planned to evaluate the water table response to seasonal infiltration and to characterize hydraulic gradients and conductivities.

Intermediate well MCOI-1 is located in TA-35, approximately 0.25 miles east of the TA-50 outfall. It was specifically installed to determine if contaminant releases have affected the quality of intermediate perched groundwater between the TA-50 outfall and Test Well 8. Air rotary drilling started in November 2004 and was completed in January 2005 at a total of 843.2 feet. The well was constructed with a single screen at the water table. However, water has not accumulated in this well so well development, aquifer testing, and pump installation have not been performed.

Intermediate well MCOI-6 is located in TA-05 and was drilled from November 2004 through January 2005 to a total depth of 720 feet below ground surface using air-rotary drilling. The well was constructed with a single-screened interval from 686 to 708 feet below ground surface, near the base of the Cerros del Rio basalt. The total depth of the well was 713 feet below ground surface. On January 21, 2005, the depth to water after well installation was 665.80 feet below ground surface.

Intermediate well MCOI-8 is located in TA-05 and was drilled from November 2004 through January 2005 to a total depth of 745 feet below ground surface using using air-rotary and fluid-assisted drilling methods. The well was completed in the Cerros del Rio basalt with a single-screened interval from 665 to 675 feet below ground surface. The depth to water after installation of the well screen was 656.7 feet below ground surface.

Intermediate borehole MCOI-10 is located on the mesa top south of Mortandad Canyon, approximately 3,500 feet east of water production well PM-5. MCOI-10 was drilled from November 2004 through February 2005 was drilled to a total depth of 1,050 feet below ground surface using air-rotary and fluid-assisted drilling methods. The well was completed 76 feet into the Puye Fanglomerate; however, no intermediate-perched groundwater was observed entering the borehole, so the borehole was plugged and abandoned.

Alluvial well MCA-1 is located in upper Mortandad Canyon and was hand augered to a total depth of 5.9 feet below ground surface where the Tshirege Member of the Bandelier tuff was encountered in January 2005. Water was encountered at 3.3 feet below ground surface in the surficial alluvium. The well was cased to a depth of 5.9 feet below ground surface and constructed with a single-screened interval from 2.4 to 5.4 feet.

Alluvial well MCA-4 is located in middle Mortandad Canyon and was hand augered to a total depth of 5.4 feet below ground surface where the Tshirege Member of the Bandelier tuff was encountered in February 2005. Water was encountered at 5 feet below ground surface in the alluvium. The well was cased to a depth of 5.4 feet below ground surface and constructed with a single-screened interval from 3.3 to 5.3 feet.

Alluvial well MCA-5 is located in upper Mortandad Canyon and was hand augered to a total depth of 6 feet below ground surface in February 2005. Water was encountered at 4 feet below ground surface in the alluvium. The well was cased to a depth of 6 feet below ground surface and constructed with a single-screened interval from 1.75 to 5.75 feet.

In June 2005, monitoring wells were installed in three of the 14 boreholes drilled near SWMU 03-010(a) and SWMU 03-001(e) to monitor shallow alluvial groundwater.

Monitoring wells 03-B-9, 03-B-10 and 03-B-13 were completed with single screens and range in depth from 30.6 to 31.5 feet below ground surface.

3.9 Cultural Resources

LANL has a large and diverse number of historic properties. Approximately 85 percent of DOE-administered land in Los Alamos County has been surveyed for prehistoric and historic cultural resources. Over 1,700 prehistoric sites have been recorded (Table 3.9-1). More than 85 percent of these archaeological 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.

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 FY 2005[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 sites	Number of notifications to Indian Tribes [c]
SWEIS ROD	Not reported	Not reported	1,295[d]	1,092	23
1998	1,920	17,937	1,369	1,304	10
1999	1,074	19,011	1,392	1,321	13
2000	119	19,428	1,459	1,386	6
2001	4,112	19,790	1,424[d]	1,297[d]	2
2002	2,686	22,476	1,835	1,699	6
2003	200	22,676	1,797 [d]	1,667 [d]	6
2004	50	22,726	1,785 [d]	1,650 [d]	3
2005	0	22,726	1,776[d]	1,640[d]	3

a Source: Information on LANL provided by DOE/LASO and LANL Cultural Resources Team (CRT) to the Secretary of Interior for a Report to Congress on Federal Archaeological Activities.

b In the CYs 1999 and 2000 Yearbooks, this column, then titled ‘Total Archaeological Sites Recorded to Date,’ included Historic Period cultural resources (AD 1600 to present), including buildings. In order to conform to the way cultural properties were discussed in the SWEIS, Historic Period properties were removed beginning with the 2001 SWEIS Yearbook. Historic sites are now documented in a separate table (Table 3.9-2).

c As part of the SWEIS preparation, 23 tribes were consulted in a single notification. Subsequent years, however, show the number of separate projects for which tribal notifications were issued; the number of tribes notified is not indicated.

d As part of ongoing work to field verify sites recorded 20 to 25 years ago, LANL’s CRT has identified sites that have been recorded more than once and have multiple Laboratory of Anthropology 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 and more sites with duplicate records will probably be identified.

LANL continues to evaluate buildings and structures from the Manhattan Project and the Early Cold War period (1943–1963) for eligibility to the National 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[12] communities as traditional cultural properties.

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 identified no sites associated with the Spanish Colonial or Mexican Periods. During FY 2004 it was decided to combine the historic periods (Historic Pueblo, US Territorial, Statehood, and Undetermined Athabaskan) into one site affiliation code “Early Historic Pajarito Plateau” (AD 1500 to 1943). 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 was issued, these types of properties have been removed from the count of historic properties because they are exempt from review under the terms of the Programmatic Agreement

[12] Athabascan refers to a linguistic group of North American Indians. Their range extends from Canada to the American Southwest, including the languages of the Navajo and Apache.

(MOU DE-GM32-00AL77152) between the DOE LASO, the New Mexico State Historic Preservation Office, and the Advisory Council on Historic Preservation. Additionally, the CRT has evaluated many Manhattan Project and Early Cold War properties (AD 1942–1963) and those properties built after 1963 that potentially have historical significance, reducing the total number of potential historic cultural resource sites to 760. 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, additional buildings may be added to the list of historic properties in the future.

Table 3.9-2. Historic Period Cultural Resource Properties at LANL[a]

Fiscal Year	Potential Properties[b]	Properties Recorded[c]	Eligible and Potentially Eligible Properties	Non-Eligible Properties	Evaluated Buildings Demolished
LANL SWEIS ROD	2,319	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
2002	753	301	218	83	42
2003	757	404	254	150	71
2004	757	410	255	155	82
2005	760	431	266	165	121

a Source: Information on LANL provided by DOE/LASO and LANL CRT to the Secretary of Interior for a Report to Congress on Federal Archaeological Activities. Numbers given represent cumulative total properties identified, evaluated, or demolished by the end of the given FY.

b This number includes historic sites that have not been evaluated, and therefore, may be potentially NRHP-eligible. In addition, beginning with the CY 2002 Yearbook, historic properties that are exempt from review under the terms of the Programmatic Agreement were removed from these totals, substantially reducing the number of potential Historic Period cultural resources.

c This represents both eligible and non-eligible sites.

LANL has recorded 140 historic sites. All have been given unique New Mexico Laboratory of Anthropology site numbers. Some of the 140 are experimental areas and artifact scatters dating from the Manhattan Project and Early Cold War periods. The majority, 127 sites, are structures or artifact scatters associated with the Early Historic Pajarito Plateau or Homestead periods. Of these 140 sites, 99 have been declared eligible for the NRHP. LANL's Manhattan Project and Early Cold War period buildings account for the remaining 620 of the 760 Historic Period properties. At this time, the New Mexico State Historic Preservation Division (NMSHPD) does not assign Laboratory of Anthropology numbers to LANL buildings. Of these historic buildings, 291 have been evaluated for eligibility and inclusion on the NRHP. One hundred twenty-four of these evaluated buildings have been declared not eligible for the NRHP; the remaining 167 are NRHP-eligible.

The CRT has documented 75 of the NRHP-eligible buildings in accordance with the terms of official Memoranda of Agreement between the DOE and the NMSHPD. These buildings have subsequently been decontaminated, decommissioned, and demolished through the D&D Program. Forty-six of the 124 non-eligible buildings have also been demolished through this program.

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 FY 2005 (October 2004 through September 2005), the CRT evaluated 1,003 LANL-proposed actions, no new field surveys to identify cultural resources were conducted. DOE sent 12 survey reports to the SHPO for concurrence in findings of effects and determinations of eligibility for the NRHP of cultural resources located during the survey. Additionally, one data recovery plan, nine Memoranda of Agreement, and five final reports for completion of Memorandum of Agreement terms were submitted to the SHPO.

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 (42 USC 1996). Tribal groups must receive notification of possible alteration of traditional and sacred places. The Governors of San Ildefonso, Santa Clara, Cochiti, Jemez, and Acoma Pueblos and the President of the Mescalero Apache Tribe received copies of three reports to identify any traditional cultural properties that a proposed action could affect.

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 (25 USC 1996). No discoveries of burials or cultural objects occurred in FY 2005 from Federal undertakings.

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 (16 USC 1996). No violations of this Act were recorded on DOE land in FY 2005.

3.9.2 Compliance Activities

Nake'muu. During FY 2005, as part of the *Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility Mitigation Action Plan* (DOE 1996), the CRT continued a long-term monitoring program at the ancestral pueblo of Nake'muu to assess the impact of LANL mission activities on cultural resources. Nake'muu is the only pueblo at LANL that still contains its original standing walls. It dates from circa AD 1200 to 1325 and contains 55 rooms with walls standing up to six feet high. Over the eight-year monitoring program, the site has witnessed a 0.9 percent displacement rate of chinking stones and 0.3 percent displacement of masonry blocks. The annual displacement rate of chinking stones is significantly correlated with the amount of snowfall in a given year and not rainfall. Although the amount of snowfall appears to have the greatest effect on chinking stone loss, rainfall does undercut the walls and could cause the catastrophic loss of a wall due to instability. The limited five-year data on shots from DARHT does not seem to correlate with chinking stone loss.

Traditional Cultural Properties Comprehensive Plan. During FY 2005, the CRT continued to assist DOE in implementing the *Traditional Cultural Properties Comprehensive Plan* (LANL 2000c). This included formal and informal meetings with the Pueblos of San Ildefonso and Santa Clara. Discussions during the year centered around working with San Ildefonso regarding properties in TA-03, along with working with both San Ildefonso and Santa Clara regarding traditional cultural properties in Rendija Canyon. Access agreements were worked out with the two Pueblos for continued access to the traditional cultural properties in Rendija Canyon after the forthcoming completion of the land transfer process between DOE and the County of Los Alamos in 2007.

Land Conveyance and Transfer. The Programmatic Agreement among the DOE, the Advisory Council on Historic Preservation, the New Mexico SHPO, and the Incorporated County of Los Alamos, New Mexico, concerning the conveyance of certain parcels of land to Los Alamos County was signed in May 2002. Excavations at the Rendija Canyon Tract continued from June to December 2005. A total of 10 cultural sites were excavated during the field season. Five historic buildings will be documented before D&D or transfer to Los Alamos County.

Cerro Grande Fire Recovery. During 2005, the CRT monitored 107 Ancestral Pueblo and Archaic period archaeological sites rehabilitated by the Pueblo of San Ildefonso in CY 2004. The monitoring was in support of the *Mitigation Action Plan for the Special Environmental Assessment for the Cerro Grande Rehabilitation Project* (DOE 2000b, 2000c). The monitoring is part of a long-term program to evaluate the success of erosion control measures and other aspects of rehabilitation.

3.9.3 Cultural Resources Management Plan

The Cultural Resources Management Plan (CRMP) provides 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, Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, and other laws, regulations, and policies in the context of UC/LANL's mission.

The CRMP provides high-level guidance for implementation of the *Traditional Cultural Properties Comprehensive Plan* and all other aspects of cultural resources management at LANL. It presents a framework for collaborating with Native American Tribes and other ethnic groups and organizations in identifying traditional cultural properties and sacred sites.

Status:
The CRMP was finalized and approved by LANL and DOE in 2005 and will be implemented during 2006 through a Programmatic Agreement signed by DOE, the New Mexico SHPO, and the Advisory Council on Historic Preservation. The management plan 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 [LANL 1998b]) may limit access to certain cultural resource sites. Erosion control under the SWPPPs may have a potential impact on cultural resource sites.

Demolished Buildings

Table 3.9.3-1 indicates the extent of historic building documentation and demolition to date. For FY 2002 and FY 2003 the number of documented buildings that were demolished was corrected from last year's report. Additionally, to date, not all buildings that have been documented have been demolished.

Table 3.9.3-1. Historic Building Documentation and Demolition Numbers

Fiscal Year	Number of Buildings for which Required Documentation was Completed	Number of Buildings Actually Demolished in Fiscal Year[a]
Pre 1995	1	Unknown
1995	21	Unknown
1998	5	Unknown
1999	5	Unknown
2000	0	Unknown
2001	8	Unknown
2002	37	14
2003	5	22
2004	14	14
2005	26	27
TOTAL	122	77

a Although buildings were demolished in the years before 2002, the CRT did not monitor the dates when the building demolitions actually occurred.

2005 Land Transferred

Three land tracts were transferred in CY 2005 (see Land Resources Section 4.7). Excavations at 11 cultural sites were completed in the Rendija Tract during 2005.

3.10 Ecological Resources

LANL is located in a region of diverse landforms, elevation, and climate—features that contribute to producing diverse 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) resulting from LANL operations. Data collected for CY 2005 support this projection. These data are reported in the 2005 Environmental Surveillance Report issued September 2006 (LANL 2006b).

In CY 2005, LANL contracted with the US Army Corps of Engineers to conduct a wetland inventory of LANL lands. All sites indicated as wetlands from historical surveys were visited. Thirty wetlands occupying portions of 14 different TAs met the criteria of the 1987 *Wetlands Delineation Manual* (USACE 1987). A total of 34 acres of wetlands were identified.

3.10.1 Conditions of the Forests and Woodlands

The 2005 water year (October 2004 to September 2005) was substantially better than 2004, and vegetation on LANL and in the surrounding area showed widespread recovery. Bark beetle activity declined dramatically from past years. Vegetation monitoring efforts continued to evaluate wildfire fuel loads, the effects of the Cerro Grande Fire of 2000, and thinning activities. Ongoing rehabilitation monitoring showed significant hydrologic recovery in areas burned in the Cerro Grande Fire (LANL 2006c).

The LANL area received approximately 16 inches of precipitation in water year 2004 and 25 inches in water year 2005. Bark beetle-induced tree mortality declined from 2003 and 2004, as much through lack of live trees as an improvement in forest health. Tree mortality first became a prominent result of the drought during 2002 and continued in 2003 and 2004. By the end of 2004, 95 percent of the piñon trees had been killed. In addition, approximately 12 percent of ponderosa pine trees had been killed. In the lower elevations of the mixed conifer zone on north-facing slopes of the canyons, up to 100 percent of the Douglas fir trees were also killed by the drought and subsequent bark beetle activity.

LANL is located in a fire-prone region and there will always be a potential for wildfires to occur during the fire season, from April 10 to September 30 (LANL 2005e). Recent modeling of wildfire risks indicates that the greatest potential for lightning to ignite fires occurs along the western and southwestern boundary of LANL and in the adjacent mountainous areas. Because of this risk, thinning has been a primary management activity to reduce fire hazards in forests and woodlands at LANL. Approximately 155 acres were thinned in 2005 in the lower Pajarito Corridor (TA-54 and -36). The total amount of thinning conducted since 2000 is approximately 9,150 acres (LANL 2005e). Of this, approximately 40 percent or 3,900 acres were in ponderosa pine forests, with the remaining acreage consisting of piñon-juniper woodlands. In addition, 800 acres at LANL had been thinned between 1997 and 1999. Throughout, the thinning targets ranged from 50 to 150 trees per acre, but recent mortality in many of these thinned areas has further reduced the density of the treated forests and woodlands.

The Cerro Grande Fire burned approximately 7,678 acres on LANL property (LANL 2004e). Most of this, 62 percent or 4,760 acres, was in ponderosa pine forests. An additional 17 percent of the Cerro Grande Fire burned in piñon-juniper woodlands on LANL. In either case, a large percentage of this, 88 percent, was burned at low severity and with 10 percent to 40 percent overstory mortality. Only 12 percent of the area at LANL that was burned by the Cerro Grande Fire was at moderate- or high-burn severities. To minimize the potential for erosion and to facilitate recovery from the fire, a total of 1,800 acres was rehabilitated after the fire with seeded grass, straw mulch, and hydromulch (LANL 2002g). Four years after rehab treatment implementation, burned areas have maintained total ground cover but vegetation cover has declined, probably as a result of drought (LANL 2006b). Cover is sufficient to protect most areas from soil loss.

3.10.2 Threatened and Endangered Species Habitat Management Plan

LANL's Threatened and Endangered Species Habitat Management Plan (LANL 1998b) received US Fish and Wildlife Service concurrence on February 12, 1999. The plan is used in project reviews and to provide guidelines to project managers for assessing and reducing 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 Resources, and Biological Resources Laboratory Implementation Requirement document (LANL 2000d) developed during 1999.

In CY 2005, LANL continued conducting annual surveys for Mexican spotted owls, southwestern willow flycatchers, and bald eagles. LANL submitted revised boundaries for Mexican spotted owl habitat at LANL to the US Fish and Wildlife Service (LANL 2005f), and received concurrence on the new boundaries. The revised boundaries are based on a two-year quantitative evaluation of vegetative conditions in canyons. Although some new areas were determined to be suitable habitat for Mexican spotted owl, overall there was a decline in areas managed for owl habitat, partially caused by tree mortality from Cerro Grande Fire and drought-related die-offs.

3.10.3 Biological Assessments and Compliance Packages

LANL reviews proposed activities and projects for potential impact on biological resources including Federal- or State-listed threatened or endangered species. These reviews evaluate and record the amount of development or disturbance at proposed construction sites, the amount of disturbance within designated core and buffer habitat, the potential impact to wetlands or floodplains in the project area, and whether habitat evaluations or species-specific surveys are needed.

During 2005 LANL completed four biological compliance packages for projects requiring an Endangered Species Act biological assessment. The compliance package includes the biological assessment and separate assessments for wetlands and floodplains, migratory birds, and State-listed species of interest. Compliance packages were written in support of the Asphalt Batch Plant and Rock Crushing Operation on Sigma Mesa (LANL 2005g), the RedLANLNet Infrastructure Expansion Program (LANL 2005h), the Construction and Monitoring of Permeable Reactive Barriers (LANL 2005i), and the Mexican Spotted Owl Habitat Redelineation (LANL 2005f). The US Fish and Wildlife Service concurred in determinations that all four projects may affect, but were not likely to adversely affect, the Mexican spotted owl and the bald eagle and will have no effect on other threatened or endangered species.

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4.0 Trend Analysis

Beginning in 1999 the Yearbook included a new chapter that examined trends by comparing actual LANL operating conditions to SWEIS ROD projections. Where the 1999 Yearbook was restricted to waste data, subsequent Yearbooks, including this edition, also included land use and utilities information. Additional information was added to the 2002 edition of the Yearbook so that SWEIS ROD projections could be applied to a wider range of data to assist in the preparation of the five-year review of the SWEIS. The purpose of these additional comparisons was to allow a more comprehensive review of the SWEIS projections compared to actual LANL operating parameters over the years in which data were available. Many of these comparisons are qualitative due to the nature of the data collected.

