SWEIS Yearbook — 2007

LA-UR-09-01653

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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)

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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)
- "SWEIS Yearbook – 2006," LA-UR-07-6628, October 2007 (LANL 2007, http://library.lanl.gov/cgi-bin/getfile?LA-UR-07-6628.htm)
- "SWEIS Yearbook – 2007," LA-UR-09-01653, February 2009 (LANL 2009, http://library.lanl.gov/cgi-bin/getfile?LA-UR-09-01653.htm)

The 2007 Yearbook will present the ninth year of data compiled since the ROD for the LANL SWEIS was issued in September 1999. The Yearbook 2007 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 2007, and, together with the previous editions of the Yearbook, provides trend analysis of these data to assist DOE in its decision-making process.

References

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

Department of Energy, 1999b. "Record of Decision: Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory in the State of New Mexico," *Federal Register*, Volume 64, p 50797. Washington, D.C. September 20, 1999.

Los Alamos National Laboratory, 1999. "SWEIS 1998 Yearbook," Los Alamos National Laboratory report LA-UR-99-6391, Los Alamos, NM. (http://lib-www.lanl.gov/cgi-bin/getfile?00460172.pdf).

Los Alamos National Laboratory, 2000a. "SWEIS Yearbook – 1999," Los Alamos National Laboratory report LA-UR-00-5520, Los Alamos, NM. (http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-00-5520.htm).

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

Los Alamos National Laboratory, 2001. "SWEIS Yearbook – 2000," Los Alamos National Laboratory report LA-UR-01-2965, Los Alamos, NM. (http://lib-www.lanl.gov/la-pubs/00818189.pdf).

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

Los Alamos National Laboratory, 2003. "SWEIS Yearbook – 2002," Los Alamos National Laboratory report LA-UR-03-5862, Los Alamos, NM. (http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-03-5862.htm).

Los Alamos National Laboratory, 2004. "SWEIS Yearbook – 2003," Los Alamos National Laboratory report LA-UR-04-6024, Los Alamos, NM. (http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-04-6024.htm).

Los Alamos National Laboratory, 2005. "SWEIS Yearbook – 2004," Los Alamos National Laboratory report LA-UR-05-6627, Los Alamos, NM. (http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-05-6627.htm).

Los Alamos National Laboratory, 2006. "SWEIS Yearbook – 2005," Los Alamos National Laboratory report LA-UR-06-6020, Los Alamos, NM. (http://lib-www.lanl.gov/cgi-bin/getfile?LA-UR-06-6020.htm).

Los Alamos National Laboratory, 2007. "SWEIS Yearbook – 2006," Los Alamos National Laboratory report LA-UR-07-6628, Los Alamos, NM. (http://library.lanl.gov/cgi-bin/getfile?LA-UR-07-6628.htm).

Los Alamos National Laboratory, 2009. "SWEIS Yearbook – 2007," Los Alamos National Laboratory report LA-UR-09-01653, Los Alamos, NM. (http://library.lanl.gov/cgi-bin/getfile?LA-UR-09-01653.htm).

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Executive Summary

Los Alamos National Laboratory (LANL) operations over the past 10 years have fallen, for the most part, well below Site-Wide Environmental Impact Statement (SWEIS) Record of Decision (ROD) projections. Operation levels that exceeded the SWEIS ROD levels were one time, non-routine events that do not represent the day-to-day operations of the Laboratory. In addition, utility consumption over the past 10 years remained well below levels projected in the SWEIS ROD and has been trending downward. The Laboratory is committed to reducing energy consumption and will continue to make improvements towards that goal in the future. Data for 1998–2007 indicate that positive impacts (such as number of employees) were greater than SWEIS projections, while negative impacts, such as radioactive air emissions, were, for the most part, well within the SWEIS environmental envelope.

<u>Background</u>

In 1999, the US Department of Energy (DOE) published a SWEIS for continued operation of LANL. DOE issued a ROD for this document in September 1999.

DOE and LANL implemented a program, the Annual Yearbook, making comparisons between SWEIS ROD projections and actual operations data. The Yearbook provides DOE/National Nuclear Security Administration (NNSA) 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 2007, 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/NNSA 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 1999 SWEIS projections of expanded operations.

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 were to routinely exceed the operating envelope, DOE would evaluate the need for a new SWEIS. As long as operations remain below the level analyzed in the SWEIS, 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.

Current Results

The 2007 Yearbook represents the first full year of operations data reported since LANL transitioned from the University of California (UC) to Los Alamos National Security, LLC (LANS). LANS, a team formed by the UC, Bechtel, BWX Technologies, and Washington Group International, currently operates LANL for the DOE and the NNSA. In addition to the change in management, major reorganization also occurred during CY 2006, resulting in the formation, renaming, and/or dissolving of various LANL groups, divisions, and directorates.

This Yearbook also represents the 10-year period that DOE evaluated cumulative impacts associated with LANL operations. This will be the last Yearbook based on the preferred alternative described in the 1999 SWEIS ROD. A new ROD is expected to be issued in CY 2008 based on alternatives analyzed in the new SWEIS.

The 2007 Yearbook addresses 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 2007, the types and levels of operations that occurred during 2007, and the 2007 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 2007, no new construction occurred at the 15 Key Facilities. At the Non-Key Facilities, one major construction project, the Ski-Hill By-pass Road was completed in 2007. Construction of the new Los Alamos Site Office building continued in 2007. The Security Perimeter Project was completed in 2006; however, the Vehicle Access Portals began operating in January 2007.

The ROD projected a total of 38 facility construction and modification projects for LANL. Twenty projects have been completed: six in 1998, eight in 1999, two in 2000, and four in 2002. The numbers 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 project 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 serves the TA-3-1837 cooling towers, was included in the new NPDES permit issued by the US Environmental Protection Agency on December 29, 2000. From January through July 2007, LANL had 21 outfalls regulated under the NPDES permit. The permit was renewed with an effective date of August 2007 and now includes 15 outfalls. In 2007 all 15 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 the chemical reporting system. The 2007 chemical usage amounts were extracted from LANL's 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 2007. Appendix A includes 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. The most recent report is "Emissions Inventory Report Summary for Calendar Year 2008."

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

- 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, and
- transfer of part of the Characterization of Materials Capability from Sigma to the Target Fabrication Facility (TFF) in 2001 then back to Sigma in 2006 and 2007 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 2007, 79 capabilities were active. The 17 inactive capabilities were the Cryogenic Separation and Thin Film Loading 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); Waste Retrieval, Size Reduction, and Other Waste Processing at the Solid Radioactive and Chemical Waste Facilities; and of the nine TA-18 capabilities (Dosimeter Assessment and Calibration, Detector Development, Materials Testing, Sub Critical 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 2,912 hours in 2007, at an average current of 198.2 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 two of LANL's facilities operated during 2007 at levels approximating those projected by the ROD—the Materials Science Laboratory (MSL) and the Non-Key Facilities. The MSL Key Facility is more akin to the Non-Key Facilities and represents 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 14 Key Facilities all conducted operations at or below projected activity levels.

This 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. In addition to the annual comparison of data, additional comparisons and trends were added to Chapter 4 to provide a comprehensive overview of the SWEIS projections compared to actual LANL operating parameters over 10 years.

Since 1998, LANL's radioactive stack emissions have not exceeded 19,100 curies. Radioactive emissions decreased significantly from 2005 to 2007 after an emission control system at LANSCE was repaired. Radioactive airborne emissions from point sources (i.e., stacks) during 2007 totaled approximately 477 curies, approximately 2 percent of the 10-year average of 21,700 curies projected by the ROD.

The number of permitted outfalls has decreased significantly since 1998. As a result of these closures, there has been an overall 56 percent decrease in flow. In addition to the decrease of the total number of permitted outfalls, the change in methodology by which flow was measured and reported in the past has had a significant impact on the flow volumes reported. 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 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. Calculated NPDES discharges totaled 178.23 million gallons for CY 2007 compared to a projected volume of 278 million gallons per year. This is approximately 43.48 million gallons less than the CY 2006 total of 221.70 million gallons, due largely to the change in the number of permitted outfalls. The 2007 total volume of discharge is well below the maximum flow of 278.0 million gallons that was projected in the SWEIS ROD.

Wastes have been generated at levels mostly below quantities projected by the SWEIS ROD. Environmental Remediation and Surveillance Program chemical wastes from 1998–2001 have been generated at levels seven times the SWEIS projection. These wastes result from exhumation of materials placed into the environment during the early history of LANL, which differ from the newly created wastes from routine LANL operations. In addition, low-level radioactive waste (LLW) data from 2000–2007 show that SWEIS projections were exceeded at the Non-Key Facilities due to heightened activities and routine maintenance of aging facilities, however, total LLW volumes with the exception of 2004 remain within SWEIS projections. Mixed LLW (MLLW) generation remains within SWEIS projections. Transuranic (TRU) and mixed TRU waste generation was within the SWEIS ROD projections with one exception in 2003. Due to the Decontamination and Volume Reduction System repackaging of legacy TRU and mixed TRU waste for shipment to the Waste Isolation Pilot Plant, and waste generated through the Offsite Source Recovery Project, SWEIS projections were exceeded. In 2007, waste quantities from 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 2007 ranged from approximately 21 percent of the MLLW projection to about 66 percent of the mixed TRU waste projection.

Since 1998, consumption of gas, water, and electricity has been well below SWEIS ROD projections. The highest peak electricity consumption was 444 gigawatt-hours during 2006 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). The electricity consumption for CY 2007 was 398 gigawatt-hours, which represents 46 gigawatt-hours less than CY 2006. The water consumption for CY 2007 was 332 million gallons, 13 million gallons less than CY 2006. Gas consumption for CY 2007 was 1.13 million decatherms, slightly less than CY 2006.

Radiological exposures to LANL workers are well within the levels projected by the SWEIS ROD. The total effective dose equivalent for the LANL workforce was 158.2 person-rem during 2007, which is considerably lower than the workforce dose of 704 person-rem projected by the ROD.

The size of the workforce has been above ROD projections since 1997. The workforce has increased steadily up to 2005. During 2006 and 2007, the size of the workforce slowly began to decrease. The 11,481 employees at the end of CY 2007 represent 130 more employees than projected and reflect a decrease of 1,283 employees from CY 2006.

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 2007, 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.)

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 1995–2007 period, and water levels in the regional aquifer have continued a gradual decline that started in about 1977. Two additional characterization wells were complete by the end of 2007.

In addition, ecological resources are being sustained as a result of protection afforded by DOE/NNSA 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 over the past 10 years have fallen, for the most part, well below SWEIS ROD projections. Operation levels that exceeded the SWEIS ROD levels were one time, non-routine events that do not reflect the day-to-day operations of the Laboratory. In addition, utility consumption over the past 10 years remained well below levels projected in the SWEIS ROD and has been trending downward. The Laboratory is committed to reducing energy consumption and will continue to make improvements towards that goal in the future. Data for 1998–2007 indicate that positive impacts (such as number of employees) were greater than SWEIS projections, while negative impacts, such as radioactive air emissions, were, for the most part, well within the SWEIS environmental envelope.

Overall, the operations data from 1998–2007 indicate that LANL has been operating within the SWEIS ROD projections and regulatory limits.

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 completed Yearbooks 2001, 2002, and 2003. Ken Rea served as document manager for Yearbooks 2001 and 2002. Susan Radzinski, Risk Reduction Office of the Environmental Protection Division (ENV-RRO), served as document manager for Yearbooks 2003, 2004, and 2005; chief contributor was Marjorie Wright, ENV-RRO. Marjorie Wright, ENV-RRO, served as document manager for the 2006 and 2007 Yearbooks.

Hector Hinojosa provided editorial support and served as the designer and electronic publication specialist. We would also like to thank Brad McKown and Hallie Bare for creating maps and figures. A special thanks to John Isaacson, SWEIS Program Manager, and Jennifer Nisengard, ENV-RRO, for their support and assistance.

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 contributors from each of the Key Facilities and other operations.

Area of Contribution	Contributor
Air Emissions	David Fuehne
Air Emissions	Sonja Salzman
Air Emissions	Walter Whetham
Bioscience (Formerly Health Research Laboratory)	Jim Coy
Bioscience (Formerly Health Research Laboratory)	Jessie Johnson
Chemistry and Metallurgy Research Building	Robert Romero
Cultural Resources	Kari Garcia
Cultural Resources	Bruce Masse
Ecological Resources	Leslie Hansen
Environmental Remediation and Surveillance Program	Shannon Smith
Groundwater	Bob King
High Explosives Processing	Connie Gerth
High Explosives Processing	Bart Olinger
High Explosives Testing	Randy Johnson
Land Resources	Kirt Anderson
Liquid Effluents	Marc Bailey
Liquid Effluents	Terrill Lemke
Liquid Effluents	Sam Loftin
Liquid Effluents	Jake Meadows
Liquid Effluents	Shannon Smith
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Los Alamos Neutron Science Center	Howard Nekimken
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Area of Contribution	Contributor
Materials Science Laboratory	Jim Coy
Materials Science Laboratory	Dee Hoisington
National Pollutant Discharge Elimination System Data	Marc Bailey
Non-Key Facilities–Atlas	Jerry Grindstaff
Non-Key Facilities–National Security Sciences Building	Keith Orr
Non-Key Facilities–Los Alamos Site Office Building	Joe Brophy
Non-Key Facilities–Security Perimeter Project	Mark Harris
Pajarito Site	Steven Long
Plutonium Complex	Harvey Decker
Pollution Prevention Program	Pat Gallagher
Radioactive Liquid Waste Treatment Facility	Leonard Sandoval
Radioactive Liquid Waste Treatment Facility	Chris Del Signore
Radiochemistry Facility	Jim Coy
Radiochemistry Facility	Carol Burns
Radiochemistry Facility	Gary Hagermann
Radiochemistry Facility	Kevin John
Radiochemistry Facility	Jacque McClory
Radiochemistry Facility	Kevin Ott
Sigma	Jim Coy
Sigma	Terry Morrison
Socioeconomics	John Pantano
Solid Radioactive and Chemical Waste Facilities	Leonard Sandoval
Solid Radioactive and Chemical Waste Facilities	Tim Sloan
Solid Radioactive and Chemical Wastes	Tim Sloan
Target Fabrication Facility	Jim Coy
Target Fabrication Facility	Dan O'rourke
Trend Analysis	Kirt Anderson
Trend Analysis	Monica Witt
Tritium Facilities	Suzanne Kitten
Tritium Facilities	Richard Hemphill
Utilities	Jerome Gonzales
Utilities	Jim Haugen
Utilities	Gilbert Mackey
Utilities	Homa Nassiri
Worker Safety/Doses	J. Chris Cantwell
Worker Safety/Doses	Bob Bates

Acronyms

ADEP	Associate Directorate for Environmental Programs
AFCI	Advanced Fuel Cycle Initiative
ALARA	as low as reasonably achievable
AOC	area of concern
ARTIC	Actinide Research and Technology Instruction Complex
bgs	below ground surface
BIO	Basis for Interim Operation
BMP	best management practice
BSL	Biosafety Level
CASA	Critical Assembly and Storage Area
CGP	Construction General Permit
CINT	Center for Integrated Nanotechnology
CMR	Chemical and Metallurgy Research (Building)
COPC	chemicals of potential concern
CY	calendar year
CRT	Cultural Resources Team
D&D	decontamination and demolition
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
DART	Days Away, Restricted, or Transferred
DE	Dynamic and Energetic Materials (Division)
DE-1	Dynamic Experimentation
DOE	US Department of Energy
DSA	Documented Safety Analysis
DTW	depth to water
DVRS	Decontamination and Volume Reduction System
EES	Earth and Environmental Sciences
EISU	Electrical Infrastructure Safety Upgrades
EMS	Environmental Management System
ENV-RRO	Risk Reduction Office
EPA	US Environmental Protection Agency
ER	Environmental Restoration (Project)
ERS	Environmental Remediation and Surveillance (Program)
ETA	Eastern Technical Area
FFCA	Federal Facility Compliance Agreement
FITS	Facility Infrastructure Technical Support (Building)
FTE	full-time equivalent (employee)
FY	fiscal year
HAP	hazardous air pollutant
HEPA	high-efficiency particulate air (filter)
HRL	Health Research Laboratory
HSWA	Hazardous and Solid Waste Amendment
HX	Hydrodynamic Experiments (Division)
IAEA	International Atomic Energy Agency
ITSRs	Interim Technical Safety Requirements
KSL	KBR/Shaw/LATA
kV	kilovolts
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
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
MOX	mixed oxide (fuel)
MSGP	Multi-Sector General Permit

MSGP-2000	2000 NPDES Storm Water MSGP for Industrial Activities
MSL	Materials Science Laboratory
NEPA	National Environmental Policy Act
NFA	no further action
NMED	New Mexico Environment Department
NMSHPD	New Mexico State Historic Preservation Division
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSSB	National Security Sciences Building
OSR	Offsite Source Recovery (Project)
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
RLUOB	Radiological Laboratory Utilities Office Building
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
SWMU	solid waste management unit
SWPPP	stormwater pollution prevention plan
SWWS	Sanitary Wastewater System
TA	Technical Area
TD	total depth
TEDE	total effective dose equivalent
TFF	Target Fabrication Facility
TRC	Total Recordable Cases
TRI	Total Recordable Incidents
TRU	transuranic
TSFF	Tritium Science and Fabrication Facility
TSTA	Tritium Systems Test Assembly (facility)
TWISP	Transuranic Waste Inspectable Storage Project
UC	University of California
UF/RO	ultrafiltration/reverse osmosis
VAP	Vehicle Access Portal
VOC	volatile organic compound
VPB	Vessel Preparation Building
W	Weapons Systems Engineering (Division)
W-6	Detonator Design
WCM	Weapons Components Manufacturing (Division)
WCM-3	Detonator Fabrication
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)
WSST	Worker Safety and Security Team
WT	Weapons Engineering Technology (Division)
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 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 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.

[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.

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

- Summary and conclusion (Chapter 5). This chapter summarizes CY 2007 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 2007.

- Radiological facilities list (Appendix C). These data identify the facilities considered as radiological in CY 2007 and indicate their categorization at the time the SWEIS was developed.

- Pollution Prevention Awards (Appendix D). This appendix provides a summary of the DOE 2007 Pollution Prevention Awards for LANL.

- National Pollutant Discharge Elimination System (NPDES) Outfalls (Appendix E). This appendix provides a summary of the outfalls at LANL, past and present.

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 Yearbook 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 2007 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/NNSA 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 2007 presents the ninth 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 DOE/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 Risk Reduction Office (formerly known as part of 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 natural and historical 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, DOE/NNSA identified the need to prepare a Supplemental SWEIS. Since the issuance of the Final SWEIS in 1999, DOE/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 programs since 1999.

In October 2004, DOE/NNSA (NNSA 2004) decided to update and supplement the original LANL SWEIS by preparing a Supplemental SWEIS to consider

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

In August 2005, a memo was issued to LANL from DOE/NNSA to prepare a new SWEIS (NNSA 2005). This new SWEIS was determined to be the appropriate level of analysis for compliance with the 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 (from the date of the new ROD). 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.

In 2006, work continued on the development of the new SWEIS. Accomplishments include the production of, and DOE/NNSA concurrence on, the release of the Draft SWEIS. The Draft SWEIS was released to the public in June 2006. The release of the public Draft SWEIS initiated the public comment period. Two public meetings were held in August 2006, and Congressional, State, and local government briefings on the SWEIS were held as well as Pueblo briefings. The public comment period lasted 75 days and closed in September 2006. The remainder of the 2006 SWEIS effort was focused on development of the Comment Response Document and the incorporation of received comments from the public, Federal, State, Tribal, and local governments into the SWEIS document where appropriate.

In 2007, the final draft of the SWEIS was produced accompanied by a draft ROD and a draft Mitigation Action Plan. Additional analyses were conducted on "intentional destructive acts" for the classified appendix. Publication of the final SWEIS is scheduled for 2008.

References

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

Department of Energy, 1999b. "Record of Decision: Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory in the State of New Mexico," *Federal Register*, Volume 64, p 50797. Washington, DC. September 20, 1999.

Los Alamos National Laboratory, 2004. “Information Document in Support of the Five-Year Review and Supplement Analysis for the Los Alamos National Laboratory Site-Wide Environmental Impact Statement (DOE/EIS-0238),” Los Alamos National Laboratory report LA-UR-04-5631, Los Alamos, NM.

National Nuclear Security Administration, 2004. Memorandum from Ed Wilmot, Manager Los Alamos Site Office, to Carolyn Mangeng, Acting Associate Director for Technical Services, Los Alamos National Laboratory, Subject: Preparation of a *Supplemental Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory (LANL), Los Alamos, New Mexico*. October 28, 2004.

National Nuclear Security Administration, 2005. Memorandum from Ed Wilmot, Manager Los Alamos Site Office, to Carolyn Mangeng, Acting Associate Director for Technical Services, Los Alamos National Laboratory, Subject: Preparation of a new *Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory (LANL), Los Alamos, New Mexico*. Identification of Document Manager and Preparation Schedule. August 16, 2005.

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2.0 Facilities and Operations

LANL has about 2,800 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 the site 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 1,064 permanent buildings and 1,825 temporary structures (trailers and transportables). Collectively, between 2001 and 2007, 564,468 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 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 11 lists identifying nuclear facilities at LANL [one in 1998 (DOE 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)], two in 2005 (LANL 2005a and 2005b), and two in 2007 (LANL 2007a and 2007b)] that significantly changed the classification of some buildings. Appendix B provides a summary of the current nuclear

[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 on-site 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 September 2007 (LANL 2007b).

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/NNSA. 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 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 2007. 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 1998–2007. 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 buildings and structures not part of a Key Facility, or the balance of LANL. The Non-Key Facilities represent a 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 52 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

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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.

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 sanitary sewage treatment facility, called the Sanitary Effluent Recycling 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.