In preparing this chapter, it became obvious that not all data collected lend themselves to this type of analysis. First, some data consist mostly of estimates (i.e., historical NPDES outfall flows) where variations between years may be nothing more than an artifact of the methodology used to make estimates. These data did not depict environmental risk, and any evaluation between years would be meaningless. Second, some data were 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 have served no practical purpose for the development of a SWEIS in the future. Finally, some data did not represent site impacts, were inherently variable, and did not represent utilization of on-site natural resources (for example, ERS Program exhumed material shipped off-site). The data conducive to numerical analysis represent real numbers of two distinct types: first, data that demonstrate cumulative effects across years where summed quantities could approach or exceed SWEIS ROD projections or regulatory limits or create negative environmental impacts (e.g., waste 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).

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 could have an impact on strategic planning for operations. Conversely, increases in available lands through cleanups performed by the ERS Program, previously called the Environmental Restoration Project, and demolition of vacated buildings also affect strategic planning. To date, however, the ERS Program has not significantly added to available land.

In CY 2002, the first of the Congressionally mandated conveyance of land to the County of Los Alamos and transfer to the Pueblo of San Ildefonso were accomplished. These disbursals effectively removed 2,239 acres from LANL and made them unavailable for LANL operational uses, though these were acres previously identified as reserve properties with no identified land use. Three additional land transfers as part of the 1997 Conveyance and Transfer process occurred during CY 2005 for a total of 45.7 acres.

The SWEIS ROD did not anticipate any significant effects on land use. Land uses within LANL boundaries have not changed substantially since the SWEIS was issued (see Table 3.7-1) and are not expected to change in the next few years. Future development will be consistent with LANL's Comprehensive Site Plan 2000 (LANL 2000), Area Development Plans, and Technical Area Master Plans, which guide LANL land development.

Though construction and modification often result in substantial loss of greenfields (previously undeveloped areas), this has not been the case for the period 1998–2005. For this Yearbook, the amount of greenfield and brownfield (previously developed areas) development was estimated using geographic information system data relating to LANL's larger ground-disturbing projects. The estimates do not include small facility projects, such as installing short utility lines.

LANL's major projects between 1998 and 2005 have affected or will affect (in some cases, actual construction has not begun) about 338 acres. About 187 acres of greenfield (about 34 of the 2005 new acres attributable to the 12-inch gas transmission line easement) have been developed or proposed for development; the remaining 154 acres consist of brownfield areas.

The greenfield development in FY 2005 consisted of several General Plant Projects and other development. These projects included the Sigma Mesa KSL Roads and Grounds complex, TA-46 FIRP office complex, TA-48 NMSSUP office complex, a new parking lot at TA-63, a detention pond at TA-16, TA-04 CCP in support of the WIPP, and a new 12-inch gas transmission line with 100-foot easement.

The brownfield development included several General Plant Project buildings and other projects, but no line items. The projects included a new asphalt plant on Sigma Mesa, evaporative ponds on Sigma Mesa, a new radio shop at TA-60, and a new parking lot on the site of the D&D'ed Health Clinic. Two D&D projects occurred: one was the removal of the chemical warehouse to be replaced with a parking lot that is not yet built. The second is the D&D of the TA-06 bunkers with the intent of returning the land to an undeveloped state.

Future construction at LANL is incorporated in various facility strategic plans. A common component of these plans is consolidation of dispersed activities into central areas and compliance with the new security Design Basis Threat requirements. As a result, future construction will frequently be concentrated in areas that are already developed or are adjacent to developed areas, thus reducing future greenfield loss.

Projects planned for FY 2006 and 2007 listed in the TYCSP include the following projects; the TA-55 Radiological Laboratory/Office/Utility Building, CMR Replacement Building, Criticality Experimental Facility, Power Grid Infrastructure Upgrade, Plutonium Facility-1 Annex Office Building, Warehouse Relocation, Computing and Communication Facility, parking facilities in support of TA-55, Pajarito Substation, and TA-03 Utility Corridor. Also a new DOE office building and the Science Complex to be located in a greenfield area west and northwest of the Wellness Center parking lot should begin construction in FY 2006 or FY 2007. In addition, the TYCSP notes in FY 2008 the TRU Waste Facility and the Radioactive Liquid Waste replacement may begin development, as well as a pedestrian underpass at TA-55, TA-69 Emergency Operations Center Support Office, Wellness Center Replacement, and Support Services Consolidation, if funding occurs.

4.2 Waste Quantities

Wastes have been generated at levels below quantities projected by the SWEIS ROD with the exception of the ERS Program chemical wastes. For three of the last seven years (1999–2001), ERS Program wastes (see Table 3.3-1) have been generated at levels at least seven times the SWEIS ROD projection. 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. ERS Program wastes are typically shipped off-site for disposal at EPA-certified waste treatment, storage, and disposal facilities and do not impact local environs.

As a result of the uncertainty in ERS Program waste estimates, the Yearbook presents totals for LANL waste generation both with and without the ERS Program. As shown in tables in Section 3.3, total generated amounts fall within projections made by the SWEIS ROD. This Yearbook also presents total volumes of solid sanitary waste.

Sanitary Waste

LANL sanitary waste generation and transfer of waste to the Los Alamos County Landfill has varied considerably over the last decade, with a peak (more than 14,000 tons) transferred to the landfill in 2000 that is probably due to removal of Cerro Grande Fire debris. The SWEIS estimated that LANL disposed of approximately 4,843 tons of waste at the Los Alamos County Landfill between July 1995 and June 1996 (DOE 1999). This estimate may not have been representative of LANL's sanitary waste disposal over the long term.

The SWEIS projected that the Los Alamos County Landfill would not reach capacity until about 2014. In 2002, the DOE renewed the special use permit for the County to operate waste disposal, transfer, and post-closure at the County landfill site. The Los Alamos County solid waste landfill is now scheduled to close by December 2007. In compliance with NMED regulations, a closure plan containing post-closure operations and maintenance manual with all the information needed to effectively monitor and maintain the facility for the entire post-closure period was submitted in September 2005. The County landfill will be replaced by a transfer station.

DOE has implemented goals for waste minimization. LANL has instituted an aggressive waste minimization and recycling program that has reduced the amount of waste disposed in sanitary landfills. LANL's per capita generation of routine sanitary waste fell from 265 kilograms per person per year in 1993 to 163 kilograms per person per year in 2001 to 114 kilograms per person per year in 2005, equivalent to a 57 percent decrease in routine waste generation. This reduction is the result of aggressive waste minimization programs that include recycling of white paper, junk mail, colored office paper, catalogs, cardboard, plastic, pallets, scrap wood, and metal and source reduction efforts such as the Stop Mail program.

LANL's total waste generation can be classified as routine and nonroutine. The waste can also be categorized as recyclable and non-recyclable. Table 4.2-1 shows LANL sanitary waste generation for FY 2005. The recycle of total (routine + nonroutine) sanitary waste currently stands at 60 percent compared to 1993 when LANL recycled only about 10 percent of the sanitary waste. In 2005, the total amount of recycled waste increased from 3,847 metric tons in 2004.

Table 4.2-1. LANL Sanitary Waste Generation in 2005 (metric tons)

	Routine	Nonroutine	Total
Recycled	2,122	1,885	4,007
Landfill disposal	1,672	518	2,190
Total	3,794	2,403	6,197

Routine sanitary waste consists mostly of food and food-contaminated waste and cardboard, plastic, glass, styrofoam packing material, and similar items.

Nonroutine sanitary waste is typically derived from construction and demolition projects. Until May 1998, construction debris was used as fill to construct a land bridge between two areas of LANL; however, environmental and regulatory issues resulted in this activity being halted. Construction of new facilities and demolition of old facilities are expected to continue to produce substantial quantities of this type of waste. Recycling programs for concrete, asphalt, dirt, and brush were established in FY 2001 and are a major component of LANL's sanitary waste reduction efforts.

Chemical Waste

Waste projections for the ERS Program, previously called the Environmental Restoration 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 ERS Program 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 ERS Program. In 1996–1997, it was assumed that the life of the ERS Program 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 ERS Program caused by changing requirements and refined waste calculations as additional data were gathered.

One task of the ERS Program 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 a 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 ERS Program 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 were completed by April 2002. A total of 20,812 cubic yards of hazardous waste and 21,354 cubic yards of other waste were excavated and shipped to a disposal facility. A total of 6,600 cubic yards were shipped and used as clean fill at MDA J.

Chemical waste quantities shown in Table 4.2-2 are higher than projections from 1999–2001 for two reasons: ERS Program cleanup activities during 1999, 2000, and 2001 and the Legacy Materials Cleanup Project during 1998. The variability in ERS Program waste projections is discussed in the previous paragraph. The Legacy Materials Cleanup Project, completed in September 1998, 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 ERS Program cleanups of PRSs within the Non-Key Facilities. When comparing the subtotal of Key and Non-Key Facilities, only the Legacy Program in 1998 pushed the quantities over SWEIS ROD projections. Regardless, these wastes (both ERS and Legacy Program) were and are shipped off-site, 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 during 2001 were mostly due to new construction and some expanded operations.

Table 4.2-2. Chemical Waste Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	1998	1999	2000	2001	2002	2003	2004	2005
Key Facilities	10^3 kg/yr	600	120	49	1,121	513	267	64	189	23
Non-Key Facilities	10^3 kg/yr	650	1,506 [a]	765	368	1,255 [b]	334	594	929 [b]	623
ERS Program	10^3 kg/yr	2,000	144	14,630 [c]	26,185 [d]	25,816 [e]	1,133	31	94	1,322
LANL	10^3 kg/yr	3,250	1,771	15,441	27,674	27,583	1,734	689	1,210	1,968

a At the Non-Key Facilities in 1998, chemical waste quantities exceeded projections because of a LANL-wide campaign to identify and dispose of chemicals no longer used or needed.
b At the Non-Key Facilities in 2001 and 2004, the increased activity from new construction generated a higher quantity of chemical waste in the form of industrial solid waste.
c Cleanup efforts of the ERS Program accounted for the large waste volumes, almost 95 percent of the total. Most of the 14.5 million kilograms of chemical waste generated by the ERS Program resulted from remediation of PRSs at TA-16, particularly MDA P. MDA P was exhumed as part of a clean-closure under the RCRA.
d Cleanup efforts of the ERS Program accounted for the large waste volumes. The continuing cleanup of MDA P, remediation of PRS 3-056(c) at the upper end of Sandia Canyon in TA-03, and the accelerated cleanup of MDA R due to the Cerro Grande Fire, were responsible for most of the chemical waste generation.
e The continuing cleanup efforts at MDA P and PRS 3-056(c) accounted for most of the ERS Program generated waste in 2001.

Low Level Waste

LANL generation of LLW is generally below that projected in the SWEIS ROD (Table 4.2-3). Although data from 2005 show that SWEIS projections were exceeded at the Non-Key Facilities, total waste volumes remain within SWEIS projections.

Table 4.2-3. LLW Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	1998	1999	2000	2001	2002	2003	2004	2005
Key Facilities	m^3/yr	7,450	1,045	1,017	1,172	2,776	1,202	1,843	875	1,349
Non-Key Facilities	m^3/yr	520	36	286	578 [a]	601 [a]	624 [a]	1,964 [a]	13,962 [a]	1,046
ERS Program	m^3/yr	4,260	726	407	2,467	562	5,484	1,819	0.76	3,016
LANL	m^3/yr	12,230	1,807	1,710	4,217	3,939	7,310	5,625	14,839	5,410

a LLW generation at the Non-Key Facilities exceeds the SWEIS ROD due to heightened activities and new construction.

Mixed Low Level Waste

Table 4.2-4 shows a significant increase in MLLW in 2000. Total LANL MLLW volume for 2000 was 598 cubic meters; 575 of that came from the MDA P cleanup. Waste generation returned to more typical levels in successive years. Even with the noticeable increase in 2000, the generation of MLLW remains within SWEIS projections.

Table 4.2-4. MLLW Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	1998	1999	2000	2001	2002	2003	2004	2005
Key Facilities	m^3/yr	54	8	17	11	20	11	16.55	22.90	17.9
Non-Key Facilities	m^3/yr	30	55 [a]	3	10	9	9	19.55	32.93	2.3
ERS Program	m^3/yr	548	9	1	577 [b]	29	0	0	0.02	50.6
LANL	m^3/yr	632	72	21	598	58	20	36.10	32.95	70.8

a MLLW for Non-Key Facilities was contaminated soil and asphalt generated by construction activities.
b Almost all of the MLLW generated in 2000 resulted from the remediation of MDA P.

TRU and Mixed TRU

Despite the expected slow, but increasing, levels of activity on pit production and related programs, generation of TRU (Table 4.2-5) and Mixed TRU waste (Table 4.2-6) remained within the projections of the SWEIS ROD. Increasing levels of effort in the pit production program and related programs are expected to result in increasing quantities of these waste types in the near future but are not expected to exceed SWEIS projections. LANL's OSR Project has generated TRU waste that is considered to be a waste from Non-Key Facilities. The SWEIS did not anticipate TRU waste generation from Non-Key Facilities. A separate NEPA review was conducted for the OSR Program and the effects of implementing the program were determined to be bounded by the SWEIS impact analysis (DOE 2000).

Table 4.2-5. Transuranic Waste Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	1998	1999	2000	2001	2002	2003	2004	2005
Key Facilities	m^3/yr	322	108	143	122	83	82	312.91	18.7	57.4
Non-Key Facilities	m^3/yr	0	0	0	3	25	37 [a]	90.46 [a]	21.4 [a]	17.5 [a]
ERS Program	m^3/yr	11	0	0	0	0	0	0	0	0
LANL	m^3/yr	333	108	143	125	108	119	403.37	40.1	74.9

a TRU waste generated at the Non-Key Facilities during CYs 2002, 2003, 2004, and 2005 was the result of the OSR Project. Because this waste comes through Shipping and Receiving, it is attributable to that location as the point of generation.

Table 4.2-6. Mixed Transuranic Waste Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	1998	1999	2000	2001	2002	2003	2004	2005
Key Facilities	m^3/yr	115	34	72	89	35	87	151.04 [a]	23.9 [a]	99.9
Non-Key Facilities	m^3/yr	0	0	0	0	0	0	5.91 [b]	0	0.2
ERS Program	m^3/yr	0	0	0	0	0	0	0	0	0
LANL	m^3/yr	115	34	72	89	35	87	156.95	23.9	100.1

a SWEIS ROD projection for mixed TRU waste generated by the Key Facilities was exceeded at the Solid Chemical and Radioactive Waste Facility due to DVRS repackaging of legacy TRU waste for shipment to WIPP.
b Generation of 5.91 cubic meters of mixed TRU waste at the Non-Key Facilities was the result of the OSR Project. Because this waste comes through Shipping and Receiving, it is attributed to that location as the point of generation.

4.3 Utility Consumption

Consumption of gas, water, and electricity is not additive in the same context as waste generation. Rather, consumption of these commodities is restricted by contract and should be compared to the SWEIS ROD projections for annual use. Section 3.4 presents these three sets of data (gas [see Table 3.4.1-1], electricity [see Tables 3.4.2-1 and 3.4.2-2], and water [see Table 3.4.3-1]) and demonstrates that none of these measured consumptions of 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.

Tables 4.3-1 and 4.3-2 show peak demand and consumption for FY 1991–2005.

Table 4.3-1. Electric Peak Coincident Demand/Fiscal Years 1991–2005

Category	LANL Base	LANSCE	LANL Total	County Total	Pool Total
SWEIS ROD	50,000[a]	63,000	113,000	Not projected	Not projected
FY 1991	43,452	32,325	75,777	11,471	84,248
FY 1992	39,637	33,707	73,344	12,426	85,770
FY1993	40,845	26,689	67,534	12,836	80,370
FY 1994	38,354	27,617	65,971	11,381	77,352
FY 1995	41,736	24,066	65,802	14,122	79,924
FY 1996	41,799	20,799	62,598	13,160	75,758
FY 1997	37,807	28,846	62,653	13,661	76,314
FY 1998	39,064	24,773	63,837	13,268	77,105
FY 1999	43,976	43,976	68,486	14,399	82,885
FY 2000	45,104	45,104	65,447	15,176	80,623
FY 2001	50,146	50,146	70,878	14,583	85,461
FY 2002	45,809	20,938	66,747	16,653	83,400
FY 2003	50,008	20,859	70,687	16,910	87,597
FY 2004	47,608	21,811	69,419	16,231	85,650
FY 2005	47,586	21,874	69,460	18,319	87,779

a All figures in kilowatts.

Table 4.3-2. Electric Consumption/Fiscal Years 1991–2005

Category	LANL Base	LANSCE	LANL Total	County	Pool Total
SWEIS ROD	345,000[a]	437,000	782,000	Not projected	Not projected
FY 1991	282,994	89,219	372,213	86,873	459,086
FY 1992	279,208	102,579	381,787	87,709	469,496
FY 1993	277,005	89,889	366,894	89,826	456,720
FY 1994	272,518	79,950	352,468	92,065	444,533
FY 1995	276,292	95,853	372,145	93,546	465,691
FY 1996	277,829	90,956	368,785	93,985	462,770
FY 1997	258,841	138,844	397,715	96,271	493,986
FY 1998	262,570	64,735	327,305	97,600	424,905
FY 1999	255,562	113,759	369,321	106,547	475,868
FY 2000	263,970	117,183	381,153	112,216	493,369
FY 2001	294,169	80,974	375,143	116,043	491,186
FY 2002	299,422	94,966	394,398	121,013	515,401
FY 2003	294,993	87,856	382,849	109,822	492,671
FY 2004	327,117	86,275	413,392	127,429	540,821
FY 2005	328,371	93,042	421,413	129,457	550,870

a All figures in megawatt-hours

Table 4.3-3 shows water consumption in thousands of gallons for CY 1992 through CY 2005.

Table 4.3-3. Water Consumption (thousands of gallons) for Calendar Years 1992–2005

Category	LANL	Los Alamos County	Total
SWEIS ROD	759,000	Not Projected	Not Applicable
CY 1992	547,535	982,132	1,529,667
CY 1993	467,880	999,863	1,467,743
CY 1994	524,791	913,430	1,438,221
CY 1995	337,188	1,022,126	1,359,314
CY 1996	340,481	1,035,244	1,375,725
CY 1997	488,252	800,019	1,288,271
CY 1998	461,350	Not Available [a]	Not Available [a]
CY 1999	453,094	Not Available [a]	Not Applicable
CY 2000	441,000	Not Available [a]	Not Available [a]
CY 2001	393,123	Not Available [a]	Not Applicable
CY 2002	324,514	Not Available [a]	Not Available [a]
CY 2003	377,768	Not Available [a]	Not Available [a]
CY 2004	346,624	Not Available [a]	Not Available [a]
CY 2005	359,252	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.

Tables 4.3-4 and 4.3-5 illustrate gas consumption and steam production, respectively, from FY 1991 through FY 2005.

Table 4.3-4. Gas Consumption (decatherms[a]) at LANL/Fiscal Years 1991–2005

Fiscal Year	SWEIS ROD	Total LANL Consumption	Total Used For Electric Production	Total Used For Heat Production
1991	1,840,000	1,480,789	64,891	1,415,898
1992	1,840,000	1,833,318	447,427	1,385,891
1993	1,840,000	1,843,936	411,822	1,432,113
1994	1,840,000	1,682,180	242,792	1,439,388
1995	1,840,000	1,520,358	111,908	1,408,450
1996	1,840,000	1,358,505	11,405	1,347,100
1997	1,840,000	1,444,385	96,091	1,348,294
1998	1,840,000	1,362,070	128,480	1,233,590
1999	1,840,000	1,428,568	241,490	1,187,078
2000	1,840,000	1,427,914	352,126	1,075,788
2001	1,840,000	1,492,635	273,312	1,219,323
2002	1,840,000	1,325,639	212,976	1,112,663
2003	1,840,000	1,220,137	41,632	1,178,505
2004	1,840,000	1,149,936	25,680	1,124,256
2005	1,840,000	1,187,855	20,086	1,167,768

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

Table 4.3-5. Steam Production at LANL/Fiscal Years 1996–2005

Fiscal Year	TA-3 Steam Production (klb [a])	TA-21 Steam Production (klb)	Total Steam Production (klb)
1996	451,363	54,033	701,792
1997	413,684	50,382	464,066
1998	377,883	37,359	415,242
1999	576,548 [b]	29,468	606,016
2000	634,758 [b]	27,840	662,598
2001	531,763 [b]	29,195	560,958
2002	478,007 [b]	26,206	504,213
2003	351,905 [b]	26,147	378,052
2004	347,110 [b]	23,910	371,020
2005	333,042 [c]	24,299	357,341

a klb: Thousands of pounds

b TA-03 steam production has two components: that used for electric production (16,571 klb for FY 2005) and that used for heat (316,471 klb in FY 2005).

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.

References

Department of Energy, 1999. "Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory," DOE/EIS-0238, Albuquerque, NM.

Department of Energy, 2000. "Supplement Analysis to the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory, Modification of Management Methods for Certain Unwanted Radioactive Sealed Sources at the Los Alamos National Laboratory" DOE/EIS-0238-SA1, Los Alamos, NM.

Los Alamos National Laboratory, 2000. "Comprehensive Site Plan 2000, Technical Site Information Document," Los Alamos National Laboratory report LA-UR-99-6704, Los Alamos, NM.

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5.0 Ten-Year Comprehensive Site Plan

The TYCSP is not included in this edition of the Yearbook because it contains Official Use Only information that cannot be released to the public. Since the Yearbooks have always been approved for public release with an unlimited distribution, the TYCSP overview of DOE/NNSA's long-range planning process at LANL will not be included in the 2005 Yearbook.

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6.0 Summary and Conclusion

6.1 Summary

The 2005 SWEIS Yearbook reviews CY 2005 operations for the 15 Key Facilities (as defined by the SWEIS) and Non-Key Facilities 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 the Non-Key Facilities and compares these 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 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.

During 2005, construction of new facilities continued at one of the 15 Key Facilities. New structures completed and occupied during 2005 included the High-Power Detonator Production Facility, Building 22-115, and magazine TA-22-118 at TA-22 and the new Hydrotest Design Facility, TA-22-120, also at TA-22. Additionally, one major construction project, construction of the CINT continued in 2005 at the Non-Key Facilities.

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. Following the events of September 11, 2001, the Laboratory supports for homeland security.

During CY 2005, 79 capabilities were active. The 17 inactive capabilities were the Cryogenic Separation at the Tritium Facilities; both the Destructive and Nondestructive Assay and the Fabrication and Metallography capabilities at CMR; Characterization of Materials at the TFF; the Accelerator Transmutation of Wastes at LANSCE; Size Reduction and Other Waste Processing at the Solid Radioactive and Chemical Waste Facilities; Radioactive Liquid Waste Pretreatment at TA-21 or in Room 60 at TA-50; and all nine TA-18 capabilities (Dosimeter Assessment and Calibration, Detector Development, Materials Testing, Subcritical Measurements, Fast-Neutron Spectrum, Dynamic Measurements, Skyshine Measurements, Vaporization, and Irradiation).

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 4,206 hours in 2005, at an average current of 125 microamps, compared to 6,400 hours at 200 microamps projected by the ROD. Similarly, no criticality experiments were conducted at Pajarito Site, compared to the 1,050 projected experiments.

Only three of LANL's facilities operated during 2005 at levels approximating those projected by the ROD—the MSL, the Bioscience Facilities, and the Non-Key Facilities. The two Key Facilities (MSL and Bioscience) 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 2005 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 administrator of LANL.

Radioactive airborne emissions from point sources (i.e., stacks) during 2005 totaled approximately 19,100 curies, just under 90 percent of the 10-year average of 21,700 curies projected by the ROD. While within the overall envelope projected by the SWEIS, LANL emissions in 2005 were dominated by the dramatic increase in LANSCE emissions relative to recent years.

A failure in one component of the emissions control system contributed to the elevated levels. A fix implemented in late November 2005 returned emissions rates to their projected levels, and these reduced emissions rates are expected to continue through 2006. Maximum off-site dose for 2005 was the highest in recent years, due to the emissions controls system failure at LANSCE. The final dose is 6.45 millirem, still below the EPA air emissions limit of 10 millirem per year established for DOE facilities.

Calculated NPDES discharges totaled 198.26 million gallons for CY 2005 compared to a projected volume of 278 million gallons per year. This is approximately 35.74 million gallons more than the CY 2004 total of 162.52 million gallons, due largely to resumption of normal Laboratory operations after the LANL stand down that occurred in July 2004. The 2005 total volume of discharge is well below the maximum flow of 278.0 million gallons that was projected in the SWEIS ROD. In addition, the apparent decrease in flows compared to the SWEIS ROD 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. Waste quantities from 2005 LANL operations were below SWEIS ROD projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities. Quantities of wastes generated in 2005 ranged from approximately 0.7 percent of the chemical waste projection to about 87 percent of the mixed TRU waste projection.

The workforce has been above ROD projections since 1997. The 13,504 employees at the end of CY 2005 represent 2,153 more employees than projected and reflect an increase of 243 employees from CY 2004. Since 1998, the highest peak electricity consumption was 421 gigawatt-hours during 2005 and the maximum peak demand was 85 megawatts during 2001 compared to projections of 782 gigawatt-hours with a peak demand of 113 megawatts. The peak water usage was 461 million gallons during 1998 (compared to 759 million gallons projected), and the peak natural gas consumption was 1.49 million decatherms during 2001 (compared to 1.84 million decatherms projected). Between 1998 and 2005, the highest collective TEDE for the LANL workforce was 155.6 person-rem during 2005, 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 2005, this expansion had not become necessary.

Cultural resources remained protected, and no excavation of sites at TA-54 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.) However, a total of 10 cultural sites were excavated in Rendija Canyon from June to December 2005.

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 1995–2005 period, and water levels in the regional aquifer have continued a gradual decline that started in about 1977. Twenty-one additional characterization wells were complete by the end of 2005.

In addition, ecological resources are being sustained as a result of protection afforded by DOE administration 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, produced a positive impact on the economy of northern New Mexico. Overall, the 2005 operations data indicate that LANL was operating within the SWEIS envelope and still ramping up operations towards the preferred Expanded Operations Alternative in the ROD.

One purpose of the 2005 Yearbook is to compare LANL operations and resultant 2005 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 2005 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 operating 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 2005 Yearbook will follow that developed for the previous Yearbooks—comparison to the SWEIS ROD.

The 2005 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.

Appendix A: Chemical Usage Estimated Emissions Data

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KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2005 ESTIMATED AIR EMISSIONS	2005 Usage
CMR Building	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.79	2.25
CMR Building	Bromine	7726-95-6	kg/yr	1.09	3.12
CMR Building	Carbon Tetrachloride	56-23-5	kg/yr	0.56	1.59
CMR Building	Chromium, Metal &Cr III Compounds, as Cr	7440-47-3	kg/yr	0.30	0.85
CMR Building	Copper	7440-50-8	kg/yr	0.01	0.60
CMR Building	Dipropylene Glycol Methyl Ether	34590-94-8	kg/yr	2.12	6.06
CMR Building	Ethanol	64-17-5	kg/yr	3.78	10.80
CMR Building	Hydrogen Bromide	10035-10-6	kg/yr	4.20	12.00
CMR Building	Hydrogen Chloride	7647-01-0	kg/yr	13.50	38.58
CMR Building	Hydrogen Peroxide	7722-84-1	kg/yr	39.44	112.68
CMR Building	Isobutane	75-28-5	kg/yr	11.31	32.31
CMR Building	Isopropyl Alcohol	67-63-0	kg/yr	2.20	6.28
CMR Building	Molybdenum	7439-98-7	kg/yr	1.69	4.83
CMR Building	Nitric Acid	7697-37-2	kg/yr	58.33	166.66
CMR Building	Oxalic Acid	144-62-7	kg/yr	0.18	0.50
CMR Building	Phosphoric Acid	7664-38-2	kg/yr	6.42	18.34
CMR Building	Propane	74-98-6	kg/yr	0.00	4.46
CMR Building	Rhodium Metal	7440-16-6	kg/yr	2.17	6.21
CMR Building	Silver (metal dust & soluble comp., as Ag)	7440-22-4	kg/yr	0.43	1.24
CMR Building	Sulfuric Acid	7664-93-9	kg/yr	9.66	27.60
CMR Building	tert-Butyl Alcohol	75-65-0	kg/yr	0.28	0.79
CMR Building	Toluene	108-88-3	kg/yr	0.15	0.43
Health Research Laboratory	Acetic Acid	64-19-7	kg/yr	4.77	13.64
Health Research Laboratory	Acetone	67-64-1	kg/yr	2.63	7.50
Health Research Laboratory	Acetonitrile	75-05-8	kg/yr	6.61	18.88
Health Research Laboratory	Acrylamide	79-06-1	kg/yr	2.16	6.17
Health Research Laboratory	Chloroform	67-66-3	kg/yr	1.31	3.75
Health Research Laboratory	Ethanol	64-17-5	kg/yr	179.59	513.10
Health Research Laboratory	Formamide	75-12-7	kg/yr	0.20	0.57
Health Research Laboratory	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	0.92	2.64
Health Research Laboratory	Hydrogen Chloride	7647-01-0	kg/yr	1.02	2.91
Health Research Laboratory	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.09	0.25
Health Research Laboratory	Isopropyl Alcohol	67-63-0	kg/yr	12.84	36.68

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2005 ESTIMATED AIR EMISSIONS	2005 Usage
Health Research Laboratory	Methyl Alcohol	67-56-1	kg/yr	25.99	74.27
Health Research Laboratory	Methylene Chloride	75-09-2	kg/yr	0.46	1.33
Health Research Laboratory	n,n-Dimethylformamide	68-12-2	kg/yr	0.17	0.47
Health Research Laboratory	Nitric Acid	7697-37-2	kg/yr	0.53	1.53
Health Research Laboratory	Phenol	108-95-2	kg/yr	0.18	0.52
Health Research Laboratory	Potassium Hydroxide	1310-58-3	kg/yr	0.35	1.00
Health Research Laboratory	Sulfuric Acid	7664-93-9	kg/yr	0.97	2.76
Health Research Laboratory	Trichloroacetic Acid	76-03-9	kg/yr	9.44	26.98
High Explosive Processing	Acetone	67-64-1	kg/yr	23.32	66.63
High Explosive Processing	Acetonitrile	75-05-8	kg/yr	18.42	52.64
High Explosive Processing	Acetylene	74-86-2	kg/yr	0.00	0.33
High Explosive Processing	Acrolein	107-02-8	kg/yr	0.15	0.42
High Explosive Processing	Bromine	7726-95-6	kg/yr	0.27	0.78
High Explosive Processing	Copper	7440-50-8	kg/yr	0.01	0.91
High Explosive Processing	Ethanol	64-17-5	kg/yr	23.41	66.90
High Explosive Processing	Ethyl Acetate	141-78-6	kg/yr	0.63	1.80
High Explosive Processing	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	5.55	15.85
High Explosive Processing	Hydrogen Chloride	7647-01-0	kg/yr	7.86	22.47
High Explosive Processing	Kerosene	8008-20-6	kg/yr	4.77	13.63
High Explosive Processing	Methyl Alcohol	67-56-1	kg/yr	8.86	25.33
High Explosive Processing	Methyl Ethyl Ketone (MEK)	78-93-3	kg/yr	57.51	164.30
High Explosive Processing	Methylene Chloride	75-09-2	kg/yr	7.43	21.23
High Explosive Processing	n,n-Dimethyl Acetamide or Dimethyl Acetamide	127-19-5	kg/yr	5.28	15.09
High Explosive Processing	Nitric Acid	7697-37-2	kg/yr	2.14	6.10
High Explosive Processing	Propyl Alcohol	71-23-8	kg/yr	0.14	0.40
High Explosive Processing	Sulfur Hexafluoride	2551-62-4	kg/yr	17.44	49.82
High Explosive Processing	Tetrahydrofuran	109-99-9	kg/yr	32.37	92.48
High Explosive Processing	Toluene	108-88-3	kg/yr	0.30	0.87
High Explosive Testing	Acetone	67-64-1	kg/yr	12.44	35.55
High Explosive Testing	Ethanol	64-17-5	kg/yr	4.88	13.95
High Explosive Testing	Methyl Alcohol	67-56-1	kg/yr	0.14	0.40
High Explosive Testing	Methylene Chloride	75-09-2	kg/yr	0.93	2.65

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2005 ESTIMATED AIR EMISSIONS	2005 Usage
High Explosive Testing	Nitromethane	75-52-5	kg/yr	2.39	6.82
High Explosive Testing	Pentane (all isomers)	109-66-0	kg/yr	4.38	12.52
High Explosive Testing	Propane	74-98-6	kg/yr	0.00	0.72
High Explosive Testing	Selenium Compounds, as Se	7782-49-2	kg/yr	0.09	0.25
High Explosive Testing	Sulfuric Acid	7664-93-9	kg/yr	0.32	0.92
LANSCE	1,3,5-Trimethylbenzene	108-67-8	kg/yr	0.32	0.90
LANSCE	1,4-Dioxane	123-91-1	kg/yr	0.36	1.03
LANSCE	2-Nitropropane	79-46-9	kg/yr	0.17	0.49
LANSCE	Acetone	67-64-1	kg/yr	20.92	59.77
LANSCE	Acetonitrile	75-05-8	kg/yr	0.30	0.87
LANSCE	Chloroform	67-66-3	kg/yr	3.11	8.90
LANSCE	Cobalt, elemental & inorg.comp., as Co	7440-48-4	kg/yr	0.01	0.89
LANSCE	Cyclohexane	110-82-7	kg/yr	0.27	0.78
LANSCE	Ethanol	64-17-5	kg/yr	35.65	101.85
LANSCE	Ethyl Ether	60-29-7	kg/yr	3.19	9.10
LANSCE	Ethylene Diamine	107-15-3	kg/yr	2.52	7.20
LANSCE	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	3.24	9.24
LANSCE	Hydrogen Chloride	7647-01-0	kg/yr	5.23	14.95
LANSCE	Hydrogen Fluoride, as F	7664-39-3	kg/yr	1.38	3.95
LANSCE	Hydroquinone	123-31-9	kg/yr	0.18	0.50
LANSCE	Isobutane	75-28-5	kg/yr	62.19	177.70
LANSCE	Isopropyl Alcohol	67-63-0	kg/yr	11.79	33.69
LANSCE	Isopropylamine	75-31-0	kg/yr	8.15	23.29
LANSCE	Lead, el.&inorg.compounds, as Pb	7439-92-1	kg/yr	0.01	0.91
LANSCE	Manganese Dust & Compounds or Fume	7439-96-5	kg/yr	2.38	6.81
LANSCE	Methyl Alcohol	67-56-1	kg/yr	9.14	26.12
LANSCE	Methyl Ethyl Ketone (MEK)	78-93-3	kg/yr	0.85	2.42
LANSCE	Methylene Chloride	75-09-2	kg/yr	0.70	1.99
LANSCE	Nitric Acid	7697-37-2	kg/yr	79.04	225.83
LANSCE	Propane	74-98-6	kg/yr	0.00	380.68
LANSCE	Sulfuric Acid	7664-93-9	kg/yr	11.27	32.20
LANSCE	tert-Butyl Alcohol	75-65-0	kg/yr	0.28	0.79
LANSCE	Tetrahydrofuran	109-99-9	kg/yr	5.83	16.66

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2005 ESTIMATED AIR EMISSIONS	2005 Usage
LANSCE	Tin numerous forms	7440-31-5	kg/yr	0.01	0.50
LANSCE	Vanadium, Respirable Dust & Fume	1314-62-1	kg/yr	0.18	0.50
LANSCE	Zinc Oxide Fume	1314-13-2	kg/yr	0.01	0.60
Machine Shops	Ethanol	64-17-5	kg/yr	10.59	30.25
Machine Shops	Kerosene	8008-20-6	kg/yr	1.06	3.03
Machine Shops	Propane	74-98-6	kg/yr	0.00	0.25
Material Science Laboratory	Acetone	67-64-1	kg/yr	4.70	13.43
Material Science Laboratory	Cyclohexane	110-82-7	kg/yr	0.27	0.78
Material Science Laboratory	Diethylene Triamine	111-40-0	kg/yr	0.34	0.96
Material Science Laboratory	Ethanol	64-17-5	kg/yr	12.03	34.36
Material Science Laboratory	Ethyl Acetate	141-78-6	kg/yr	0.32	0.90
Material Science Laboratory	Ethyl Ether	60-29-7	kg/yr	0.98	2.80
Material Science Laboratory	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	0.23	0.66
Material Science Laboratory	Hydrogen Chloride	7647-01-0	kg/yr	2.08	5.94
Material Science Laboratory	Hydrogen Peroxide	7722-84-1	kg/yr	0.25	0.70
Material Science Laboratory	Isopropyl Alcohol	67-63-0	kg/yr	4.40	12.57
Material Science Laboratory	Magnesium Oxide Fume	1309-48-4	kg/yr	0.18	0.50
Material Science Laboratory	Methyl Alcohol	67-56-1	kg/yr	1.94	5.54
Material Science Laboratory	n,n-Dimethyl Acetamide or Dimethyl Acetamide	127-19-5	kg/yr	0.33	0.94
Material Science Laboratory	n,n-Dimethylformamide	68-12-2	kg/yr	0.33	0.95
Material Science Laboratory	n-Butyl Acetate	123-86-4	kg/yr	0.31	0.88
Material Science Laboratory	Nitric Acid	7697-37-2	kg/yr	1.34	3.82
Material Science Laboratory	Phosphoric Acid	7664-38-2	kg/yr	1.67	4.77
Material Science Laboratory	p-Phenylenediamine	106-50-3	kg/yr	0.18	0.50
Material Science Laboratory	Tetrahydrofuran	109-99-9	kg/yr	0.31	0.89
Material Science Laboratory	Zinc Oxide Fume	1314-13-2	kg/yr	0.01	0.50
Pajarito Site	Ethanol	64-17-5	kg/yr	3.14	8.96
Pajarito Site	Propane	74-98-6	kg/yr	0.00	98.02
Pajarito Site	Zinc Chloride Fume	7646-85-7	kg/yr	0.12	0.34
Plutonium Facility Complex	Acetone	67-64-1	kg/yr	4.56	13.03
Plutonium Facility Complex	Acetylene	74-86-2	kg/yr	0.00	1.97
Plutonium Facility Complex	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.28	0.80