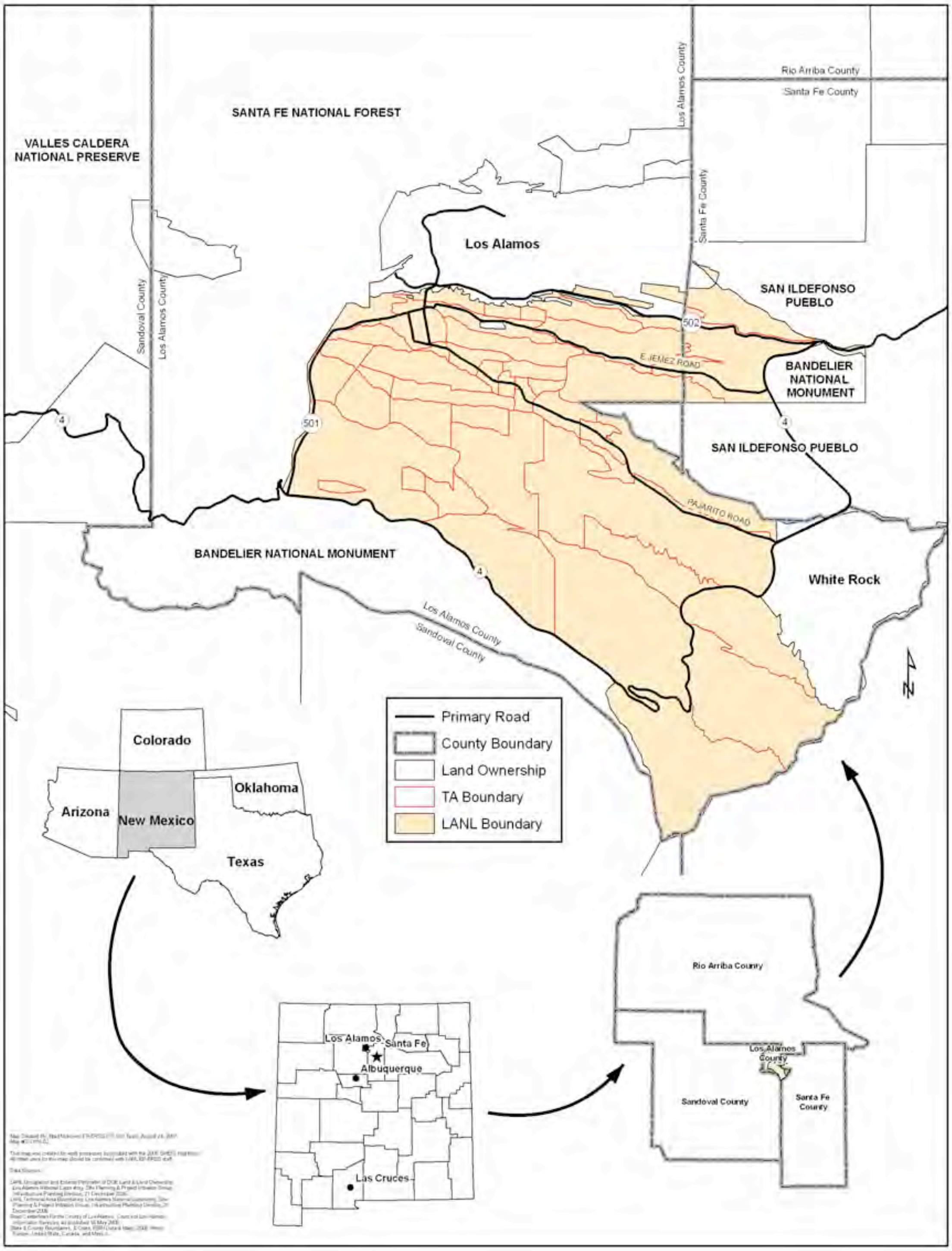


Figure 2-1. Location of LANL

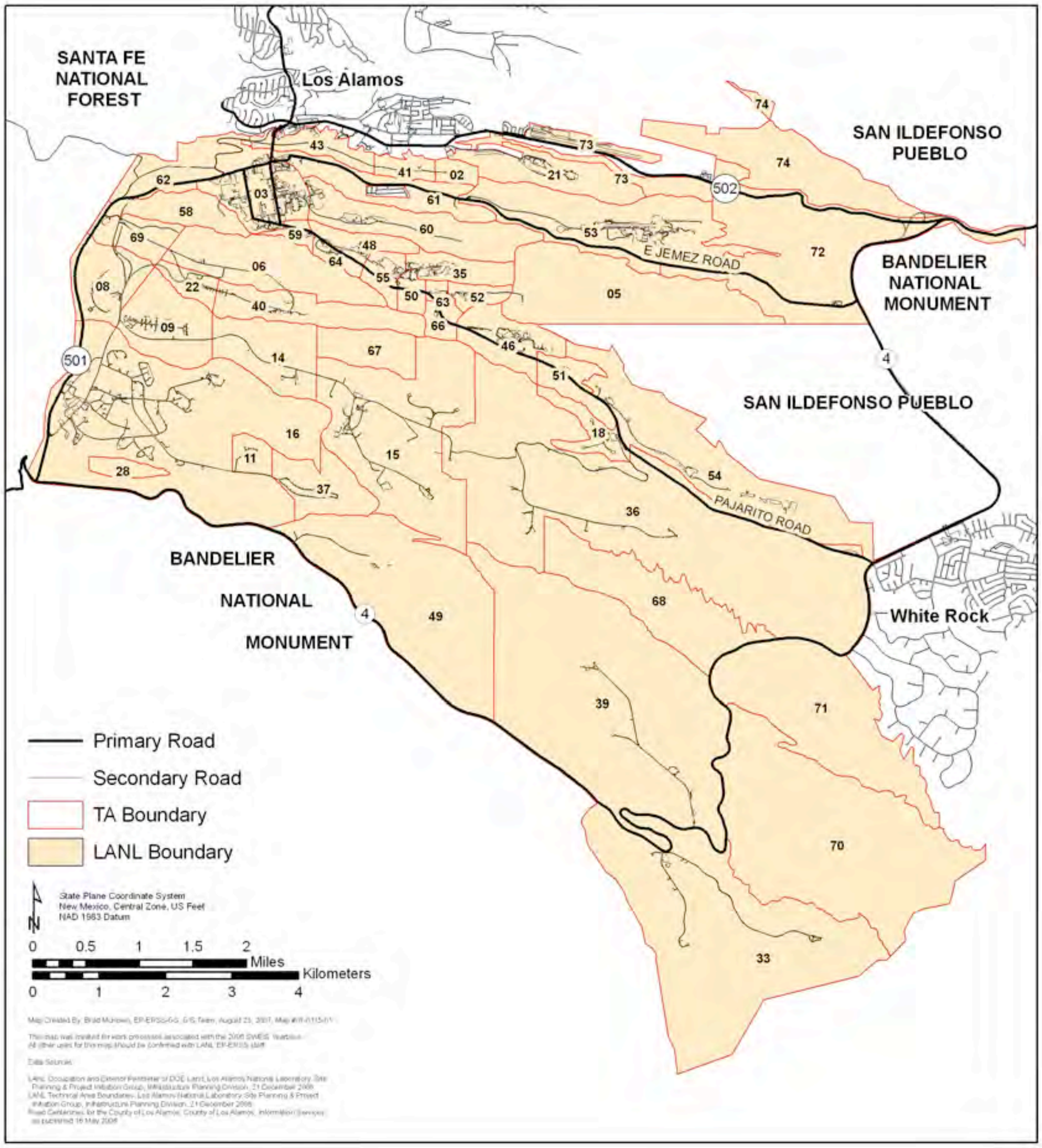
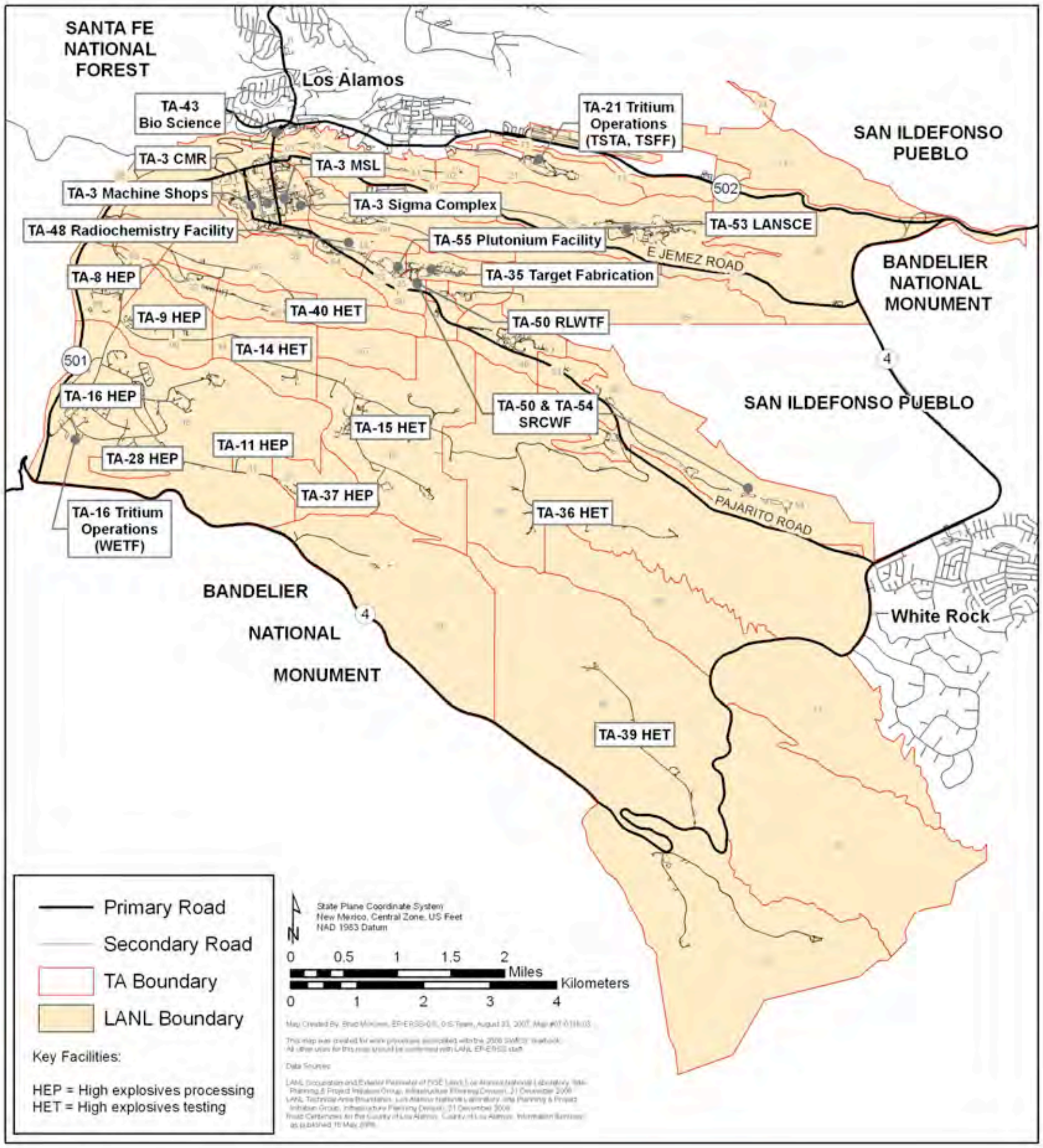


Figure 2-2. Location of TAs



*HEP is High Explosives Processing; HET is High Explosives Testing; WETF is Weapons Engineering Tritium Facility; TSTA is Tritium Systems Test Assembly; TSFF is Tritium Science and Fabrication Facility; SRCWF is Solid Radioactive and Chemical Waste Facility.

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). TA-55-7 has been empty for approximately three years other than office space and small-scale non-rad experiments. It is currently unoccupied. Additionally, the Associate Directorate for Stockpile Manufacturing 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 TA-55-355 Safe, Secure Trailer (SST) Facility, was constructed. This facility became operational in November 2005.

The DOE/NNSA listing of LANL nuclear facilities for both 1998 and 2007 (DOE 1998a, LANL 2007b) 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 TA-55-355 to the list of Nuclear Hazard Category 2 facilities (LANL 2007b) (Table 2.1-1). TA-55-185 was slated to be used for mixed oxide (MOX) rods storage in FS65 shipping containers; however, the building was found to be unacceptable (seismic and other requirements) and was never used as such. TA-55-185 was removed from the Nuclear Facilities List in January. The SST pad (55-355) is still categorized as a Category 2 nuclear facility, however all special nuclear material (SNM) has been removed and Authorization Basis is in the process of reviewing documents to determine if a re-categorization is necessary.

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

Building	Description	NHC SWEIS ROD	NHC DOE 1998[a]	NHC LANL 2007[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 Facility			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 2007b).

***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 2007. 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 projected for potential modification to bring it into operational status. This was not done, and the DOE/NNSA 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. Decontamination and decommissioning (D&D) of this building began in November of 2007. The building is "cold and dark" and in the process of being demolished.

2.1.1 Construction and Modifications at the Plutonium Complex

The SWEIS projected four facility modifications:

- renovation of the Nuclear Material Storage Facility. Building PF-41was analyzed in the new SWEIS as a potential long-term radiography facility or to be demolished. In September 2006, a memorandum was sent from DOE/NNSA Service Center to DOE Head Quarters recommending that the Final SWEIS identify Option 1 as the proposed option. This option stated DOE/NNSA would demolish TA-55-41 and construct a new building at TA-55 to house and operate radiography capabilities previously performed at TA-08. It was also recommended that the demolition of building TA-55-41 be categorically excluded as the structure is non-contaminated and waste could be sent offsite (NNSA 2006). D&D of this building began in November of 2007. The building is "cold and dark" and in the process of being demolished.
- 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 TA-55-313 building (PF-313) immediately to the east of the TA-55-66 building was completed in 2003; trailers installed at TA-48 belong to TA-55 and house TA-55 personnel, mostly staff performing Authorization Basis work for the facility. This area is now listed as property belonging to TA-55.
- 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 meet the 20 pits per year capacity.

During CY 2001, there were several projects that were started for maintenance or replacement purposes. If these projects have not yet been completed, their 2007 status is listed below:

CMR Replacement Project[4] DOE Pre-conceptual Design (LANL 2001d), ongoing in CY 2006; In 2007 construction of the Radiological Laboratory/Utility/Office Building (RLUOB) began.

FRIT Transfer System (LANL 2001e; DOE 1996a), on hold in CY 2007 due to funding deficiency;

TA-18 Relocation Project CAT-III/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 SNM from TA-18 (DOE 2005a, LANL 2005c). Construction occurred during spring of 2005; SNM was transferred to TA-55

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

in September 2005. In October 2006, the majority of all SNM was removed from this site and was taken to Nevada Test Site, TA-55, and Y-12 and a small amount to TA-54 for disposition. All remaining programmatic SNM has been removed from the interim storage pad (SST) at TA-55.

During CY 2002, there were several projects that were started for maintenance or replacement purposes. The projects are listed below with their CY 2007 status:

TA-55 Radiography/Interim (LANL 2001i), ongoing in 2007.
TA-55 Radiography (LANL 2001j), complements TA-55 Radiography/Interim, on hold in CY 2007 due to funding.
New radioactive liquid waste collection system line tie-ins design phase is ongoing in CY 2006 (DOE 2003a); the tie-ins have been completed and some remaining soil erosion prevention and paving are expected to be complete in 2007. There is still some minor work inside PF-4. All work on this project completed in 2007 and the lines are operational.
Installation of new liquid nitrogen lines and tank on west side of facility was completed in August/September of 2005 (DOE 2003b); Project completed.
TA-55 New Parking Lot (LANL 2002d) was completed in CY 2007.
FITS Building Parking Lot (LANL 2002e) was completed in January 2006.
CMR Replacement Geotechnical Investigation (LANL 2002f), the first phase in determining the feasibility of constructing the CMR Replacement. Geotechnical surveys were performed in CY 2003; additional surveys continued in CY 2004 and 2005. Construction on the RLUOB was started in late CY 2006 and is scheduled for completion in CY 2008 (LANL 2005d). Beneficial occupancy is scheduled for September 2009; ongoing in 2007.

In 2004, 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 2007.

The procurement and installation of a new uranium decontamination system was initiated in 2004, however, this project was cancelled in 2006 due to lack of funding.

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 (TA-55-4). For all seven capabilities, activity levels were below those projected by the SWEIS ROD. Table 2.1.2-1 presents details.

[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. Plutonium Complex/Comparison of Operations

Capability	SWEIS ROD[a]	2007 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 2007.
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 2007. Fewer than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in CY 2007.
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 2007. Fewer than 12 pits were processed through tritium separation in CY 2007.
	Process neutron sources up to 5,000 curies/yr. Process neutron sources other than sealed sources.	Neutron sources were processed in CY 2007 but well below the 5,000 curies/yr level.
	Process up to 400 kilograms/yr of actinides.[b] Provide support for dynamic experiments.	Fewer than 400 kilograms of actinides were processed in CY 2007. No dynamic experiments support occurred in CY 2007.
	Perform decontamination of 28 to 48 uranium items per month.	In CY 2007, 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 2007.
	Conduct plutonium research, 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 2007. Wing 2 at CMR facility is no longer operational. These activities are carried out at TA-55 with no changes for 2007.
	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
	Develop safeguards instrumentation for plutonium assay.	Continued support of safeguards instrumentation development during CY 2007.

	Analyze samples in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in CY 2007 in support of actinide reprocessing and research and development activities.
Fabrication of Ceramic-Based Reactor Fuels	Build MOX fuel test reactor fuel assemblies and continue research and development on fuels.	AFCI fuels were fabricated in CY 2007 for irradiation testing. MOX fuel was fabricated in CY 2007.
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.	Approximately 15 kilograms of plutonium-238 were processed, evaluated, and/or tested in 2007.
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 2007.

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. No wastes generated during 2007 exceeded SWEIS ROD projections.

Table 2.1.3-1. Plutonium Complex/Operations Data

Parameter	Units[a]	SWEIS ROD	2007 Operations
Radioactive Air Emissions:			
Plutonium-239[b]	Ci/yr	2.70E-5	1.02E-09
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]	6.70E-08
Strontium-90/Yttrium-90	Ci/yr	Not projected[c]	None detected
Tritium in Water Vapor	Ci/yr	7.50E+2	2.63E+00
Tritium as a Gas	Ci/yr	2.50E+2	3.66E+00
NPDES Discharge 03A–181	MGY	14	2.25
Wastes:			
Chemical	kg/yr	8,400	960.97
LLW[e]	m^3/yr	754[f]	265.05
MLLW[e]	m^3/yr	13[f]	5.59
TRU[e]	m^3/yr	237[g]	75.09
Mixed TRU	m^3/yr	102[g]	71.30
Number of Workers	FTEs	589[h]	642[h]

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 LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; TRU = transuranic.
f Includes estimates of waste generated by the facility upgrades associated with pit fabrication.
g 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.
h 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 2007 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 2007 operations is routinely collected information and represents only Los Alamos National Security, LLC (LANS) 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

2.2 Tritium Facilities (TA-16)

This Key Facility consists of tritium operations at TA-16. Tritium operations in 2007 were conducted in the Weapons Engineering Tritium Facility (WETF, Building TA-16-205). In 2007, the Tritium Science and Fabrication Facility (TSFF, Building TA-21-209) and the Tritium Systems Test Assembly (TSTA) were in Surveillance and Maintenance mode with only limited equipment removed.

Limited operations involving the removal of tritium from actinide materials 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 1999 SWEIS. The tritium emissions from TA-55, however, are included in the Plutonium Complex Key Facility.

The WETF, had a tritium inventory greater than 30 grams during the entire 2007 year and, thus, was listed as a Category 2 nuclear facility (Table 2.2-1).

Table 2.2-1. Tritium Buildings with Nuclear Hazard Classification

Building	Description	NHC SWEIS ROD	NHC DOE 1998[a]	NHC LANL 2007[b]
TA-16-0205[c]	WETF	2	2	2
TA-16-0205A[c]	WETF	2		2
TA-16-0450[c]	WETF	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 2007b)
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. Following a readiness review, TA-16-205, -205A, and -450 will be considered one facility.

2.2.1 Construction and Modifications at the Tritium Facilities

The SWEIS projected one facility modification:

- Extending the WETF tritium operations into TA-16-450. Remodeling began in 1999 and was completed in 2000. Upgrade of part of the WETF roof to meet current seismic requirements began in 2000 and was completed in 2001. The operational readiness review to extend the tritium processing area of WETF into Building 450 was started in 2002.

During 2007, the Building 205 stack was disconnected and rerouted to share the Building 450 stack. Building 450 radiological wastewater drains were connected to the Building 205 wastewater tank. The connection of the buildings to a common stack and radiological wastewater tank is part of the path forward for inclusion of Building 450 to the WETF nuclear boundary (LANL 2000a), start up is proposed for CY 2008. A getter cart system was installed in Building 205; this will enhance metallurgical and material research at the WETF in CY 2008. During CY 2007, testing of a new Finnegan Mass Spectrometer installed in Building 450 continued enhancing the existing gas analysis capabilities. The major heating, ventilation, and air conditioning upgrade to Building 205, which started in CY 2006, was completed in CY 2007.

2.2.2 Operations at the Tritium Facilities

The SWEIS identified nine capabilities for this Key Facility. In CY 2007, no new capabilities have been added; however, membrane purification and thin film loading (capabilities that existed in 2006 at the TSFF) have been removed. Table 2.2.2-1 lists the seven capabilities identified in the SWEIS and presents CY 2007 operational data for each of these capabilities. Operations in 2007 were near projections by the SWEIS ROD. Three high-pressure gas fill operations were conducted in 2007 and approximately 10 gas boost system tests were performed. The WETF performed at or near the SWEIS ROD projections of 65 gas processing operations.

Table 2.2.2-1. Tritium Facilities/Comparison of Operations

Capability	SWEIS ROD[a]	2007 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 three high-pressure gas fills/processing operations were performed in 2007 with additional activities being performed to bring the capability at or near 65 times/yr.
Gas Boost System Testing and Development: WETF	System testing and gas processing operations involving quantities of up to 100 grams.	Approximately 10 gas boost tests were performed in 2007.
Diffusion: WETF	Research on tritium movement and penetration through materials. Expect six to eight experiments/month. Capability also used for removal of helium from tritium.	Capability used in 2007.
Metallurgical and Material Research: 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 2% tritium emissions from WETF.
Gas Analysis: 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 WETF during 2007. No changes in facility emissions occurred from this activity.
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.	No activity. Project is no longer active; capability has not been used since 1999.

Capability	SWEIS ROD[a]	2007 OPERATIONS
Calorimetry: 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 WETF. No changes occurred in facility emissions from this activity.
Solid Material and Container Storage: WETF	Storage of tritium occurs in process systems, process samples, inventory for use, and as waste.	Inventory is stored and maintained at the WETF.

a Includes the remodel of Building TA-16-450 to connect it to WETF in support of Neutron Tube Target Loading (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)/Operations Data

Parameter	Units	SWEIS ROD	2007 OPERATIONS
Radioactive Air Emissions:			
TA-16/WETF, Elemental tritium	Ci/yr	3.00E+2	8.50E+01
TA-16/WETF, Tritium in water vapor	Ci/yr	5.00E+2	1.57E+02
TA-21/TSTA, Elemental tritium	Ci/yr	1.00E+2	Not measured[a]
TA-21/TSTA, Tritium in water vapor	Ci/yr	1.00E+2	Not measured[a]
TA-21/TSFF, Elemental tritium	Ci/yr	6.40E+2	Not measured[a]
TA-21/TSFF, Tritium in water vapor	Ci/yr	8.6E+2	Not measured[a]
NPDES Discharge:[b]			
Total Discharges	MGY	0.3	18.13
02A-129 (TA-21)	MGY	0.1	17.74[c]
03A-158 (TA-21)	MGY	0.2	0.39[c]
Wastes:			
Chemical	kg/yr	1,700	0.0
LLW	m^3/yr	480	14.7
MLLW	m^3/yr	3	0.23
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	28[d]	1[d]

a There were no radiological operations at TA-21 in 2007. These buildings have been shut down and await decommissioning.

b 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.

c This outfall does not have a flow meter. This number was based on instantaneous flow measured during a field visit as required by the NPDES permit, then extrapolated over 24 hours, seven days per week.

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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

2.3 Chemistry and Metallurgy Research Building (TA-03)

The CMR Building was designed and constructed to the 1949 Uniform Building Code and occupied in 1952 to house analytical chemistry, plutonium metallurgy, uranium chemistry, and engineering design and drafting activity. 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."

The CMR Facility is 550,000 square feet that consists of a main building (TA-03-29) and a LLW Storage and Transfer Facility (TA-03-154) 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.

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 1997a, DOE 1998a, LANL 2007b). CMR is 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 2007[b]
TA-03-0029	CMR	2		2
TA-03-0029	Radiochemistry Hot Cell		2[c]	
TA-03-0029	SNM Vault		2[c]	
TA-03-0029	Nondestructive analysis/nondestructive examination Waste Assay		2[c]	
TA-03-0029	IAEA Classroom[d]			
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 2007b).
c The CMR Facility was divided into separate components in 1998 and grouped together in 2007.
d 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 2007.

2.3.1 Construction and Modifications at the CMR Building

The ROD projected five facility modifications by December 2007:

- 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 to include only those upgrades needed to maintain safe and reliable operations 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
- Heating, Ventilation, and Air Conditioning delta Pressure System
- Hood Wash-down System
- Hot Cell Delta Pressure System
- Hot Cell Controls
- Stack Monitors Phase A
- Emergency Personnel Accountability System
- Stack Monitors Phase B
- Compressor System
- Sprinkler Head Replacement
- Emergency Lighting System
- Emergency Notification
- Internal Power Distribution
- Operations Center
- Ventilation System Filter Replacement
- Fire Protection System

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

In November 2003, DOE/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 2004). 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 Confinement Vessel Disposition Project (previously known as the Bolas Grande Project) which would provide for the disposition of large vessels previously used to contain experimental explosive shots involving various actinides. 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). The project was placed on hold in 2004 based on a decision by NNSA that the project was a Major Modification. This decision was later rescinded. The project is expected to move forward in 2008.

CMR Safety Basis. The CMR Facility Safety Basis documentation currently consists of the 1998 BIO and associated Interim Technical Safety Requirements (ITSRs), which expire in 2010. Updates to the CMR BIO and ITSRs were submitted in April 2004 but rejected in April 2005 by DOE/NNSA who then directed that the ITSRs be updated. The ITSR update, which represents improvements in the Safety Basis through changes to existing or additional controls, is expected to be approved by NNSA in CY 2008.

2.3.2 Operations at the CMR Building

While the CMR Facility continues to maintain normal operations in support of the Pit Manufacturing and Surveillance missions, an effort to reduce the overall risk of the facility was begun in 2006. The scope of CMR Facility Risk Reduction Project includes relocating hazardous activities from Wings 2 and 4 that were considered particularly vulnerable to seismic activity to other areas of the facility or to another site. Uranium processing activities in Wing 4 were moved to Wings 5 and 9 in 2006. Plutonium metallurgy operations in Wing 2 were relocated to TA-55 in 2007

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]	2007 Operations
Analytical Chemistry	Sample analysis in support of a wide range of actinide research and processing activities. Approximately 7,000 samples/yr.	Analytical Chemistry received ~805 samples during CY 2007 and conducted over 7,000 analytical processes involving microgram quantities of nuclear material.
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 2007, 1,220 kg of excess Transient Reactor Test fuel comprised of highly enriched uranium/graphite composite was processed and repacked for disposal.
Destructive and Nondestructive Analysis (Design Evaluation Project)	Evaluate 6 to 10 secondaries/yr through destructive/nondestructive analyses and disassembly.	No activity in CY 2007. Project has not been active since 1999.
Nonproliferation Training	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 in an effort to reduce the CMR Building to a Category 3 nuclear facility and renamed the Nuclear Measurement School. In 2002, this activity returned to CMR from TA-18. Two nuclear measurement schools were conducted in CY 2007.

Capability	SWEIS ROD[a]	2007 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.	No work was done on this program in CY 2007.
	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.	No Metallurgical microstructural/chemical analysis and compatibility testing of actinides were performed in CY 2007. Process activity was moved to TA-55 in 2007.
	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 2001. No activity in CY 2007.
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. No process activity in 2007.

	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.[d] Material recovered and retained in inventory. Up to 1,000 kilograms annual throughput.	Casting furnace capability was removed in 1999. No enriched uranium solution processing was conducted in CY 2007.

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.

d Uranium casting equipment was removed to provide space for the Confinement Vessel Disposition Project.

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. 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	2007 Operations
Radioactive Air Emissions:			
Total Actinides[a]	Ci/yr	7.60E-4	1.15E-05
Strontium-90/Yttrium-90	Ci/yr	Not projected[b]	None detected
Krypton-85	Ci/yr	1.00E+2	None detected
Germanium-68/Gallium-68	Ci/yr	Not projected[b]	None detected
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	0.60
Wastes:			
Chemical	kg/yr	10,800	1,653.10
LLW	m^3/yr	1,820	46.02
MLLW	m^3/yr	19	0.41
TRU	m^3/yr	28[d]	8.70
Mixed TRU	m^3/yr	13[d]	0.21
Number of Workers	FTEs	204[e]	138[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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

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). In 2002, DOE/NNSA staff prepared the TA-18 environmental impact statement (DOE 2002c) for relocating the Pajarito Site Key Facility capabilities and materials. In the ROD, DOE/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. Implementation of the ROD for Security Category I and II removal activities was initiated in 2004. Security Category I and II nuclear materials have been removed from this TA. In 2006, NNSA made the decision to get all of the Security Category III and IV out of TA-18 by March of 2007, in order to downgrade the site from the Nuclear Hazard Classification Category 2 to a Radiological Facility. In October 2006, the majority of all SNM was removed from this site and was taken to Nevada Test Site, TA-55, and Y-12, and a small amount to TA-54 for disposition.

In March 2007, TA-18 was at the radioactive material amount (<8.4 gram Pu239 equivalent) level to be considered a Radiological Facility. In April 2007, TA-18 was removed from the Nuclear Facility List and downgraded to a Radiological Low Hazard Facility (LANL 2007b).

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).

At the time of the SWEIS ROD, DOE listed the whole Key Facility as a Category 2 nuclear facility. In 2007, TA-18 was recategorized to a Radiological Facility.

The Authorization Basis, comprised of a BIO document and Technical Safety Requirements, have been retired.

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. In CY 2007, approximately 50 percent of the TA-18 facilities were placed into Surveillance and Maintenance mode.

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 2006 was the relocation of the Security Category III and IV nuclear materials to the Nevada Test Site, Y-12, and other LANL sites in preparation for moving the TA-18 mission to Nevada. During 2007, 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]	2007 Operations
Dosimeter Assessment and Calibration	Perform up to 1,050 criticality experiments per year.	No Activity
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

Capabilities	SWEIS ROD[a]	2007 Operations
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%.	No Activity
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, 2005, 2006, and 2007.

2.4.3 Operations Data for the Pajarito Site

All research activities at Pajarito Site have ceased. Consequently, operations data were 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. In 2007, chemical waste generation at Pajarito Site exceeded SWEIS ROD projections due to the disposition of asphalt associated with a spill cleanup. 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	2007 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	13,608[c]
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[d]	3[d]

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 2007.

b Page 5-116, Section 5.3.6.1, “Public Health,” of the SWEIS.

c Chemical waste generated at Pajarito Site exceeded what was projected in the SWEIS ROD due to the disposition of asphalt associated with a spill cleanup.

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 2007 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 2007 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

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 (TA-03-141), the Press Building (TA-03-35), and the Thorium Storage Building (TA-03-159). Primary activities are the fabrication of metallic and ceramic items, characterization of materials, and process research and development. This Key Facility had two Category 3 nuclear facilities, 03-66 and 03-159, identified in the SWEIS; however, in April 2000, Building TA-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 TA-03-66 was downgraded from a Hazard Category 3 nuclear facility and removed from the nuclear facilities list (LANL 2002a). As shown in Table 2.5-1, in September 2001, Buildings TA-03-35, -66, -159, and -169 were placed on the radiological facility list (LANL 2002b). Building TA-03-141 is a Non-Nuclear High Hazard Facility.

Table 2.5-1. Sigma Buildings Identified as Radiological Facilities

Building	Description	LANL 2002[a]
TA-03-35	Press Building	RAD
TA-03-66	Sigma Building	RAD
TA-03-159	Thorium Storage Building	RAD
TA-03-169	Butler Building	RAD

a LANl Radiological Facilities List (LANL 2002b)

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 the 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 would 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/NNSA 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 funding;

- 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;
- Rad Liquid Waste upgrades to Rad Liquid Waste System to include telemetry and communications to RLWTF—completed in 2006.

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 2007 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]	2007 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 187 assignments and 830 specimens were characterized.
	Analyze up to 36 tritium reservoirs/yr.	Total of 12 tritium reservoirs analyzed in CY 2007.
	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 72 stainless steel and beryllium pit components.
	Fabricate up to 200 tritium reservoirs/yr.	Fewer than 25 reservoirs fabricated.
	Fabricate components for up to 50 secondaries/yr.	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.

Capability	SWEIS ROD[a]	2007 Operations
Fabrication of Metallic and Ceramic Items (cont.)	Fabricate targets and other components for accelerator production of tritium research.	On hold in 2007.
	Fabricate test storage containers for nuclear materials stabilization.	Produced approximately 20 containers.
	Fabricate nonnuclear (stainless steel and beryllium) components for up to 20 pit rebuilds/yr.	Fabricated less than 20 stainless steel and beryllium components.

a Includes Sigma Building renovation and modifications for Beryllium Technology Facility.

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	2007 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	1.48
03A–022	MGY	4.4	1.48
03A–024	MGY	2.9	0
Wastes:			
Chemical	kg/yr	10,000	6,555.60
LLW	m^3/yr	960	100.40
MLLW	m^3/yr	4	0.21
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	101[b]	90[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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

2.6 Materials Science Laboratory (TA-03)

The MSL Key Facility is a single laboratory building (TA-03-1698) 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 Facilities List (LANL 2002b) and remained on the list in CY 2007.

2.6.1 Construction and Modifications at the Materials Science Laboratory

The SWEIS identified that completion of the top floor of the MSL was planned and was included in an environmental assessment (DOE 1991), but was not funded.

To date, the completion of the top floor of the MSL remains unscheduled and unfunded. Construction of the Material Science and Technology 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. The Center for Integrated Nanotechnologies (CINT) contains laboratories and office space to accommodate state-of-the-art equipment and research. It is located near the Materials Science Complex. The two-story, 36,500-square-foot building houses approximately 50 people. Occupants include LANL staff plus collaborators from universities, other laboratories, and private industry. CINT focus is 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.

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 was started in November 2004. CINT was completed in December 2005. Initial operations started in April 2006 and full operation in CY 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 2007, 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 2007 operations to projections made by the SWEIS ROD.