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2005 ESTIMATED AIR EMISSIONS	2005 Usage
Plutonium Facility Complex	Ethanol	64-17-5	kg/yr	82.07	234.50
Plutonium Facility Complex	Hydrogen Chloride	7647-01-0	kg/yr	9.14	26.11
Plutonium Facility Complex	Hydrogen Peroxide	7722-84-1	kg/yr	0.18	0.50
Plutonium Facility Complex	Magnesium Oxide Fume	1309-48-4	kg/yr	0.35	1.00
Plutonium Facility Complex	Methyl Alcohol	67-56-1	kg/yr	0.28	0.79
Plutonium Facility Complex	Nitric Acid	7697-37-2	kg/yr	9.35	26.71
Plutonium Facility Complex	Oxalic Acid	144-62-7	kg/yr	0.53	1.50
Plutonium Facility Complex	Potassium Hydroxide	1310-58-3	kg/yr	0.18	0.50
Plutonium Facility Complex	Propane	74-98-6	kg/yr	0.00	0.24
Plutonium Facility Complex	Tributyl Phosphate	126-73-8	kg/yr	1.36	3.89
Radiochemistry Site	1,4-Dioxane	123-91-1	kg/yr	0.11	0.31
Radiochemistry Site	Acetic Acid	64-19-7	kg/yr	1.84	5.25
Radiochemistry Site	Acetic Anhydride	108-24-7	kg/yr	0.38	1.08
Radiochemistry Site	Acetone	67-64-1	kg/yr	88.61	253.17
Radiochemistry Site	Acetonitrile	75-05-8	kg/yr	7.71	22.04
Radiochemistry Site	Ammonia	7664-41-7	kg/yr	0.26	0.73
Radiochemistry Site	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.18	0.50
Radiochemistry Site	Benzene	71-43-2	kg/yr	0.31	0.88
Radiochemistry Site	Bromine	7726-95-6	kg/yr	0.29	0.83
Radiochemistry Site	Carbon Tetrachloride	56-23-5	kg/yr	2.51	7.17
Radiochemistry Site	Dicyclopentadiene	77-73-6	kg/yr	0.34	0.98
Radiochemistry Site	Diethanolamine	111-42-2	kg/yr	0.19	0.55
Radiochemistry Site	Diethylamine	109-89-7	kg/yr	0.12	0.35
Radiochemistry Site	Diisopropylamine	108-18-9	kg/yr	0.31	0.88
Radiochemistry Site	Ethanol	64-17-5	kg/yr	7.42	21.20
Radiochemistry Site	Ethyl Acetate	141-78-6	kg/yr	0.16	0.45
Radiochemistry Site	Ethyl Ether	60-29-7	kg/yr	11.39	32.55
Radiochemistry Site	Ethylene Diamine	107-15-3	kg/yr	0.19	0.54
Radiochemistry Site	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	1.18	3.37
Radiochemistry Site	Hydrogen Bromide	10035-10-6	kg/yr	3.28	9.38
Radiochemistry Site	Hydrogen Chloride	7647-01-0	kg/yr	199.88	571.07
Radiochemistry Site	Hydrogen Fluoride, as F	7664-39-3	kg/yr	2.76	7.90
Radiochemistry Site	Hydrogen Peroxide	7722-84-1	kg/yr	8.12	23.21

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2005 ESTIMATED AIR EMISSIONS	2005 Usage
Radiochemistry Site	Hydroquinone	123-31-9	kg/yr	0.18	0.50
Radiochemistry Site	Isopropyl Alcohol	67-63-0	kg/yr	10.11	28.90
Radiochemistry Site	Magnesium Oxide Fume	1309-48-4	kg/yr	0.09	0.25
Radiochemistry Site	Methyl Alcohol	67-56-1	kg/yr	6.76	19.30
Radiochemistry Site	Methyl Iodide	74-88-4	kg/yr	0.11	0.33
Radiochemistry Site	Methyl Methacrylate	80-62-6	kg/yr	1.33	3.80
Radiochemistry Site	Methyl Silicate	681-84-5	kg/yr	0.18	0.50
Radiochemistry Site	Methylene Chloride	75-09-2	kg/yr	19.75	56.44
Radiochemistry Site	Molybdenum	7439-98-7	kg/yr	0.36	1.02
Radiochemistry Site	n,n-Dimethylformamide	68-12-2	kg/yr	1.44	4.13
Radiochemistry Site	Naphtalene	91-20-3	kg/yr	0.18	0.50
Radiochemistry Site	n-Heptane	142-82-5	kg/yr	0.48	1.37
Radiochemistry Site	Nitric Acid	7697-37-2	kg/yr	582.23	1663.52
Radiochemistry Site	Oxalic Acid	144-62-7	kg/yr	0.53	1.50
Radiochemistry Site	Pentane (all isomers)	109-66-0	kg/yr	3.38	9.64
Radiochemistry Site	Phosphoric Acid	7664-38-2	kg/yr	1.28	3.67
Radiochemistry Site	Potassium Hydroxide	1310-58-3	kg/yr	1.44	4.11
Radiochemistry Site	Propane	74-98-6	kg/yr	0.00	254.03
Radiochemistry Site	Propionic Acid	79-09-4	kg/yr	0.17	0.50
Radiochemistry Site	Pyridine	110-86-1	kg/yr	0.36	1.02
Radiochemistry Site	Sulfuric Acid	7664-93-9	kg/yr	13.20	37.72
Radiochemistry Site	Tetrahydrofuran	109-99-9	kg/yr	1.90	5.43
Radiochemistry Site	Toluene	108-88-3	kg/yr	4.56	13.03
Radiochemistry Site	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.22	22.23
Radiochemistry Site	VM & P Naphtha	8032-32-4	kg/yr	7.35	21.00
Sigma Complex	Acetone	67-64-1	kg/yr	1.80	5.13
Sigma Complex	Aluminum numerous forms	7429-90-5	kg/yr	0.03	2.84
Sigma Complex	Arsenic, el.&inorg.,exc. Arsine, as As	7440-38-2	kg/yr	0.44	1.26
Sigma Complex	Beryllium	7440-41-7	kg/yr	1.27	3.63
Sigma Complex	Chlorine Trifluoride	7790-91-2	kg/yr	112.00	320.00
Sigma Complex	Diethylene Triamine	111-40-0	kg/yr	0.67	1.92
Sigma Complex	Ethanol	64-17-5	kg/yr	11.96	34.16
Sigma Complex	Hydrogen Chloride	7647-01-0	kg/yr	42.97	122.76

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2005 ESTIMATED AIR EMISSIONS	2005 Usage
Sigma Complex	Hydrogen Fluoride, as F	7664-39-3	kg/yr	54.77	156.49
Sigma Complex	Isopropyl Alcohol	67-63-0	kg/yr	4.67	13.35
Sigma Complex	Mercury numerous forms	7439-97-6	kg/yr	0.03	3.06
Sigma Complex	Methyl Alcohol	67-56-1	kg/yr	5.54	15.83
Sigma Complex	Molybdenum	7439-98-7	kg/yr	0.45	1.28
Sigma Complex	Naphtalene	91-20-3	kg/yr	0.09	0.25
Sigma Complex	Phosphoric Acid	7664-38-2	kg/yr	2.57	7.34
Sigma Complex	Phosphorus	7723-14-0	kg/yr	0.08	0.23
Sigma Complex	Sulfuric Acid	7664-93-9	kg/yr	1.29	3.68
Sigma Complex	Uranium (natural) Sol.&Unsol.Comp. as U	7440-61-1	kg/yr	1.50	4.28
Target Fabrication Facility	2-Methoxyethanol (EGME)	109-86-4	kg/yr	0.34	0.96
Target Fabrication Facility	Acetic Acid	64-19-7	kg/yr	0.92	2.62
Target Fabrication Facility	Acetone	67-64-1	kg/yr	17.42	49.76
Target Fabrication Facility	Acetonitrile	75-05-8	kg/yr	4.12	11.79
Target Fabrication Facility	Benzene	71-43-2	kg/yr	6.44	18.41
Target Fabrication Facility	Chloroform	67-66-3	kg/yr	0.52	1.48
Target Fabrication Facility	Ethanol	64-17-5	kg/yr	3.92	11.20
Target Fabrication Facility	Ethyl Ether	60-29-7	kg/yr	2.45	7.00
Target Fabrication Facility	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	7.86	22.45
Target Fabrication Facility	Hydrogen Cyanide	74-90-8	kg/yr	0.21	0.60
Target Fabrication Facility	Hydrogen Peroxide	7722-84-1	kg/yr	0.49	1.41
Target Fabrication Facility	Isopropyl Alcohol	67-63-0	kg/yr	2.47	7.07
Target Fabrication Facility	Mercury numerous forms	7439-97-6	kg/yr	0.05	4.54
Target Fabrication Facility	Methyl Alcohol	67-56-1	kg/yr	27.70	79.14
Target Fabrication Facility	Methyl Ethyl Ketone (MEK)	78-93-3	kg/yr	2.26	6.44
Target Fabrication Facility	Methyl Silicate	681-84-5	kg/yr	0.11	0.30
Target Fabrication Facility	Methylene Chloride	75-09-2	kg/yr	13.47	38.47
Target Fabrication Facility	n,n-Dimethylformamide	68-12-2	kg/yr	21.96	62.74
Target Fabrication Facility	Nitric Acid	7697-37-2	kg/yr	3.74	10.68
Target Fabrication Facility	Pentane (all isomers)	109-66-0	kg/yr	0.88	2.50
Target Fabrication Facility	Potassium Hydroxide	1310-58-3	kg/yr	2.10	6.00
Target Fabrication Facility	Sulfuric Acid	7664-93-9	kg/yr	1.61	4.60
Target Fabrication Facility	tert-Butyl Alcohol	75-65-0	kg/yr	0.55	1.58

KEY FACILITY	CHEMICAL NAME	CAS NUMBER	UNITS	2005 ESTIMATED AIR EMISSIONS	2005 Usage
Target Fabrication Facility	Tetrahydrofuran	109-99-9	kg/yr	7.78	22.23
Target Fabrication Facility	Toluene	108-88-3	kg/yr	7.28	20.81
Target Fabrication Facility	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.01	0.50
Tritium Operations	Ethanol	64-17-5	kg/yr	0.26	0.75
Tritium Operations	Nitric Acid	7697-37-2	kg/yr	0.27	0.76
Tritium Operations	Propane	74-98-6	kg/yr	0.00	97.49
Waste Management Operations	Ethanol	64-17-5	kg/yr	1.80	5.13
Waste Management Operations	Hydrogen Chloride	7647-01-0	kg/yr	409.30	1169.42
Waste Management Operations	Potassium Hydroxide	1310-58-3	kg/yr	1.06	3.02
Waste Management Operations	Propane	74-98-6	kg/yr	0.00	2139.57
Waste Management Operations	Pyridine	110-86-1	kg/yr	0.33	0.93
Waste Management Operations	Sulfuric Acid	7664-93-9	kg/yr	76.48	218.52
Waste Management Operations	Tetrahydrofuran	109-99-9	kg/yr	0.29	0.84

Appendix B: Nuclear Facilities List

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UNITED STATES GOVERNMENT | DEPARTMENT OF ENERGY

memorandum

National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, New Mexico 87544

DATE: OCT 28 2005

REPLY TO ATTN OF: SABT/PMH:05/002

SUBJECT: Revision 7 of the DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities

TO: Mr. James W. Angelo, Division Leader, Performance Surety Division, MS C347

REFERENCES:

1. Ltr. dated September 30, 2005, PS-DO:05-143, subject as above, with attachment.
2. Memorandum, dated August 1, 2005, from Christopher Steele to Steven Girrens, Division Leader, ESA Division, and James Angelo, Division Leader, PS Division, subject "Approval of 2nd LANL Submittal Request for TSFF Downgrade"

DISCUSSION:

The NNSA Los Alamos Site Office Safety Authorization Basis Team (SABT) has reviewed and approved the Los Alamos National Laboratory (LANL) submission of Revision 7 of the List of Los Alamos National Laboratory Nuclear Facilities, PS-SBO-401 (Attachment 1). This list provides a revised compilation of Nuclear Hazard Category 1 and 2 facilities at LANL. Revision 7 of the List of Los Alamos National Laboratory Nuclear Facilities includes all NNSA approved LANL nuclear facility categorization updates as of September 30, 2005, and supersedes Revision 6, dated June, 2005.

The nuclear facilities list was created exclusively to document all Hazard Category 2 and 3 nuclear facilities, and is a stand alone reference document for these categorization purposes. However, the list is not intended to (and does not) document the complete Authorization Basis for LANL nuclear facilities. The complete Authorization Basis for these nuclear facilities is documented in the Authorization Agreement.

NNSA understands that the only change from Revision 6 to Revision 7 is the deletion of the TSFF from this list as a result of being downgraded to a less than Category 3 facility, as approved in Reference 2, and subject to the Conditions of Approval outlined in Reference 2.

IN ACCORDANCE WITH THE CONTRACT REQUIREMENTS, LANL SHALL NOT PERFORM ANY WORK UNDER THIS APPROVAL THAT CHANGES THE COST, SCOPE, OR WORK PRIORITY ASSOCIATED WITH THE STATEMENT OF WORK IN THE LANL CONTRACT. LANL SHALL ENSURE THAT IF THIS IS AN ISSUE, IT IS CALLED TO THE COR'S AND

CO'S IMMEDIATE ATTENTION AND PRIOR TO INITIATING ANY WORK THAT COULD CAUSE THIS TO OCCUR.

If you have any questions regarding this memo, please contact me at 667-3418 or Philip Howe at 665-5332.

Christopher M. Steele
Senior Authorization Basis Manager

cc
E. Wilmot, Manager, LASO
J. McConnell, NA-1, HQ/Forrs
P. Cahalane, NA-1, HQ/Forrs
X. Ascanio, NA-124, HQ/GTN
S. Pierpoint, NA-124.1, HQ/GTN
G. Schlapper, SSA, LASO
C. Steele, SABM, LASO
K. Keilholtz, AMFO, LASO
G. Rodriguez, PL, LASO
C. Keilers, DNFSB, LASO
R. Cramberg, SABT, LASO
J. Houghton, SABT, LASO
P. Howe, SABT, LASO
L. Knoell, SABT, LASO
C. Kullberg, SABT, LASO
D. Lee, SABT, LASO
D. Young, SABT, LASO
J. Angelo, PS-DO, LANL, MS C347
D. Satterwhite, PS-SBO, LANL, MS-K561

Received for James K.
3:19pm 10/18/05
RC
Action!
PHocok 10-28

Los Alamos
NATIONAL LABORATORY
EST. 1943

Performance Surety Division
James W. Angelo, Division Leader
P.O. Box 1663, MS C347
Los Alamos, New Mexico 87545
505-665-5550/Fax 505-665-0318

Date: September 30, 2005
Refer To: PS-DO:05-143

Mr. Christopher M. Steele
Senior Authorization Basis Manager
Los Alamos Site Office
528 35th Street, MS A316
Los Alamos, NM 87544

Dear Mr. Steele:

The attached document, "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," revision 7 has been updated to reflect the current categorization of the Laboratory's Nuclear Facilities. The Laboratory intends to review and update Nuclear Facilities List in a reasonable timeframe after a significant change occurs; such changes include the addition or deletion of a nuclear facility from the list, re-categorization, etc.

Please review and concur with the document as the SABM, forward to the LASO Site Manager, then return the signed original to PS-4 with a recommended DOE distribution. This office will provide the production and distribution, and will post it on the Laboratory's internal web site.

If you have any questions regarding this transmittal, please contact James J. Kuropatwinski at 665-9690.

Sincerely,

James W. Angelo
Division Leader

JWA/JJK:amm

Attachment: LANL Nuclear Facility List PS-SBO-401, Rev. 7

Cy: IM-9, MS A150
PS-4 File
PS-DO File

Performance Surety Division	Documentation and Records	PS-SBO 401 Rev. 7 October, 2005

DOE/LANL LIST OF LOS ALAMOS NATIONAL LABORATORY NUCLEAR FACILITIES

U.S. Department of Energy
National Nuclear Security Administration
Los Alamos Site Office

Los Alamos National Laboratory
Performance Surety Division
Safety Basis Office (PS-4)

APPROVED FOR USE	
LANL PS-SBO Office Leader	10/12/05 Date
LASO Senior Authorization Basis Manager	10/27/05 Date
LASO Manager	10/28/05 Date

Record of Document Revisions

Revision Record		
Revision	**Date**	**Summary**
0	April 2000	Original Issue.
1	June 2001	Updated nuclear facility list and modified format.
2	December 2001	Corrected CSOs, referenced DOE approval memo for 10 CFR 830 compliant facilities, new acronym list, and safety basis documentation update since last revision.
3	July 2002	Semi-annual update.
4	February 2004	Update safety basis documentation for Transportation, TA-18 LACEF, TA-8-23 Radiography, TA-21 TSTA, and TA-50 RLWTF. Added 11 Environmental Sites that were categorized as Hazard Category 2 and Hazard Category 3 Nuclear Facilities. TA-21 TSTA, TA-48-1 Radiochemistry, and TA-50 RAMROD were downgraded to Radiological Facilities and removed from this list. The facility contacts were changed from the Facility Manager and Facility Operations to Responsible Division Leader and Facility Management Unit.
5	August 2004	Updated TA-50 RLWTF as Hazard Category 2 Nuclear Facility, Added DVRS as a temporary Hazard Category 2 Nuclear Facility. Downgraded TSFF to a Hazard Category 3 Nuclear Facility from a Hazard Category 2. The organization of the Nuclear Facility List was modified to identify only the document that categorizes the facility. Other safety basis documents related to a facility would be identified in the Authorization Agreements. The purpose of this was to reduce redundancy and conflicts between the Nuclear Facility List and Authorization Agreements.
6	June 2005	Removed TA-8-23 from Nuclear Facility per SABM/STEELE 040805, "Approval of request to Recategorize the TA-8-23 Nuclear Facility to a less than High Hazard Radiological Facility" dated 4/8/2005. Updated TA55 PF-185 as a Hazard Category 2 Nuclear Facility per SABM:STEEL, "TA-55-PF185 OSRP SB Approval" dated 5/17/2005. Updated TA55 PF-355 as a Hazard Category 2 Nuclear Facility per SER for SST Facility, dated 5/25/2005. Updated various RDLs, editorial changes, etc. Tables columns listing the DOE CSO, and the LANL FMU were deleted upon consultation between SBO and SABT. Table rows re-ordered for easier reading.
7	October 2005	Removed TSFF per the successful OFO V&V per SABM: Steele: Approval of 2nd LANL Submittal Request for TSFF Downgrade; dated 8/1/2005

Changes in Nuclear Facility Status

Date	Description
3/97	Omega West Reactor (OWR), TA-2-1, downgraded from hazard category 2 reactor facility to a radiological facility. OWR removed from the nuclear facilities list.
9/98	Safety Analysis Report (SAR) approved accepting the Radioactive Materials, Research, Operations, and Demonstration Facility (RAMROD), TA-50-37, as a hazard category 2 nuclear facility. RAMROD added to the nuclear facilities list.
9/98	TA-35 Buildings 2 and 27 downgraded from a hazard category 2 nuclear facility to a hazard category 3 nuclear facility.
9/98	Basis of Interim Operations (BIO) approved accepting the Los Alamos Neutron Science Center (LANSCE) A-6 Isotope Production and Materials Irradiation and 1L Manuel Lujan Neutron Scattering Center (MLNSC) Target Facilities as hazard category 3 nuclear facilities.
10/98	TA-8 Radiography Facility Buildings 24 and 70 downgraded from hazard category 2 nuclear facilities to radiological facilities.
11/98	Health Physics Calibration Facility (TA-3 SM-40, SM-65 and SM-130) downgraded from a hazard category 2 nuclear facility to a radiological facility. SM-40 and SM-65 had been hazard category 2 nuclear facilities while SM-130 had been a hazard category 3 nuclear facility. Health Physics Calibration Facility removed from the nuclear facilities list.
12/98	Radioactive Liquid Waste Treatment Facility (RLWTF) downgraded from a hazard category 2 nuclear facility to a hazard category 3 nuclear facility.
1/99	Pion Scattering Experiment of the TA-53 Nuclear Activities at Los Alamos Neutron Science Center (LANSCE) removed from the nuclear facilities list.
2/00	Building TA-50-190, Liquid Waste Tank, of the Waste Characterization Reduction and Repackaging Facility (WCRRF) removed from the nuclear facilities list.
3/00	DOE SER clarifies segmentation of the Waste Characterization Reduction and Repackaging Facility (WCRRF) as: 1) Building TA-50-69 designated as a hazard category 3 nuclear facility, 2) an outside operational area designated as a hazard category 2 nuclear facility, and 3) the Non-Destructive Assay (NDA) Mobile Facilities located outside TA-50-69 and designated as a hazard category 2 nuclear facility.
4/00	Building TA-3-159 of the TA-3 SIGMA Complex downgraded from hazard category 3 nuclear facility to a radiological facility and removed from the nuclear facilities list.
4/00	TA-35 Nonproliferation and International Security Facility Buildings 2 and 27 downgraded from hazard category 3 nuclear facilities to radiological facilities and removed from the nuclear facilities list.
3/01	TA-3-66, Sigma Facility, downgraded and removed from this nuclear list.
5/01	TA-16-411, Assembly Facility, downgraded and removed from this nuclear list.
5/01	TA-8-22, Radiography Facility, downgraded and removed from this nuclear list.
6/01	Site Wide Transportation added as a nuclear activity (included in 10 CFR 830 plan).
9/01	TA-53 LANSCE, WNR Target 4 JCO approved as hazard category 3 nuclear activity.
10/01	TA-53 LANSCE IL JCO in relation to changes in operational parameters of the coolant system with an expiration date of 1/31/02.
10/01	TA-53 LANSCE Actinide BIO approved as hazard category 3 nuclear activity.
3/02	TA-33-86, High Pressure Tritium Facility (HPTF) removed from nuclear facilities list.
4/02	TA-53 LANSCE, DOE NNSA approves BIO for Storing Activated Components (A6, etc.) in Bldg 53-3 Sector M "Area A East" and added as hazard category 3 nuclear activity.
7/02	TA-53 LANSCE, WNR Facility Target 4 downgraded to below hazard category 3 and removed

Changes in Nuclear Facility Status

Date	Description
	from the nuclear facilities list.
1/03	TA-50 Radioactive Materials, Research, Operations, and Demonstration (RAMROD) facility was downgraded to below hazard category 3 and removed from the nuclear facilities list.
6/03	TA-48-1, Radiochemistry and Hot Cell Facility was downgraded to below hazard category 3 and removed from the nuclear facilities list.
7/03	TA-21 Tritium System Test Assembly (TSTA) facility was downgraded to below hazard category 3 and removed from the nuclear facilities list.
11/03	TA-10 PRS 10-002(a)-00 (Former liquid disposal complex) environmental site was categorized as a hazard category 3 nuclear facility
11/03	TA-21 PRS 21-014 (Material Disposal Area A) environmental site was categorized as a hazard category 2 nuclear facility
11/03	TA-21 PRS 21-015 (Material Disposal Area B) environmental site was categorized as a hazard category 3 nuclear facility
11/03	TA-21 PRS 21-016(a)-99 (Material Disposal Area T) environmental site was categorized as a hazard category 2 nuclear facility
11/03	TA-35 PRS 35-001 (Material Disposal Area W, Sodium Storage Tanks) environmental site was categorized as a hazard category 3 nuclear facility
11/03	TA-35 PRS 35-003(a)-99 (Wastewater treatment plant (WWTP)) environmental site was categorized as a hazard category 3 nuclear facility
11/03	TA-35 PRS 35-003(d)-00 (Wastewater treatment plant – Pratt Canyon) environmental site was categorized as a hazard category 3 nuclear facility
11/03	TA-49 PRS 49-001(a)-00 (Material Disposal Area AB) environmental site was categorized as a hazard category 2 nuclear facility
11/03	TA-50 PRS 50-009 (Material Disposal Area C) environmental site was categorized as a hazard category 2 nuclear facility
11/03	TA-53 PRS 53-006(b)-99 (Underground tank with spent resins) environmental site was categorized as a hazard category 2 nuclear facility
11/03	TA-54 PRS 54-004 (Material Disposal Area H) environmental site was categorized as a hazard category 3 nuclear facility
3/04	TA-54-38, Radioassay and Nondestructive Testing (RANT) Facility, is re-categorized as a Hazard Category 2 nuclear facility from Hazard Category 3.
6/04	TA-54-412 Decontamination and Volume Reduction Glovebox (DVRS) added to Nuclear Facility List. The facility will operate as a Hazard Category 2 not exceeding 5 months from the date LASO formally releases the facility for operations following readiness verification.
6/04	DOE Safety Evaluation Report for the TSFF BIO establishes that TSFF is re-categorized as a Hazard Category 3 from Hazard Category 2.
7/04	TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) was re-categorized as a Hazard Category 2 Nuclear Facility based on a DOE Memo dated March 20, 2002.

Changes in Nuclear Facility Status

Date	Description
4/05	Removed TA-8-23 from Nuclear Facility List per SABM/STEELE 040805, "Approval of request to Recategorize the TA-8-23 Nuclear Facility to a less than High Hazard Radiological Facility" dated 4/8/2005.
5/05	Updated TA55 PF-185 as a Hazard Category 2 Nuclear Facility per SABM:STEEL, "TA-55-PF185 OSRP SB Approval" dated 5/17/2005.
5/05	Updated TA55 PF-355 as a Hazard Category 2 Nuclear Facility per SER for SST Facility dated 5/25/2005.
10/05	Removed TSFF from the Nuclear Facility List per SABM: Steele: Approval of 2nd LANL Submittal Request for TSFF Downgrade; dated 8/1/2005

FORWORD

1. This joint U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA), Los Alamos Site Office (LASO) and Los Alamos National Laboratory (LANL), Performance Surety (PS) Division document has been prepared by the LASO Safety Authorization Basis Team (SABT) and the Safety Basis Office (SBO) at LANL. This document provides a tabulation and summary information concerning hazard category 2 and 3 nuclear facilities at LANL.

2. This nuclear facility list will be updated to reflect changes in facility status caused by inventory reductions, final hazard classifications, exemptions, facility consolidations, and other factors.

3. DOE-STD-1027-92 methodologies are the bases used for identifying nuclear facilities to be included in this standard. Differences between this document and other documents that identify nuclear facilities may exist as this list only covers nuclear hazard category 2 and 3 facilities that must comply with the requirements stipulated in 10 CFR 830, Subpart B. Other documents might include facilities that have inventories below the nuclear hazard category 3 thresholds, such as radiological facilities.

LIST OF ACRONYMS AND ABBREVIATIONS

Term	Meaning
ARIES	Advanced Recovery and Integration Extraction System
BIO	basis for interim operations
BUS	Business Operations (Division)
C	Chemistry (Division)
CFR	Code of Federal Regulations
CMR	Chemistry and Metallurgy Research (Facility)
CSO	cognizant secretarial officer
DD	Division Director
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations
DP	Defense Programs (DOE)
DSA	documented safety analysis
DVRS	decontamination and volume reduction glovebox
EM	Environmental Management (DOE)
ESA	Engineering Sciences and Applications (Division)
ESH	Environment, Safety and Health (Division)
F&IB	Feedback and Improvement Board
FSAR	final safety analysis report
FM	facility management
FMU	facility management unit
FWO	Facility and Waste Operations (Division)
HA	hazard analysis
HC	hazard category
HPTF	High Pressure Tritium Facility
HSR	Health, Safety and Radiation
IAW	in accordance with
IFIT	Isotopic Fuel Impact Test
ITSR	interim technical safety requirements
JCO	justification for continued operations
LACEF	Los Alamos Criticality Experiment Facility
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LASO	Los Alamos Site Office
LLW	low-level waste
MER	management evaluation report
MDA	material disposal area
MLNSC	Manuel Lujan Neutron Scattering Center
N	Nuclear Nonproliferation Division
NIS	Nonproliferation and International Security (Division) (name changed to Nuclear Nonproliferation Division)
NDA	non-destructive assay
NMT	Nuclear Materials Technology (Division)

NNSA .... National Nuclear Security Administration
NSM Rule .... Nuclear Safety Management Rule, 10 CFR 830
NTTL .... neutron tube target loading
NWIS .... Nuclear Waste Infrastructure Services
OAB .... Office of Authorization Basis
OLASO .... Office of Los Alamos Site Operation
OSR .... operational safety requirement
OWR .... Omega West Reactor
PRS .... Potential Release Site
PS .... Performance Surety (Division)
Pu .... plutonium
RAMROD .... Radioactive Material, Research, Operations, and Demonstration (Facility)
RANT .... Radioactive Assay Nondestructive Testing (Facility)
RDL .... Responsible Division Leader
Rev. .... revision
RLWTF .... Radioactive Liquid Waste Treatment Facility
SA .... safety assessment
SAR .... safety analysis report
SB .... safety basis
SBO .... Safety Basis Office
SER .... safety evaluation report
SM .... South Mesa
STD .... standard
SST .... Safe-Secure Trailer
SUP .... Supply Chain Management (Division) (formerly known as BUS)
TA .... technical area
TBD .... to be determined
TRU .... transuranic
TSD .... transportation safety document
TSE .... Tritium Science Engineering (Group)
TSFF .... Tritium Science and Fabrication Facility
TSR .... technical safety requirement
TSTA .... Tritium Systems Test Assembly (Facility)
TWISP .... Transuranic Waste Inspectable Storage Project
USQ .... unreviewed safety question
WCRRF .... Waste Characterization, Reduction and Repackaging Facility
WETF .... Weapons Engineering Tritium Facility
WSDF .... Waste Storage and Disposal Facility

1 SCOPE

Standard DOE-STD-1027-92, Change 1, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, provides methodologies for the hazard categorization of DOE facilities based on facility material inventories and material at risk. This document lists hazard category 2 and 3 nuclear facilities because they must comply with requirements in Title10, *Code of Federal Regulations*, Part 830, Nuclear Safety Management, Subpart B, "Safety Basis Requirements." The Los Alamos National Laboratory (LANL) nuclear facilities that are below hazard category 3 (radiological facilities) have not been included on this list because they are exempt from the requirements in 10 CFR 830, Subpart B.

2 PURPOSE

This standard provides a list of hazard category 2 (HC2) and 3 (HC3) nuclear facilities at LANL. The list will be revised, as appropriate, to reflect changes in facility status resulting from final hazard categorization or movement, relocation, or final disposal of radioactive inventories. The list shall be used as the basis for determining initial applicability of DOE nuclear facility requirements. The list now identifies the categorization of site wide transportation and environmental sites per the requirements of 10 CFR 830, Subpart B.

3 APPLICABILITY

This standard is intended for use by NNSA and contractors with responsibilities for facility operation and/or oversight at LANL.

4 REFERENCES

4.1 49 CFR 173.469, Title 49, *Code of Federal Regulations,* Part 173 "Shippers - General Requirements for Shipments and Packagings."

4.2 DOE O 420.2, Change 1, *Safety of Accelerator Facilities*, USDOE, 5/26/99.

4.3 DOE-STD-1027-92, Change 1, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, USDOE, 9/97.

4.4 10 CFR 830, Title 10, *Code of Federal Regulations*, Part 830, "Nuclear Safety Management."

4.5 ANSI N43.6, American National Standards Institute (ANSI) N43.6, "American National Standard for General Radiation Safety—Sealed Radioactive Sources, Classification".

5 NUCLEAR FACILITIES LIST

Table 5-1 identifies all HC2 and HC3 nuclear facilities at LANL. Facilities have been categorized based on criteria in DOE-STD-1027-92, Change 1. Site, zone or area, building number, name, and dominant hazard category identifies each facility. The dominant hazard category is determined by identifying the highest hazard category for multi-process facilities. Buildings, structures, and processes addressed by a common documented safety analysis have been designated as a single facility. DOE-STD-1027-92, Change 1, permits exclusion of sealed radioactive sources from a radioactive inventory of the facility if the sources were fabricated and tested in accordance with 49 CFR 173.469 or ANSI N43.6. In addition, material contained in U.S. Department of Transportation (DOT) Type B shipping containers may also be excluded from radioactive inventory. Facilities containing only material tested or stored in accordance with these standards do not appear in the list and tables that follow.

TABLE 5-1. Summary of LANL Nuclear Facilities

HAZ CAT	FACILITY NAME
2	Site Wide Transportation
2	TA-16 Weapons Engineering Tritium Facility (WETF)
3	TA-53 Los Alamos Neutron Science Center (LANSCE) 1L Target
3	TA-53 LANSCE Lujan Center ER-1/2 Actinide
3	TA-53 LANSCE Storage of Activated Components/Targets (A-6, etc.) in Building 53-3, Sector M Area A East
2	TA-3 Chemistry and Metallurgy Research Facility (CMR)
2	TA-18 Los Alamos Critical Experiment Facility (LACEF) and Hillside Vault
2	TA-55 Plutonium Facility
2	TA-55 PF-185
2	TA-55 SST Facility
2	TA-50 Radioactive Liquid Waste Treatment Facility (RLWT)
2	TA-50 Waste Characterization Reduction and Repackaging Facility (WCRR)
2	TA-54 Waste Storage and Disposal Facility (Area G)
2	TA-54 Transuranic Waste Inspectable Storage Project (TWISP)
2	TA-54 Radioactive Assay Nondestructive Testing (RANT) Facility
2	TA-54 Decontamination and Volume Reduction (DVRS) Glovebox
2	TA-21 PRS 21-014 (MDA A)
3	TA-21 PRS 21-015 (MDA B)
2	TA-21 PRS-21-016(a)-99 (MDA T)
3	TA-10 PRS 10-002(a)-00 (Former liquid disposal complex)
3	TA-35 PRS 35-001 (MDA W – Sodium Storage Tanks)
3	TA-35 PRS 35-003(a)-99 (Wastewater Treatment Plant (WWTP))
3	TA-35 PRS 35-003(d)-00 (Wastewater Treatment Plant (Pratt Canyon))
2	TA-49 PRS 49-00(a)-00 (MDA AB)
2	TA-50 PRS 50-009 (MDA C)
2	TA-53 PRS 53-006(b)-99 (Underground tank with spent resin)
3	TA-54 PRS 54-004 (MDA H)

Summary of Table 5-1:
18 Hazard Category 2 Nuclear Facilities
9 Hazard Category 3 Nuclear Facilities

27 Total Nuclear Facilities

6 LANL NUCLEAR FACILITIES SUMMARY TABLES

The Table 5-2 lists the categorization basis information and a brief description for each nuclear facility identified in Table 5-1.

TABLE 5-2. Nuclear Facility Categorization Information

TA	Bldg/ PRS	Haz Cat	Facility Name	Description	Categorization Basis	RDL
Site Wide		2	Site Wide Transportation	Laboratory nuclear materials transportation	Safety Evaluation Report, Los Alamos National Laboratory Transportation Safety Document (TSD) Technical Safety Requirements (TSRs), September 2002, LANL BUS4-SA-002, R0. US DOE NNSA LASO November 8, 2002.	SUP
16	0205	2	Weapons Engineering and Tritium Facility (WETF)	Tritium Research	Safety Evaluation Report (SER) for WETF, SER-Rev.0, March 27, 2002.	ESA
53	IL Target	3	TA-53 Nuclear Activities at Los Alamos Neutron Science Center (LANSCE)	Lujan Center Neutron Production Target	Safety Evaluation Report for LANSCE (TA-53) 1L Target-BIO, Rev.1, March 22,2000	LANSCE
53	Lujan Center ER-1/2	3	TA-53 Nuclear Activities at Los Alamos Neutron Science Center (LANSCE)	Actinide scattering experiments	Safety Evaluation Report Basis for Interim Operations for Experiments on Neutron Scattering by Actinides at the Manuel Lujan, Jr. Neutron Scattering Center, Sept 17, 2001	LANSCE
53	Area A-6	3	TA-53 Nuclear Activities at Los Alamos Neutron Science Center (LANSCE)	In-place storage DU and A-6 beam stop	DOE Memo – Approval and Safety Evaluation (SER) for the Basis for Interim Operations (BIO) for the LANSCE in Place Storage Operations in Building 53-3, Sector M "Area East", SABM A6 LANSCE BIO Approval, April 6, 2002.	LANSCE
3	0029	2	Chemistry and Metallurgy Research Facility CMR	Actinide chemistry research and analysis	*CMR Basis for Interim Operations*, dated August 26, 1998	NMT
18		2	Los Alamos Critical Experiment Facility (LACEF)	Critical experiment site	LANL Technical Area 18 Basis for Interim Operations, TA-18-AB-SAD-0102. March 2002.	NMT

TA	Bldg/ PRS	Haz Cat	Facility Name	Description	Categorization Basis	RDL
55	4	2	TA-55 Plutonium Facility	Pu glovebox lines; processing of isotopes of Pu	*Safety Evaluation Report of the Los Alamos National Laboratory Technical Area 55 Plutonium Building-4, Safety Analysis Report and Technical Safety Requirements*, December 1996.	NMT
55	185	2	TA-55 PF-185	Staging only facility for a period of up to5 years from June 2005.	*TA55-PF185 OSRP SB Approval*, May 17, 2005.	NMT
55	355	2	TA-55 SST Facility	Interim storage for nuclear material until June 2010.	*Safety Evaluation Report (SER) for the SST Facility at TA-55, Rev. 0, May 25, 2005.*	NMT
50	0001	2	TA-50 Radioactive Liquid Waste Treatment Facility (RLWT)	Main treatment plant, pretreatment plant, decontamination operation	DOE Memorandum: Hazard Categorization of the Radioactive Liquid Waste Treatment Facility (RLWTF), SABT/RCJ.0202, March 20, 2002.	NWIS
	0002	2		Low level liquid influence tanks, treatment effluent tanks, low level sludge tanks		
	0066	2		Acid and Caustic waste holding tanks		
	0090	2		Holding tank		
50	0069	3	TA-50 Waste Characterization Reduction and Repackaging Facility (WCRR)	Waste characterization, reduction, and repackaging facility	*Safety Evaluation Report (SER) for Waste Characterization, Reduction, and Repackaging Facility (WCRRF) Interim Technical Safety Requirements (ITSRs), TA-50-69*, Rev. 0, February 15, 2000, March 13, 2000. (ITSRs/ HA approved as a BIO)	NWIS
	External	2		NDA mobile activities outside TA-50-69		
	External	2		Drum staging/storage pad and waste container temperature equilibration activities outside TA-50-69		
54	Area G	2	TA-54 Waste Storage and Disposal Facility (Area G)	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.	U.S. Department of Energy, National Nuclear Security Administration SER for TA-55 Area G DSA 11/28/03; Final Documented Safety Analysis (DSA) Technical Area 54, Area g, ABD-WFM-001, Rev.0 April 9, 2003, ADB-WFM-002, Rev. 0, November 10, 2003.	NWIS

TA	Bldg/ PRS	Haz Cat	Facility Name	Description	Categorization Basis	RDL
54	Pad 2	2	TA-54 Transuranic Waste Inspectable Storage Project (TWISP)	Recovery of buried TRU waste	Safety Evaluation Report (SER) for TWISP-SER-Rev. 0 June 26, 2000. Basis for Interim Operations (BIO) Transuranic Waste Inspectable Storage Project (TWISP), TA-54, Area G; TWISP-BIO-Rev. 0, April 24, 2000, TWISP-TSR-Rev. 0, April 24, 2000.	NWIS
	0033	2		TRU waste storage, fabric dome with TRU waste drum		
54	0038	2	TA-54 Radioactive Assay Nondestructive Testing (RANT) Facility	Nondestructive assay and examination of waste drums, WIPP certification of TRU waste drums, TRUPACT loading of drums	Safety Evaluation Report, Basis for Interim Operation (BIO) and Technical Safety Requirements for the Radioassay and Nondestructive Testing (RANT) Facility, Technical Area 54-38, ABD-WFM-007, Rev. 0, May 30, 2003; LASO December 23, 2003	NWIS
54	412	2	TA-54 Decontamination and Volume Reduction Glovebox	Recovery of buried TRU waste Note: The facility will operate as a Hazard Category 2 not exceeding 5 months from the date LASO formally releases the facility for operations following readiness verification.	Safety Evaluation Report: Basis for Interim Operation (BIO) and Technical Safety Requirements (TSRs) for the Decontamination and Volume Reduction Glovebox in support of the Quick-to-WIPP Project. ABD-WFM, Rev. 0 April 8, 2004. SER Effective Date: June 8, 2004.	NWIS
21	21-014	2	PRS 21-014 (MDA A)	MDA A is a 1.25 acre site that was used intermittently from 1945 to 1949 and 1969 to 1977 to dispose of radioactively contaminated solid wastes, debris from D&D activities, and radioactive liquids generated at TA-21. The area contains two buried 50,000 gal. storage tanks (the "General's Tanks") on the west side of MDA A, two rectangular disposal pits (each 18 ft long x 12.5 ft wide x 12.5 deep) on the east side of MDA A, and a large central pit (172 ft long x 134 ft wide x 22 ft deep).	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS

TA	Bldg/ PRS	Haz Cat	Facility Name	Description	Categorization Basis	RDL
21	21-015	3	PRS 21-015 (MDA B)	MDA B is an inactive 6.03 acre disposal site. It was the first common disposal area for radioactive waste generated at LANL and operated from 1945 to 1952. The site runs along the fence line on DP Road and is located about 1600 ft east of the intersection of DB Road and Trinity Drive. The site comprises four major pits (each 300 ft x 15 ft x 12 ft deep), a small trench (40 ft x 2 ft x 3 ft deep), and miscellaneous small disposal sites.	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS
21	21-016(a)-99	2	PRS 21-016(a)-99 (MDA T)	MDA T, an area of about 2.2 acres, consists of four inactive absorption beds, a distribution box, a subsurface retrievable waste storage area disposal shafts, a former waste treatment plant, and cement paste spills on the surface and within the retrievable waste storage area.	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS
10	10-0029(a)-99	3	PRS 10-002(a)-99 (Former liquid disposal complex)	PRS 10-002(a)-99 is associated with the former liquid disposal complex serving the radiochemistry laboratory at TA-10. The complex discharged to leach fields and pits. The entire complex underwent D&D in 1963. All above ground and below ground structures were removed. The remaining materials were placed in a pit that remains in place.	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS

TA	Bldg/ PRS	Haz Cat	Facility Name	Description	Categorization Basis	RDL
35	35-001	3	PRS 31-001 (MDA W Sodium Storage Tanks)	MDA W consists of two vertical shafts or "tanks" that were used for the disposal of sodium coolant used in LAMPRE-1 sodium cooled research reactor. The two tanks are 125 ft long stainless steel tubes that were half filled and inserted into carbon steel casings separated by approximately 3 ft. Until 1980, a metal control shed was located above the tanks, but this feature was removed and replaced with a concrete cover. The predominant radionuclide of concern in the Sodium is Pu-239 that may have been introduced from a breach of one or two fuel elements during the operational life of LAMPRE-1.	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS
35	35-003(a)-99	3	PRS 35-003(a)-99 (Wastewater treatment plant (WWTP))	The WWTP was located at the east end of Ten Site Mesa and operated from 1951 until 1963. It consisted of an array of underground waste lines, storage tanks, and chemical treatment precipitation tanks. The plant treated liquid waste that originated from the radiochemistry laboratories and operation of the radioactive lanthanum-140 hot cells in Bldg 35-2. The liquid wastes from the laboratories were acidic, and the radioactivity in the waste came from barium-140, lanthanum-140, strontium-89, strontium-90, and yttrium-90.	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS

TA	Bldg/ PRS	Haz Cat	Facility Name	Description	Categorization Basis	RDL
35	35-003(d)-00	3	PRS 35-003(d)-00 (Wastewater treatment plant – Pratt Canyon)	The former structures associated with the Pratt Canyon component of the WWTP. All buildings, foundations, and structures were removed during D&D activities in 1981 and 1985, then backfilled with 20 ft of clean fill material.	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS
49	49-001(a)-00	2	PRS 49-001(a)-00 (MDA AB)	This underground, former explosive test site comprises four distinct areas, each with a series of deep shafts used for subcritical testing. Radioactively contaminated surface soil exists at one of the test areas [SWMU 49-001(g)].	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS
50	50-009	2	PRS 50-009 (MDA C)	MDA C was established in 1948 to replace MDA B. MDA C covers 11.8 acres and consists of 7 pits (four are 610 ft x 40 ft x 25 ft, one is 110 ft x 705 ft x 18 ft, one is 100 ft x 505 ft x 25 ft, and one 25 ft x 180 ft x 12 ft), 107 shafts (each typically 2 ft dia. x 10-25 deep), and one unnumbered shaft used for a single strontium-90 source disposal. Pits and shafts were used for burial of hazardous chemicals, uncontaminated classified materials, and radioactive materials. TRU waste also was buried in unknown quantities in the pits. The landfill was used until 1974. COCPCs included inorganic chemicals, VOCs, SVOCs, and radionuclides.	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS

TA	Bldg/ PRS	Haz Cat	Facility Name	Description	Categorization Basis	RDL
53	53-006(b)-99	2	PRS 53-006(b)-99 (Underground tank with spent resins)	Three inactive underground tanks associated with the former radioactive liquid waste system at TA-53. One tank (Structure 53-59) is 28 in dia x 65 ft long and contains spent ion exchange resin. Two empty tanks are 6 ft dia x 12 ft long and are not included here.	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS
54	54-004	3	PRS 54-004 (MDA H)	MDA H is a 0.3 acre site on Mesita del Buey that contains nine inactive shafts that were used for disposal of LANL waste. Each shaft is 6 ft dia x 60 ft deep.	DOE Memo: *New Categorization of Existing Nuclear Facilities at LANL, November 26, 2003* LANL Memo: *Initial Categorization of Environmental Sites, November 21, 2003, RRES-DO:03-138*	NWIS

Appendix C: Radiological Facilities List

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LOS ALAMOS NATIONAL LABORATORY

RADIOLOGICAL FACILITY LIST

PS-OAB-403, Revision 1

Prepared by: George F. Nolan	Signature: [signature] for George Nolan	Date: 1/13/03
Approved by: David G.Satterwhite, Office Leader	Signature: [signature]	Date: 1/13/03

HISTORY OF REVISIONS

Revision Record		
Revision	Date	Summary
0	09/18/01	Original Issue
1	11/14/02	Annual update based upon input from facility managers

Los Alamos
NATIONAL LABORATORY

James L. Holt
Associate Director for Operations
Los Alamos National Laboratory
Mail Stop A104
Los Alamos, New Mexico 87545
505-667-0079/Fax 505-665-1812

Date: September 26, 2002
Refer to: AD-Ops:02-120

Christopher M. Steele
National Nuclear Security Administration
Office of Los Alamos Support Operations
P.O. Box 1663, Mail Stop A316
Los Alamos, NM 87545

Dear Mr. Steele:

Subject: Radiological Facilities Inventory of Radioactive Material

Attached for your information are the results of LANL's annual radioactive material inventory, conducted in accordance with the requirement of LIR 300-00-05, *Facility Hazard Categorization*. Attachment 1 is the radioactive material inventory report for radiological facilities. The methodology used in developing this report is detailed in Attachment 2. Attachment 3 is the updated listing of radiological facilities. Attachment 4 is a summary of the changes to the radiological facilities list over the past year

If you have questions please contact George Nolan, 7-3477.

Sincerely,

James L. Holt
Associate Director for Operations

JLH:DGS:mv

Attachments:
1. RAM Inventory
2. RAM Inventory Methodology
3. LANL Radiological Facility List
4. Summary of Radiological Facility List Changes.

Action to Jim Loud and Dave Satterwhite Due to Scott COB Nov. 7th. KMB 11/1

United States Government **Department of Energy**

memorandum

National Nuclear Security Administration
Albuquerque Operations Office
Office of Los Alamos Site Operations
Los Alamos, New Mexico 87544

DATE: October 25, 2002

REPLY TO ATTN OF: SABT/RCJ.02.012: SABM Steele

SUBJECT: Radiological Facilities Inventory of Radioactive Material

TO: James L. Holt, Associate Director for Operations, MS-A104

The Los Alamos National Laboratory (LANL) submitted, via a letter from J. Holt to C. Steele, dated September 26, 2002, the "Radiological Facilities Inventory of Radioactive Material" to National Nuclear Security Administration (NNSA) for information (Attachment 1). NNSA has reviewed the subject document and has identified issues in a number of the hazard categorization tables included in the document. These tables provide the calculations of the Hazard Category (HC3) Ratio used to determine that the radioactive material inventory in the facility is less than HC3 in accordance with the standard and Laboratory Implementing Requirements (LIR 300-00-05, Facility Hazard Categorization).

The calculations provided in these tables are used by LANL to finalize the current list of Radiological Facilities (RF) at LANL. NNSA performed independent verification of a small number of the hazard categorization results using the Mass Inventory values provided with the correct threshold values obtained from DOE-STD-1027-92 CN1. The results of the NNSA review indicates that the inventory / HC3 ratios for the NIS facilities could be greater than one (Attachment 2).

NNSA comments on the above referenced submittal are included as Attachment 2. NNSA requires LANL to review all of the Radioactive Material Inventory tables submitted in the referenced document and revise those tables as appropriate.

If you have any questions regarding this matter please contact Randy Janke of my staff at 665-4205 or myself at 667-3418.

Christopher M. Steele
Senior Authorization Basis Manager

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Los Alamos
NATIONAL LABORATORY

James L. Holt
Associate Director for Operations
Los Alamos National Laboratory
Mail Stop A104
Los Alamos, New Mexico 87545
505-667-0079/Fax 505-665-1812

Date: November 14, 2002
Refer to: AD-Ops:02-152

Christopher M. Steele
National Nuclear Security Administration
Office of Los Alamos Support Operations
P.O. Box 1663, Mail Stop A316
Los Alamos, NM 87545

Dear ~~Mr. Steele~~ Chris:

Subject: Radiological Facilities Inventory of Radioactive Material

Reference: SABT/RCJ.02.012:SABM Steele (October 25, 2002)

The subject document has been revised and attached (Attachment 1) according to your comments/ observations transmitted in the Reference stated above. Response/resolution to each comment has been also documented and attached (Attachment 2).

If you have questions, please contact David Satterwhite 5-8034 or Kyo Kim 5-8902 of my staff.

Sincerely,

Jim

James L. Holt
Associate Director for Operations

JLH:DGS:mv

Attachments:

1. List of LANL Radiological Facilities
2. NNSA Comment Resolution

Based upon input from facility managers (FM), the facilities listed in the table below are identified as radiological facilities. The definition for radiological facility per in the DOE-approved LIR 300-00-05, *Facility Hazard Categorization,* is:

> *A radioactive material using area/activity that contains less than category 3 inventories as listed in Table A.1 DOE-STD-1027-92, but where the amount of radioactive material present is sufficient to create a "radiological area" as defined in 10 CFR 835. Radioactive material that is either in a DOT Type B shipping container or is a sealed source may be excluded from consideration per the conditions defined by DOE-STD-1027-92.*

Based on the LIR definition, the following instructions were provided to the facility mangers to identify radiological facilities:

a. Contains less than hazard category 3 (<HC3) amounts of RAM (see DOE-STD-1027-92, Change 1).
b. Contains area posted as a radiological area (per 10 CFR 835)
c. Exclude RAM in sealed radioactive sources meeting requirements of ANSI N43.6.
d. Exclude RAM in U.S. Department of Transportation (DOT) Type B container.
e. Exclude structures included in the safety bases of HC2 and HC3 nuclear facility (see *DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities*, FWO-OAB 401, Rev. 1), and
f. Exclude structures whose only source of radiation is machine produced X rays.
g. RAM used in exempted, commercially available products, should not be considered part of a facility's inventory.

Radiological facilities (<HC3) are nuclear facilities but are not required to comply with 10 CFR 830, Subpart B. The attached table provides a list of these radiological facilities identified in September 2002. Several facilities are listed as potentially radiological facilities. These facilities normally have no RAM, but could receive RAM on an interim basis. Per DOE-STD-1027-92, a facility is involved with an inventory of radioactive materials that varies with time must be categorized on the basis of its maximum inventory of radioactive materials.

LANL RADIOLOGICAL FACILITY SUMMARY TABLE

TA-BLDG	Descriptor	FM/FMU	Disposition Note
TA-2-1	Omega Reactor	D. McLain/64	D&D residual radiation
TA-3-16	Ion Exchange	D. McLain/64	D&D, tritium
TA-3-34	Cryogenics Bldg B	L. Woodrow/73	Multiple isotope samples
TA-3-35	Σ Press Building	L. Woodrow/73	DU plus residual in ducts
TA-3-40	Physics Bldg (HP)	S. Archuleta/77	To relocate TA-36-1/214
TA-3-66	Sigma Building	L. Woodrow/73	DU
TA-3-102	Tech Shop Add	B. Grace/70	DU
TA-3-159	Σ Thorium Storage	L. Woodrow/73	Th-232
TA-3-169	Warehouse	L. Woodrow/73	DU
TA-3-1698	Material Science Lab	L. Woodrow/73	Multiple isotope samples
TA-3-1819	Experiment Mat'l Lab	L. Woodrow/73	Multiple isotope samples
TA-8-22	X ray Facility	B. Grace/70	Potential DU
TA-8-70	Non Destructive Testing	B. Grace/70	DU/Th-232
TA-8-120	Radiography	B. Grace/70	Potential DU
TA-11-30	Vibration Test	B. Grace/70	Potential DU
TA-15-R183	Vault	T. Alexander/67	DU
TA-16-88	RAM Machine Shop	B. Grace/70	DU/Th-232
TA-16-202	Laboratory	B. Grace/70	DU/tritium
TA-16-207	Component Testing	B. Grace/70	Potential DU/Th-232, Rm 113
TA-16-300	Component Storage	B. Grace/70	DU/Th-232
TA-16-301	Component Storage	B. Grace/70	DU
TA-16-302	Component Storage Training	B. Grace/70	DU/Th-232
TA-16-332	Component Storage	B. Grace/70	DU/Th-232
TA-16-410	Assembly Building	B. Grace/70	DU/Th-232
TA-16-411	Assembly Building	B. Grace/70	DU/Th-232
TA-21-5	Lab Bldg	D. McLain/64	D&D
TA-33-86	High pressure tritium	D. McLain/64	D&D
TA-35-2	Nuclear Safeguards Research	P. Bussolini/75	NIS-5 sources
TA-35-27	Nuclear Safeguards Lab	P. Bussolini/75	NIS-5 sources
TA-36-1	Laboratory and offices	S. Helmick/71	Sources
TA-36-214	Central HP Calibration Facility	S. Helmick/71	Sources
TA-37-10	Storage Magazine	B. Grace/70	DU
TA-37-14	Storage Magazine	B. Grace/70	DU
TA-37-16	Storage Magazine	B. Grace/70	DU
TA-37-24	Storage Magazine	B. Grace/70	DU
TA-37-25	Storage Magazine	B. Grace/70	DU
TA-41-1	Underground Vault	B. Grace/70	DU/Th-232
TA-43-1	Bio Lab	R. Crook/72	Sources
TA-53-945	RLW Treatment Facility	D. Seely/61	Waste products
TA-53-954	RLW Basins	D. Seely/61	Waste products
TA-54-412	DVRS	D. McLain/64	Waste products

LIST OF LANL RADIOLOGICAL FACILITIES

Table	TA-BLDG	Descriptor	FM/FMU	Disposition/Note
1.	TA-2-1	Omega Reactor	D. McLain/64	D&D residual radiation
2.	TA-3-16	Ion exchange	D. McLain/64	D&D tritium
3.	TA-3-34	Condensed Matter & Thermal Physics	L. Woodrow/73	Multiple isotope samples
4.	TA-3-35	Sigma Press Building	L. Woodrow/73	DU
5.	TA-3-40	Physics Bldg (Health Physics)	S. Archuleta/77	Multiple isotope samples
6.	TA-3-66	Sigma Building	L. Woodrow/73	DU
7.	TA-3-102	RAM Machine Shop	B. Grace/70	DU
8.	TA-3-159	Sigma Thorium Building	L. Woodrow/73	Th-232
9.	TA-3-169	Sigma Thorium Building	L. Woodrow/73	DU
10.	TA-3-1698	Material Science Lab	L. Woodrow/73	Multiple isotope samples
11.	TA-3-1819	Material Science Lab	L. Woodrow/73	Multiple isotope samples
12.	TA-8-22	Radiography	B. Grace/70	DU
13.	TA-8-70	NDT&E	B. Grace/70	DU/Th-232
14.	TA-8-120	Radiography	B. Grace/70	Potential DU
15.	TA-11-30	Vibration Testing	B. Grace/70	Potential DU
16.	TA-15-R183	Vault	T. Alexander/67	DU
17.	TA-16-88	Component Storage	B. Grace/70	DU/Th-232
18.	TA-16-202	Laboratory	B. Grace/70	DU/tritium
19.	TA-16-207	Component Testing	B. Grace/70	DU/Th-232, Rm 113
20.	TA-16-300	Component Storage	B. Grace/70	DU/Th-232
21.	TA-16-301	Component Storage	B. Grace/70	DU
22.	TA-16-302	Component Storage/Training	B. Grace/70	DU/Th-232
23.	TA-16-332	Component Storage	B. Grace/70	DU/Th-232
24.	TA-16-410	Assembly Building	B. Grace/70	DU/Th-232
25.	TA-16-411	Assembly Building	B. Grace/70	DU/Th-232
26.	TA-21-5	Lab Bldg	D. McLain/64	D&D
27.	TA-33-86	High pressure tritium facility	D. McLain/64	D&D, tritium
28.	TA-35-2	Nuclear Safeguards Research	P. Bussolini/75	Sources
29.	TA-35-27	Nuclear Safeguards Research	P. Bussolini/75	Sources
30.	TA-36-1	Calibration Lab and offices	S. Helmick/71	Sources
31.	TA-36-214	Calibration Lab and offices	S. Helmick/71	Sources
32.	TA-37-10	Storage Magazine	B. Grace/70	DU
33.	TA-37-14	Storage Magazine	B. Grace/70	DU
34.	TA-37-16	Storage Magazine	B. Grace/70	DU
35.	TA-37-24	Storage Magazine	B. Grace/70	DU
36.	TA-37-25	Storage Magazine	B. Grace/70	DU
37.	TA-41-1	Underground Vault	B. Grace/70	DU/Th-232
38.	TA-43-1	Bio/Chem Laboratory	Crook/72	Lab sources
39.	TA-53-945	RLW Treatment	D. Seely/61	RLW products
40.	TA-53-954	RLW Basins	D. Seely/61	RLW products
41.	TA-54-412	Radioactive waste compactor (DVRS)	D. McLain/64	Residual

Table 1 Isotopic Inventory for BLDG TA-2-1

Descriptor: Omega Reactor

Division: FWO

Responsible FM/FMU: D. McLain/64

RAM Accountability Procedure: SO-WFM-001, *Inventory Control for Radiological Facilities*

Disposition D&D

Date of Inventory: Not applicable

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Fixed low level residual radiation. No new RAM allowed.			
		HC3 Ratio Sum	NA

Table 2 Isotopic Inventory for BLDG TA-3-16

Descriptor: Ion exchange

Division: FWO

Responsible FM/FMU: D. McLain/64

RAM Accountability Procedure: FM Standing Order

Disposition D&D

Date of Inventory: Not applicable

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Entrained tritium. No new RAM allowed.			
		HC3 Ratio Sum	NA