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[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. Materials Science Laboratory (TA-03)/Comparison of Operations

Capability	SWEIS ROD[a]	2007 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 2007. Cold mock up of weapons assembly and processing as well as other technologies continued to be expanded in CY 2007.
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 2007. 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.
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 2007 and is now about 42 workers in CY 2007, 15 less than what was 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	2007 Operations
Radioactive Air Emissions	Ci/yr	Negligible	Not Measured
NPDES Discharge Volume	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	600	121
LLW	m^3/yr	0	0
MLLW	m^3/yr	0	0
Wastes (cont.):			
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	57[a]	42[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 2007 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 2007 operations is routinely collected information and represents only LANS (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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

2.7 Target Fabrication Facility (TA-35)

The TFF is a two-story building (TA-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 before 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

The ROD did not project any facility changes through 2007. 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 and 1999–2007 time periods.

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 1998–2007 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	2007 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 Hydrodynamic Experiments (HX) 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 100 tests. Did not support high-explosive pulsed-power tests or high-energy-density physics tests at levels identified during preparation of the SWEIS.
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 1998–2007 waste volumes, which were less than projected. Table 2.7.3-1 details operations data for CY 2007.

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

Parameter	Units	SWEIS ROD	2007 Operations
Radiological Air Emissions	Ci/yr	Negligible	Not Measured[a]
NPDES Discharge:	MGY		
4A-127	MGY	0	Eliminated
Wastes:			
Chemical	kg/yr	3,800	86.60
LLW	m^3/yr	10	0
MLLW	m^3/yr	0.4	0.20

TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	54[b]	52[b]

a The emissions continue to be sufficiently low that monitoring is not required.
b The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CY 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

2.8 Machine Shops (TA-03)

The Machine Shops Key Facility consists of two buildings, the Nonhazardous Materials Machine Shop (Building TA-03-39) and the Radiological Hazardous Materials Machine Shop (Building TA-03-102). Both buildings are located within the same exclusion area. Activities consist of machining, welding, fabrication, inspection, and assembly of various materials in support of many LANL programs and projects. In September 2001, Building TA-03-102 was placed on the Radiological Facilities List (LANL 2001c).

2.8.1 Construction and Modifications at the Machine Shops

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

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	2007 Operations
Fabrication of Specialty Components	Provide fabrication support for the dynamic experiments program and explosives research studies. Support up to 100 hydrodynamic tests/yr. Manufacture up to 50 joint test assembly sets/yr. Provide general laboratory fabrication support as requested.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.
Fabrication Utilizing Unique Materials	Continue fabrication utilizing unique and unusual materials.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.
Dimensional Inspection of Fabricated Components	Provide appropriate dimensional inspection of above fabrication activities. Undertake additional types of measurements/inspections.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.

2.8.3 Operations Data for the Machine Shops

Since activities were well below projections by the SWEIS ROD, so too were operations data. Chemical waste generated in 2007 was 232 kilograms, 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	2007 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]	3.66E-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	232
LLW	m^3/yr	606	33.60
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]	115[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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

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). In November 2002, the updated LANL Radiological Facilities List (LANL 2002b) was published and identified Buildings TA-08-22, -70,-120, TA-11-30, TA-16-88,-202, -207, -300, -301, -302, -332, -410, -411,-413, -415, TA-37-10, -14,-16, -22, -24, and -25 as radiological facilities (Table 2.9-1).

Table 2.9-1. High Explosives Processing Buildings Identified as Radiological Facilities

Building	Description	LANL 2002[a]
TA-08-0022	Radiography	RAD
TA-08-0023	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 Facilities List (LANL 2002b).

Operations at this Key Facility are performed by personnel in multiple directorates, divisions, and groups. Weapons Engineering Technology Division (WT) is responsible for the majority of high explosives manufacturing and assembly work. Dynamic Experimentation (DE-1) in the Dynamic and Energetic Materials Division (DE) performs chemical synthesis of new explosives and provides analytical and testing services. Detonator Design (W-6) in Weapons Systems Engineering Division (W) operates a detonator test laboratory and performs research and development on new initiation systems. Detonator Fabrication (WCM-3) in Weapons Component Manufacturing (WCM) produces stockpile detonators and initiation devices. Applied Engineering and Technology group conducts non-destructive testing and evaluation.

WT Division brings the majority (>99 percent) of explosives into LANL, stores it as raw material, presses the raw explosives into solid shapes, and machines these shapes to customers' specifications. The completed shapes are shipped to offsite customers and to on-site customers for use in experiments and open detonations. DE-1 produces a small quantity of high explosives during the year from basic chemistry and lab scale synthesis operations. W-6 and WCM-3 use a small quantity of explosives for manufacturing and testing detonators and initiating devices. Waste explosives from pressing and machining operations and excess explosives are treated by open burning or open detonation.

Information from multiple divisions must be combined to capture operational parameters for production and processing high explosives. 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.

Although not projected in the 1999 SWEIS, a real-time radiography capability was added to this Key Facility and became operational in 2001. Buildings TA-16-220, -222, -223, -224, -225, and -226 (LANL 2001k) were vacated and demolished. Planning and modification work at TA-09 to consolidate high explosives formulation operations previously conducted at Building TA-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 TA-16-1409 incinerator (DOE 2000b) 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 WETF. 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.

Construction of a new Tritium Sciences Engineering group office building located near TA-16-205 was completed in 2001, with beneficial occupancy in late 2001 (DOE 2002e).

The TA-16 Service Station Demolition Project (DOE 2000b) was completed in late 2002. This project included the D&D of structures TA-16-195, -206, and -208 and the removal of an underground gasoline storage tank, TA-16-1456.

Beneficial occupancy of TA-16-933, a new office building for Weapons Engineering group located near TA-16-202 was realized in mid-2003 (DOE 2002e). Decommissioning of the TA-16-220 complex (X-ray buildings, rest houses, and darkroom) was completed by the end of 2003 with the demolition of TA-16-220, -221, -222, -223, -224, -225, -226, and -1482. The TA-16-390 complex was vacated in 2001 and D&D was completed in 2003 with the removal of TA-16-390 Basket Washing Building and TA-16-362 (DOE 1998b).

The removal of TA-16-7, a small steam plant, and TA-16-88, a pre-engineered Casting Rest House, was the only D&D project completed in 2004 (DOE 1998b). Construction of the TA-16 Weapons Plant Support Facility, TA-16-969, was completed in 2004 with beneficial occupancy in mid-2004 (DOE 2002e).

Many structures which had reached the end of their useful service life were demolished in 2005. The TA-16-340 complex decommissioning (explosives synthesis, blending, and storage), which began in 2004, was completed in early 2005 with the removal of TA-16-340, -339, -341, -342, -343, -344, and -345 (DOE 1998b). The demolition of TA-16-370 (metal forming and machining), ancillary structures TA-16-372, -1038, and approximately 3,000 feet of steam line was completed in early 2005 (DOE 1998b). The D&D of the TA-16 Steam Plant including support structures was completed in mid-2005. This project included the removal of TA-16-540, -547, -542, and -445, a 150,000-gallon diesel tank (DOE 1998b). Demolition and removal of TA-16 High Speed Machining Shops (TA-16-476, -477, -478) was also completed in mid-2005.

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 TA-22-115, and magazine TA-22-118. The proposed work is within the scope of a DOE-approved NEPA categorical exclusion (DOE 2000c). Construction was delayed because of the LANL shut down. Beneficial occupancy occurred in December 2005.

Two high explosives process laboratories at TA-09 (TA-09-35 and TA-09-43) were demolished and removed in early 2006 (DOE 2003e). D&D of excess structures (isotope building and utility buildings) at TA-08, including TA-08, -24, -25, -28, and -29, was completed in late 2006 (DOE 1998b).

Installation and start-up of an evaporator in the High Explosives Wastewater Treatment Facility located at TA-16-1508 was completed in 2007. The evaporator was designed for use downstream of the carbon/ion exchange units to reduce the volume of treated water discharged from the outfall (DOE 1996c). This was a major step toward the goal of "zero liquid discharge."

Pressing operations located in TA-16-430 were moved to TA-16-260 in CY 2007 in preparation for D&D (DOE 1998b).

2.9.2 Operations at High Explosives Processing

The SWEIS ROD identified six capabilities for this Key Facility. No new capabilities have been added, and none have been deleted. Activity levels during 2007 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/NNSA decided, however, to keep high explosives production at Pantex Plant. However, the projections for high explosive processing were retained because DOE/NNSA 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 2007 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 2007, 2,592 pounds of high explosives and 880 pounds of mock high explosives material were used in the fabrication of test components for HX, DE, WCM, W, and WT Divisions and external customers. DE-1 formulated approximately 20 pounds of DAAF for use on-site in 2007. Materials testing by DE-1 at TA-09 expended <1 pound of various explosives, including PBX-9501, DAAF, TAGzT, TAGDNAT, and DNAT. Materials testing by W-6 at TA-22 also expended <1 pound of PETN-based detonators. The level of high explosives usage was significantly below the SWEIS ROD projection of 82,700 pounds of high explosives, while the usage of mock high explosives was about 30 percent of the SWEIS ROD projection of 2,910 pounds.

During CY 2007, WT Division produced 672 pieces of explosives weighing 2,592 pounds. In machining experimental components, 1,199 pounds of water-saturated explosive scrap were generated and treated by open burning. The machined components were sent to HX and DE Divisions, Lawrence Livermore National Laboratory, and external customers for experimentation and test detonations. High explosives processing and high explosives laboratory operations generated 24,000 gallons of explosive-contaminated water, which were treated at the High Explosives Wastewater Treatment Facility. Approximately one-third of the volume treated (8,800 gallons) was released through the outfall and the remainder (over 15,000 gallons) was evaporated in the newly installed equipment. Also, 596 pounds of explosives-contaminated filters were burned and 375 pounds of high explosives-contaminated sand were treated. Also explosive-contaminated metal is now cleaned and salvaged. In addition, 13 gallons of the solvent dimethyl-sulfoxide with dissolved high explosives were burned. In order to treat these explosives and contaminated materials, 1,400 gallons of propane were expended.

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]	2007 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.	WT Division fabricated approximately 672 high explosives parts in CY 2007. Fewer 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.
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.	W 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.	HX Division performed fewer than 15 stockpile related safety and mechanical tests during CY 2007.
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 WCM Division resulted in the manufacture of fewer than 40 product lines in CY 2007.

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 2007 were 2,591.5 pounds of high explosive and 879.2 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 2007 are provided in Table 2.9.3-1. The NPDES discharge volume was about 0.01 million gallons, compared to a projection of 12 million gallons. Waste quantities were well below projections made by the SWEIS ROD.

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

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

Parameter	Units	SWEIS ROD	2007 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	0.01
03A-130 (TA-11)	MGY	0.04	0
05A-055 (TA-16)	MGY	0.13	0
05A-097 (TA-11)	MGY	0.01	0
Wastes:			
Chemical	kg/yr	13,000	19,455.60[c]
LLW	m^3/yr	16	2.8
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[d]	95[d]

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-08), 04A-157 (TA-16), 05A-053 (TA-16), 05A-056 (TA-16), 05A-066 (TA-9), 05A-067 (TA-9), 05A-068 (TA-09), 05A-069 (TA-11), 05A-071 (TA-16), 05A-072 (TA-16), 05A-096 (TA-11), 06A-073 (TA-16), 06A-074 (TA-08), and 06A-075 (TA-08).

c Chemical Waste generated at the High Explosive Processing exceeded what was projected in the SWEIS ROD due to non-routine waste generated from removal of HE waste water sumps at TA-9 and TA-14 and cleanup activities of magazines at TA-37 in support of the Footprint Reduction Project.

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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

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) and the Vessel Preparation Building (VPB) (building TA-15-534). Building types consist of preparation and assembly facilities, bunkers, analytical laboratories, high explosives storage magazines, and offices. Activities consist primarily of testing munitions and high explosives components for nuclear weapons and for Science-Based Stockpile Stewardship Program tests and experiments and for threat reduction activities.

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

2.10.1 Construction and Modifications at High Explosives Testing

Several facilities within the High Explosives Testing Key Facility were decommissioned and removed during CY 2007, these facilities include TA-15-40, 15-140, and 15-305 (DOE 2003e). To increase operation efficiencies, Meenie firing site, TA-36-06, was shut down and transferred to Surveillance and Maintenance in preparation for D&D. Experimental capabilities previously conducted at Meenie Site were transferred to other High Explosives Testing Facilities firing sites. A temporary target building was constructed at TA-39, Firing Point 57, to shelter and protect four to five smaller-scale experiments that lead into a larger integrated experiment, the building will be removed at the conclusion of the experiments (DOE 1996d). A 116-foot by 20-foot concrete slab extension was added to the existing concrete slab on the south side of the VPB, 15-534, to facilitate use of a large forklift (DOE 1996e).

Former Dynamic Experimentation Division Strategic Plan for the Future. In 2002, DOE/NNSA determined that an environmental assessment would be required for the former Dynamic Experimentation 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 2007 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. Less than 592 kilograms of depleted uranium were expended in 2007, compared to approximately 3,900 kilograms projected by the SWEIS ROD. The quantity of expended depleted uranium includes the quantity of depleted uranium expended during material sanitization.

In 2007, hydrotesting continued at DARHT with four major hydrotest experiments. Single-walled steel containment vessels were used for these hydrotest experiments to mitigate the fragments and particulate emissions associated with the experiment. These steel containment vessels achieved at least a 40 percent reduction in material released to the open air as prescribed for Phase II of the Phased Containment Option. The steel vessels were decontaminated on the DARHT firing point and transported to the VPB where they were prepared for the next experiment. The DARHT Axis II team successfully kicked four pulses through to the target on the scaled accelerator. Each of the four pulses were 35 ns in duration and uniformly spaced 400 ns apart. The kicker and downstream transport system performed extremely well. For intermediate-scale dynamic experiments containing beryllium, single-walled steel containment vessels were also implemented at the Eenie Firing Point (TA-36-03). The use of a steel vessel mitigates essentially all of the fragments and particulate emissions associated with an experiment.

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	2007 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).	Four major hydrodynamic tests were conducted. Less than 592 kilograms of depleted uranium were expended.
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 were 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 2007 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	2007 Operations
Radioactive Air Emissions:			
Depleted Uranium	Ci/yr	1.5E-1[a]	Not Measured[b]
Chemical Usage:[c]			
Aluminum[d]	kg/yr	45,450	217.16
Beryllium	kg/yr	90	1.63
Copper[d]	kg/yr	45,630	8.6
Depleted Uranium	kg/yr	3,130[e]	30.54
Lead	kg/yr	240	0
Tantalum	kg/yr	300	0.0012
Tungsten	kg/yr	300	0
NPDES Discharge:			
Number of outfalls[f]	----	14	2
Total Discharges	MGY	3.6	0.85
03A–028 (TA-15)[g]	MGY	2.2	0
03A–185 (TA-15)[g]	MGY	0.73	0.85
Wastes:			
Chemical	kg/yr	35,300	16,223.40
LLW	m^3/yr	940	8.50
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]	184[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).

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 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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

2.10.4 Cerro Grande Fire Effects at High Explosives Testing

Continuing Effects. The LANL Water Stewardship Project continues to monitor the storm water control placements and re-vegetation efforts (best management practices [BMPs]) that were conducted immediately after the fire. To date, these efforts, a direct consequence of the fire, appear to be successful in stabilizing soils within the High Explosive Testing Facility area of LANL by minimizing run-off and reducing storm flows onto High Explosive Testing Facility property. These inspection and monitoring efforts will continue through CY 2008.

Other fire-related activities involve fuel wood mitigation efforts that include continued tree and undergrowth thinning throughout the High Explosive Testing Facility. The overall goals of the Wildfire Hazard Reduction Plan (LANL 2001l) 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 TA-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. 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 Areas B and C. Isotope production had not occurred since 1998; however, the new Isotope Production Facility received its first beam on December 23, 2003, as part of the facility commissioning activities that continued into 2004. The Isotope Production Facility completed its third complete run cycle in 2007.

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 was commissioned in 2005 in Area B, and completed its first full run cycle in 2006 (DOE 2002f). Experimental Area A, formerly used for materials irradiation experiments and isotope production, is currently inactive. A second accelerator facility located at TA-53, the Low-Energy Demonstration Accelerator (LEDA), was decommissioned and dismantled in 2006.

In September 2006, the DOE concurred with LANSCE's request to be considered as an accelerator facility regulated under DOE Order 420.2B and all facilities at TA-53 were removed from the nuclear hazard facility list in CY 2007. LANSCE is classified as an Accelerator Facility and currently operates under five main safety basis documents. The documents are the BIO for Actinide Experiments, BIO for the 1L Target, BIO for Area A East, the Hazard Analysis for High Explosive Operations at LANSCE, and the Interim Safety Assessment Document for LANSCE. LANSCE has submitted a Safety Assessment Document to DOE in FY 2008 that will cover the accelerator, experimental areas, and the Isotope Production Facility.

2.11.1 Construction and Modifications at Los Alamos Neutron Science Center

The ROD projected significant facility changes and expansion to occur at LANSCE by December 2006. Table 2.11.1-1 indicates that four projects have been completed, and no additional projects started in 2007.

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	Yes[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. Clean up 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. Clean up of the north lagoon was done in CY 2002. The lagoons (Solid Waste Management Unit [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 New Mexico Environment Department (NMED) approved the final report in 2006.

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 was to remove the accelerator and some but not all support equipment and leave the building and certain installed equipment in place. This was accomplished/completed in 2006.]

c The Short-Pulse Spallation Source project was completed in 2003. 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 Enhancement subproject completed in January 2004 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 received its first beam on December 23, 2003. Commissioning was completed in 2004, and the facility has completed three full production run cycles as of the end of 2007.

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. At present, the Laboratory is not pursuing the concept of a stand-alone Dynamic Experiment Laboratory.

In addition to these projected construction activities, a warehouse was constructed in CY 1998 to store equipment and other materials formerly stored outside, a waste treatment facility for radioactive liquids generated at LANSCE was constructed during CY 1999, and construction of new cooling towers 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. The NPD-Gamma experiment was completed in December 2006 and decommissioned in early 2007. During 2006, construction on Flight Path 13 was complete; however, the project is currently on hold due to funding deficiencies. Four projects associated with TA-53-3 revitalization were completed in 2007 to include replacement of cooling water system water pumps, replacement of hot water systems such as the boilers in room M110, upgrade of the building ventilation system for TA-53-7, and replacement of electrical distribution system components such as switchboards and panel boards and replacement of much of the 208/480V electrical distribution in Sector B (DOE 1996f). A project in TA-53-365 was completed in 2007 to modify and install equipment associated with a High Power Electrodynamics group Free Electron Laser project. The modifications included installation of a 2.5-cell radio-frequency injector, and modification of an existing 700 MHz radio-frequency system (DOE 1999b). In 2007, TA-53-25 received major roof maintenance where existing skylights were removed and a membrane overlay was installed to extend the entire roof (DOE 1996g).

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 2007, LANSCE operated the accelerator and four of the five experimental areas. Area A has been idle for more than seven years. 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. Los Alamos Neutron Science Center (TA-53)/ Comparison of Operations

CAPABILITY	SWEIS ROD[a]	2007 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 2007, H+ beam was delivered to the Isotope Production Facility for 2,912 of 3,629 scheduled hours at an average current of 198.2 microamperes with 80.2% reliability. H- beam was delivered as follows: (a) to the Lujan Center for 2,653 of 3,255 scheduled hours at an average current of 102.7 microamperes with 81.2% total availability. (b) to WNR Target 2 for 77 of 90 scheduled hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere with 85.3% total availability. (c) to WNR Target 4 for 2,809 of 3,227 scheduled hours at an average current of 1.78 microamperes with 87.1% total availability. (d) through Line X to Line B (ultracold neutron) for 846 of 982 scheduled hours in a "pulse on demand" mode of operation, with an average current below 1 nanoampere with 86.2% total availability. (e) through Line X to Line C (pRad) for 717 of 754 scheduled hours in a "pulse on Accelerator Beam Delivery, Maintenance, and Development (cont.)demand" mode of operation, with an average current below 1 femtoampere with 95.1% 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; decommissioning and dismantlement was accomplished in 2006. A small project is currently under way in MPF-365 to prepare for the radio-frequency testing of a photoinjector cavity for a FEL. The structure is being prepared to accept radio-frequency power in the LEDA accelerator tunnel.
Experimental Area Support	Full-time remote handling and radioactive waste disposal capability required during Area A interior modifications and Area A-East renovation.	Full-time capability for remote handling has not been maintained due to loss of funding to support material and equipment upkeep and replacement of retiring workers. Modifications and renovations were not undertaken.
	Support of experiments, facility upgrades, and modifications.	Support activities were conducted per the projections of the SWEIS ROD.

CAPABILITY	SWEIS ROD[a]	2007 OPERATIONS
Experimental Area Support (cont.)	Increased power demand for LANSCE linac and LEDA radio-frequency operation.	The average beam current to the Lujan Center remained generally constant between 100 and 110 microamperes. There are no power demands from the LEDA facility because the accelerator has been decommissioned.
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).	341 experiments were conducted at the Lujan Center and 113 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 2007. 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 were conducted in CY 2007.
Subatomic Physics Research	Conduct 5 to 10 physics experiments/yr at Manuel Lujan Center, WNR facility, and LPSS.	During CY 2007 LANSCE beam operations supported the initial two experiments conducted in the ultra-cold neutron experimental area (B).
	Conduct proton radiography experiments, including contained experiments with high explosives.	40 of 50 experiments conducted in CY 2007 involved the use of propellants containing either black powder or high explosives.
Medical Isotope Production	Irradiate up to approximately 50 targets/yr for medical isotope production.	A total of 44 targets were irradiated in 2007 (21 RbCl targets for Sr-82; 18 Gallium targets for Ge-68 production; 1 Aluminum target for Na-22 production; 1 Niobium target for Y-88 production and 1 Selenium target for As-73 production, 1 Indium target for Cd-109 production, 1 Hafnium target for Lu-173 production).

	Added production of exotic, neutron-rich, and neutron-deficient isotopes (requires modification of an existing target area).	No production in 2007.
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 2007 for LANSCE was 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 542 user visits during the seven-month 2007 run cycle. The facility operated at an average 81.2 percent availability for the Lujan Center and 87 percent for WNR, allowing the completion of 454 experiments for internal and external neutron scattering and neutron nuclear physics users. Another significant accomplishment was the second production run for the ultra-cold neutron experimental area.

2.11.3 Operations Data for Los Alamos Neutron Science Center

Since both construction activities, which contribute to waste quantities, and levels of operations were less than those projected by the SWEIS ROD, operations data were also less than projected. Radioactive air emissions are a key parameter since LANSCE emissions have historically accounted for more than 95 percent of the total LANL offsite dose. The total point source emissions were approximately 249 curies, which represents a 98 percent decrease from 2005. As in recent years, the Area A beam stop did not operate during 2006; however, operations in Line D resulted in the majority of emissions reported for 2007. Waste generation and NPDES discharge volumes were well below projected quantities. Table 2.11.3-1 provides details.

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

PARAMETER	UNITS	SWEIS ROD	2007 OPERATIONS
Radioactive Air Emissions:			
Argon-41	Ci/yr	7.44E+1	1.09E+01
Arsenic-72	Ci/yr	Not projected [a]	None detected
Arsenic-73	Ci/yr	Not projected [a]	None detected
Beryllium-7	Ci/yr	Not projected [a]	1.62E-06
Bromine-76	Ci/yr	Not projected [a]	7.60E-04
Bromine-77	Ci/yr	Not projected [a]	9.50E-05
Bromine-82	Ci/yr	Not projected [a]	2.17E-03
Carbon-10	Ci/yr	2.65E+0	2.33E-01
Carbon-11	Ci/yr	2.96E+3	1.45E+02
Mercury-193	Ci/yr	Not projected[a]	None detected
Mercury-197m	Ci/yr	Not projected[a]	1.50E-03
Mercury-197	Ci/yr	Not projected[a]	1.50E-03
Mercury-203	Ci/yr	Not projected[a]	None detected
Nitrogen-13	Ci/yr	5.35E+2	2.18E+01

PARAMETER	UNITS	SWEIS ROD	2007 OPERATIONS
Radioactive Air Emissions (cont.):			
Nitrogen-16	Ci/yr	2.85E-2	None detected
Sodium-24	Ci/yr	Not projected[a]	2.11E-06
Osmium-191	Ci/yr	Not projected[a]	1.60E-05
Oxygen-14	Ci/yr	6.61E+0	3.90E-01
Oxygen-15	Ci/yr	6.06E+2	3.95E+01
Tritium as Water	Ci/yr	Not projected[a]	1.11E+01
LEDA Projections (eight-yr average):			
Oxygen-19	Ci/yr	2.16E-3	No operations in 2007
Sulfur-37	Ci/yr	1.81E-3	No operations in 2007
Chlorine-39	Ci/yr	4.70E-4	No operations in 2007
Chlorine-40	Ci/yr	2.19E-3	No operations in 2007
Krypton-83m	Ci/yr	2.21E-3	No operations in 2007
Others	Ci/yr	1.11E-3	No operations in 2007
NPDES Discharge:			
Total Discharges	MGY	81.8	15.10
03A-047	MGY	7.1	0
03A-048	MGY	23.4	14.80
03A-049	MGY	11.3	0
03A-113	MGY	39.8	0.30
Wastes:			
Chemical	kg/yr	16,600	17,047.20[b]
LLW	m^3/yr	1,085	33.30
MLLW	m^3/yr	1	0.07
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	560[c]	346[c]

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

b Chemical waste generated at LANSCE exceeded what was projected in the SWEIS ROD due to the disposition of roofing debris associated with the TA-53-25 re-roofing project.

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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

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 TA-43-1, -37, -45, and -20) plus additional offices and labs located at TA-35-85, -254, and -2, and TA-03-562 and -1076. Additionally, Bioscience has small operations located at TA-16-460. Operations at TA-43 and TA-35-85 and -2 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 [e.g., BSL-1 and -2]), cellular components (e.g., RNA, DNA, and proteins), instrument analysis (e.g., laser and mass spectroscopy), and cellular systems (e.g., 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 2007b). 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 SWEIS ROD projected no new construction or major modifications to this Key Facility.

In CY 2007, due to the deterioration of the steam condensate return line leading to the steam plant, a temporary holding tank was installed (DOE 1996h). The holding tank is emptied a few times each day. The return line will be replaced as soon as funds become available.

A new roof was installed on the lower south and lower west sections of the facility. Only minor interior changes were made to accommodate operational needs (i.e., 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 continues to decrease. 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 -2 work, which includes very limited work with potentially infectious microbes. All activities involving infectious microorganisms are regulated by the Centers for Disease Control, 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. Progress on final engineering requirements, the Authorization Basis, and readiness assessments continue. 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 DOE/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 is in progress.

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 and continues to restructure and redirect to enhance growth. Since the issuance of the SWEIS ROD in 1999, one core research capability was added in 2005, and two more core research capabilities were added in 2006.

Following these changes, Bioscience Division now has 11 core research capabilities:

- Bio-Materials and Chemistry
- Cell Biology
- Computational Biology
- Environmental Microbiology
- Genomic Science
- Measurement Science and Diagnostics
- Molecular Synthesis and Isotope Applications
- Structural Biology
- Pathogenesis
- Proteomic Science
- Metabolomics

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.

Table 2.12.2-1 compares CY 2007 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. Total researchers per CY represent students, temporary employees, and visiting staff from other institutions. The FTE index from the SWEIS ROD represents only regular full- and part-time LANL staff.

Table 2.12.2-1. Bioscience Facilities/Comparison of Operations

Capabilities	SWEIS ROD	2007 Operations
Bio-Materials and Chemistry	Not in SWEIS ROD. Conduct research utilizing materials that mimic the functions of living systems based upon the relationships found between structure, function, and formation. (5 FTEs)	In CY 2007, 2 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 2007, 9 FTEs were associated with Molecular Cell Biology.
Computational Biology	Not in SWEIS ROD. Conduct research developing tools for managing, analyzing, and interpreting biological data and on modeling simple and complex biological systems. (10 FTEs)	In CY 2007, 4 FTEs were associated with Computational Biology.
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 2007, 5 FTEs were associated with Environmental Microbiology.
Genomic 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 2007, 28 FTEs were associated with Genomic 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 2007, 17 FTEs were associated with Measurement Science and Diagnostics.
Molecular Synthesis and Isotope Applications	Generate biometric organic materials and construct synthetic biomolecules.	In CY 2007, 4 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 2007, 8 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 life cycle. 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)	In CY 2007, 17 FTEs were associated with Pathogenesis.

Capabilities	SWEIS ROD	2007 Operations
Proteomic Science	Not in SWEIS ROD. Technology development to better analyze proteins at the cellular level. This includes how the proteins are expressed, their structure and function as well as their interaction with other proteins.	New capability developed in CY 2007. In CY 2007, 5 FTEs were associated with Proteomic Science.
Metabolomics	Not in SWEIS ROD. Development of assays and platforms for pathogen detection, diagnosis of infection and disease, and therapy monitoring.	New capability developed in CY 2007. In CY 2007, 9 FTEs were associated with Metabolomics.
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 2007, 7 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	2007 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	10,500	1,664.50
Biomedical Waste	kg/yr	280[c]	Eliminated in 1999
LLW	m^3/yr	20	5.25
MLLW	m^3/yr	1.5	0
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	98[d]	100[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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

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 TA-48-1), the Assembly Checkout Building (TA-48-17), the Diagnostic Instrumentation and Development Building (TA-48-28), the Clean Chemistry/Mass Spectrometry Building (TA-48-45), the Weapons Analytical Chemistry Facility (48-107), and the Machine and Fabrication Shop (TA-48-8). During CY 2004, the Radiochemistry Laboratory, TA-48-1, was downgraded to a radiological Category C (low hazard) facility. Buildings TA-48-8, -17, -28, -45, and -107, are classified as low hazard chemical facilities (LANL 2007b).

2.13.1 Construction and Modifications at the Radiochemistry Facility

The SWEIS ROD projected no facility changes through CY 2007, 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 project was initiated and was completed in CY 2007. A National Fire Protection Standard (NFPA 45) compliant perchlorate system was installed in RC1 room 421 and placed into operation in CY 2006. In March 2006, a new chiller system and a stand-by diesel generator were installed in Building 45.

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 have been deleted. The primary measure of activity for this Key Facility is the number of personnel conducting research. In CY 2007, 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 2004c), 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

[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.

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 two and half FTEs in 2007.

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

Capability	SWEIS ROD	2007 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 2007, operations continued at approximately twice the levels identified in 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 2007, operations continued at approximately half the levels identified in the SWEIS. (10 FTEs)
Ultra-Low-Level Measurements	Isotope separation and mass spectrometry. (30 FTEs [a])	Level of operations decreased during 2007 (20 FTEs).
Nuclear/ Radiochemistry	Radiochemical operations involving quantities of alpha-, beta-, and gamma-emitting radionuclides for non-weapons and weapons work. (44 FTEs)	Decrease in quantities of alpha-emitting radionuclides used in operations. (35 FTEs)
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 in the SWEIS. (18 FTEs)
Actinide/TRU Chemistry	Radiochemical operations involving significant quantities of alpha-emitting radionuclides. (12 FTEs)	Slightly increased level of operations, but approximately the same as levels identified in the SWEIS. (14 FTEs)
Data Analysis	Re-examination of archive data and measurement of nuclear process parameters of interest to weapons radiochemists. (10 FTEs)	Less than projected by the SWEIS ROD. (6 FTEs)
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)	Below projections of the SWEIS ROD. (35 FTEs)
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 levels 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 2007, maintained slightly higher sample processing than the number of samples projected by the SWEIS ROD. (10 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. Four 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	2007 Operations
Radioactive Air Emissions:			
Mixed Fission Products[a]	Ci/yr	1.4E-4	Not measured
Plutonium-239	Ci/yr	1.1E-5	None detected[b]
Uranium-234 & U-235	Ci/yr	4.4E-7	None detected[b]
Mixed Activation Products[a]	Ci/yr	3.1E-6	None detected[b]
Arsenic-72	Ci/yr	1.1E-4	4.32E-06
Arsenic-73	Ci/yr	1.9E-4	9.10E-04
Arsenic-74	Ci/yr	4.0E-5	1.14E-06
Beryllium-7	Ci/yr	1.5E-5	None detected[b]
Bromine-77	Ci/yr	8.5E-4	4.53E-04
Germanium-68	Ci/yr	1.7E-5	3.90E-03
Gallium-68	Ci/yr	1.7E-5	3.90E-03
Rubidium-86	Ci/yr	2.8E-7	None detected
Selenium-75	Ci/yr	3.4E-4	2.76E-04
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	551.20
LLW	m^3/yr	270	170.40
MLLW	m^3/yr	3.8	0.82
TRU	m^3/yr	0	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	128[d]	126[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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

2.14 Radioactive Liquid Waste Treatment Facility (TA-50)

The RLWTF is located at TA-50 and consists of the treatment facility (Building TA-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 includes the following structures: the RLWTF itself (Building TA-50-01), the tank farm and pumping station (TA-50-2), the acid and caustic waste storage tank farm (TA-50-66), and a 100,000-gallon influent holding tank (TA-50-90) (Table 2.14-1).

There are no other nuclear facilities and no Moderate Hazard non-nuclear buildings within this Key Facility (LANL 2007b).

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 2007[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 2007b).

2.14.1 Construction and Modifications at the Radioactive Liquid Waste Treatment Facility

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.

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 TA-50-01 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 TA-50-83 and TA-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, TA-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. In 2007, construction was interrupted at about 75 percent complete. No forecast completion date has been published.

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 2007, 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
- 2006: 6 million liters
- 2007: 4.4 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]	2007 Operations
Waste Characterization	Support, certify, and audit generator characterization programs.	As projected.
Packaging, Labeling	Maintain waste acceptance criteria for radioactive liquid waste treatment facilities.	As projected.
Waste Transport, Receipt, and Acceptance	Collect radioactive liquid waste from generators and transport to TA-50.	As projected.
Radioactive Liquid Waste Pretreatment	Pretreat 900,000 liters/yr of radioactive liquid waste at TA-21.	No pretreatment took place at TA-21.
	Pretreat 80,000 liters/yr of radioactive liquid waste from TA-55 in Room 60.	Pretreated 1,590 liters of water during CY 2007.[b]
	Solidify, characterize, and package 3 cubic meters/yr of TRU waste sludge in Room 60.	No TRU waste sludge was solidified in 2007.
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.	Processed 4.4 million liters of radioactive liquid waste.
	De-water, characterize, and package 10 cubic meters/yr of LLW sludge.	Generated 2.3 cubic meters of LLW sludge during 2007.
	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.[c]
	Decontaminate air-proportional probes for reuse (approximately 300/month).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.[c]
	Decontaminate vehicles and portable instruments for reuse (as required).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.[c]
	Decontaminate precious metals for resale (acid bath).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.[c]
	Decontaminate scrap metals for resale (sandblast).	No activity. Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.[c]
	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.[c]

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 TA-55, Room 60 is in the process of a three-year/seven-million-dollar renovation, which is expected to become operational in CY 2008. The liters of water (1,590) represent de-inventory water left in the equipment.
c 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

The SWEIS ROD did not project the quality of effluent, only quantity. However, the treatment process was upgraded in 1999 in order to improve effluent quality. As a result, there were zero violations of the State of New Mexico discharge limit for nitrate, fluoride, and total dissolved solids, zero violations of NPDES permit limits, and zero violations of the DOE discharge standards for radioactive liquid wastes during CY 2007. And because of the upgrade, NMED groundwater standards for nitrates, fluoride, and total dissolved solids have been met for all but two weeks for the past eight years; NPDES permit limits have been met 96 of 96 months; and DOE discharge standards have been met for 94 of 96 months. 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 2007. 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.

Radioactive air emissions continued to be negligible (less than one microcurie), and NPDES discharge volume (4.4 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	2007 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	3.60E-08
Thorium-230	Ci/yr	Negligible	None detected
Uranium-234	Ci/yr	Negligible	None detected
NPDES Discharge:			
051	MGY	9.3	1.21
Wastes:			
Chemical	kg/yr	2,200	4,031[a]
LLW	m^3/yr	160	36.20
MLLW	m^3/yr	0	0.10[b]
TRU	m^3/yr	30	0
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	62[a]	80[c]

a Chemical waste generated exceeded the SWEIS ROD projection due to petroleum-contaminated soils generated during the construction of the CMR Replacement Facility at TA-55 and petroleum-contaminated soils from a vacuum pump leak at Building TA-50-01.
b MLLW generated exceeded the SWEIS ROD projection due to lead bricks contaminated with low-level radioactivity.
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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

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.

In September 2007, the Waste Characterization, Reduction, and Repackaging (WCRR) Facility (Building TA-50-69) was updated to a hazard Category 2 nuclear facility (LANL 2007b). In addition, there are several other 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 TA-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. In September 2007 the WCRR Facility was again updated to a Category 2 facility.

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

Building	Description	SWEIS ROD	DOE 1998[a]	LANL 2007[b]
TA-50-0069	WCRR Facility Building	2	3	2
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
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 2007b).
c In the most recent Nuclear Facilities List (LANL 2007b), “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

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.

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. During CY 2007, this project was put on hold due to funding.

The Offsite 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 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 US Nuclear Regulatory Commission 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 Offsite Waste Program, and the Plutonium-239/Beryllium Neutron Source Project. Approximately 346 were collected for storage at TA-54 during CY 2007. 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 1996i), 7405 (DOE 1999e), and 7570 (DOE 1999f), the 1999 SWEIS (DOE 1999a), and a SA to the 1999 SWEIS (DOE 2000d).

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 have been deleted. The primary measurements of activity for this facility are volumes of newly generated chemical, low-level, and TRU wastes to be managed and volumes of legacy TRU waste and MLLW in storage. A comparison of CY 2007 to projections made by the SWEIS ROD can be summarized as follows:

Chemical wastes: Approximately 724 metric tons of chemical waste were generated at LANL during CY 2007. This compares to an average quantity of 3,250 metric tons per year projected by the SWEIS ROD.

LLW: Approximately 2,769 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 expand into either Zone 4 or Zone 6 at TA-54.

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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.

MLLW: During CY 2007, 25 cubic meters were generated and delivered to TA-54, 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: During CY 2007, 653 cubic meters of TRU wastes were shipped to WIPP, and 167 cubic meters of newly generated TRU wastes (non-hazardous) were added to storage.

Mixed TRU Wastes: During CY 2007, 300 cubic meters of mixed TRU wastes were shipped to WIPP, approximately 65 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]	2007 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.	No legacy MLLW was characterized in 2007.
	Characterize 9,010 cubic meters of legacy TRU waste.	Characterized approximately 830 cubic meters of TRU waste in 2007.
	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 offsite 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 90 TRU waste packages in CY 2007; no drums were cored in 2007.
	Vent 16,700 drums of TRU waste retrieved during TWISP.	Drums were not vented in CY 2007.
	Maintain current version of WIPP waste acceptance criteria and liaison with WIPP operations.	As projected.
Compaction	Compact up to 25,400 cubic meters of LLW.	Approximately 630 cubic meters of LLW was compacted into approximately 133 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.

Capability	SWEIS ROD[a]	2007 Operations
Waste Transport, Receipt, and Acceptance	Collect chemical and mixed wastes from LANL generators and transport to TA-54.	Collected and transported chemical and mixed wastes.
	Begin shipments to WIPP in 1999.	Shipments to WIPP began 3/26/1999.
	Over the next 10 years, ship 32,000 metric tons of chemical wastes and 3,640 cubic meters of MLLW for offsite land disposal restrictions, treatment, and disposal.	Approximately 724 metric tons of chemical waste and approximately 20 cubic meters of MLLW were shipped for offsite treatment and disposal from the Solid Radioactive and Chemical Waste Facility.
	Over the next 10 years, ship no LLW for offsite disposal.	No LLW was sent offsite for disposal.
	Over the next 10 years, ship 9,010 cubic meters of legacy TRU waste to WIPP.	502 cubic meters of legacy TRU wastes were shipped to WIPP in 2007.
	Over the next 10 years, ship 5,460 cubic meters of operational and environmental restoration TRU waste to WIPP.	Approximately 150 cubic meters of operational (newly generated) TRU wastes were shipped to WIPP in CY 2007. No environmental restoration TRU wastes were shipped to WIPP.
	Over the next 10 years, ship no environmental restoration soils for offsite solidification and disposal.	No environmental restoration soils were shipped for offsite solidification and disposal in 2007. [b]
	Annually receive, on average, 5 cubic meters of LLW and TRU waste from offsite locations in 5 to 10 shipments.	No LLW was received from any offsite locations.[c]
Waste Storage	Stage chemical and mixed wastes before shipment for offsite treatment, storage, and disposal.	Chemical and mixed wastes were staged before shipment.
	Store legacy TRU waste and MLLW.	As projected.
	Store LLW uranium chips until sufficient quantities have accumulated for stabilization.	No uranium chips were stored for stabilization in CY 2007.
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 2007.
Other Waste Processing	Demonstrate treatment (e.g., electrochemical) of MLLW liquids.	No activity.
	Land farm oil-contaminated soils at Area J.	No activity. Area J is now closed.
	Stabilize 870 cubic meters of uranium chips.	No uranium chips were stabilized in CY 2007.
	Provide special-case treatment for 1,030 cubic meters of TRU waste.	No special-case treatment of TRU waste in CY 2007.
	Solidify 2,850 cubic meters of MLLW (environmental restoration soils) for disposal at Area G.	No environmental restoration soils were solidified in CY 2007.
Disposal	Over next 10 years, dispose of 420 cubic meters of LLW in shafts at Area G.	Approximately 5 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 2,769 cubic meters of LLW was disposed of in cells. Area G was not expanded.

Disposal (cont.)	Over next 10 years, dispose of 100 cubic meters per year administratively controlled industrial solid wastes[d] in pits at Area J.	No activity. Area J is now closed.
	Over next 10 years, dispose of non-radioactive classified wastes in shafts at Area J.	No activity. Area J is now closed.
Decontamination Operations[e]	Decontaminate LANL personnel respirators for reuse (approximately 700/month).	In 2007, decontaminated approximately 500 personnel respirators per month at TA-54-1009.
	Decontaminate air-proportional probes for reuse (approximately 300/month).	In 2007, decontaminated 40 faces and 40 bodies per month at TA-54-1009.
	Decontaminate vehicles and portable instruments for reuse (as required).	No activity in 2007.
	Decontaminate precious metals for resale (acid bath).	No activity.[f]
	Decontaminate scrap metals for resale (sandblast).	No activity.[f]
	Decontaminate 200 cubic meters of lead for reuse (grit blast).	No activity.[f]

a Includes the construction of four new storage domes for the TWISP.
b The Environmental Restoration (ER) 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 offsite disposal facility. These wastes do not typically require processing at TA-54 and do not go through the TA-54 operations for shipment.
c The amount of LLW exceeded what was projected in the ROD, however, there was no LLW or TRU waste receipts from offsite locations from 1998–2002, a small amount of LLW was received in 2003, in 2004 there were no waste receipts, and in 2007 DOE suspended the storage and stabilization of uranium chips.
d In the SWEIS, the term "industrial solid waste" was used for construction debris, chemical waste, and sensitive paper records.
e The Decontamination Operations capability was identified with the RLWTF Key Facility in the SWEIS. Activities before 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.
f 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 2007 were less than projected by the SWEIS ROD and so were air emissions. 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	2007 Operations
Radioactive Air Emissions:[a]			
Tritium	Ci/yr	6.09E+1	Not monitored[a]
Americium-241	Ci/yr	6.60E-7	2.61E-10
Plutonium-238	Ci/yr	4.80E-6	8.93E-11
Plutonium-239	Ci/yr	6.80E-7	2.28E-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]	None detected
NPDES Discharge	MGY	No outfalls	0
Wastes:[c]			
Chemical	kg/yr	920	0
LLW	m^3/yr	174	382.20[d]
MLLW	m^3/yr	4	0

Parameter	Units	SWEIS ROD	2007 Operations
Wastes (cont.):[c]			
TRU	m^3/yr	27	48.1[e]
Mixed TRU	m^3/yr	0	5.2[e]
Number of Workers	FTEs	65[f]	62[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 Several empty 55-gallon drums previously containing TRU waste were sent to WCRR Facility, repacked, and characterized as LLW.
e SWEIS ROD projections for TRU and Mixed TRU waste generated at the Solid Chemical and Radioactive Waste Facility were exceeded during CY 2007 due to the disposition of 55-gallon drums that came from TA-50.
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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

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 Facilities List in March 2002 and downgraded to a radiological facility. The D&D of the formerly used tritium facility, TA-33-86, was completed in 2002. In November 2003, five PRSs located within Non-Key Facilities were added to the Nuclear Facilities List.

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

Building	Description	NHC SWEIS ROD	NHC DOE 1998[a]	NHC LANL 2007[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 2007b).

Additionally, several Non-Key Facilities were identified as radiological facilities in September 2002 (Table 2.16-2; 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 2007.

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 Facilities List (LANL 2001c).
b LANL Radiological Facilities List (LANL 2002b).

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 2.16.1-1. Complete descriptions of these projects can be found in previous Yearbooks (LANL 2003, 2004d, 2005e, 2006, and 2007c).

Table 2.16.1-1. Non-Key Facilities Completed Construction Projects

Description	Year Completed	NEPA Review
Los Alamos Research Park	2001	DOE 1997b
Strategic Computing Complex	2001	DOE 1998e
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 2000e
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
Atlas	2006	DOE 2001g
NSSB	2006	DOE 2001h

New projects that are still under construction are discussed in the following paragraphs.

a) NPDES Outfall Project

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

b) Los Alamos Site Office (LASO) Building

Description: The LASO Building is proposed to consolidate core personnel within DOE/NNSA into a centralized and modern office building to meet the long-term needs of DOE/NNSA activities. This building will be located on the south side of West Jemez Road at the west end of the Wellness Center in TA-03. The facility will be single story, approximately 25,000 total gross square feet. The plans and specifications include structural, architectural, mechanical, electrical, and civil designs. The special systems designs include the fire protection system, the security system, and the building telecommunication system. Because this was greenfield development, the building services utility designs include sewer, water, and natural gas.

Status: This project received NEPA coverage through an existing DOE-approved categorical exclusion (DOE 2005b). The notice of contract award was January 24, 2007, and it is estimated that building occupancy will be August 2008.

c) Security Perimeter Project

Description: As a result of the events of September 11, 2001, DOE/NNSA and LANL Management determined that there was a critical need to upgrade the security around the core area (TA-3) of the Laboratory. Unauthorized access needed to be restricted and controlled to minimize the possibility of a terrorist threat. The long-term solution was to establish a security perimeter around the core area of the Laboratory by installing Vehicle Access Portals (VAPs), closing and rerouting a section of Diamond Drive, and constructing a new road to connect West Road to the existing Ski Hill Road in order to maintain public access and provide an alternative evacuation route. The VAPs were proposed to allow all vehicle traffic attempting to enter the LANL core area to be routed through access control stations. All vehicles coming into TA-3, from either the Los Alamos town site or from West Jemez Road have to drive through the new VAPs where they are screened. Public access is allowed during periods of lower security levels. The VAPs are located on East Jemez Road, near the southeast corner of Diamond Drive and Jemez Road, and also at West Jemez Road at the Camp May Road intersection.

Status: This project received NEPA coverage through the *Environmental Assessment for Proposed Access Control and Traffic Improvements at Los Alamos National Laboratory*, and subsequent supplemental analyses (DOE 2002k). Construction for this project began in 2005. The VAPs began operating January 8, 2007. The Project received Critical Decision 4 from DOE/NNSA in July 2007.

d) Ski Hill By-pass

Description: The construction of a new road to connect West Road to the existing Ski Hill Road was proposed in order to maintain public access and provide an alternative evacuation route due to the construction of the new security perimeter road. The 0.9 mile of new road was constructed per New Mexico Department of Transportation standards. Overhead electrical and telephone utilities were relocated to the north of the road.

Status: This project received NEPA coverage through the *Environmental Assessment for Proposed Access Control and Traffic Improvements at Los Alamos National Laboratory*, and subsequent supplemental analyses (DOE 2002k). Construction for this project began in September of 2006. Construction was completed in September of 2007, and the road became operational in October of 2007.

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 2007, no new capabilities were added to the Non-Key Facilities, and none of the eight was deleted.

The 6,030 employees in the Non-Key Facilities at the end of CY 2007 reflect a decrease of 33 employees over the employees reported in the 2006 SWEIS Yearbook (LANL 2007c).

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, historic properties, 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 74 percent of the workforce. In 2007, the Non-Key Facilities generated about 54 percent of the total LANL chemical waste volume; about 25 percent of the total LLW waste volume; about 73 percent of the MLLW volume; and about 7 percent of the total TRU waste volume. Table 2.16.3-1 presents details of the operations data from CY 2007.

The combined flows of the Sanitary Wastewater System (SWWS) and the TA-03 Steam Plant account for about 65 percent of the total discharge from Non-Key Facilities and about 50 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	2007 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	3.31
013	MGY	[b]	89.35
03A-027	MGY	5.8	11.10
03A-160	MGY	5.1	19.77
03A-199	MGY	---	15.07[c]
NPDES Discharge (cont.):			
22 others	MGY	17	[d]
Wastes:			
Chemical	kg/yr	651,000	391,519.80
LLW	m^3/yr	520	848.50[e]
MLLW	m^3/yr	30	97.47[e]
TRU	m^3/yr	0	11[f]
Mixed TRU	m^3/yr	0	0
Number of Workers	FTEs	4,601[g]	6,030[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.
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 and MLLW generation at the Non-Key Facilities exceeded the SWEIS ROD projection due to the heightened activities and routine maintenance of aging facilities.
f TRU waste generated at the Non-Key Facilities during CY 2007 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 2007 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 2007 operations is routinely collected information and represents only LANS 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. Because these are not directly comparable, in Chapter 4 we will only trend total workforce.

2.17 Environmental Programs Directorate (ADEP)

The Environmental Programs Directorate (ADEP), which includes the operations and responsibilities of the previous ER Project, may generate a significant amount of waste during characterization and remediation activities; therefore, the ADEP 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 11 years from 1996–2007.

The DOE established the ER Project in 1989 to characterize and, if necessary, remediate over 2,100 SWMUs and areas of concern (AOCs) known, or suspected, to be contaminated from historical Laboratory operations. Many of the SWMUs and AOCs are located on DOE/NNSA property. However, some properties, which still contain SWMUs and AOCs that need to be addressed, have been conveyed to Los Alamos County or to private ownership (at various locations within the Los Alamos town site). Characterization and remediation efforts are regulated by and coordinated with the NMED for chemical constituents and/or DOE/NNSA for radionuclides.

In CY 2007, ADEP 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 documents submitted to NMED and work activities were formally tracked.

Some of the major plans and reports completed include the following:

- Investigation Report for Guaje/Barrancas/Rendija Canyons;
- Investigation Report for Guaje/Barrancas/Rendija Canyons, Rev. 1;
- Summary of North Canyons Phase 1 Sediment Investigations, Addendum 1;
- Available Data and Cleanup Activities for AOC C-00-041;

- Remedy Completion Report, DOE-LASO TA-73 Airport Landfill, SWMUs 73-001(a) and 73-001(d);
- Investigation Report for Consolidated Unit 73-002-99 and Corrective Action for SWMU 73-002, at Technical Area 73;
- North Canyons Phase 1 Sediment Investigations, Addendum 1;
- Status Report Summarizing Results of Additional Field Work at MDA A, SWMU 21-014;
- Phase II Investigation Work Plan (MDA T);
- Phase II Investigation Report for Consolidated Unit 21-016(a)-99, Material Disposal Area T, at Technical Area 21;
- Subsurface Vapor Monitoring Plan, MDA T, at TA-21;
- Investigation Report for Consolidated Unit 21-018(a)-99, MDA V, at TA 21, Rev. 1;
- DP Site Aggregate Area Investigation Report;
- Investigation Work Plan for Lower Los Alamos Canyon Aggregate Area;
- Summary Report on Potential Sources of Perchlorate Found in Perched-Intermediate and Regional Groundwater beneath the Los Alamos and Pueblo Canyon Watershed;
- Los Alamos/Pueblo Canyons (TA-21) Well Evaluation and Network Recommendations;
- Plan to Investigate the Source of PCBs at LA-SMA-2;
- Response to Comments on Section 8.0 in Approval with Direction, Mortandad Canyon Investigation Report;
- Mortandad Canyon Groundwater Monitoring Well Network Evaluation;
- Mortandad Canyon Groundwater Monitoring Well Network Evaluation, Rev. 1;
- Work Plan to Plug and Abandon Mortandad Canyon Wells Test Well 8 and MCOBT-4.4;
- Drilling Work Plan for Regional Monitoring Well near Material Disposal Area C;
- Well Evaluation and Network Recommendations;
- Phase II Investigation Work Plan for Material Disposal Area C, SWMU 50-009, at TA-50;
- Phase II Investigation Work Plan for Material Disposal Area C, SWMU 50-009, at TA-50, Rev 1;
- Drilling and Sampling Results from Boreholes between Pit 2 and Pit 3 at MDA C, SWMU 50-009, at TA-50;
- Investigation Report for the Middle Mortandad/Ten Site Aggregate, Rev 1;
- Investigation Work Plan for Upper Mortandad Canyon Aggregate Area;
- Historical Investigation Report for Upper Mortandad Canyon Aggregate Area;
- Investigation Work Plan for Middle Cañada del Buey Aggregate Area, Rev 1.0;
- Historical Investigation Report for Middle Cañada del Buey Aggregate Area, Rev 1.0;
- TA-54 Well Evaluation and Network Recommendations;
- TA-54 Well Evaluation and Network Recommendations, Rev. 1;
- Drilling Work Plan for Regional and Intermediate Wells at TA-54;
- Summary Report: 2006 In Situ Soil Vapor Extraction Pilot Study at Material Disposal Area L, Technical Area 54, Los Alamos National Laboratory;

- Periodic Monitoring Report for MDA L;
- Addendum to the Investigation Report for MDA L, SWMU 54-006, at TA 54;
- Interim Subsurface Vapor-Monitoring Plan for MDA L at TA-54;
- Interim Subsurface Vapor-Monitoring Plan for MDA L at TA-54, Rev. 1;
- Addendum to the Investigation Report for MDA G, Consolidated Unit 54-013(b)-99, at TA-54;
- Corrective Measures Evaluation Plan for MDA G, SWMU 54-013(b)-99 at TA-54, Rev.1;
- Corrective Measures Evaluation Plan for MDA G at TA-54, Rev. 2;
- Work Plan for the Implementation of an In Situ Soil-vapor Extraction Pilot Study at TA-54, MDA G;
- Periodic Monitoring Report for Vapor Sampling Activities at MDA G;
- Periodic Monitoring Report for Vapor Sampling Activities at MDA H, SWMU 54-004, at TA-45, Fiscal Year 2007;
- Status Report for SWMUs 03-010(a) and 03-001(e) Interim Measure Activities at TA-03;
- Summary of Pajarito Canyon Phase 2 Sediment Investigations;
- Remedy Completion Report for the Investigation and Remediation of SWMU 61-002 at TA 61;
- Remedy Completion Report for the Investigation and Remediation of SWMU 61-002 at TA 61, Rev. 1;
- Addendum to the Work Plan for Sandia Canyon and Canada del Buey;
- Revised Addendum to the Work Plan for Sandia Canyon and Canada del Buey;
- Work Plan for Geochemical Characterization and Drilling for Fate and Transport of Contaminants Originating in Sandia Canyon;
- Summary of Sandia Canyon Phase 1 Sediment Investigations;
- Fate and Transport Modeling Report for Chromium Contamination from Sandia Canyon;
- R-35 Status Report (Chromium);
- Drilling Work Plan for Regional Aquifer Well R-36 (R-12 Screen 3 Replacement);
- Sandia Canyon Biota Investigation Work Plan;
- Remedy Completion Report for AOC 16-024(v) and SWMUs 16-026(r) and 16-031(f);
- Response to the Notice of Disapproval for Remedy Completion Report for the Investigation and Remediation of AOC 16-024(v) and SWMUs 16-026(r) and 16-031(f) and Revision 1 of the Remedy Completion Report;
- Investigation Report for Consolidated Units 16-007(a)-99 and 16-008(a)-99 at TA-16;
- Evaluation of the Suitability of Wells near TA-16 for Monitoring Contaminant Releases from Consolidated Unit 16-021(c)-99;
- Evaluation of the Suitability of Wells near TA-16 for Monitoring Contaminant Releases from Consolidated Unit 16-021(c)-99, Rev. 1;
- Corrective Measures Evaluation Report, Intermediate and Regional Groundwater, Consolidated Unit 16-021(c)-99;
- Corrective Measures Implementation Plan for Consolidated Unit 16-021(c)-99;