Table 3 Isotopic Inventory for TA-3-34

Descriptor: Condensed Matter and Thermal Physics

Division: MST

Responsible FM/FMU: L. Woodrow/73

RAM Accountability Procedure: MST-FSP-PAC-5304, *Facility Safety Plan for the Material Science Complex*

Date of Inventory: August 8, 15, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Pu-239	0.15	8.4	0.020
		HC3 Ratio Sum	**0.020**

Table 4 Isotopic Inventory for TA-3-35

Descriptor: Sigma Press Building

Division: MST

Responsible FM/FMU: L. Woodrow/73

RAM Accountability Procedure: MST-FOM-AP-0310, *MST Field Operations Manual for Radionuclide Inventory Management*

Date of Inventory: August 15, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Empty			
		HC3 Ratio Sum	**0.000**

Table 5 Isotopic Inventory for TA-3-40

Descriptor: Physics Building (Health Physics)

Division: P

Responsible FM/FMU: D. Riker/77

RAM Accountability Procedure: FSP-FMU77-2002-02

Date of Inventory: September 12, 2002

Isotope	Activity(Ci)	1027 HC3 TQ (Ci)	HC3 Ratio
Cl-36	4.7E-7	3.4E+2	0.000
Co-60	2.00E-6	2.8E+2	0.000
Sr-90	1.70E-5	1.6E+1	0.000
I-129	1.03E-6	6.0E-2	0.000
Cs-137	5.50E-3	6.0E+1	0.000
Pu-238	7.41E-8	6.2E-1	0.000
Pu-239	4.00E-8	5.2E-1	0.000
H-3	1.00E+1	1.6E+4	0.001
		HC3 Ratio Sum	**0.001**

Table 6 Isotopic Inventory for TA-3-66

Descriptor: Sigma Building

Division: MST

Responsible FM/FMU: L. Woodrow/73

RAM Accountability Procedure: MST-FOM-AP-0310, *MST Field Operations Manual for Radionuclide Inventory Management*

Date of Inventory: August 15, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	9.55E+3	1.3E+4	0.735
		HC3 Ratio Sum	**0.735**

Table 7 Isotopic Inventory for TA-3-102

Descriptor: RAM machine shop

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	3E+3	1.3E+4	0.231
		HC3 Ratio Sum	**0.231**

Table 8 Isotopic Inventory for TA-3-159

Descriptor: Sigma Thorium Building

Division: MST

Responsible FM/FMU: L. Woodrow/73

RAM Accountability Procedure: MST-FOM-AP-0310, *MST Field Operations Manual for Radionuclide Inventory Management*

Date of Inventory: August 15, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Th-232	2.43E+5	9.1E+5	0.267
		HC3 Ratio Sum	**0.267**

Table 9 Isotopic Inventory for TA-3-169

Descriptor: Sigma Thorium Building

Division: MST

Responsible FM/FMU: L. Woodrow/73

RAM Accountability Procedure: MST-FOM-AP-0310, *MST Field Operations Manual for Radionuclide Inventory Management*

Date of Inventory: August 15, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	1.18E+3	1.3E+4	0.091
		HC3 Ratio Sum	**0.091**

Table 10 Isotopic Inventory for TA-3-1698

Descriptor: Material Science Lab

Division: MST

Responsible FM/FMU: L. Woodrow/73

RAM Accountability Procedure: MST-FSP-PAC-5304, *Facility Safety Plan for the Material Science Complex*

Date of Inventory: August 15, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Empty			0.000
		HC3 Ratio Sum	**0.000**

Table 11. Isotopic Inventory for TA-3-1819

Descriptor: Material Science Lab

Division: MST

Responsible FM/FMU: L. Woodrow/73

RAM Accountability Procedure: MST-FSP-PAC-5304, *Facility Safety Plan for the Material Science Complex*

Date of Inventory: August 15, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Empty			0.00
		HC3 Ratio Sum	**0.00**

Table 12. Isotopic Inventory for TA-8-22

Descriptor: Radiography

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	4.8E+1	1.3E+4	0.004
		HC3 Ratio Sum	**0.004**

Table 13. Isotopic Inventory for TA-8-70

Descriptor: NDT&E

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	4.70E+1	1.3E+4	0.004
Th-232	0	9.1E+2	0.000
		HC3 Ratio Sum	**0.004**

Table 14. Isotopic Inventory for TA-8-120

Descriptor: Radiography

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
Empty			
		HC3 Ratio Sum	**0.000**

Table 15. Isotopic Inventory for TA-11-30

Descriptor: Vibration testing

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Empty			
		HC3 Ratio Sum	**0.000**

Table 16. Isotopic Inventory for TA-15-R183

Descriptor: Vault

Division: DX

Responsible FM/FMU: T. Alexander/67

RAM Accountability Procedure: PRO-DX-001 and PRO-DX-009

Date of Inventory: August 26, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
U-238 (DU)	7.38E+5	1.3E+7	0.057
		HC3 Ratio Sum	**0.057**

Table 17. Isotopic Inventory for TA-16-88

Descriptor: Component storage

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	6.26E+2	1.3E+4	0.048
Th-232	0	9.1E+2	0.000
		HC3 Ratio Sum	**0.048**

Table 18. Isotopic Inventory for TA-16-202

Descriptor: Laboratory

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
U-238 (DU)	0.0E+0	1.3E+7	0.000
H-3	0.0E+0	1.6E+0	0.000
		HC3 Ratio Sum	**0.000**

Table 19. Isotopic Inventory for TA-16-207

Descriptor: Component testing

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	5.4E+1	1.3E+4	0.004
Th-232	0	9.1E+2	0.000
		HC3 Ratio Sum	**0.004**

Table 20. Isotopic Inventory for TA-16-300

Descriptor: Component storage

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	0	1.3E+4	0.000
Th-232	0	9.1E+2	0.000
		HC3 Ratio Sum	**0.000**

Table 21. Isotopic Inventory for TA-16-301

Descriptor: Component storage

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	2.3E+1	1.3E+4	0.002
		HC3 Ratio Sum	**0.002**

Table 22. Isotopic Inventory for TA-16-302

Descriptor: Component storage/training

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	3.91E+2	1.3E+4	0.030
Th-232	0	9.1E+2	0.000
		HC3 Ratio Sum	**0.030**

Table 23. Isotopic Inventory for TA-16-332

Descriptor: Component storage

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	5.113E+3	1.3E+4	0.393
Th-232	1.50E+2	9.1E+2	0.165
		HC3 Ratio Sum	**0.558**

Table 24. Isotopic Inventory for TA-16-410

Descriptor: Assembly building

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	1.94E+2	1.3E+4	0.015
Th-232	0	9.1E+2	0.000
		HC3 Ratio Sum	**0.015**

Table 25. Isotopic Inventory for TA-16-411

Descriptor: Assembly building

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Materials*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	4.0E+0	1.3E+4	0.000
Th-232	0	9.1E+2	0.000
		HC3 Ratio Sum	**0.000**

Table 26. Isotopic Inventory for TA-21-5

Descriptor: Laboratory building

Division: FWO

Responsible FM/FMU: D. McLain/64

RAM Accountability Procedure: FM Standing Order

Disposition: D&D

Date of Inventory: Not applicable

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Fixed low level residual radiation. No new RAM allowed per FM standing order.			
		HC3 Ratio Sum	**NA**

Table 27. Isotopic Inventory for TA-33-86

Descriptor: High-pressure tritium facility

Division: FWO

Responsible FM/FMU: D. McLain/64

RAM Accountability Procedure: FM Standing Order

Disposition: D&D

Date of Inventory: Not applicable

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
Entrained tritium in confinement system piping that is open to the atmosphere. No new RAM allowed per FM standing order.			
		HC3 Ratio Sum	NA

Table 28. Isotopic Inventory for TA-35-2

Descriptor: Nuclear safeguards research

Division: NIS

Responsible FM/FMU: P. Bussolini/75

RAM Accountability Procedure: NIS-5-99-01, *Radioactive Sealed Source Control and Accountability*

Date of Inventory: August 8, 2002

Isotope	Inventory (Ci)	1027 HC3 TQ (Ci)	HC3 Ratio
Am-241	1.32E-1	5.20E-1	0.254
Ba-133	3.42E-3	1.10E+3	0.000
Cd-109	1.65E-4	1.80E+2	0.000
Cm-244	3.80E-5	1.04E+0	0.000
Cs-137	5.24E-4	6.00E+1	0.000
Np-237	4.00E-6	4.20E-1	0.000
Pu-238*	5.55E-3	3.60E-2	0.154
Pu-239*	1.49E+0	8.40E+0	0.177
Pu-240*	2.83E-1	2.28E+0	0.124
Pu-241*	1.97E-2	3.10E-1	0.064
Pu-242*	2.20E-2	1.58E+2	0.000
Sr-90	2.28E-2	1.60E+1	0.001
Tc-99	8.50E-2	1.70E+3	0.000
Th-228	6.31E-6	1.00E+0	0.000
Th-232	5.62E-4	1.00E-1	0.006
U-235*	1.81E+3	1.90E+6	0.001
U-238*	2.42E+4	1.30E+7	0.002
		HC3 Ratio Sum	**0.783**

Note *: U and Pu isotopes are in gram unit

Table 29. Isotopic Inventory for TA-35-27

Descriptor: Nuclear safeguards research

Division: NIS

Responsible FM/FMU: P. Bussolini/75

RAM Accountability Procedure: NIS-5-99-01, *Radioactive Sealed Source Control and Accountability*

Date of Inventory: August 8, 2002

Isotope	Inventory (Ci)	1027 HC3 TQ (Ci)	HC3 Ratio
H-3	2.91E+0	1.60E+4	0.000
Cf-252	2.09E-2	3.20E+0	0.007
Am-241	3.88E-2	5.20E-1	0.074
Cs-137	2.84E-3	6.00E+1	0.000
Pu-238*	5.18E-4	3.60E-2	0.014
Pu-239*	4.58E-1	8.40E+0	0.054
Pu-240*	5.27E-2	2.28E+0	0.023
Pu-241*	3.31E-3	3.10E-1	0.010
Pu-242*	1.50E-2	1.58E+2	0.000
Ra-226	4.43E+0	1.20E+1	0.369
U-235*	9.96E+3	1.90E+6	0.005
U-238*	1.39E+6	1.30E+7	0.106
		HC3 Ratio Sum	**0.662**

Note *: Pu and U isotopes are in gram units

Table 30. Isotopic Inventory for TA-36-1

Descriptor: Calibration lab and offices

Division: Responsible FM/FMU: S. Helmick/71

RAM Accountability Procedure: HSR-4-SOP-07, *Safe Operating Procedure for the Central Health Physics Calibration Facility*

Date of Inventory: September 3, 2002

Isotope	Activity (Ci)	1027 HC3 TQ (Ci)	HC3 Ratio
Am-241	1.13E-5	5.2E-1	0.000
Gd-148	4.2E-8	8.2E-2	0.000
Ba-133	2.08E-6	1.1E+3	0.000
C-14	1.6E-7	4.2E+2	0.000
Cl-36	4.79E-7	3.4E+2	0.000
Cs-137	7.76E-5	6.0E+1	0.000
I-129	1.03E-7	6.0E-2	0.000
Na-22	1.36E-6	2.4E+2	0.000
Pm-147	1.14E-7	1.00E+3	0.000

Isotope	Activity (Ci)	1027 HC3 TQ (Ci)	HC3 Ratio
Pu-238	7.00E-8	6.2E-1	0.000
Pu-239	3.97E-6	5.2E-1	0.000
Ra-226	9.00E-10	1.20E+1	0.000
Sr-90	4.54E-5	1.6E+1	0.000
Tc-99	2.92E-7	1.7E+3	0.000
Tl-204	4.00E-8	1.20E+3	0.000
H-3	2.00E+1	1.6E+4	0.001
U-235	6.00E-9	4.2E+0	0.000
		HC3 Ratio Sum	**0.001**

Table 31. Isotopic Inventory for TA-36-214

Descriptor: Calibration lab and offices

Division: Responsible FM/FMU: S. Helmick/71

RAM Accountability Procedure: HSR-4-RIC-SOP-06, *Central Health Physics Calibration Facility Safe Operating Procedure, (Sec. 8)*

Date of Inventory: September 3, 2002

Isotope	Activity (Ci)	1027 HC3 TQ (Ci)	HC3 Ratio
Pm-147	1.58E-3	1.00E+3	0.000
Tl-204	1.20E-4	1.20E+3	0.000
Sr-90	4.65E-3	1.6E+1	0.000
Cs-137	1.28E-4	6.0E+1	0.000
		HC3 Ratio Sum	**0.000**

Table 32. Isotopic Inventory for TA-37-10

Descriptor: Storage magazine

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Material*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	8.60E+3	1.3E+4	0.662
		HC3 Ratio Sum	**0.662**

Table 33. Isotopic Inventory for TA-37-14

Descriptor: Storage magazine

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Material*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	8.79E+3	1.3E+4	0.676
		HC3 Ratio Sum	**0.676**

Table 34. Isotopic Inventory for TA-37-16

Descriptor: Storage magazine

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Material*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	8.28E+3	1.3E+4	0.637
		HC3 Ratio Sum	**0.637**

Table 35. Isotopic Inventory for TA-37-24

Descriptor: Storage magazine

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Material*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	8.80E+3	1.3E+4	0.677
		HC3 Ratio Sum	**0.677**

Table 36. Isotopic Inventory for TA-37-25

Descriptor: Storage magazine

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Material*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	8.77E+3	1.3E+4	0.675
		HC3 Ratio Sum	**0.675**

Table 37. Isotopic Inventory for TA-41-1

Descriptor: Underground vault

Division: ESA

Responsible FM/FMU: B. Grace/70

RAM Accountability Procedure: ESA-WMM-AP-04, *Material Control and Physical Inventory of Nuclear Material*

Date of Inventory: September 24, 2002

Isotope	Mass (kg)	1027 HC3 TQ (kg)	HC3 Ratio
U-238 (DU)	0	1.3E+4	0.000
Th-232	0	9.1E+2	0.000
		HC3 Ratio Sum	**0.000**

Table 38. Isotopic Inventory for TA-43-1

Descriptor: Bio/Chem Lab

Division: B

Responsible FM/FMU: R. Crook/72

RAM Accountability Procedure: B-PRO-001, *Procedure for Receipt of Radioactive Material at HRL*

Date of Inventory: September 16, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
C-14	2.24E-3	9.40E+1	0.000
		HC3 Ratio Sum	**0.000**

Table 39. Isotopic Inventory for TA-53-945

Descriptor: RLW treatment

Division: LANSCE

Responsible FM/FMU: D. Seely/61

RAM Accountability Procedure: SOP-RLW-002, Rev. 3, *Procedures for TA-53 Radioactive Liquid Waste System: Emergency, Operations, Maintenance, and Sampling*

Date of Inventory: September 24, 2002

Isotope	Activity(Ci)	1027 HC3 TQ (Ci)	HC3 Ratio
H-3	5.8E-2	1.6E+4	0.000
P-32	9.9E-4	1.2E+1	0.000
Co-58	4.5E-8	9.0E+2	0.000
Gd-148	1.2E-4	8.2E-2	0.001
Yb-166	1.4E-2	8.4E+2	0.000
Lu-170	3.1E-2	5.0E+2	0.000
Lu-171	2.3E-3	1.4E+3	0.000
Hf-172	2.2E-2	9.4E+1	0.000
Lu-172	4.8E-3	4.8E+2	0.000
Hf-175	1.4E-2	2.0E+3	0.000
W-181	1.5E-1	1.3E+4	0.000
Ta-182	4.9E-2	6.2E+2	0.000
W-185	9.0E-2	1.4E+3	0.000
U-234	8.3E-6	4.2E+0	0.000
U-235	1.9E-7	4.2E+0	0.000
U-238	1.6E-7	4.2E+0	0.000
Pu-238	4.6E-6	6.2E-1	0.000
Pu-239	2.2E-6	5.2E-1	0.000
Am-241	8.0E-6	5.2E-1	0.000
		HC3 Ratio Sum	**0.001**

Table 40. Isotopic Inventory for TA-53-954

Descriptor: Radioactive liquid waste basins

Division: LANSCE

Responsible FM/FMU: D. Seely/61

RAM Accountability Procedure: SOP-RLW-002, Rev. 3, *Procedures for TA-53 Radioactive Liquid Waste System: Emergency, Operations, Maintenance, and Sampling*

Date of Inventory: September 24, 2002

Isotope	Activity (Ci)	1027 HC3 TQ (Ci)	HC3 Ratio
H-3	5.8E-2	1.6E+4	0.000
Co-58	4.5E-8	9.0E+2	0.000
Lu-170	3.1E-2	5.0E+2	0.000
Hf-172	2.2E-2	9.4E+1	0.000

Isotope	Activity (Ci)	1027 HC3 TQ (Ci)	HC3 Ratio
Hf-175	1.4E-2	2.0E+3	0.000
W-181	1.5E-2	1.3E+4	0.000
		HC3 Ratio Sum	**0.000**

Table 41. Isotopic Inventory for TA-54-412

Descriptor: Radioactive waste compactor (DVRS)

Division: FWO

Responsible FM/FMU: D. McLain/64

RAM Accountability Procedure: DOP-WFM-001, *DVRS Process Operation*

Date of Inventory: September 24, 2002

Isotope	Mass (g)	1027 HC3 TQ (g)	HC3 Ratio
None			
		HC3 Ratio Sum	NA

Attachment 2

Response/Resolution of NNSAComments on LANL's Radiological Facilities Inventory of Radioactive Material

No.	Page	Section/Para/Line	Reviewer Comment	Response/Resolution
1	1	List of LANL RF's	Observation: The table descriptors are inconsistent with the descriptor provided by the Facility Manager (FM). Example; table 3 states 'Cryogenics Bldg. B' and the FM's ' Condensed matter and Thermal Physics'. This inconsistency can be found for table 3,7,9,11,12,17,and 41. Action; use consistent terminology.	Revised descriptors to be consistent with each other.
2	1	List of LANL RF's	Observation: the tables' Disposition/Note are not consistent with that provided by the FM. Example; table 9 states 'Multiple isotope samples' and the FM's is 'Empty' This inconsistency can be found for table 3,4,10,11,14,and 15. Action; correct the difference.	The subject buildings will be used for the purpose Noted when needed. No RAM was stored at the time of inventory.
3	1	List of LANL RF's	Observation: the observation items No.1 and No. 2, listed above, have been incorporated into the LANL List of Radiological Facility (RF) attached to LOS ALAMOS NATIONAL LABORATORY RADIOLOGICAL FACILITY LIST, PS-OAB-403, Rev. 1 Action: correct the RF's list using the information obtained from the completion of observation items No. 1 and 2.	See 1 & 2 above
4	8	Table 20	Observation: the header states 1027 HC3 TQ (g) while the threshold values listed are in (kg). No impact on the HC3 ratio Action; list the required 1027 TQ values in (g)	Corrected, changed "g" to read "kg".
5	9	Table 23	Observation; the header states 1027 HC3 TQ (g) while the threshold values for U-238 and Th-232 listed are in (kg). Using the inventory mass values listed (g) and the correct 1027 values in (g) shown in Bold then;	All numbers are in Kg units. Table heading has been corrected. HC3 ratios as reported is still correct.