- Corrective Measures Implementation Plan for Consolidated Unit 16-021(c)-99, Rev. 1;
- Monthly Corrective Measures Study Progress Reports for 16-021(c)-99 the 260 Outfall;
- Investigation Work Plan for S-Site Aggregate Area;
- Historical Investigation Report for S-Site Aggregate Area;
- Investigation Work Plan for S-Site Aggregate Area, Rev. 1;
- Investigation Work Plan for Sites at TA-49 Outside the Nuclear Environmental Site Boundary;
- Investigation Work Plan for Sites at TA-49 Inside the Nuclear Environmental Site Boundary;
- Historical Investigation Report for Sites at TA-49 Inside the Nuclear Environmental Site Boundary;
- Investigation Work Plan for North Ancho Canyon Aggregate Area;
- Historical Investigation Report for North Ancho Canyon Aggregate Area;
- Investigation Work Plan for North Ancho Canyon Aggregate Area, Rev 1 and NOD Response;
- General Facility Information 2007;
- 2007 Interim Facility-Wide Groundwater Monitoring Plan (Annual Update);
- Pilot Well Rehabilitation Study Report;
- Work Plan for R-Well Rehabilitation and Replacement, Rev. 1;
- Work Plan for R-Well Rehabilitation and Replacement, Rev. 2;
- Well R-32 Rehabilitation and Conversion Summary Report;
- R-12 Summary Report;
- Well R-32 Rehabilitation and Conversion Summary Report, Rev. 1;
- Periodic Monitoring Reports for Ancho, Los Alamos, Mortandad, Pajarito, Sandia, Water Canyon/Canon de Valle, and White Rock Watersheds;
- Groundwater Background Investigation Report, Rev. 2;
- Groundwater Background Investigation Report, Rev. 3;
- Evaluation of Sampling Systems for Multiple-Completion Regional Aquifer Wells at LANL;
- Amendment to Drilling Methodology for Regional Groundwater Monitoring Well R-35;
- Final Completion Report Intermediate Well R-3i;
- First Regional Aquifer Well Completion Report Due in FY07 (Completion report for Wells R-35a and R-35b);
- Well Screen Analysis Report Rev. 1;
- Well Screen Analysis Report Rev. 2;
- Review of March 2007 Groundwater Data;
- Plan for Screen Isolation/Abandonment and Well Replacement;
- Drilling Work Plan for Regional Aquifer Well R-25b;
- Revision of the Technical Approach for Calculating Recreational Soil Screening Levels for Chemicals;
- Monthly Groundwater Monitoring Data Reviews;
- Well Completion Summary Fact Sheets for Regional Wells R-35a and R-35b

Ongoing field activities included the following:

- BMP inspection/maintenance and storm water/snowmelt sampling ongoing-lab wide.
- Annual Comprehensive Site Compliance Evaluations completed at sites- lab wide.
- Quarterly and semi-annual groundwater and surface water monitoring in all watersheds (Los Alamos/Pueblo, Mortandad, Water/Cañon de Valle, Pajarito, Sandia, Ancho, Chaquehui, and Frijoles).
- Chromium surface water and groundwater investigation ongoing with emphasis in Sandia and Mortandad Canyons.
- Drilled regional wells R-35a and R-35b.
- Site restoration at Well R-23i, LADP-5, R-17, LAOI-3.2a, R-27, R-3i, cdb-16-2(i).
- Rehabilitation of Wells R-32, R-12, and R-20.
- Sediment sampling in Acid, Ancho, Cañada Del Buey, Chaquehui, DP, Fence, Los Alamos, Mortandad, Pajarito, Potrillo, Pueblo, Sandia, and Water Canyons in support of Environmental Surveillance Program.
- Sediment sampling in support of Pajarito Canyon and Sandia Canyon biota and sediment investigations and Los Alamos Canyon low-head weir characterization.
- SWMU 73-002 Voluntary Corrective Measures Airport Ashpile completed and included in characterization and remediation activities.
- DP Site aggregate area investigation ongoing.
- Middle Mortandad/Ten Site investigation completed and included characterization and remediation activities.
- Bayo Canyon investigation ongoing and nearing completion (95% completed).
- Guaje/Barrancas/Rendija investigation completed and included characterization and remediation activities.
- TA-03, SWMU 03-055(c) characterization sampling in support of accelerated investigation for the West Jemez Bypass Road.
- TA-16, 260 Outfall sampling in support of Corrective Measures Implementation.
- TA-16, 16-008(a)-99 sampling in support of investigation.
- MDA C investigation ongoing.
- MDA G supplemental sampling completed and included borehole drilling, pore gas sampling.
- MDA L supplemental sampling completed and included borehole drilling, pore gas sampling, tuff sampling, and core sampling.
- MDA T Phase II completed (borehole drilling, pore gas sampling, finished characterization activities).
- MDA A Phase II completed (borehole drilling, geophysical logging; ongoing characterization activities [pore-gas sampling]).
- Middle Los Alamos Canyon investigation completed and included characterization and remediation activities.

2.17.1 Operations of the Environmental Programs Directorate

In 1990, 2,124 SWMUs and AOCs were originally identified; 1,099 of the original sites were listed in 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 as AOCs by LANL as potentially requiring investigation and/or remediation, but were not regulated under the HSWA Module. Since 1990, six additional sites have been identified.

During 1999 and 2000 there was an effort to consolidate sites. All sites were evaluated and those which were in the same geographic proximity with similar contaminant types and migration pathways were combined. The discrete SWMUs and AOCs were grouped into consolidated units based on geographic proximity, similar operating history, etc. This resulted in a revised total of 1,602 consolidated and discrete SWMUs and AOCs. This deviation from the original identification system for SWMUs and AOCs results in a significant difference in tracking numbers from prior years.

In March 2005, the NMED, DOE/NNSA, and the University of California entered into a Compliance Order on Consent (Consent Order) that replaces the HSWA Module and regulates all sites being addressed[9]. Consolidated units are still used to facilitate the discussion of investigation and remediation activities, but under the Consent Order discrete units comprising the consolidated units are tracked and removed from the Laboratory's Hazardous Waste Facility Permit rather than the consolidated unit as a whole. Since the Consent Order and through the end of CY 2007, 687 units have been approved for no further action (NFA) [10], including 164 units that have been removed from the Laboratory's Hazardous Waste Facility Permit. Based on prior NFA approvals and consolidation of geographically proximate sites, a total of 866 SWMUs and AOCs still require characterization and/or remediation activities. Pursuant to the Consent Order, the NFA determination has been replaced with a Certificate of Completion. In 2007 the Project received certificates of completion for two SWMUs and one AOC.

Security Perimeter Project – SWMU 61-002. SWMU 61-002 is a former storage area that was located in TA-61, east of the Radio Repair Shop (Building 61-23) on East Jemez Road. A Remedy Completion Report for SWMU 61-002 was submitted to NMED in May 2007 and reported that the nature and extent of contamination have been defined for SWMU 61-002 and the results of the human health screening assessments indicate no potential unacceptable risk to human health under industrial and construction worker scenarios. Ecological screening assessment results show no potential risk to ecological receptors from residual contamination at the SWMU. In the report, the Laboratory requested a Certificate of Completion (corrective action complete with controls) be granted for SWMU 61-002.

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

[10] NFA means that the ADEP has no further regulatory requirements for the site. Requirements may exist under other LANL projects.

SWMUs 03-010(a) and 03-001(e). SWMU 03-010(a) is the outfall area from a former vacuum repair shop (Building 03-030). The outfall area is located on a steep slope of the rim of Twomile Canyon about 30 feet west of Building 03-030. SWMU 03-001(e) is a storage area located on the west side of Building 03-030. In 2007, Interim Measures activities were conducted at SWMUs 03-010(a) and 03-001(e) in response to the 2005 environmental investigations conducted at the site in which a shallow groundwater body was found to contain elevated levels of tritium and volatile organic compounds (VOCs). During a week-long tracer study event conducted in 2006, a southern culvert that received precipitation runoff from Building 03-030 was shown to be the potential source of recharge to the shallow groundwater at SWMUs 03-010(a) and 03-001(e). In April 2007 this culvert was video-logged and a gash was discovered 2 feet west of the building foundation. In October 2007, the entire line was hand excavated and the damage indicated by the video logging activities was verified. In addition, the bottom of the culvert was found to be significantly deteriorated. A new corrugated metal pipe was installed in the original trench and all joints were connected with couplings, sealed with mastic, and encased in concrete.

MDA A, SWMU 21-014. MDA A is a 1.25-acre area at TA-21 that was used to dispose of radioactively contaminated solid and liquid waste, debris from D&D activities, and radioactive liquids generated at TA-21. MDA A consists of two subsurface storage tanks, two rectangular storage pits, and a large central pit. Supplemental investigations to the 2006 investigation report continued in 2007. The three objectives of the supplemental investigation were to assess the vertical extent of tritium pore gas beneath MDA A, further characterize tritium and VOC extent in pore gas beneath MDA A, and plug and abandon open boreholes. As a result of these activities 12 open boreholes were plugged and abandoned. The Supplemental Sampling Status Report for MDA A was submitted to NMED in December 2007 and concluded that as a result of these supplemental sampling activities the vertical and lateral extent of tritium in pore gas has been defined at MDA A and the vertical and lateral extent of pore-gas VOCs are defined at MDA A.

MDA T, Consolidated Unit 21-016(a)-99. MDA T is a fenced area of approximately 2.2 acres at TA-21. MDA T consists of four inactive absorption beds, buried sumps and pipelines, up to 64 shafts, a former Retrievable Waste Storage Area, former and current waste treatment plant locations, and portable incinerators. Phase II investigations at MDA T were conducted in 2007 as a follow up of the 2005/2006 implementation of the approved Investigation Work Plan. Phase II investigations were conducted to continue characterization of tritium and VOC vapors beneath MDA T; define the vertical extent of americium-241, plutonium-238, and plutonium-239 at locations on the DP Canyon slope; assess if americium-241, plutonium-238, and plutonium-239 activities in surface soils have been impacted by recent storm runoff and the December 2006 water main leaks at TA-21; and acquire nitrate and supplemental perchlorate data on the DP Canyon slope. The Phase II Investigation Report for MDA T was submitted to NMED in November 2007 and concluded that the nature and extent of americium-241, plutonium-238, and plutonium- 239 have been defined. The report also indicated that the nature and extent of nitrate and perchlorate have been fully investigated and defined. Pore-gas monitoring will continue at MDA T. The nature and extent of pore gas will be comprehensively evaluated and presented in a report following completion of planned vapor-monitoring activities.

MDA V, Consolidated Unit 21-018(a)-99. MDA V is a 0.88-acre site on the west end of TA-21 that consists of three absorption beds that were used to dispose of liquid waste from former laundry operations conducted at Building 21-20 and, for a short time, waste from a waste disposal laboratory at Building 21-45. In July 2007 LANL submitted revision 1 of the MDA V Investigation Report in response to a notice of disapproval to the original report (submitted in 2006) received from NMED in January 2007. As requested by NMED, additional confirmatory sampling was completed in 2007 on the northwest slope of SWMU 21-013(b) and presented in this revision. The MDA V investigation report, revision 1, also concludes that the site poses no unacceptable risk to human health under a residential scenario. Additionally, an investigation is in progress in an area of elevated radioactivity identified north of SWMU 21-018(a) during the post-remediation walkover survey. The results from this ongoing investigation will be presented in a future supplemental investigation report.

Consolidated Units 16-007(a)-99 and 16-008(a)-99. The 30s Line (consolidated unit 16-007(a)-99) and 90s Line (consolidated unit 16-008(a)-99) were primarily high explosives machining facilities where high explosives were machined to specific shapes to support the development of nuclear weapons. The 30s Line operated from 1945 to the early 1950s and the 90s Line operated from 1950 to 1970. In both facilities, high explosives-contaminated wastewater was routed through the sumps and drainlines to either settling ponds or to a drainage to Cañon de Valle. The 30s Line buildings, fixtures, and settling ponds were decommissioned and removed during the 1960s. During a 1996 Voluntary Corrective Action, the 90s Line buildings and fixtures underwent demolition and decommissioning activities and were removed; however the pond remains at TA-16. In November 2007 LANL submitted an Investigation Report for 16-007(a)-99 and 16-008(a)-99 to NMED. Investigation activities were conducted in September 2006 and August 2007 and included collection of field screening samples from near-surface soil and tuff samples. One surface water sample was collected from within the 90s Line Pond and one groundwater sample was collected from a perched water zone at a depth of 145 feet southeast of the pond. The sampling results showed the vertical and lateral extent of contamination had not been defined for all chemicals of potential concern (COPCs) at either consolidated unit. Future remediation actions were recommended at both sites to define the nature and extent of contamination.

Consolidated Unit 73-002-99. In July 2007 the Investigation Report for Consolidated Unit 73-002-99 was submitted to NMED. This Investigation Report discussed the corrective action activities at SWMU 73-002. Field activities were conducted between 2005-2007. The objective of this investigation was to complete surface and subsurface characterization of Consolidated Unit 73-002-99 and to remove incinerator ash and debris at SWMU 73-002 with concentrations of COPCs exceeding residential screening action levels for radionuclides and soil screening levels for inorganic and organic chemicals. In addition, contaminated soil was removed from SWMUs 73-004(b) and 73-006 (component SWMUs of Consolidated Unit 73-002-99). Field investigation activities included borehole drilling and sampling to characterize the vertical and lateral extent of contamination. Based on the characterization data from this investigation and from previous investigations conducted at the site, the nature and extent of radionuclide and inorganic and organic COPCs in both surface and subsurface media are defined for Consolidated Unit 73-002-99. Concentrations of COPCs do not pose a potential unacceptable risk/dose to human health under a residential scenario. The results of the ecological screening assessment indicate that no potential unacceptable risk exists to receptors at Consolidated Unit 73-002-99. NMED approved the report in August 2007 and issued a Certificate of Completion (corrective action complete with controls) for SWMUs 73-002, 73-004(a), 73-004(b), 73-006, and AOC 73-003 as part of the approval letter.

Middle Mortandad/Ten Site Aggregate Area. LANL submitted the Middle Mortandad/Ten Site Aggregate Investigation Report, Revision 1, in July 2007. Remediation activities were conducted in April and June of 2007 at SWMUs 35-016(o) and 35-016(p). These remediation activities included the removal of approximately 0.23 cubic yards of polyaromatic hydrocarbon-contaminated soil and collection of confirmation samples. Results from the confirmation sampling indicate that the soil removal achieved approximately 70 percent to 80 percent reductions in the maximum concentrations of polyaromatic hydrocarbons as these sites. Ecological risk screening was also conducted for all seven subareas within the Middle Mortandad/Ten Site Aggregate. No potential unacceptable ecological risk was found to exist in any of the subareas. The revised report concluded that in evaluating individual SWMUs, AOCs, and consolidated units with the new data obtained in 2007 and revised screening levels adopted by NMED in 2005, all sites were found to be at or below the NMED target level for excess cancer risk. All SWMUs, AOCs, and consolidated units, except for AOC 35-018(a), in all seven subareas of the Middle Mortandad/Ten Site Aggregate are at or below NMED target levels or the DOE target dose, and they pass risk screening under either residential, industrial, or recreational scenarios. For sites that did not pass residential screening but passed industrial or recreational screening, proposed controls include maintenance of current land use (either industrial or recreational).

Delta Prime Site Aggregate Area. LANL submitted the Delta Prime (DP) Site Aggregate Area Investigation Report to NMED in November of 2007. This report presented the results of field activities performed in 2006 and 2007 at five sites and one outfall within the DP Site Aggregate Area. Field investigations were conducted at AOC 21-002(b), Consolidated Unit 21-003-99, AOC 21-009, SWMU 21-013(c), and SWMU 21-024(c) to define the nature and extent of contamination at these sites.

Corrective action activities also took place at SWMUs 21-012(b), 21-024(a), 21-024(e), 21-024(g), 21-024(o), and 21-027(c) and consolidated units 21-024(l)-99 and 21-026(a)-99. The objective of these corrective actions was to reduce or prevent the migration of contamination by removing infrastructure and environmental media suspected to contain contaminants in accordance with the work plan submitted by LANL in August 2004 and approved by NMED in April 2005. Based on confirmation sampling data from the 2006/2007 corrective action activities for these sites, the extent of contamination has not been defined for any of the additional sites and the report determined that additional sampling is warranted.

Ongoing corrective action activities and sample collection continued in 2007 at SWMUs 21-024(b), 21-024(d), 21-024(h), 21-024(i), 21-024(j), 21-024(k), 21-024(n), and 21-027(a) and consolidated units 21-022(h)-99 and 21-023(a)-99. Risk assessments will be completed for all the sites addressed in the Aggregate Area report once nature and extent has been defined and/or remediation has taken place.

Interim Facility-wide Groundwater Monitoring Plan, Revision 1. The Interim Facility-wide Groundwater Monitoring Plan, Revision 1, submitted to NMED in May 2007 and approved in August 2007 fulfilled a requirement of the Consent Order. Four modes of water will continue to 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 schedule.

Guaje/Barrancas/Rendija Canyons Aggregate Area. The Investigation Report for Guaje/Barrancas/Rendija Canyons was submitted in August of 2007. This report presented the results of investigation activities conducted in 2006 and 2007 at SWMUS and AOCs within the TA-00 boundaries of the Guaje/Barrancas/Rendija Canyons Aggregate Area. Field investigations were conducted at SWMUs 00-011(a), 00-011(c), 00-011(d), and 00-011(e) and at AOCs C-00-020 and C-00-041. Investigation activities included site surveys, surface and subsurface sampling, and the collection of soil and tuff samples. Results of the characterization data show that nature and extent of surface and subsurface contamination have been defined for SWMUs 00-011(a), 00-011(d), and 00-011(e). The nature and extent of total petroleum hydrocarbon contamination have been defined for AOC C-00-041. The report determined that these sites do not pose an unacceptable risk to human health under a residential scenario, and the results of an ecological risk screening assessment also indicate no unacceptable risk to the environment. No further investigation at SWMU 00-011(c) or AOC C-00-020 were conducted because results of the current site survey and previous site surveys indicated that these sites were not used as impact areas. The report recommended that these six sites receive a Certificate of Completion without controls.

Canyons Projects. The Canyons Projects implemented in 2007 focused primarily on investigations in Middle Los Alamos Canyon, Middle Mortandad/Ten Site Canyons, Bayo Canyon, and the North Canyons (Guaje/Barrancas/Rendija Canyons). Additional investigations were ongoing in Pajarito and Sandia Canyons with the main emphasis being on chromium, surface water, groundwater investigations, and biota and sediment investigations.

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

As a result of the Consent Order, routine sampling is now conducted in all seven watershed and subwatershed groupings within LANL boundaries. Reporting on these sampling events are done on a periodic basis scheduled by the Consent Order and will include addressing the impact of the Cerro Grande Fire on COPC concentrations in canyon media in the future.

No new Environmental Sites were added to the DOE/LANL Nuclear Facilities List (LANL 2007b) during CY 2007. SWMU 10-002(a)-99 was removed in September of 2007 per SBT:5KK-003 “Re-categorization of TA-10, Bayo Canyon Nuclear Environmental Site,” dated 8/10/2007. 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-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 DP 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	Consolidated Unit 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 shaft, 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.	3

Zone	SWMU/AOC	Description	HAZ CAT
TA-35	Consolidated Unit 35-003(a)-99	The Wastewater 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 Building 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
TA-35	Consolidated Unit 35-003(d)-00	The former structures associated with the Pratt Canyon component of the Wastewater 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	Consolidated Unit 49-001(a)-00	MDA AB consists of an underground, former explosive test site that comprises four distinct areas, each with a series of deep shafts used for subcritical testing.	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 seven 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.	2
TA-53	Consolidated Unit 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 ft in diameter and 65 ft long and contains spent ion exchange resin. The other two tanks, 6ft in diameter and 12 ft long, formerly stored radioactive liquid waste. In 2000/2001 the two tanks were emptied, washed, and drainlines to the tanks were cut and capped.	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	Consolidate Unit 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

References

Department of Energy, 1991. "Environmental Assessment for the Materials Science Laboratory," DOE/EA-0493, and Finding of No Significant Impact. Los Alamos, NM.

Department of Energy, 1992a. "Nuclear Safety Analysis Report," DOE Order 5480.23, Washington, D.C.

Department of Energy, 1992b. "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Report," DOE Standard DOE-STD-1027-92, Washington, D.C.

Department of Energy, 1993. "Nonnuclear Consolidation Environmental Assessment, Nuclear Weapons Complex Reconfiguration Program," DOE/EA-0792, Washington, D.C.

Department of Energy, 1995a. "Environmental Assessment for Relocation of Neutron Tube Target Loading Operations," DOE/EA-1131, and Finding of No Significant Impact. Los Alamos, NM.

Department of Energy, 1995b. "Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement," DOE/EIS-0228, Albuquerque, NM.

Department of Energy, 1995c. "Environmental Assessment for Radioactive Source Recovery Program," DOE/EA-1059, and Finding of No Significant Impact. Los Alamos, NM.

Department of Energy, 1996a. "Categorical Exclusion for FRIT (crushed glass) Transfer System," LAN-96-022, Accession Number 8521, Los Alamos, NM.

Department of Energy, 1996b. "Environmental Assessment for Effluent Reduction," DOE/EA-1156, and Finding of No Significant Impact. Los Alamos, NM.

Department of Energy, 1996c. "Categorical Exclusion for High Explosive Wastewater Treatment Facility (installation and start-up)," LAN-96-012, Accession Number 6067, Los Alamos, NM.

Department of Energy, 1996d. "Categorical Exclusion for Temporary Target Building at Firing Point 57," LAN-96-022, Accession Number 13846, Los Alamos, NM.

Department of Energy, 1996e. "Categorical Exclusion for Concrete Slab Addition at TA-15-534, Vessel Prep Building," LAN-96-012, Accession Number 13840, Los Alamos, NM

Department of Energy, 1996f. "Categorical Exclusion for LANCE FIRP Revitalization Project," LAN-96-010, Accession Number 11412, Los Alamos, NM

Department of Energy, 1996g. "Categorical Exclusion for TA-53-25 Roof Maintenance," LAN-96-010, Accession Number 14315, Los Alamos, NM

Department of Energy, 1996h. "Categorical Exclusion for Repair Steam Condensate Leak," LAN-96-022, Accession Number 9334, Los Alamos, NM.

Department of Energy, 1996i. "Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management," Appendix K, "Atlas Facility Project-Specific Analysis," DOE/EIS-0236, Washington, D.C.

Department of Energy, 1997a. "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports," DOE-STD-1027-92, Washington, D.C.

Department of Energy, 1997b. "Environmental Assessment for the Lease of Land for the Development of a Research Park at Los Alamos National Laboratory," DOE/EA-1212, Los Alamos, NM.

Department of Energy, 1998a. "DOE List of Los Alamos National Laboratory Nuclear Facilities," DOE Albuquerque Operations Office Memorandum, Albuquerque, NM.

Department of Energy, 1998b. "Categorical Exclusion for Decontamination and Decommissioning of Vacant Structure," LAN-98-052, Accession No. 6137, Los Alamos, NM.

Department of Energy, 1998c. "Categorical Exclusion for TA-53 Storage Building," LAN-98-110, Accession No. 7199, Los Alamos, NM.

Department of Energy, 1998d. "Categorical Exclusion for TA-53 Radioactive Waste Treatment System," LAN-98-109, Accession No. 7175, Los Alamos, NM.

Department of Energy, 1998e. "Environmental Assessment for the Proposed Strategic Computing Complex, Los Alamos National Laboratory, Los Alamos, New Mexico," DOE/EA-1250, Los Alamos, NM.

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

Department of Energy, 1999b. "Categorical Exclusion for TA-53 Cooling Tower," LAN-96-022, Accession No. 7583, Los Alamos, NM.

Department of Energy, 1999c. "Categorical Exclusion for Electrodialysis Reversal," LAN-99-025, Accession Number 7428, Los Alamos, NM.

Department of Energy, 1999d. "Categorical Exclusion Volume Reducing Evaporator (TA-50/248)," LAN-99-025, Accession Number 7737, Los Alamos, NM.

Department of Energy, 1999e. "Categorical Exclusion for Changes to Radioactive Source Recovery Program," LAN-99-049, Accession Number 7405, Los Alamos, NM.

Department of Energy, 1999f. "Categorical Exclusion for Radioactive Source Storage at LANL," LAN-99-049, Rev. 1, Accession Number 7570, Los Alamos, NM.

Department of Energy, 1999g. "Environmental Assessment for Nonproliferation and International Security Center," DOE/EA-1238, Los Alamos, NM.

Department of Energy, 2000a. "DOE List of Los Alamos National Laboratory Nuclear Facilities," DOE Los Alamos Area Office and Los Alamos National Laboratory, Los Alamos, NM.

Department of Energy, 2000b. "Categorical Exclusion for Construction of the Detonator Production Facility," CX Amendment to LAN-00-034, Accession Number 7912, Los Alamos, NM.

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

Department of Energy, 2000d. "Categorical Exclusion for the Live-Fire Shoot House," LAN-97-112, Accession Number 7245, Los Alamos, NM.

Department of Energy, 2001a. "Categorical Exclusion for the Material Science and Technology Office Building," LAN-96-022, Accession Number 8618, Los Alamos, NM.

Department of Energy, 2001b. "Categorical Exclusion for the Chemistry Technical Support Building," LAN-96-011, CX Amendment, Accession Numbers 8044 and 8227, Los Alamos, NM.

Department of Energy, 2001c. "Environmental Assessment for the Emergency Operations Center and Multi-Channel Communications Project," DOE/EA-1376, Los Alamos, NM.

Department of Energy, 2001d. "Categorical Exclusion for the S-3 Security Systems Facility," LAN-96-022, Accession Number 8612, Los Alamos, NM.

Department of Energy, 2001e. "Categorical Exclusion for the ESH-2 Medical Clinic," LAN-96-022, Accession Number 8398, Los Alamos, NM.

Department of Energy, 2001f. "Categorical Exclusion for the TA-63 FWO-DO Office Building," LAN-96-022, Accession Number 9622, Los Alamos, NM.

Department of Energy, 2001g. "Environmental Assessment for Atlas Relocation and Operation at the Nevada Test Site, Los Alamos, New Mexico," DOE/EA-1381, Los Alamos, NM.

Department of Energy, 2002a. "Safety Evaluation Report, Los Alamos National Laboratory Transportation Safety Document (TSD) Technical Safety Requirements

(TSRs), LANL BUS-SA-002, R0," DOE National Nuclear Security Administration, Albuquerque Operations Office, Los Alamos Site Operations, Los Alamos, NM.

Department of Energy, 2002b. "Final Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory," DOE/EIS-319, Los Alamos, NM.

Department of Energy, 2002c. "Record of Decision: Final Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory," Federal Register, Volume 67, p. 79906. Washington, D.C.

Department of Energy, 2002d. "Categorical Exclusion for the Center for Integrated Nanotechnologies (CINT) Gateway to Los Alamos Project," LAN-02-011, Accession Number 8579, Los Alamos, NM.

Department of Energy, 2002e. "Environmental Assessment for Proposed TA-16 Engineering Complex at Los Alamos National Laboratory, Los Alamos, New Mexico," DOE/EA-1407, Los Alamos, NM.

Department of Energy, 2002f. "Categorical Exclusion for the Ultracold Neutron Project at LANSCE," LAN-02-037, Accession No. 9004, Los Alamos, NM.

Department of Energy, 2002g. "Environmental Assessment for the Proposed Construction and Operation of a Biosafety Level 3 Facility at Los Alamos National Laboratory, Los Alamos, NM," DOE/EA-1364, Accession Number 8250, Los Alamos, NM.

Department of Energy, 2002h, "Categorical Exclusion for Ion Exchange Removal of Perchlorates," LAN 96-012, Accession Number 8632, Los Alamos, NM.

Department of Energy, 2002i. "Categorical Exclusion for the Truck Security Inspection Station," LAN-96-022, Accession Number 8726, Los Alamos, NM.

Department of Energy, 2002j. "Categorical Exclusion for the D Division Office Building (DDOB)," LAN-96-011, CX Amendment, Accession Number 8595, Los Alamos, NM.

Department of Energy, 2002k. "Environmental Assessment for Proposed Access Control and Traffic Improvements at Los Alamos National Laboratory, Los Alamos, New Mexico," DOE/EA-1429 draft, Los Alamos, NM.

Department of Energy, 2003a. "Categorical Exclusion for Liquid Waste Line Replacement," LAN-96-012, Accession Number 9708, Los Alamos, NM.

Department of Energy, 2003b. "Categorical Exclusion for Nitrogen System Upgrade," LAN-96-022, Accession Number 9702, Los Alamos, NM.

Department of Energy, 2003c. "Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at the Los Alamos National Laboratory," DOE/EIS-0350, Los Alamos, NM.

Department of Energy, 2003d. "Supplement Analysis to the 1999 Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory for the Proposed Disposition of Certain Large Containment Vessels," DOE/EIS-0238-SA-03, Los Alamos, NM.

Department of Energy, 2003e. "Environmental Assessment for the Proposed Consolidation of Certain Dynamic Experimentation Activities at the Two-Mile Mesa Complex," DOE/EA-1447 draft, Los Alamos, NM.

Department of Energy, 2003f. "Categorical Exclusion for the TA-03 Parking Structure Project," Accession Number 9443, Los Alamos, NM.

Department of Energy, 2004. "Record of Decision: Final Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at the Los Alamos National Laboratory," DOE/EIS-0350, Federal Register, Volume 69, p. 6967. Washington, D.C. July 9, 2000.

Department of Energy, 2005a. "Categorical Exclusion for TA-55 SST-Pad Construction," Accession Number 11046, Los Alamos, NM.

Department of Energy, 2005b. "Categorical Exclusion for IOB-1, 2, and 3 and Master Plan," Accession Number 11319-11321, Los Alamos, NM.

Federal Register, 2001. "Nuclear Safety Management," US Department of Energy, 10 CFR 830, Vol. 66, No. 7, Washington, D.C.

Los Alamos National Laboratory, 2001a. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Facility and Waste Operations Division, Office of Authorization Basis, FWO-OAB 401, Rev. 1, Los Alamos, NM.

Los Alamos National Laboratory, 2001b. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Facility and Waste Operations Division, Office of Authorization Basis, FWO-OAB 401, Rev. 2, Los Alamos, NM.

Los Alamos National Laboratory, 2001c, "Los Alamos National Laboratory Radiological Facilities List," Facility and Waste Operations Division, Office of Authorization Basis, FWO-OAB 403, Rev. 0, Los Alamos, NM.

Los Alamos National Laboratory, 2001d. "CMR Replacement Project Preconceptual Design," ESH-ID 01-0194, Los Alamos, NM.

Los Alamos National Laboratory, 2001e. "FRIT Transfer System," ESH-ID 01-0193, Los Alamos, NM.

Los Alamos National Laboratory, 2001f. "TA-18 Relocation Project Office Building," ESH-ID 01-0058, Los Alamos, NM.

Los Alamos National Laboratory, 2001g. "TA-18 Relocation Project CATIII/IV at TA-55," ESH-ID 01-0055, Los Alamos, NM.

Los Alamos National Laboratory, 2001h. "TA-18 Relocation Project CAT-1 Piece," ESH-ID 01-0030, Los Alamos, NM.

Los Alamos National Laboratory, 2001i. "TA-55 Radiography/Interim," ESH-ID 01-0258, Los Alamos, NM.

Los Alamos National Laboratory, 2001j. "TA-55 Radiography (complements ESH-ID 01-0258)," ESH-ID 01-0259, Los Alamos, NM.

Los Alamos National Laboratory, 2001k. "TA-16-220 Complex Decommission" ESH-ID 01-0253, Los Alamos, NM.

Los Alamos National Laboratory, 2001l. "Wildfire Hazard Reduction Project Plan," Los Alamos National Laboratory document LA-UR-01-2017, Los Alamos, NM.

Los Alamos National Laboratory, 2002a. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Performance Surety Division, Office of Authorization Basis, FWO-OAB 401, Rev. 3, Los Alamos, NM.

Los Alamos National Laboratory, 2002b. "Los Alamos National Laboratory Radiological Facilities List," Performance Surety Division, Office of Authorization Basis, PS-OAB-403, Rev. 1, Los Alamos, NM.

Los Alamos National Laboratory, 2002c. "Los Alamos National Laboratory Transportation Safety Document," Business Operations Division, Materials Management Group, BUS4-SA-002, R0, Los Alamos, NM.

Los Alamos National Laboratory, 2002d. "TA-55 New Parking Lot," ESH-ID 02-0075, Los Alamos, NM.

Los Alamos National Laboratory, 2002e. "Facility Infrastructure Technical Support Building Parking Lot," ESH-ID 02-0125, Los Alamos, NM.

Los Alamos National Laboratory, 2002f. "CMR Replacement Geotechnical Investigation," ESH-ID 02-0185, Los Alamos, NM.

Los Alamos National Laboratory, 2002g. "Hydrotest Design Facility," ESH-ID 02-0059, Los Alamos, NM.

Los Alamos National Laboratory, 2003. "SWEIS Yearbook 2002—Comparison of Operations Data from 1998 to 2002 to Projections of the Site-Wide Environmental

Impact Statement for Continued Operation of Los Alamos National Laboratory," Los Alamos National Laboratory report LA-UR-03-5862, Los Alamos, NM.

Los Alamos National Laboratory, 2004a. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Performance Surety Division, Office of Authorization Basis, PS-OAB 401, Rev. 4, Los Alamos, NM.

Los Alamos National Laboratory, 2004b. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Performance Surety Division, Office of Authorization Basis, PS-SBO 401, Rev. 5, Los Alamos, NM.

Los Alamos National Laboratory, 2004c. "LIR 402-560-01.2, Beryllium Use," Revised August 30, 2004.

Los Alamos National Laboratory, 2004d. "SWEIS Yearbook 2003," Los Alamos National Laboratory report LA-UR-04-6024, Los Alamos, NM.

Los Alamos National Laboratory, 2005a. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Performance Surety Division, Office of Authorization Basis, PS-OAB 401, Rev. 6, Los Alamos, NM.

Los Alamos National Laboratory, 2005b. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Performance Surety Division, Office of Authorization Basis, PS-OAB 401, Rev. 7, Los Alamos, NM.

Los Alamos National Laboratory, 2005c. "TA-55 SST-Pad Construction," PR-ID 04P-0247, Los Alamos, NM.

Los Alamos National Laboratory, 2005d. "CMRR Phase A: Radiological Lab/Utility/Office Building (RLUOB)," PR-ID 05P-0172, Los Alamos, NM.

Los Alamos National Laboratory, 2005e. "SWEIS Yearbook 2004," Los Alamos National Laboratory report LA-UR-05-6627, Los Alamos, NM.

Los Alamos National Laboratory, 2006. "SWEIS Yearbook 2005," Los Alamos National Laboratory report LA-UR-06-6020, Los Alamos, NM.

Los Alamos National Laboratory, 2007a. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Performance Surety Division, Office of Authorization Basis, PS-SBO 401, Rev. 8, Los Alamos, NM.

Los Alamos National Laboratory, 2007b. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Safety Basis Division, Office of Authorization Basis, SB 401, Rev. 9, Los Alamos, NM.

Los Alamos National Laboratory, 2007c. "SWEIS Yearbook 2006," Los Alamos National Laboratory report LA-UR-07-6628, Los Alamos, NM.

National Nuclear Security Administration, 2001. "Environmental Assessment for the Construction and Operation of a New Office Building and Related Structures within TA-03," NNSA/EA-1375, Los Alamos, NM.

National Nuclear Security Administration, 2006. Memorandum from Elizabeth Withers, SWEIS Document Manager, Albuquerque Service Center, to Alice Williams, NNSA NEPA Compliance Officer, DOE/ Head Quarters Subject: Final Site-Wide Environmental Impact Statement (SWEIS) – Reasonableness of the Reuse of the Existing PF-41 Facility to House the Proposed New Radiography Facility at Los Alamos National Laboratory (LANL), and Procurement of Certain Equipment for the Proposed New Radiography Facility. Albuquerque Service Center, Albuquerque, NM. September 20, 2006.

Steele, C. M. 2002. "Transmittal of Approval of the Safety Evaluation Report (SER) for the Los Alamos National Laboratory (LANL) Transportation Safety Document (TSD) and Technical Safety Requirements (TSRs)," DOE National Nuclear Security Administration, Albuquerque Operations Office, Los Alamos Site Operations, SABT/RCJ.02.013: SABM Steele, Los Alamos, NM.

3.0 Site-Wide 2007 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 methods that duplicate those used in the SWEIS; hence, they have been included to provide the basis 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.

3.1 Air Emissions

3.1.1 Radioactive Air Emissions

Radioactive airborne emissions from point sources (i.e., stacks) during 2007 totaled approximately 477 curies, approximately 2 percent of the 10-year average of 21,700 curies projected by the ROD.

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 242 curies.

Emissions of activation products from LANSCE were much reduced in 2007 as a result of repairs to the emission control system. The total point source emissions from LANSCE were approximately 229 curies.

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 83 curies. Additional detail about radioactive air emissions is provided in LANL's 2007 annual compliance report to the EPA (LANL 2008a), submitted in June 2008, and in the 2007 Environmental Surveillance Report (LANL 2007a).

Maximum offsite dose for 2007 to the maximum exposed individual was 0.52 millirem. The EPA radioactive air emissions limit for DOE facilities is 10 millirem per year. This dose is calculated to the theoretical "maximum exposed individual" who lives at the nearest offsite receptor location 24 hours per day, eating food grown at that same site, etc. No actual person received this dose.

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 2007 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	2003 Operations	2004 Operations	2005 Operations	2006 Operations	2007 Operations
Carbon monoxide	Tons/year	58	31.9	17.1	17.5	17.6	13.9
Nitrogen oxides	Tons/year	201	49.6	24.5	24.5	24.5	19.6
Particulate matter	Tons/year	11	22.1[b]	3.0	3.2	3.4	2.9
Sulfur oxides	Tons/year	0.98	1.3[b]	0.3	0.3	0.4	0.5

a Emissions included on the annual Emissions 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 2005 and 2006 Emissions Inventory Reports (LANL 2006a and 2007b). In CY 2007, over 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 2007 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 were below the levels evaluated in the SWEIS ROD except sulfur oxides. The higher sulfur oxide emissions in the Title V Operating Permit Emissions Report are due to inclusion of emissions from over 200 small boilers and heaters and approximately 50 stationary standby generators located throughout the LANL facility.

Table 3.1.2.1-2. 2004 through 2007 Emissions for Criteria Pollutants as Reported on LANL's Title V Operating Permit Emissions Reports[a]

Pollutants	Units	SWEIS ROD	Title V Facility-Wide Emission Limits	2004 Emissions	2005 Emissions	2006 Emissions	2007 Emissions
Carbon monoxide	Tons/year	58	225	35.4	35.1	34.2	33.3
Nitrogen oxides	Tons/year	201	245	50.5	50.5	57.0	52.0
Particulate matter	Tons/year	11	120	4.8	5.0	5.3	4.9
Sulfur oxides	Tons/year	0.98	150	1.5	1.9	4.2	1.0

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 standby 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 and Community Right-to-Know Act (42 USC 11023) and for reporting regulated air pollutants estimated from research and development operations in the annual Emissions Inventory Reports (LANL 2005a and 2006a).

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 2006 Yearbooks (LANL 2000a, 2001a, 2002a, 2003a, 2004a, 2005b, and 2006b). 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)					
	2002	2003	2004	2005	2006	2007
Hazardous air pollutants	7.7	7.3	5.7	5.4	4.8	5.8
Volatile organic compounds	14.9	11.2	8.0	11.2	10.1	12.3

Emissions of VOCs and HAPs from chemical use in research and development activities in 2007 are similar to previous years.

3.2 Liquid Effluents

From January 1, 2007, through July 31, 2007, LANL had 21 wastewater outfalls that were regulated under NPDES Permit No. NM0028355. This permit was renewed by EPA Region 6 with an effective date of August 1, 2007, and now includes 15 outfalls (14 industrial outfalls and one sanitary outfall). Based on discharge monitoring reports prepared by LANL's Water Quality and RCRA Group, 15 permitted outfalls had recorded flows in CY 2007 totaling an estimated 178.23 million gallons. This is approximately 43.48 million gallons less than the CY 2006 total of 221.71 million gallons. The 2007 total volume of discharge is 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. Details on NPDES noncompliance during 2007 will be provided in the 2007 Environmental Surveillance Report (LANL 2007a).

CY 2007 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 2007 discharges came from Non-Key Facilities (see Table 3.2-2).

Key Facilities accounted for approximately 39.6 million gallons of the 2007 total. LANSCE discharged approximately 15.1 million gallons in 2007, about 5.01 million gallons less than in 2006, accounting for about 38.1 percent of the total discharge from all Key Facilities (see Table 3.2-2). 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 SWWS at TA-46, a Non-Key Facility, the RLWTF at TA-50, (one of the Key Facilities), and the High Explosives Wastewater Treatment Facility at TA-16 (one of the Key Facilities).

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

Watershed	# Outfalls (SWEIS ROD)	# Outfalls August 1, 2007[a]	Discharge (SWEIS ROD)	Discharge 2007
Cañada del Buey	3	1[b]	6.4	0
Guaje	7	0	0.7	0
Los Alamos	8	2	44.8	23.1304
Mortandad	7	5	37.4	25.9005
Pajarito	11	0	2.6	0
Pueblo	1	0	1.0	0
Sandia	8	5	170.7	23.5577
Water	10	3[c]	14.2	105.6406
Totals	**55**	**15**	**278.0**	**178.2292**

a Twenty-one outfalls were permitted to discharge January 1, 2007, through July 31, 2007, and 15 were permitted to discharge from August 1, 2007, through December 31, 2007.
b Includes Outfall 13S from the SWWS, 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.

The RLWTF, TA-50 Building 01, Outfall 051 discharges into Mortandad Canyon. During CY 2007, about 1.21 million gallons of treated radioactive liquid effluent, about 0.42 million gallons less than CY 2006, 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 August 1, 2007[a]	Discharge (SWEIS ROD)	Discharge 2007
Key Facilities				
Plutonium Complex	1	1	14.0	2.247895
Tritium Facility	2	1	0.3	18.134075
CMR Building	1	1	0.5	0.599378
Sigma Complex	2	1	7.3	1.477924
High Explosives Processing	11	2	12.4	0.010372
High Explosives Testing	7	1	3.6	0.845207
LANSCE	5	2	81.8	15.101415
Biosciences	1	0	2.5	0
Radiochemistry Facility	2	0	4.1	0
RLWTF	1	1	9.3	1.210466
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	138.602452[b]
Totals	**55**	**15**	**278.0**	**178.2292**

a Twenty-one outfalls were permitted to discharge January 1, 2007, through July 31, 2007, and 15 were permitted to discharge from August 1, 2007, through December 31, 2007.
b Mainly due to discharge from SWWS and the TA-03 steam plant.

The TA-16 High Explosives Wastewater Treatment Facility (one of the Key Facilities) discharged about 0.008799 million gallons in CY 2007. 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 2007 discharge from LANL. This total, 138.602452 million gallons, was about 3.49755 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 SWWS and the TA-03 steam plant, account for about 66.9 percent of the total discharge from Non-Key Facilities and about 52 percent of all water discharged by LANL. The SWWS at TA-46 processed about 89.354 million gallons of treated wastewater during CY 2007, 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 about 3.311 million gallons from the TA-03 power plant to Outfall 001 was less than the CY 2006 discharge of 9.191 million gallons. The CY 2007 contribution from TA-46 (Outfall 13S) to the Outfall 001 discharge decreased by about 13.892 million gallons over the 2006 value, accounting for the majority of the decrease of about 19.7716 million gallons discharged from Outfall 001 in CY 2007 compared to CY 2006.

The NPDES Industrial Storm Water Permit Program regulates storm water discharges from identified industrial activities (including runoff from inactive SWMUs) and their associated facilities. These activities include metal fabrication; hazardous waste treatment, storage, and disposal; landfilling operations; vehicle and equipment maintenance; recycling activities; electricity generation; and asphalt manufacturing.

The University of California (UC) and the DOE were co-permittees under the EPA 2000 NPDES Storm Water Multi-Sector General Permit for Industrial Activities (MSGP-2000). The MSGP-2000 expired October 30, 2005, without EPA issuing a new permit. Administrative continuance of the MSGP-2000, which requires continued compliance with the expired permit requirements, was granted to existing permit holders. This continuance will remain in effect until a new permit is issued. There is currently no identified date for issuance of a new permit.

The MSGP-2000 required the development and implementation of site-specific storm water pollution prevention plans (SWPPPs), which must include identification of potential pollutants and the implementation of BMPs. SWPPPs are intended to help ensure that LANL surface waters receiving storm water runoff meet EPA and state water quality standards. The Permit requirement also includes monitoring of storm water discharges from permitted sites.

LANL implements and maintains 15 SWPPPs under the MSGP-2000 requirements, covering 26 facilities and site-wide SWMUs. Compliance with the MSGP-2000 requirements for these sites is achieved primarily by implementing the following:

- Identify potential pollutants and activities that may impact surface water quality and identify and provide structural and non-structural controls (BMPs) to limit the impact of those pollutants.
- Develop and implement facility-specific SWPPPs.
- Monitor storm water runoff at facility gauging stations for industrial sector-specific benchmark parameters, and conduct visual inspections of storm water runoff to assess color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of storm water pollution.

During CY 2005, LANL and the DOE/NNSA entered into a compliance agreement with the EPA to protect surface water quality at LANL through an 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 to the UC that coincides with the FFCA.

The FFCA/Administrative Order 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/LANS to comply with all requirements of the Laboratory’s Multi-Sector General Permit (MSGP).

The FFCA/Administrative Order 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 Laboratory canyons pursuant to a Storm Water Monitoring Plan and 2) site-specific sampling at approximately 289 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 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 contaminant 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 2007, 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/NNSA property. LANL also conducted 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 conducted 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 2007a), SWPPP for SWMUs and AOCs, and *Surface Water Data at Los Alamos National Laboratory* (an example is LANL 2005c).

In 2007, LANL conducted Site-specific monitoring at SWMUs and AOCs at 160 locations as required by the FFCA/Administrative Order. Around 2,000 inspections were completed to assess BMP effectiveness and follow up maintenance was completed as needed. A draft Individual Storm Water Permit is expected to be issued by EPA in October 2008.

The NPDES Construction General Permit (CGP) Program regulates storm water discharges from construction activities disturbing one or more acres, including those construction activities that are part of a larger common plan of development collectively disturbing one or more acres.

During 2007, the Laboratory implemented and maintained 51 construction site SWPPPs and addendums to SWPPPs and performed 542 storm water inspections. The Laboratory uses a geographic information system to manage project information and generate status reports that facilitate reporting under the Director's Portfolio Reviews. The overall CGP compliance record in 2007 was 99 percent for all inspections compared to 94 percent in 2006. During the summer months, when most high-intensity precipitation events occur, 275 out of 276 inspections were compliant. At the end of 2007, 100 percent of the Laboratory's permitted sites were in compliance with the CGP.

The LANL storm water team continued to develop new methods to assist with storm water compliance. Improvements in accounting for non-uniform distribution of precipitation gauges were made by using the Thiessen polygon method. The Thiessen polygon method associated 13 precipitation gauges across the Laboratory with LANL construction projects to ensure refined data were used for triggering storm water inspections. The gauges were equipped with five-minute tipping buckets connected to existing stations that were equipped with data loggers. Storm water requirements were incorporated into Exhibit F so each bidder that responds to a Request for Proposal for a Laboratory project is given project-specific subcontractor environmental requirements. Presentations were also given to Subcontractor Technical Representatives and work planners to increase awareness on CGP requirements.

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 or Institutional Procedures. 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 ER 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	2006	2007
Chemical	10^3 kg/yr	3,250	1,683	724.4
LLW	m^3/yr	12,200	9,604	3,293.9
MLLW	m^3/yr	632	29.1	133.4
TRU	m^3/yr	333	76.4	143.0
Mixed TRU	m^3/yr	115	39.5	76.7

Waste quantities from 2007 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 2004b). 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 WMin and PP principles into the planning process;
- supporting the development of new technologies to reduce or eliminate waste;
- working with waste generators to identify WMin and PP opportunities;
- using appropriate material substitution and process improvements;
- encouraging use of energy- and water-efficient equipment;

- encouraging procurement of environmentally preferable products;
- recycling and reusing materials; and
- tracking, projecting, and analyzing waste data to improve waste management.

In 2004, LANL began development and implementation of a prevention-based 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."

The Laboratory's EMS was third-party certified to the ISO 14001:2004 standard in April 2006 by the National Sciences Foundation International Strategic Registration. As part of the EMS, the Laboratory Governing Policy contains the Laboratory's official policy on environment. This policy is the basis for setting annual environmental targets and objectives.

The following is the Laboratory's environmental policy statement:

> We approach our work as responsible stewards of our environment to achieve our mission. We prevent pollution by identifying and minimizing environmental risk. We set quantifiable objectives, monitor progress and compliance, and minimize consequences to the environment, stemming from our past, present, and future operation. We do not compromise the environment for personal, programmatic, or operational reasons.

3.3.1.1 FY 2007 EMS Institutional Objectives

The following are LANL's EMS Institutional Objectives for FY 2007:

1. Ensure environmental compliance
2. Reduce waste with a focus on solid radioactive waste
3. Improve Laboratory-wide energy and fuel conservation
4. Laboratory-wide cleanout activities to disposition unneeded equipment, materials and chemicals and associated waste by end of FY 2011
5. Achieve Zero Liquid Discharge by 2012

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 offsite 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 2007 was about 22 percent of the chemical waste volumes projected by the SWEIS ROD. Table 3.3.2-1 summarizes chemical waste generation during CY 2007.

ERS Program wastes accounted for about 7 percent of the chemical waste volumes projected by the SWEIS ROD. 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	2006	2007
Key Facilities	10^3 kg/yr	600	61.7	82.1
Non-Key Facilities	10^3 kg/yr	650	1,521[a]	391.5
ERS Program	10^3 kg/yr	2,000	99.6	250.7
LANL	10^3 kg/yr	3,250	1,683[b]	724

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 2007 was well below volumes projected by the SWEIS ROD. LLW generated in CY 2007 was 26 percent of the volume projected by the SWEIS ROD (Table 3.3.3-1).

Table 3.3.3-1. LLW Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	2006	2007
Key Facilities	m^3/yr	7,450	896	1,098.7
Non-Key Facilities	m^3/yr	520	792.4	848.5[a]
ERS Program	m^3/yr	4,260	7,916.3[b]	1,346.7
LANL	m^3/yr	12,230	9,604.8 [c]	3,293.9

a LLW and MLLW generation at the Non-Key Facilities exceeded the SWEIS ROD projections because of heightened activities and routine maintenance of aging facilities.
b LLW generation for the ERS Program exceeded the SWEIS ROD projection due to heightened activities associated with the Consent Order.
c Discrepancy in the additive LLW volumes is due to round-off error.

3.3.4 Mixed Low-Level Radioactive Wastes

Generation in 2007 approximated 21 percent of the MLLW volumes projected by the SWEIS ROD. ERS Program produced about 28 cubic meters of MLLW in 2007, approximately 4 percent of the volumes projected by the SWEIS ROD. Table 3.3.4-1 examines these wastes by generator categories.

Table 3.3.4-1. MLLW Generators and Quantities

Waste Generator	Units	SWEIS ROD Projection	2006	2007
Key Facilities	m^3/yr	54	4.2	7.4
Non-Key Facilities	m^3/yr	30	17.2	97.4[a]
ERS Program	m^3/yr	548	7.7	28.5
LANL	m^3/yr	632	29.1	133.3

a LLW and MLLW generation at the Non-Key Facilities exceeded the SWEIS ROD projections because of heightened activities and routine maintenance of aging facilities.

3.3.5 Transuranic Wastes

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 2007. TRU waste generated at the Non-Key Facilities during CY 2007 exceeded the SWEIS ROD projections as a 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	2006	2007
Key Facilities	m^3/yr	322	33.9	131.9
Non-Key Facilities	m^3/yr	0	42.4[a]	11.0[a]
ERS Program	m^3/yr	11	0	0
LANL	m^3/yr	333	76.4[b]	143

a TRU waste generated at the Non-Key Facilities during CYs 2004, 2005, 2006, and 2007 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.

b Discrepancy in the additive chemical waste volumes is due to round-off error.

3.3.6 Mixed Transuranic Wastes

LANL mixed TRU waste generation in 2007 was below the mixed TRU waste volume projected by the SWEIS ROD. In 2007, mixed TRU wastes were generated at only two facilities–the Plutonium Facility Complex 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 OSR 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	2006	2007
Key Facilities	m^3/yr	115	39.5	76.7
Non-Key Facilities	m^3/yr	0	0	0
ERS Program	m^3/yr	0	0	0
LANL	m^3/yr	115	39.5	76.7

3.4 Utilities

Ownership and distribution of utility services continue to be split between DOE/NNSA and Los Alamos County. DOE/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/NNSA Natural Gas Transmission Line in August 1999. DOE/NNSA 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 2007. Approximately 91 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 2007 was less than projected by the SWEIS ROD. During FY 2007, slightly less natural gas was used for heating than in FY 2006, and there was more electric generation at the TA-03 power plant than in FY 2006. Table 3.4.1-2 illustrates steam production for FY 2007.

Table 3.4.1-1. Gas Consumption (decatherms[a]) at LANL/FY 2007[b]

SWEIS ROD	Total LANL Consumption	Total Used for Electric Production	Total Used for Heat Production	Total Steam Production
1,840,000	1,132,279	92,343	1,039,937	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/FY 2007[a]

TA-03 Steam Production (klb[b])	TA-21 Steam Production (klb)	Total Steam Production (klb)
352,994[c]	17,786[d]	370,780

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 (81,684 klb for FY 2007) and that used for heat (297,945 klb in FY 2007).

d The steam plant at TA-21 was permanently shut down in August 2007 and there has been no production since July 2007.

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 DOE and Los Alamos County have entered into a 10-year contract (with extensions) 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. The rewinding and installation of the unit is finished, but the unit is not on-line due to condenser problems. Hopefully these problems will be corrected by the end of 2008. To get the maximum benefit from this refurbishment, the steam path and cooling tower for the unit needs to be improved; this upgrade is scheduled to be completed in FY 2008. 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-kilovolt substation at TA-06. The main power transformer for WTA, rated at up to 56 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 STA 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. The transmission line from the WTA substation to the STA substation and the STA substation construction was finished in February of 2006. The refurbishment of the ETA substation is complete and the uncrossing of the transmission lines is to be finished in about December of 2008. The construction of the portion of the line from the Norton substation to STA is still being negotiated.

Internally within the LANL 13.2-kilovolt distribution system, upgrades to the existing underground ducts are needed to fully utilize the capabilities of the new WTA substation and the newly upgraded ETA substation. This will provide for redundant feeders to critical facilities. Together with this, upgrade to the aging TA-03 substation will complete the major upgrades both in the 13.2-kilovolt distribution and 115-kilovolt transmission systems.

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 the end of 2008). 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/NNSA issued a Finding of No Significant Impact in December 2002. Installation and training on the first 20-megawatt combustion turbine generator at the TA-03 power plant is expected to be completed by the end of 2008.

Table 3.4.2-1 shows peak demand and Table 3.4.2-2 shows annual use of electricity for FY 2007. 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/FY[a] 2007

Category	LANL Base	LANSCE	LANL Total	County Total	Pool Total
SWEIS ROD	50,000[b]	63,000	113,000	Not projected	Not projected
FY 2007	50,849	14,783	65,632	18,569	84,201

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/FY[a] 2007

Category	LANL Base	LANSCE	LANL Total	County	Pool Total
SWEIS ROD	345,000[b]	437,000	782,000	Not projected	Not projected
FY 2007	327,939	70,276	398,215	114,602	512,817

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.

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

The DARHT facility began commissioning operations of its first axis in FY 2001. The load level is about one megawatt for the first axis. The second axis is to be tested in the summer of 2007 and is expected to become fully operational in 2008 at a load level of about one to two megawatts.

It is expected that in January 2007 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 proposed 115/13.8-kilovolt 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.

The Nicholas C. Metropolis Center is planning to add to their computing power with a 60-TeraOps upgrade. This upgrade should increase their load by about 14 megawatts. This is proposed to come on line starting the summer of 2008 and continuing in about two-megawatt increments per year until FY 2014.

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 Ten-Year Comprehensive Site Plan 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/NNSA 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/NNSA. 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, before further investment.

LANL has installed water meters on high usage facilities 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-60-year-old system as problems arise.