Attachment 2

Response/Resolution of NNSAComments on LANL's Radiological Facilities Inventory of Radioactive Material

No.	Page	Section/Para/Line	Reviewer Comment	Response/Resolution
			Isotope, Inventory Mass(g), 1027 HC3 TQ (g), HC3 Ratio U-238, 5.113E+3, **1.3 E+7**, **0.000393** Th-232, 1.5E+2 , 9.1E+5 **0.000165** HC# RATIO SUM **0.000558** Because of the obvious errors with the TQ values from 1027 there is no confidence that the Mass values listed under Inventory column are correct, therefore revise the whole table.	
6	11	Table 28	Observation; the header states 1027 HC3 TQ (Ci) while the TQ values listed are not correct for Pu-238, 239,240,241, Pu-242, U-235 and U-238, they appear to be stated in grams. Using the inventory mass values listed (Ci) and the correct 1027 values in (Ci) shown in Bold below then; Isotope , Inventory (Ci), 1027 HC3TQ(Ci), HC3 Ratio Am –241 1.32E-1 5.2E-1 0.254 Ba-133 3.42E-3 1.1E+3 0.000 Cd-109 1.65E-4 1.8E+2 0.000 Cm-244 3.8E-5 1.04E+1 0.000 Cs-137 5.24E-4 6.00E+1 0.000 Np-237 4.00E-6 4.2E-1 0.000 Pu-238 5.55E-3 **6.2E-1** **0.0089** Pu-239 1.49E+0 **5.2E-1** **2.865** Pu-240 2.83E-1 **5.2E-1** **0.5442** Pu-241 1.97E-2 **3.2E+1** **0.0006** Pu-242 2.20E-2 **6.2E-2** **0.0354** Sr-90 2.28E-2 1.6E+1 0.000 Tc-99 8.5E-2 1.7E+3 0.000 Th-228 6.31E-6 **1.0E+00** 0.000 U-235 1.81E+3 **4.2E+00** **4.30E+2** U-238 2.42E+4 **4.2E+00** **5.762E+3** **HC3 Ratio Sum** **6.2E+3**	All Pu and U isotopes are reported in grams and a footnote has been added to note this fact at the bottom of the table. HC3 Ratio as reported is correct and no "unidentified HC3 facility" exists.

Attachment 2

Response/Resolution of NNSAComments on
LANL's Radiological Facilities Inventory of Radioactive Material

No.	Page	Section/Para/Line	Reviewer Comment	Response/Resolution
			The errors in the Table raise a concern that TA-35-2 may be an **unidentified HC3** facility. Because of the obvious errors with the TQ values from 1027 there is no confidence that the Mass values listed under Inventory column are correct, therefore revise the whole table.	
7	12	Table 29	Observation; the header states the 1027 HC3 TQ (Ci), while the TQ values listed are not correct for Pu-238, 239, 240, 241, Pu-242, U-235 and U-238, they are in (g). Using the inventory mass values listed (Ci) and the correct 1027 values in (Ci) shown in Bold below then; Isotope , Inventory (Ci), 1027 HC3 TQ (Ci), HC3 Ration H-3 2.91E+0 **1.6E+4** **0.000** Cf-252 2.09E-2 3.2E+0 0.007 Am-241 3.88E-2 5.2E-1 0.074 Cs-137 2.84E-3 6.00E+1 0.000 Pu-238 5.18E-4 **6.2E-1** **0.000** Pu-239 4.58E-1 **5.2E-1** **0.881** Pu-240 5.27E-2 **5.2E-1** **0.101** Pu-241 3.31E-3 **3.2E+1** **0.000** Pu-242 1.5E-2 **6.2E-1** **0.024** Ra-226 4.43E+0 1.20E+1 0.369 U-235 9.96E+3 **4.2E+00** **2.37E+3** U-238 1.39E+6 **4.2E+00** **3.31E+5** HC3 Ratio Sum **3.312E+5** The errors in the Table raise a concern that TA-35-27 may be an **unidentified HC3** facility. Because of the obvious errors with the TQ values from 1027	The H-3 TQ has been corrected. All Pu and U isotopes are reported in grams. The HC3 ratio has been changed from 0.665 to 0.662 due to H-3 isotope. A footnote has been added at the bottom of the table.

Attachment 2

Response/Resolution of NNSAComments on LANL's Radiological Facilities Inventory of Radioactive Material

No.	Page	Section/Para/Line	Reviewer Comment	Response/Resolution
			there is no confidence that the Mass values listed under Inventory column are correct, therefore revise the whole table.	
8	14-15	Table 35 and 36	The Inventory/Hazard Category 3 (HC3) ratios for separate facilities within close proximity approach unity. The proximity of storage magazines within TA-37, with radioactive material inventories approaching unity, may be as close as a few hundred feet. For example, storage magazines 24 and 25 are within approximately 200 feet of one another and have HC3 ratios of 0.677 and 0.675, respectively. DOE-STD-1027-92 states: "...the standard permits the concept of facility segmentation provided the hazardous material in one segment could not interact with hazardous materials in other segments..." Common cause evaluation basis accidents need to be carefully evaluated to ensure that the hazard categorization was appropriately applied for this facility as well as others. The use of segmentation per DOE-STD-1027-92 should be evaluated carefully to ensure that the hazard categorization can be supported.	In accordance with ESA practices, bulk DU and bulk HE are not stored together in these magazines. Hence, segmentation for these facilities is believed to be defensible under the worst case situation due to facility design and form of DU (solid non-dispersible). However, the segmentation issue will be re-visited as a part of resolving non-nuclear hazard categorization issues raised in the NNSA memorandum, SABT:3DN-008 (April 25, 2002)."

S = Suggested comment.
R = Required comment (comment must be addressed).

Appendix D: DOE 2005 Pollution Prevention Awards for LANL

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1	Replacement of Beryllium-Copper Snap Ring	A team from ESA and X Divisions found a non-hazardous substitute for a particular type of snap ring they used for shipping. The original snap ring contained beryllium, and the beryllium dust that was generated during strength testing posed safety risks to employees. The new snap ring is made of stainless steel, and many of the safety precautions used during testing of the beryllium-containing snap rings are no longer necessary.
2	Sample Volume Reduction by Recharacterization	Personnel at TA-54 compiled extensive documentation for a particular drum containing a large assortment of unlabeled vials. Without this documentation, each container would have required individual sampling and analytical results for a wide variety of components. The sampling would have taken several days of effort by multiple technicians, generated waste, and would have cost an estimated $500,000. Instead the team determined all possible constituents so that individual sampling was not required to ship the drum for disposal.
3	Waste Reduction by Information Mining	Five drums of legacy waste at TA-54 contained old vacuum pumps that had been coated with a hard, asphalt emulsion. There was speculation that these vacuum pumps contained some quantity of elemental mercury, meaning that treatment would be very difficult and expensive. The original plan was to melt the asphalt off the vacuum pumps so that the mercury could be removed, but this plan would have generated a lot of additional waste materials during the process. The team found documentation that the mercury had been drained by the generator prior to disposal. Savings on treatment of those five drums is an estimated $138,000.
4	EMS Design Elements to Projects	KSL is participating in the Environmental Management System process along with the Los Alamos National Laboratory, even though there is no requirement for KSL to do so. By identifying their environmental aspects of operation, KSL can identify pollution prevention opportunities to optimize processes and increase overall efficiency. Particular targets include waste minimization and improved chemical management.
5	Pueblo Complex Waste Minimization and Recycling	William Smith and Samuel Martinez provide operational support to ENV-ECR, and they have gone above and beyond ordinary work responsibilities to increase recycling efforts at the Pueblo Complex. Most recently they placed four large bins in the hallways of the Pueblo Complex to collect recyclable material for the MS A1000 program. William and Samuel collect this material and package it themselves to ensure that the material gets appropriately recycled.
6	Halon Reuse and Refrigerant Reclamation	KSL collected halon from fire extinguishers around LANL and sent about 4000lb to the Department of Defense for reuse. About 8700lb of the halon went to a company called Pure Chem, Inc. in Texas for reclamation and resale. Altogether, LANL avoided disposal of over 12,000lb of resources that were beneficially recovered instead.

7	Increase in KSL's Purchases with Recycled Content	Affirmative procurement is a program in which Federal agencies purchase specific types of items that are manufactured with some recycled materials. During FY2004, KSL increased its percentage of affirmative procurement purchases to 92% from their previous high of 87%.
8	Brass Key and Core Handling	When new locks are installed and keys are changed out, the old brass locks and keys must be securely handled so that there is no chance any of the keys or cores could get stolen. Due to a shortage of disposal space at TA-54, the keys and cores could not be buried as they had in the past. KSL worked with MST and S Divisions to find a new disposal path. MST was able to smelt all of the brass keys and lock cores to eliminate the potential security risk.
9	Recyclex Turf Reinforcement Mat	KSL and NWIS-UI personnel used approximately 6400 square feet of Recyclex mat at the WTA Road Project to reduce erosion near the roadbed. The Recyclex mat is made of 100% recycled polyester that was derived from old soda bottles. Using the Recyclex mat instead of an equivalent mat manufactured from virgin materials saved approximately 440lb of resources.
10	Waste Characterization Savings in 2004	NWIS-SWO, Duratek, and Aurora Technical Services discovered that a portion of the soil samples taken from a project at TA-39 had been incorrectly characterized as mixed low-level waste, which is one of the most expensive waste types to handle. By correctly reclassifying these soil samples as non-hazardous waste, LANL saved over $172,000 in disposal costs.
11	Elimination of a Hazardous Waste Stream Using Silver Recovery	ESA-AET installed a silver recovery unit on its film-processing operations in two locations at TA-8. Once the silver is removed from the spent photographic fixer, the resulting liquid is no longer hazardous. The silver recovery units will prevent approximately 500 gallons of hazardous waste annually and will allow the silver to be recovered for future use.
12	RCRA Hazardous Waste Labels for Lithium Batteries	A team from NMT-1 and HSR-1 developed a label for lithium batteries that are provided by the TA-55 warehouse. The label explains to users that these lithium batteries cannot be thrown away in the trash and must be handled as hazardous waste. Any hazardous material that gets mistakenly thrown away in the trash is a potential safety risk to workers and has the potential to leach hazardous chemicals into the environment. The lithium battery labels reduce the chance of hazardous materials being mishandled and reduce overall liability for LANL.
13	SM-30 Mail Room Support for Recycling and Pollution Prevention	Since 2000, the SM-30 mailroom employees have been instrumental in the success of LANL's MS A1000 recycling program for mixed paper, transparencies, and toner cartridges. This past year the mailroom also began to collect binders for delivery to Salvage so the binders can be reused by LANL employees or auctioned. The MS A1000 program diverts approximately 200 metric tons of material annually from the landfill.

14	Metal Molds for Plutonium Aliquot Production	Metal aliquot molds made out of tantalum will replace graphite molds currently used in the production of plutonium aliquots for pit manufacturing. This replacement eliminates the graphite waste of approximately 200lb annually. The reusable tantalum molds will save workers about 140 hours per year. Overall annual savings total $250,000.
15	Doing What it Takes! Low-Level Waste Minimization	A team from LANSCE and NWIS-SWO developed a method for cutting apart bottles of resin for filtering water so that the resin could be tested for contamination. Since the bottles couldn't be opened in the past, the contents had to be considered low-level waste. Now that the resin can actually be tested, most of the waste resin has been found to be non-hazardous, and the non-hazardous metal bottles can be recycled.
16	Reuse of Containers	200 stainless steel containers that did not meet specifications for special nuclear material storage were used instead to repackage low-level waste. By using these existing containers instead of purchasing new ones, LANL saved about $100,000. An additional $10,000 was avoided because the existing containers had enough shielding to make secondary containers unnecessary, and about 500 cubic feet of low-level waste was avoided this way.
17	Reclamation of Detector Tubes	Members of FWO-SWO sent 419 detector tubes containing helium and argon back to Reuter Stokes, the manufacturer, for reclamation instead of disposing of the tubes as hazardous waste. The team saved LANL approximately $60,000 by choosing reclamation over disposal.
18	Save the Ozone; Reduce the Waste	A team from NMT and N Divisions are replacing compressor unit coolers that contain ozone-depleting refrigerants with thermoelectric coolers. The thermoelectric coolers have longer lifetimes than the compressor units and they do not use any refrigerant gases. In addition to reducing impact on the ozone layer, less mixed low-level waste will ultimately be generated since the thermoelectric coolers will not need replacement as frequently.
19	Minimization Efforts for Low-Level Waste at LANSCE	During a waste segregation project at LANSCE, a team from NWIS and HSR Divisions sorted out approximately 3150 cubic feet of material that had been incorrectly assumed to be low-level waste in the past and packaged the remaining material more efficiently. There was an overall 57% waste volume reduction from this project and avoided waste disposal costs of approximately $45,000.
20	LANSCE Lead Waste Minimization and Recycle Project	The LANSCE waste management team surveyed, packaged, and shipped over 210,000lb of lead for recycle. The remaining lead stockpile was repackaged in plastic wrapping to minimize generation of lead-contaminated debris. By reducing the lead stockpile by over 80%, there will be fewer potential health, safety, and environmental impact risks.

21	Environmental Liability Reduction Through Removal of Moratorium Metal	LANSCE accumulated 14 roll-off bins of metal as a result of facility upgrades. Having this material onsite represented a potential environmental liability, so the LANSCE waste management team shipped the material to Duratek, a metal processing facility in Oak Ridge, Tennessee. Some of this metal was turned into waste containers that can be used by the DOE complex.
22	Sustainable Design Section Now in LANL Engineering Standards	A new section in the Engineering Standards Manual for LANL was created to centralize sustainable design requirements and guidance. The new section affects the construction of new buildings and major renovations of existing buildings. These changes will allow LANL to better meet DOE expectations for improving energy efficiency and pollution prevention through improved construction.
23	HAZMAT Team Assists with LA County Household Hazardous Waste Event	The LANL HAZMAT team voluntarily assisted with the Los Alamos County Household Hazardous Waste collection event. Having the emergency response team on site provides additional safety for the workers and residents who are delivering items. The HAZMAT Team contributed to the successful event in which Los Alamos County collected over 12,000lb of household hazardous waste from its residents.
24	Reduction of Transuranic Waste Through Use of Replacement Furnace Elements	In the past, the Carbolite processing furnaces inside glove boxes at TA-55 had to be completely replaced when the furnace elements burned out. Now these furnaces use replaceable elements, reducing the amount of transuranic waste generated by 83% and waste disposal costs by $30,000 annually. The furnace elements are also easier to install and reduce potential risks to employees.
25	Environmental Commitment by AA-2 and AA-4	AA-2 and AA-4 have taken full advantage of all LANL recycling programs and established an office supply reuse area. The office supply reuse area has reduced the quantity of supplies that they need to order from the JIT catalog.
26	Environmentally Friendly Metallographic Preparation Technique for Uranium Alloys	Some of the chemicals used in the traditional process for preparing uranium alloys contain regulated metals and therefore pose potential environmental risks and require special handling and disposal. MST-6 developed a new procedure that only uses two types of chemicals that do not contain regulated metals. Since fewer, less-toxic chemicals are required, the procedure is safer for employees.
27	Green Commitment by Aramark	ARAMARK switched to a dishwasher that uses less water and energy than the previous model. ARAMARK is recycling large amounts of cardboard and continuously using less Styrofoam for food packaging and serving. ARAMARK also tries to provide drinks in plastic bottles whenever possible since plastic is easier to recycle than glass.
28	Asphalt Millings Erosion Control Berm	KSL and PM Division constructed a new erosion-control berm that is composed of 100% recycled asphalt. The asphalt came from a stockpile generated at LANL from various road resurfacing projects. If the berm had been built from soil, more labor, stabilization, and about 100 cubic feet of materials would have been required.

29	Electronic Business Card Media	LANL has switched to electronic media for much of its recruitment efforts. Instead of paper folders, brochures, and handouts, potential employees are given a business card sized CD that contains all of the same information. The use of this electronic media has reduced the use of paper recruiting materials by 25-40%.
30	Compactability of Low-level Waste	Some of the low-level waste generated at LANL can be compacted so that disposal requires less space. Glass, however, cannot be compacted since broken glass poses a safety hazard. Richard Salazar of NMT-2 orders chemicals in plastic containers whenever possible. The cost for disposing of compactable low-level waste is only half of the cost for non-compactable waste.
31	Glove Box Decontamination Operations	Members of this team decontaminated old glove boxes that were scheduled for removal from TA-55. Originally the glove boxes would have been handled as transuranic waste. Since the glove boxes were decontaminated, however, they could be more easily and less expensively handled as low-level waste. Waste disposal savings for these five glove boxes was over $9,000.
32	Filtration of Aqueous Foam Waste at DX Firing Sites	The Hydrotest Program uses aqueous foam to mitigate particulate dispersion from explosives tests and prevent hazardous and radioactive materials from entering the environment. As collected, the foam could not be treated at the Radioactive Liquid Waste Treatment Facility, and solidification of the waste would have generated a tremendous volume of waste for low-level disposal. The team designed and built a filtration unit that allows the filtered liquid to be disposed at RLWTF while generating a minimal amount of solid waste.
33	Recycling Enthusiasm	Steve Sandoval of the Public Affairs Office is an avid recycler both at the Laboratory and at home. Steve often runs articles on pollution prevention or recycling in the LANL Daily NewsBulletin. Steve is also a board member of the Keep Santa Fe Beautiful program.
34	MST Division Spring Clean-Up	MST & Residents of TA-35 were involved in Spring 2004 clean up events to boost housekeeping efforts and promote recycling. Participants gathered up their A1000 recyclables, wood, metal, salvage items, and cleaned out their offices. Pre-planning and coordination efforts paid off and teams are now forming for another clean up.
35	Sanitary Effluent Recycle Facility	The Sanitary Effluent Recycle Facility can recycle about 100 gallons of water per minute from the sanitary wastewater treatment plant for reuse by the cooling towers of the SCC building and several other buildings. The SERF is expected to reuse approximately 20,000,000 gallons of water.
36	NWIS Clean-Up Efforts at DX Division	During 2004, NWIS Division helped DX Division remove a lot of waste material from the site including 21 truckloads of metal for recycling by Ace Metals, 9 truckloads of material for Salvage, and six bins of waste wood. By cleaning up the site, there were fewer potential environmental and safety hazards.

37	Radioactive Liquid Waste Treatment Facility Chemical Usage Reductions	During 2004, a team at the Radioactive Liquid Waste Treatment Facility installed a controlled carbon dioxide pH adjustment system. Now 100lb of sodium hydroxide and 4 gallons of concentrated sulfuric acid per month are no longer needed. Annual savings on chemical procurement are over $6500 and savings on avoided waste disposal are approximately $5000.
38	Wood Pallet Recycling	NWIS-SWO Material Recycling Facility crew began a wood recycling program this fiscal year with a local small business. 2235 pallets, 97 sheets of plywood, 76 2x4s, and 7 wood spools were recycled in 2004 instead of going to the landfill. Annually, this project is expected to prevent approximately 10% of the Laboratory?s sanitary waste from ending up at the landfill.
39	Reuse of Hardened De-Icing Salt	Large containers of granular De-Icing salt are placed around TA-55 each winter so that employees can spread salt on the walkways to keep them safe. Despite being stored in plastic containers with lids, the salt accumulates moisture and eventually turns into large chunks that cannot be spread for de-icing. Hundreds of pounds of this unusable salt were going to be disposed as a non-regulated waste. Sheryl worked with facility management to have this salt re-crushed, and it was used for de-icing this past winter. This eliminated a waste stream and saved the cost of purchasing additional salt.

To obtain a copy of the SWEIS Yearbook – 2005, contact Susan Radzinski
Project Lead, ENVP-RRO, P.O. Box 1663, MS K404
Los Alamos, New Mexico 87545.
This 2005 Yearbook is available on the web at:
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Lead Writer: Susan Radzinski
Editor: Hector Hinojosa
Compositor and Printing Coordinator: Hector Hinojosa

Los Alamos
NATIONAL LABORATORY
Los Alamos, New Mexico 87545