Table 3.4.3-1 shows water consumption in thousands of gallons for CY 2007. Under the 1999 SWEIS Expanded Operations Alternative, water use for LANL was projected to be 759 million gallons per year. LANL consumed about 333 million gallons during CY 2007. Actual use by LANL in 2007 was about 426 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 2007 was about 221 million gallons less than the estimated CY 2007 consumption of 554 million gallons. The calculated NPDES discharge of 178.2 million gallons (see Table 3.2-2) in CY 2007 was about 53 percent of the total LANL usage of 333 million gallons.

Table 3.4.3-1. Water Consumption (thousands of gallons) for CY 2007

Category	LANL	Los Alamos County	Total
SWEIS ROD	759,000	Not Projected	Not Applicable
CY 2007	332,867	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

It is the policy of LANL to conduct our work safely and responsibly; ensure a safe and healthful working environment for our workers, contractors, visitors, and other on-site personnel; and protect the health, safety, and welfare of the general public. It is our policy that we will not compromise safety for personal, programmatic, operational, or any other reason. In CY 2007, LANS has continued to make significant progress in the area of worker safety at LANL. Worker Safety and Security Teams (WSSTs) are now established across the Laboratory and are actively engaged in accident and injury prevention. The Institutional WSST was instrumental in determining the injury prevention goals for 2007–2008. Preparations are well underway for participation in the DOE Voluntary Protection Program. The Laboratory's compliance plan for 10 CFR 851, Worker Safety and Health Program, is well established, with specific emphasis placed on chemical management program improvements. Human performance improvement concepts and principals have been incorporated into Laboratory processes for work management, event investigation, and causal analysis. This is leading to an improved ability to identify and correct issues that contribute to events and accidents.

3.5.1 Accidents and Injuries

The three most prevalent work-related injuries and illnesses for LANL workers are slips/trips/falls, repetitive motion, and push/pull/lift injuries. These areas were specifically targeted in 2007 for focused injury prevention efforts. Improved ice and snow removal efforts as well as increased employee awareness helped reduce the number of ice/snow related injuries in the 2007/2008 winter season. Increased emphasis on ergonomic evaluations and early intervention has helped decrease repetitive and push/pull/lift injuries.

Table 3.5.1-1 summarizes occupational injury and illness rates during CY 2000–CY 2007. Occupational injury and illness rates for workers in CY 2007 decreased from CY 2006 in both Total Recordable Cases (TRC) and Days Away, Restricted, or Transferred Cases (DART) 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	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
2006	NA[b]	NA[b]	2.56	1.15
2007	NA[b]	NA[b]	2.04	0.80

a Total Recordable Cases, number per 200,000 hours worked. Formerly called TRI: Total Recordable Incident rate
b LANS, LLC took over management function at LANL in 2006. UC Workers Only is no longer applicable.

3.5.2 Ionizing Radiation and Worker Exposures

Occupational radiation exposures for workers at LANL during CY 2007 are summarized in Table 3.5.2-1. The collective total effective dose equivalent, or collective TEDE, for the LANL workforce during CY 2007 was 158.2 person-rem. These reported doses could change with time because estimates of committed effective dose equivalent from radioactive material intakes in many cases are based on several years of bioassay results; as new results are obtained, the dose estimates may be modified accordingly. Data in Table 3.5.2-1 show 532 fewer radiation workers received measurable dose in CY 2007 than CY 2006, with corresponding increase in average dose per worker. Of the 158.2 person-rem collective TEDE reported for CY 2007, 7.9 person-rem was from internal exposures to radioactive materials, most of which was from a single contaminated wound event, and the rest are from small plutonium intakes.

Table 3.5.2-1. Radiological Exposure to LANL Workers[a]

Parameter	Units	SWEIS ROD	CY 2006	CY 2007
Collective TEDE (external + internal)	person-rem	704	163.3	158.2
Number of workers with non-zero dose	number	3,548	2,093	1,561
Average non-zero dose:				
• external + internal radiation exposure	millirem	Not projected	78	101
• external radiation exposure only	millirem	Not projected	78	98

a Data in this report are current as of 04/29/2008.

The highest individual doses in CY 2007 were typical of doses received since CY 2000. With the exception of the worker involved in the contaminated wound event, no worker's dose exceeded the DOE's five-rem/year dose limit, and no worker's dose was above the two-rem/year LANL administrative control level. Table 3.5.2-2 summarizes the highest individual dose data for CYs 2001–2007.

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

CY 2001	CY 2002	CY 2003	CY 2004	CY 2005	CY 2006	CY 2007
1.284	2.214	25.960	2.500	2.300	1.238	7.430
1.225	1.897	8.700	1.510	2.051	1.148	1.642
1.123	1.783	5.700	1.148	2.000	1.060	1.573
1.002	1.644	3.500	1.061	1.603	1.053	1.508
0.934	1.534	1.935	1.055	1.398	0.971	1.503

a Data in this report are current as of 04/29/2008.

Comparison with the SWEIS Baseline. The collective TEDE for CY 2007 is about 76 percent of the 208 person-rem per year baseline in the SWEIS. 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, particularly TA-55, tend to increase or decrease the LANL collective TEDE. Of special importance to the baseline ROD is that the plutonium-238 power sources and heat sources for the Cassini spacecraft were being produced 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 (about 12 percent) of the LANL collective TEDE. Pit production at TA-55 is planned to increase to 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.

Plutonium facility operations account for the majority of occupational dose at LANL. CY 2007 doses in this facility were not as high as anticipated at the beginning of the year and significantly lower than CY 2006. For various reasons, programmatic work was not executed as expected. Additionally, there was a significant reduction in work throughout the facility during a pause in operations in the fourth quarter of CY 2007 due to criticality safety concerns.

In addition to plutonium facility operations, significant portions of LANL whole body external dose were accrued by workers performing maintenance at TA-53 (the linac), and those supporting retrieval, repackaging, and shipping radioactive solid waste to the WIPP.

ALARA Program: LANL occupational exposure continues to be deliberately managed, with associated processes and documentation regarding these occupational dose data, work performed, dose optimization efforts, ALARA (as low as reasonably achievable) goal tracking, and other performance indicators. Based on established ALARA goals, dose accrual to date, and expected workload, CY 2008 doses are expected to reach on the order of 130 rem. Improvements in maintaining radiation exposures 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 2007 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. Pit manufacturing rates approved in the ROD have not become fully realized, 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 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 Plutonium Materials Technology Division, Health Physics Operations, Actinide Analytical Chemistry group, and KSL groups in CY 2007 was approximately 97.8 person-rem or about 62 percent of the total LANL collective TEDE.

As discussed previously, maintenance activities at TA-53 and waste operations at TA-50 and TA-54 also contributed significant dose to the LANL total.

3.6 Socioeconomics

The LANL-affiliated workforce continues to include LANS employees and subcontractors. As shown in Table 3.6-1, the number of employees has exceeded SWEIS ROD projections by just over 1 percent. The 11,481 employees at the end of CY 2007 are 130 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 11,481 total employees at the end of CY 2007 reflect a decrease of 1,283 employees as compared to the 12,764 employees reported in the 2006 Yearbook (LANL 2006b).

Table 3.6-1. LANL-Affiliated Work Force

Category	LANS 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 2007	9,789	228	105	842	517	11,481

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 FY 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 the total payroll, benefits, and procurements, it is expected that the LANL 2007 economic contribution was similar to the three years analyzed for DOE/NNSA.

The residential distribution of LANS employees reflects the housing market dynamics of three counties. As seen in Table 3.6-2, 87 percent of the LANS employees continued to reside in the three counties of Los Alamos, Rio Arriba, and Santa Fe.

Table 3.6-2. County of Residence for LANS 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 2007	4,720	1,576	2,229	780	9,305	484	9,789

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 LANS 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. LANS Employee[a] Index for Key Facilities

Key Facility	Reference Year 1999[b]	Calendar Year 2007
Plutonium Complex	589	642
Tritium Facilities	28	1
CMR	204	138
Pajarito Site	70	3
Sigma Complex	101	90
MSL	57	42
TFF	54	52
Machine Shops	81	115
High Explosive Testing	227	184
High Explosive Processing	96	95
LANSCE	560	346
HRL	98	100
Radiochemistry Laboratory	128	126
Waste Management–Radioactive Liquid Waste	62	80
Waste Management–Radioactive Solid and Chemical Waste	65	54
Rest of LANL	4,601	6,030
Total Employees	7,021	8,098

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 LANS 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 2007, the land resources (i.e., undeveloped and developed lands) available for use at LANL has been reduced. In CY 2002, approximately 2,209 acres of land were transferred to the Department of Interior in trust for the Pueblo of San Ildefonso and to Los Alamos County 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 to Los Alamos County for a total of 45.7 acres. No lands were transferred in CY 2006. In January 2007, the archive and welding school buildings were conveyed to the County of Los Alamos, leaving 41.24 acres of DOE-owned land in the area and 39.822 acres of Laboratory managed land.

Also during CY 2000, LANL's 2000/2001 Comprehensive Site Plan (LANL 1999) 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.

Since CY 2000 the Comprehensive Site Plan has been expanded by the addition of several Area Development Plans and TA Master Plans, as support documents. Included in this list are the following Area Development Plans: Pajarito Corridor East Planning Area, West Pajarito Corridor, Core Planning Area Update, Anchor Ranch Planning Area and an Update, TA-21 Master Plan and an update, Water Canyon Planning Area, Sigma Mesa Planning Area, and LANSCE Planning Area.

The following TAs have had a Master Plan developed since the completion of the 2000/2001 Comprehensive Site Plan: TA-03, TA-59, TA-64, TA-48, TA-55, TA-50, TA-35, TA-63, TA-66, TA-52, TA-51, TA-46, TA-54, TA-53, TA-16, TA-22, TA-15, TA-33, and TA-21, including updates for TA-21, TA-63, and TA-03. During 2007 the following Master Plans are being updated: TA-03, TA-63, TA-50, TA-54, and TA-49.

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[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.

Other planning documents developed since the 2000/2001 Comprehensive Site Plan include the annual Ten-Year Site Plan, a Laboratory capital improvement document, the 2005 Site Transportation Plan, a LANL Sustainable Design Guide, Site and Architectural Design Principles, and its replacement, the Site Development Standards.

Projects under construction in CY 2007 include the TA-55 CMR Replacement, RLUOB, Security Perimeter Project, LASO Building, TA-55 Covered Storage Pad, D&D of PF41, and the D&D of TA-21 continued. LASO is on previously undeveloped land and the remainder of these projects are on previously developed or disturbed land.

CY 2007 land use was similar to the previous CYs: the land acreage (Table 3.7-1) remained constant; the ongoing construction projects from CY 2003–CY 2007 continued.

Table 3.7-1. Site-wide Land Use

Land Use Category	Acreage in CY 2004–CY 2007
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, LANL, Los Alamos County, or other adjacent landowners will make several large tracts of land available for use. For example, under Public Law 105-119, the DOE/NNSA 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. No land was transferred in CY 2006. In CY 2007, one tract (A-8a) for a total of 22 acres was conveyed to Los Alamos County. 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 of Los Alamos is located.
DP Road	27	Between the western boundary of TA-21 and the major commercial districts of the Los Alamos town site.
DOE LASO	8	Within the Los Alamos town site between Los Alamos Canyon and Trinity Drive.
Airport	144	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.
TA-74 South	647	Southern reach of Pueblo Canyon between the White Rock Y and Airport.

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/NNSA 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 50 percent and 27 percent of the total water pumped from 1999 to 2001 (LANL 2003b). 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, 2003b).

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 all applicable water supply standards. There have been 37 hydrogeologic characterization wells installed that monitor the regional aquifer and 29 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, 2004c).

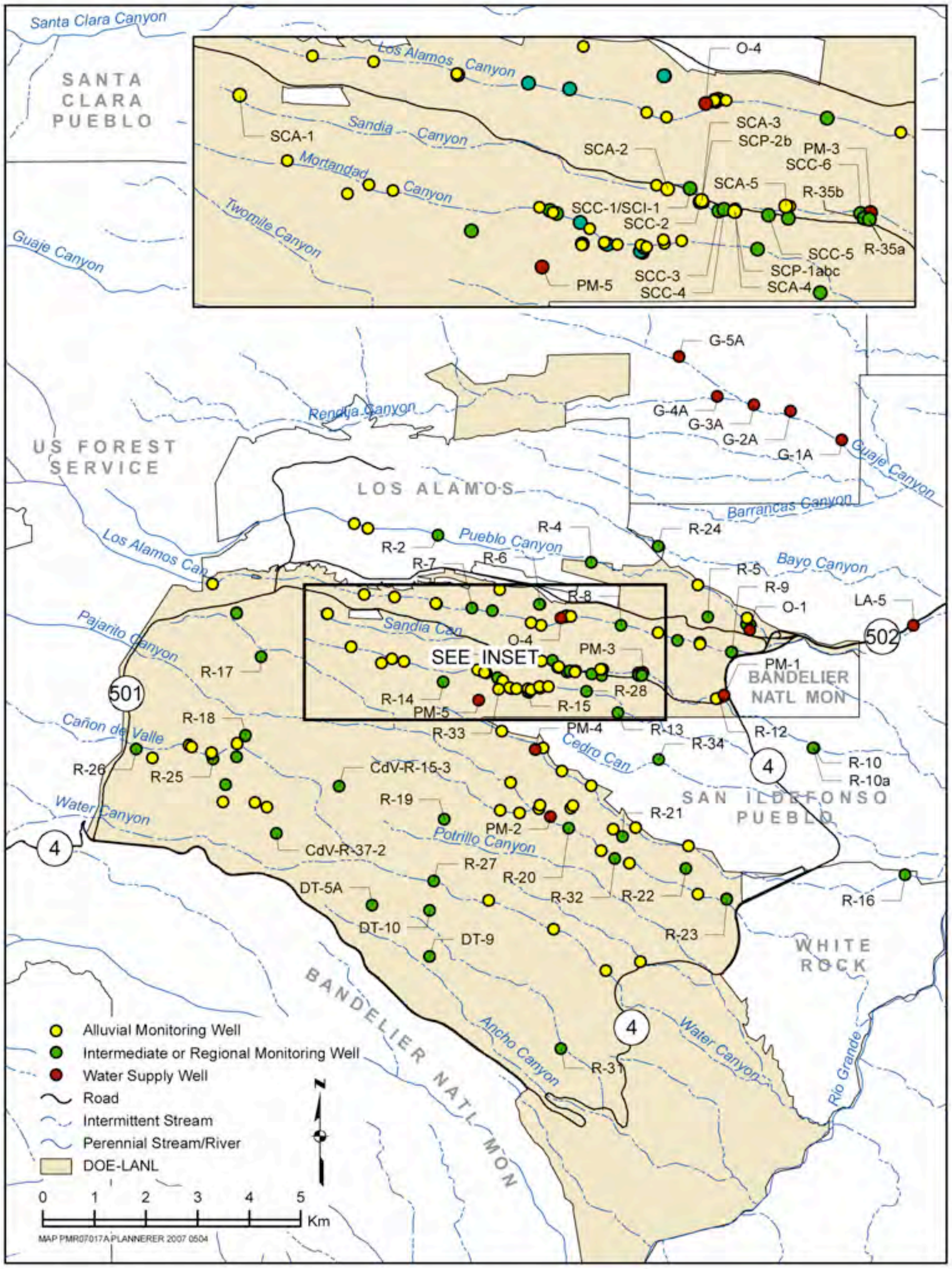

Figure 3-1. Alluvial, intermediate, and regional aquifer characterization wells within LANL and vicinity.

3.8.1 New Regional Aquifer Wells

During CY 2007, two new regional groundwater monitoring wells were installed. Monitoring wells R-35a and R-35b were drilled and completed in July 2007 by the Environmental Programs Water Stewardship Project (LANL 2007c).

The R-35 project site is located in Sandia Canyon on the north side of East Jemez Road (the Los Alamos Truck Route) at mile marker 9 in the eastern portion of the Laboratory (see Figure 3-1). The paired-well configuration is intended to determine if chromium contamination is present in regional groundwater near municipal water supply well PM-3, and, if so, to evaluate if chromium concentrations vary with depth. If chromium contamination is not present, the R-35 wells will serve as sentry wells for PM-3. The drilling objectives were to drill and install two separate single-screened regional aquifer-monitoring wells. R-35a is the deeper well; the objectives were to drill the well so it would align stratigraphically with the top of the well screen in PM-3 and with the top of the Miocene basalt unit at 1,136 feet below ground surface (bgs) as the lower bound of the stratigraphic target. R-35b is the shallower well whose objective was to monitor the upper portion of the regional aquifer. The wells are approximately 90 feet apart.

An important factor at the beginning of the R-35 project that guided drilling activities was the ability to drill the R-35 boreholes to a total depth (TD) without the use of mud-rotary methods. At the onset of drilling activities, contingencies were in place to allow the use of mud-rotary techniques, if needed, to finish the boreholes. Although no other regional monitoring wells had been drilled to completion at the Laboratory without drilling fluid additives or mud-rotary methods, the field team was confident that the holes could be completed without the use of these techniques and additives. Given the uncertainties surrounding drilling methods and the uncertainties about the nature of formations to be encountered at the R-35 site, the selection of equipment and casing sizes erred on the conservative side for successfully finishing each borehole without mud-rotary techniques or drilling fluid additives. No perched water was observed in the R-35a borehole.

The R-35a borehole was successfully drilled to a TD of 1,143 feet bgs, two feet into the Miocene basalt. A well was installed with a screened interval between 1,013 and 1,062 feet bgs. The depth to water (DTW) after installation and well development was 792.1 feet bgs. Cuttings were collected at five-foot intervals in the borehole from ground surface to TD. The R-35a borehole served as the location for the primary set of geophysical logs performed by the field services contractor. Post-installation activities included well development, aquifer testing, surface completion, dedicated sampling system installation, site restoration, and wellhead surveying.

The R-35b borehole was successfully drilled to a TD of 897.6 feet bgs. A well was installed with a screened interval between 825 and 848 feet bgs. The DTW after installation and well development was 786.9 feet bgs. Cuttings samples were collected at five-foot intervals in the borehole from ground surface to TD. Post-installation activities included well development, aquifer testing, surface completion, dedicated sampling system installation, site restoration, and wellhead surveying.

Cuttings samples were collected from both R-35 boreholes at five-foot intervals from ground surface to the TD of 1,143 feet bgs at R-35a and the TD of 897.6 feet bgs at R-35b. Approximately 500 to 700 mL of bulk cuttings were collected from the discharge hose, sealed in Ziploc self-sealed plastic bags, labeled, and archived in core boxes.

Sieved fractions (>#10 and >#35 mesh) were placed in chip trays along with unsieved (whole rock) cuttings. Sieved fractions that make up the contents of the chip trays were collected from ground surface to 615 feet bgs in R-35b and from 615 feet bgs to 1,143 feet bgs in R-35a. Sieved fractions for the interval of lost circulation in R-35b (400 to 485 feet bgs) were compensated with cuttings from R-35a. Bulk cuttings samples were collected in R-35b from 615 feet bgs to TD at 897.6 feet bgs; and likewise, bulk samples were collected in R-35a from ground surface to 615 feet bgs. The Laboratory screened all cuttings before they were removed from the site.

Groundwater screening samples were collected from the drilling discharge at 20-foot intervals below the top of regional groundwater in the R-35a borehole and at 10-foot intervals in the R-35b borehole. Typically, upon reaching the bottom of a 20-foot run of casing, the driller would cut off water circulation (if injecting water) and circulate air to clean out the hole. As the discharge cleared, a water sample would be collected directly from the discharge hose. Not all intervals below the top of water could be captured at the end of a casing run. Alternatively, some samples, particularly those near the top of the regional aquifer in the R-35a borehole, were collected upon start-up of the next casing run after the borehole had time to equilibrate. The samples were submitted to the Laboratory's Earth and Environmental Sciences (EES)-6 groundwater chemistry laboratory for analysis of anions, metals, and (in some cases) total organic carbon. Sampling documentation and containers were provided by the Laboratory and processed through the Laboratory Sample Management Office.

In addition, groundwater field-screening samples were collected during drilling activities for the analysis of chromium. The samples were analyzed using a HACH model DR/2400 instrument following HACH Method 8023. At the onset of drilling activities, only a few screening samples were proposed to be duplicated by the EES-6 laboratory to verify the accuracy of the field-sampling kits. Ultimately, the EES-6 laboratory analyzed all field-screening samples.

Regional groundwater was first encountered at R-35a during drilling at approximately 800 feet bgs in the Puye Formation sediments. Groundwater screening samples were collected in both boreholes during drilling, well development, and aquifer testing. After well development, static water levels were recorded at 792.1 feet bgs in R-35a and 786.9 feet bgs in R-35b. Following well installation, the wells were developed and aquifer pump tests were conducted. A dedicated submersible pump and the wellhead surface pad were installed at each location.

3.8.2 Well Rehabilitation

In some LANL characterization wells, the use of fluids to assist well drilling has affected the chemistry of groundwater samples. From 1998 through 2007, over 40 new wells were drilled for hydrogeologic characterization beneath the Pajarito Plateau as part of the Laboratory's Hydrogeologic Workplan or as part of corrective measures. Of these wells, some have screens in perched intermediate zones, most have screens in the regional aquifer, and a few have screens in both perched intermediate zones and the regional aquifer. Concerns about the reliability or representativeness of the groundwater quality data obtained from these wells stem from the potential for residual drilling fluids and additives to mask the present and future detection of contaminants. New wells (e.g., R-35a and R-35b drilled in 2007) are drilled without the use of drilling fluids and also undergo extensive well development to reduce the turbidity of water samples.

The NMED approved a well screen analysis methodology set forth in the Well Screen Analysis Report (LANL 2007d). The methodology relies on comparing well water quality data for certain chemical species that can be affected by drilling fluids to their natural background ranges. The well screen analysis methodology now provides a means of (1) marking historical data for drilling fluid effects, (2) determining trends in improvement of degradation of well screen water quality for monitoring purposes, and (3) determining the condition of screens undergoing redevelopment and rehabilitation.

In CY 2007 three wells underwent redevelopment: R-32, R-12, R-20. These wells were selected for redevelopment because of their important locations for groundwater monitoring. Physical redevelopment methods included jetting, swabbing, and extensive pumping. All of the wells were converted to dual- or single-screen wells. The preferred sampling system installed in dual-screen wells is the Baski system, which allows active purging while sampling, as do submersible pumps in single-screen wells. A summary of redevelopment results for each of the wells is presented below.

- R-32 was converted from a three-screen well to a single-screen well with a dedicated submersible pump. Its water quality is very good, as determined by analysis of geochemical parameters (LANL 2007e).
- R-12 was converted from a three-screen to a dual-screen well with a Baski sampling system. The top two screens that were retained improved in water quality and the top screen also improved in hydraulic properties. Their water quality is now good (LANL 2008b).
- R-20 was converted from a three-screen to a dual-screen well with a Baski sampling system. The top two screens that were retained improved in water quality and in hydraulic properties. Their water quality is now very good (LANL 2008c).

3.9 Cultural Resources

LANL has a large and diverse number of historic properties. Approximately 86 percent of DOE-administered land in Los Alamos County has been surveyed for prehistoric and historic cultural resources. Over 1,800 prehistoric sites have been recorded (Table 3.9-1). During FY 2007, sites that have been excavated since the 1950s were removed from the overall site count numbers. Thus, the number of recorded sites is less than in reports from previous years. 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 (NRHP) at LANL FY 2007[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	Percentage of total site eligibility	Number of notifications to Indian Tribes[c]
SWEIS ROD	Not reported	Not reported	1,295[d]	1,092	84	23
1998	1,920	17,937	1,369	1,304	95	10
1999	1,074	19,011	1,392	1,321	95	13
2000	119	19,428	1,459	1,386	95	6
2001	4,112	19,790	1,424[d]	1,297[d]	91	2
2002	2,686	22,476	1,835	1,699	93	6
2003	200	22,676	1,797[d]	1,667[d]	93	6
2004	50	22,726	1,785[d]	1,650[d]	92	3
2005	0	22,726	1,776[d]	1,640[d]	92	3
2006	31	23,267[e]	1,715[d]	1,619[d]	94	3
2007	4	23,134[e]	1,719[d]	1,623[d]	94	4

a Source: Information on LANL provided by DOE/NNSA 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 2002. This effort will continue over the next several years and more sites with duplicate records will probably be identified.

e The total acreage surveyed was recalculated and corrected due to changes in the new DOE/NNSA boundary. Therefore, the total acres surveyed utilizing the new DOE/NNSA boundary and the corrected archaeological area surveyed is a total of 23,134 acres.

LANL continues to evaluate buildings and structures from the Manhattan Project and the Early Cold War period (1943–1963) for eligibility to the 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,

[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.

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 dated June 2006 between the NNSA/LASO, the New Mexico State Historic Preservation Office (SHPO), 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 754. 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[d]
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	47
2003	757	404	254	150	69
2004	757	410	255	155	83
2005	760	431	266	165	112
2006	753	592	338	254	135
2007	754	593	336	257	138

a Source: Information on LANL provided by DOE/NNSA 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.

d This represents the total number of evaluated buildings demolished to date.

LANL has recorded 136 historic sites. As stated previously, during FY 2006, sites that have been excavated since the 1950s were removed from the overall site count numbers. Thus, the number of recorded sites is less than in reports from previous years. All have been given unique New Mexico Laboratory of Anthropology site numbers. Some of the 136 are experimental areas and artifact scatters dating from the Manhattan Project and Early Cold War periods. The majority, 113 sites, are structures or artifact scatters associated with the Early Historic Pajarito Plateau or Homestead periods. Of these 136 sites, 94 are eligible for the NRHP. LANL's Manhattan Project and Early Cold War period buildings account for the remaining 618 of the 754 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, 457 have been evaluated for eligibility and inclusion on the NRHP. Two hundred fifteen of these evaluated buildings have been declared not eligible for the NRHP; the remaining 242 are NRHP-eligible.

The CRT has documented 80 of the NRHP-eligible buildings in accordance with the terms of Memoranda of Agreement between the DOE/NNSA and the NMSHPD. These buildings have subsequently been decontaminated, decommissioned, and demolished through the D&D Program. Fifty-eight of the 215 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 SHPO and/or the Advisory Council on Historic Preservation about possible adverse effects to NRHP-eligible resources.

During FY 2007 (October 2006 through September 2007), the CRT evaluated 750 LANL-proposed actions, one new field survey to identify cultural resources was conducted. DOE/NNSA sent six survey reports to the SHPO for concurrence in findings of effects and determinations of eligibility for cultural resources located during survey projects. Additionally, one final report for the completion of data recovery stipulations was 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 four 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 2007 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/NNSA land in FY 2007.

3.9.2 Compliance Activities

Nake'muu. During FY 2006, the long-term monitoring program to assess the impact of LANL mission activities on cultural resources at the ancestral pueblo of Nake'muu was completed as part of the *Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility Mitigation Action Plan* (DOE 1996). 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. During the nine-year monitoring program 1998–2006, the site witnessed a 0.9 percent displacement rate of chinking stones and 0.3 percent displacement of masonry blocks. Statistical analyses indicate that these displacement rates are significantly correlated with annual snowfall, but not with annual rainfall or explosive tests at the DARHT facility. The site was revisited during September 2007 and was observed to have experienced an unusually high percentage of new displaced masonry blocks. The CRT is currently in the process of evaluating the possibility of reinstating a monitoring program as well as a program of long-term stabilization and protection for the standing walls.

Traditional Cultural Properties Comprehensive Plan. During FY 2007, the CRT continued to assist DOE/NNSA in implementing the *Traditional Cultural Properties Comprehensive Plan* (LANL 2000b). 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.

Land Conveyance and Transfer. The Laboratory began the sixth year of a multiyear program of archaeological excavation in support of the Land Conveyance and Transfer Project. Thirty-nine archaeological sites were excavated during the four field seasons, with more than 200,000 artifacts and 2,000 samples being recovered. This work was conducted under a Programmatic Agreement among the DOE/NNSA, the Advisory Council on Historic Preservation, the New Mexico SHPO, and the Incorporated County of Los Alamos concerning the conveyance of certain parcels of land to the county for economic development. During FY 2007, all analyses were completed and nearly all of the report was written.

Cerro Grande Fire Recovery. During 2007, the CRT continued to monitor 33 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 Analysis 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. In addition, tree snags were removed from three homestead properties and repairs were made to the two fences surrounding traditional cultural properties in Rendija Canyon.

3.9.3 Cultural Resources Management Plan

The Cultural Resources Management Plan 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 LANS's mission.

The Cultural Resources Management Plan 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 Cultural Resources Management Plan was finalized and approved by LANL and DOE/NNSA in 2005 and was implemented during 2006 through a Programmatic Agreement signed on June 15, 2006, by DOE/NNSA, the New Mexico SHPO, and the Advisory Council on Historic Preservation. The management plan will be updated every five years after issuance. During 2007, implementing activities included (1) the survey and recording of the cavate complex at Tsirege Pueblo in preparation for the eventual nomination of Tsirege Pueblo as a component of the LANL Ancestral Pueblo National Historic Landmark District; and (2) the continued assessment of individual properties within the proposed Project Y Manhattan Project National Historic Landmark, as part of data gathering for use in developing the forthcoming landmark nomination package for the National Park Service. The degree of implementation of the plan in future years is contingent on funding.

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. To date, not all buildings that have been documented as part of the D&D Program have been demolished.

Table 3.9.3-1. Historic Building Documentation and Demolition Numbers

Fiscal Year	Number of Buildings for which 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	3	Unknown
2001	8	Unknown
2002	37	14
2003	17	22
2004	14	14
2005	25	29
2006	8	23
2007	18	3
TOTAL	162	105

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

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 2006 support this projection. These data are reported in the 2007 Environmental Surveillance Report (LANL 2007a).

LANL management approved a LANL Biological Resources Management Plan in September 2007 (LANL 2007f), and LANL subject matter experts prepared and published a source document for migratory bird BMPs in December 2007 (LANL 2007g).

3.10.1 Conditions of the Forests and Woodlands

The forests and woodlands in the LANL area have undergone significant changes that began with the 2000 Cerro Grande Fire that will have an impact on forest health for decades to come. The fire reduced tree densities in the area, particularly on Forest Service land west of LANL. Subsequent wildfire risk reduction thinning activities reduced tree density and cover on much of the LANL forest and woodland. At the same time, the recent bark beetle infestation killed many of the remaining mature conifer trees throughout the Pajarito Plateau. LANL forests and woodlands are now much more open and will continue to be dominated by understory species for many years.

The Cerro Grande Fire burned approximately 7,678 acres on LANL property (LANL 2004d). 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 2007a). Cover is sufficient to protect most areas from soil loss.

LANL is located in a fire-prone region and there will always be a high potential for wildfires. 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. The total amount of thinning conducted since 2000 is approximately 9,150 acres (LANL 2005d). 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 was thinned between 1997 and 1999.

Bark beetle-induced tree mortality has leveled off over the past two years, 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.

The LANL area received approximately 16 inches of precipitation in water year 2004 (October–September), 25 inches in water year 2005, 14 inches in 2006, and ~20 inches in 2007. The average for the TA-6 meteorological station is 17 inches. This cycle of alternating wet and dry years makes it difficult to identify any trend in vegetation recovery. We see rapid growth of understory plant species during wet years and neutral or negative response to dry years. Although we can reasonably expect to see regrowth of shrubby species, it is unlikely that there will be any appreciable increase in tree species until the current climate trends improve.

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 and southwestern willow flycatcher. The Threatened and Endangered Species Habitat Management Plan was incorporated into the NEPA, Cultural Resources, and Biological Resources Laboratory Implementation Requirement document developed during 1999, which is now an Institutional Procedure (LANL 2008d).

In CY 2007, LANL continued conducting annual surveys for Mexican spotted owls, southwestern willow flycatchers, and bald eagles. Bald eagles were delisted in June 2007, and were therefore no longer managed at LANL under the Habitat Management Plan after that date. The Biological Resources Compliance and Monitoring Team provided guidance for avoiding human disturbance and habitat alteration impacts on federally listed species to projects and operations through excavation permit reviews and the permits and requirements identification process.

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 2007 the Biological Resources Compliance and Monitoring Team completed one biological assessment of a new laydown area for the CMR Replacement project (LANL 2007h). The US Fish and Wildlife Service concurred in the determination that the project may affect, but was not likely to adversely affect, federally listed species.

References

Department of Energy, 1996. “Dual Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Mitigation Action Plan,” DOE/EIS-0228.

DOE (US Department of Energy), 1999. “Record of Decision: Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory in the State of New Mexico,” *Federal Register*, Volume 64, p 50797. Washington, D.C.

DOE (US Department of Energy), 2000a. “Environmental Assessment for Electrical Power System Upgrades at Los Alamos National Laboratory, Los Alamos, New Mexico,” DOE/EA-1247, and Finding of No Significant Impact. Los Alamos, NM.

DOE (U.S. Department of Energy). 2000b. Special Environmental Analysis for the Department of Energy, National Nuclear Security Administration, Actions Taken in Response to the Cerro Grande Fire at Los Alamos National Laboratory. DOE/SEA-03, Los Alamos Area Office, Los Alamos, New Mexico.

DOE (U.S. Department of Energy). 2000c. Letter to Dr. John Browne, Director, Los Alamos National Laboratory from David A. Gurule, Area Manager, Los Alamos Area Office on December 15, 2000.

DOE (US Department of Energy), 2002. "Environmental Assessment for Installation and Operation of Combustion Turbine Generators at Los Alamos National Laboratory, Los Alamos, New Mexico," DOE/EA-1430.

DOE (US Department of Energy), 2003. *Environmental Protection Program,* DOE Order 450.1, Washington, D.C.

LANL (Los Alamos National Laboratory), 1995. "Environmental Geochemistry for Surface and Subsurface Waters in the Pajarito Plateau and Outlying Areas, New Mexico," Los Alamos National Laboratory report LA-12912-MS, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 1998a. "Water Supply at Los Alamos during 1997," Los Alamos National Laboratory report LA-13548-PR, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 1998b. "Threatened and Endangered Species Habitat Management Plan," Los Alamos National Laboratory report LA-CP-98-96, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 1999. "Comprehensive Site Plan 2000, Technical Site Information Document," Los Alamos National Laboratory report LA-UR-99-6704, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2000a. "SWEIS Yearbook — 1999," Los Alamos National Laboratory report LA-UR-00-5520, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2000b. "A Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at Los Alamos National Laboratory, New Mexico," Los Alamos National Laboratory document LA-UR-00-2400, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2001a. "SWEIS Yearbook — 2000," Los Alamos National Laboratory report LA-UR-01-2965, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2001b. "Groundwater Monitoring Program at Los Alamos National Laboratory," Los Alamos National Laboratory report LA-UR-01-2054, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2002a. "SWEIS Yearbook — 2001," Los Alamos National Laboratory report LA-UR-02-3143, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2002b. "Characterization Well R-22 Geochemistry Report," Los Alamos National Laboratory report LA-13986-MS, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2002c. "Characterization Well R-15 Geochemistry Report," Los Alamos National Laboratory report LA-13896-MS, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2002d. "Characterization Well R-12 Geochemistry Report," Los Alamos National Laboratory report LA-13952-MS, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2002e. "Characterization Wells R-9 and R-9i Geochemistry Report," Los Alamos National Laboratory report LA-13927-MS, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2002f. "Characterization Well R-19 Geochemistry Report," Los Alamos National Laboratory report LA-13964-MS, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2002g. "Characterization Well R-7 Geochemistry Report," Los Alamos National Laboratory report LA-14004-MS, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2003a. "SWEIS Yearbook — 2002," Los Alamos National Laboratory report LA-UR-03-5862, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2003b. "Water Supply at Los Alamos 1998–2001," Los Alamos National Laboratory report LA-13985-PR, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2004a. "SWEIS Yearbook — 2003," Los Alamos National Laboratory report LA-UR-04-6024, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2004b. "2004 Pollution Prevention Roadmap," Los Alamos National Laboratory report LA-UR-04-8973, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2004c. "Characterization Well R-25 Geochemistry Report," Los Alamos National Laboratory report LA-14198-MS, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2004d. "Burn Severities, Fire Intensities, and Impacts to Major Vegetation Types from the Cerro Grande Fire," Los Alamos National Laboratory report LA-14159, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2005a. "U.S. Department of Energy Report: 2004 LANL Radionuclide Air Emissions," Los Alamos National Laboratory report LA-14233, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2005b. "SWEIS Yearbook — 2004," Los Alamos National Laboratory report LA-UR-05-6627, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2005c. "Surface Water Data at Los Alamos National Laboratory: 2004 Water Year," Los Alamos National Laboratory report LA-14211-PR, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2005d. "Los Alamos National Laboratory Wildland Fire Management Program Update 2005," Los Alamos National Laboratory report LA- UR-05-6626, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2006a. "U.S. Department of Energy Report: 2005 LANL Radionuclide Air Emissions," Los Alamos National Laboratory report LA-14298, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2006b. "SWEIS Yearbook — 2005," Los Alamos National Laboratory report LA-UR-06-6020, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2007a. "Environmental Surveillance at Los Alamos during 2007," Los Alamos National Laboratory report LA-14369-ENV, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2007b. "U.S. Department of Energy Report: 2006 LANL Radionuclide Air Emissions," Los Alamos National Laboratory report LA-14339, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2007c. "Completion Report for Regional Aquifer Wells R-35a and R-35b Los Alamos National Laboratory Los Alamos, New Mexico," Los Alamos National Laboratory document LA-UR-07-5342, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2007d. "Well Screen Analysis Report, Revision 2," Los Alamos National Laboratory document LA-UR-07-2852, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2007e. "Well R-32 Rehabilitation and Conversion Summary Report," Los Alamos National Laboratory document LA-UR-07-7341, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2007f. "Biological Resources Management Plan for Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-07-2595, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2007g. "Migratory Bird Best Management Practices Source Document for Los Alamos National Laboratory, Revision 0," Los Alamos National Laboratory document LA-UR-07-8434, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2007h. "Amended Biological Assessment (Cons. # 2-22- 03-1-0302): The Potential Change in Project Effects of the Chemistry and Metallurgy Research Facility Replacement Project on Federally Listed Threatened and Endangered Species, Los Alamos National Laboratory, Los Alamos, New Mexico," Los Alamos National Laboratory document LA-CP-07-0823, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2008a. "2007 LANL Radionuclide Air Emissions Report," Los Alamos National Laboratory report LA-14365, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2008b. "Well R-12 Rehabilitation and Conversion Summary Report, Rev. 1," Los Alamos National Laboratory document LA-UR-08-0260, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2008c. "Well R-20 Rehabilitation and Conversion Summary Report," Los Alamos National Laboratory document LA-UR-080056, Los Alamos, NM.

LANL (Los Alamos National Laboratory), 2008d. "National Environmental Policy Act (NEPA), Cultural Resources, and Biological Resources (NCB) Reviews," Los Alamos National Laboratory Institutional Procedure P405, Los Alamos, NM.

Lansford, R., L. Adcock, S. Ben-David, and J. Temple, 1997. "The Economic Impact of Los Alamos National Laboratory on North-Central New Mexico and the State of New

Mexico Fiscal Year 1996," New Mexico State University; prepared for the US Department of Energy.

Lansford, R., L. Adcock, S. Ben-David, and J. Temple, 1998. "The Economic Impact of Los Alamos National Laboratory on North-Central New Mexico and the State of New Mexico Fiscal Year 1997," New Mexico State University; prepared for the US Department of Energy.

Lansford, R., L. Adcock, S. Ben-David, and J. Temple, 1999. "The Economic Impact of Los Alamos National Laboratory on North-Central New Mexico and the State of New Mexico Fiscal Year 1998," New Mexico State University; prepared for the US Department of Energy.

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4.0 Trend Analysis

Beginning in 1999 the Yearbook included a new chapter that examined trends by comparing actual waste volumes generated from LANL operations to SWEIS ROD projections. In 2002, 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. This Yearbook represents the 10-year period that DOE evaluated cumulative impacts associated with LANL operations. The purpose of these additional comparisons was to allow a more comprehensive review of the SWEIS projections compared to actual LANL operating parameters.

This chapter compares actual operating data for 1998 to 2007 to projected effects for parameters discussed in the SWEIS, including effluent, workforce, regional, and long-term environmental effects and trends that information in figures in which data were available.

4.1 Air Emissions

Air emissions continue to be within regulatory limits. LANL continues to be in compliance with air quality standards under the Clean Air Act.

4.1.1 Radioactive Air Emissions

The SWEIS projected annual radioactive stack emissions for LANL at 21,700 curies per year. Since 1999, LANL's radioactive stack emissions have not exceeded 19,100 curies, which occurred in 2005. 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. 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. Emissions of activation products from LANSCE were much reduced in 2006 and 2007 as a result of repairing the emission control system. Consequently, LANL is still operating within the parameters that the SWEIS analyzed (Figure 4-1).

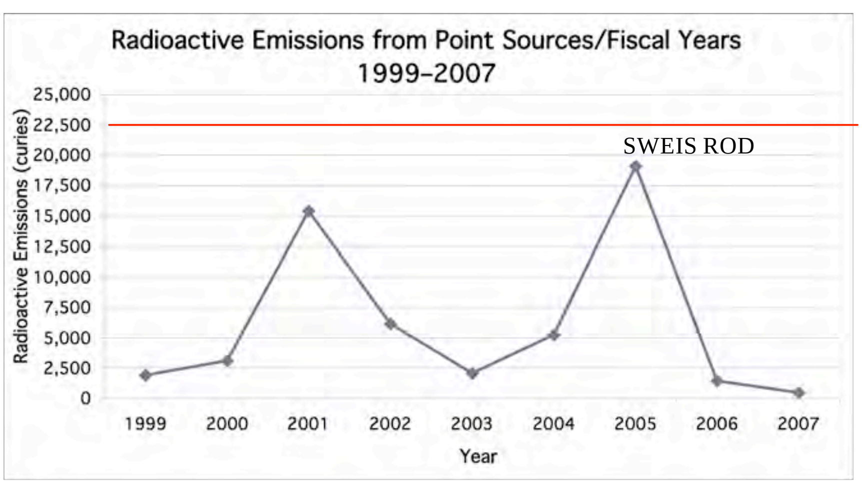

Figure 4-1. Radioactive emissions from point sources for FY 1999–2007.

Tritium emissions are the largest contributor to LANL's overall radioactive emissions. Tritium emissions from Key Facilities, with one exception (2001), have been within the projections of the SWEIS. The single exception was a one-time release of 7,600 curies (Figure 4-2). The SWEIS ROD parameter for tritium emissions from Non-Key Facilities is 910 curies per year. The average annual emissions of tritium from Non-Key Facilities have exceeded that value (1999–2001) due to cleanup activities at TA-33 and TA-41. The annual emissions of tritium from Non-Key Facilities during 2002 and 2003 were well below what was projected in the SWEIS. Cleanup activities were completed in 2004 therefore monitoring activities were ceased.

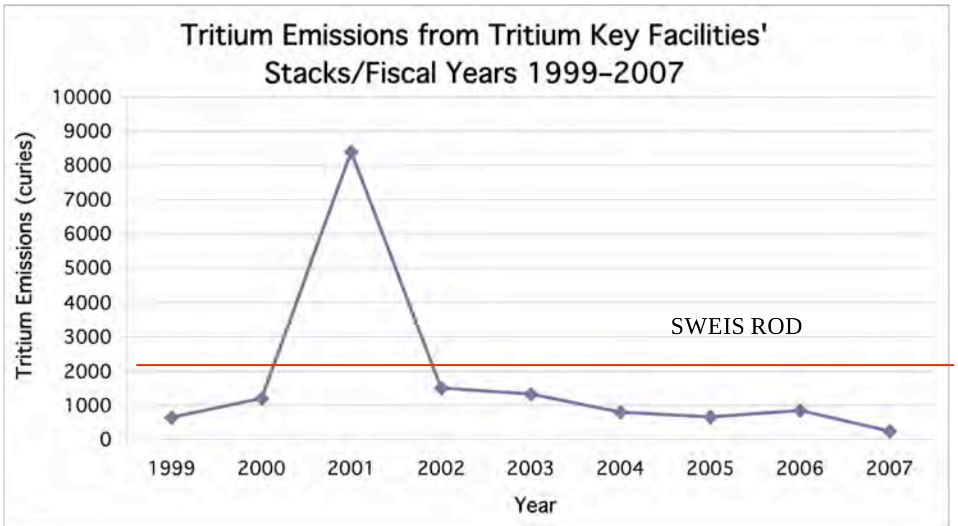

Figure 4-2. Tritium emissions from Tritium Key Facilities' stacks for FY 1999–2007.

The SWEIS projected the maximum offsite dose to a member of the public at 5.44 millirem per year. In the period from 1999 to 2004, the actual dose has been lower than projected. Maximum offsite dose for 2005 was the highest in recent years, due to the emissions controls system failure at LANSCE. The final dose value was 6.45 millirem, still below the EPA air emissions limit of 10 millirem per year established for DOE facilities. During CYs 2006 and 2007, the dose value returned to the much lower levels measured before 2005 (Figure 4-3).

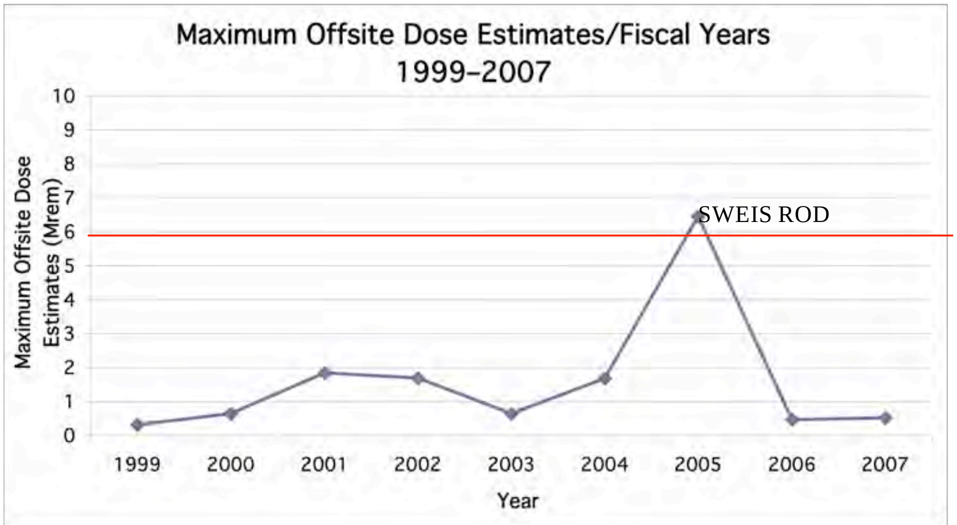

Figure 4-3. Maximum offsite dose estimates for FY 1999–2007.

4.1.2 Nonradioactive Air Emissions

The Los Alamos area continues to be an attainment area for criteria air pollutants under the Clean Air Act. With a few exceptions, the annual emissions of criteria air pollutants from LANL operations from 1999 to 2007 remained within SWEIS projections for all four categories (carbon monoxide [Figure 4-4], nitrogen oxides [Figure 4-5], particulate matter [Figure 4-6], and sulfur oxides [Figure 4-7]). During the Cerro Grande Fire in 2000, the steam plant burned fuel oil, significantly increasing the emissions of sulfur oxides. In 2002 and 2003, the use of air curtain destructors to dipose of trees thinned as part of the Cerro Grande Rehabilitation Project resulted in higher than projected quantities of particulates and sulfur oxides. At the end of the large-scale tree thinning, the emissions dropped to levels more in line with SWEIS projections. In the period from 2002 to 2007, nitrogen oxide emissions decreased due to the installation of flue gas recirculation equipment at the steam plant and to the transfer of a water pump to Los Alamos County.

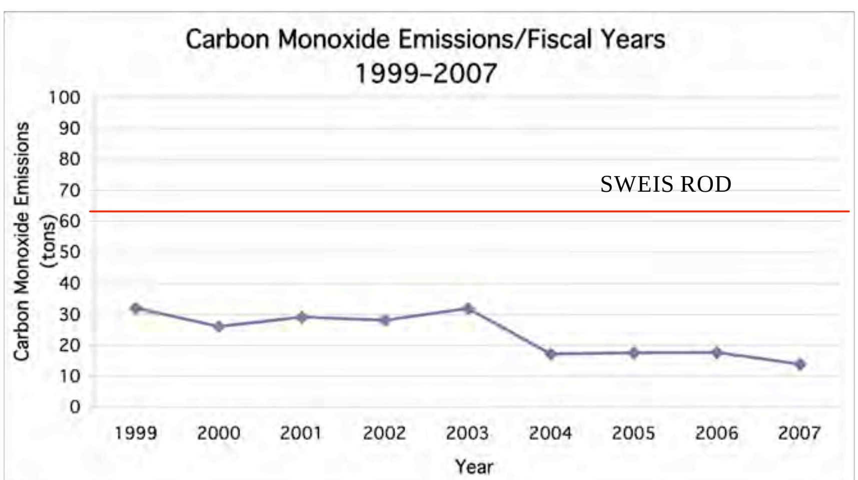

Figure 4-4. Carbon monoxide emissions for FY 1999–2007.

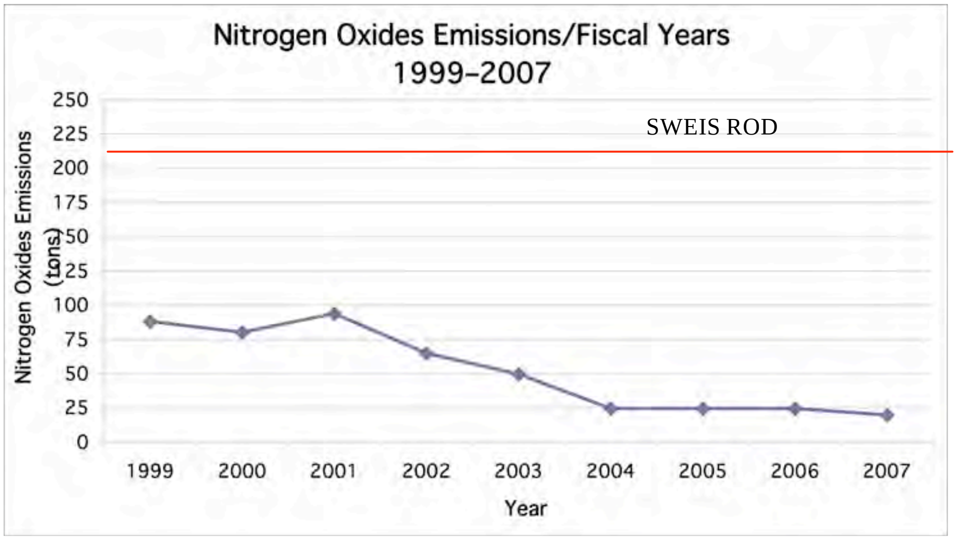

Figure 4-5. Nitrogen oxides emissions for FY 1999–2007.

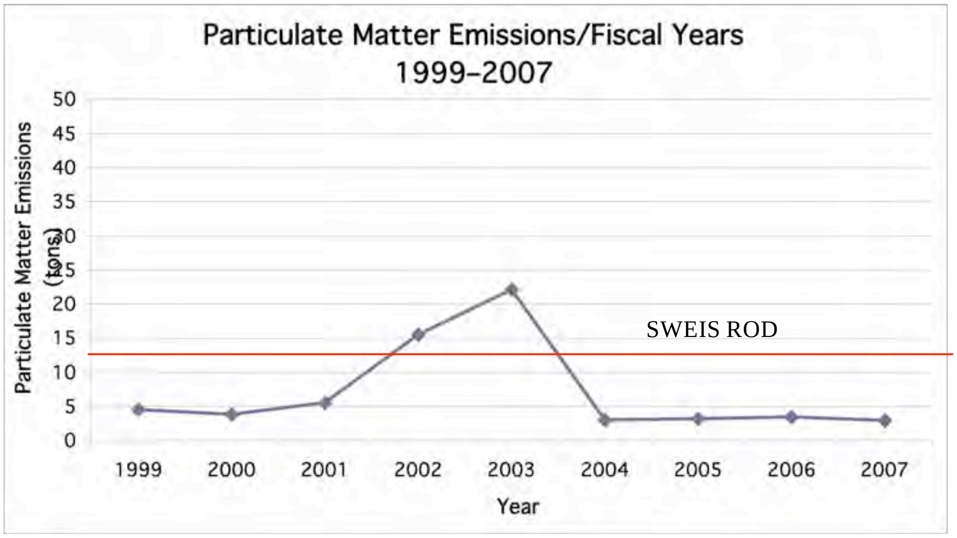

Figure 4-6. Particulate matter emissions for FY 1999–2007.

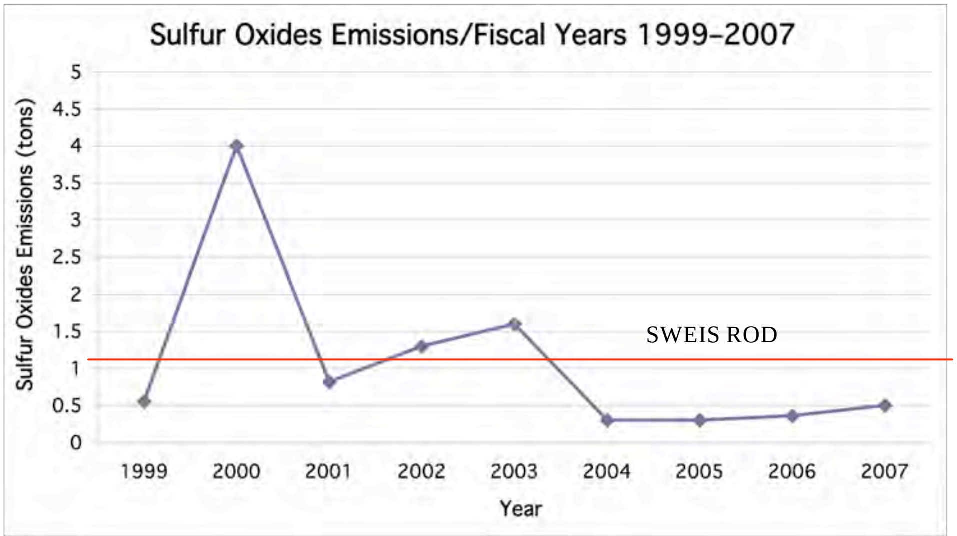

Figure 4-7. Sulfur oxides emissions for FY 1999–2007.

SWEIS ROD projections for VOCs and HAPs were expressed as concentrations rather than emissions; direct comparisons cannot be made. Information on total VOCs and HAPs estimated from LANL operations are shown in Figure 4-8.

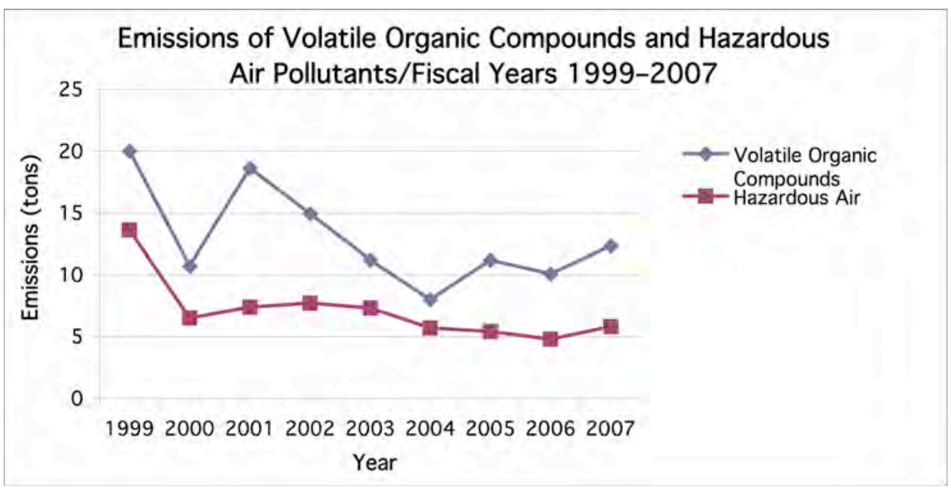

Figure 4-8. Emissions of VOCs and HAPs for FY 1999–2007.

4.2 Surface Water Quality

The number of permitted outfalls at LANL has decreased from 88 at the end of 1996 to 21 in 2002 to 15 on August 1, 2007 (Appendix E). As a result of these closures, there has been an overall 56 percent decrease in flow over 1999 levels.

The SWEIS assumed that reducing outfall volumes would result in improved surface water quality since fewer contaminants would be discharged. It also assumed that water treatment improvements at the RLWTF and at the High Explosives Wastewater Treatment Facility would contribute to higher surface water quality. From 1999–2007, the effluent volumes at RLWTF, the High Explosives Wastewater Treatment Facility, and LANSCE were reduced (Figure 4-9). During the LANL shutdown in 2004, operations ceased, significantly decreasing the outfall volumes at LANSCE.

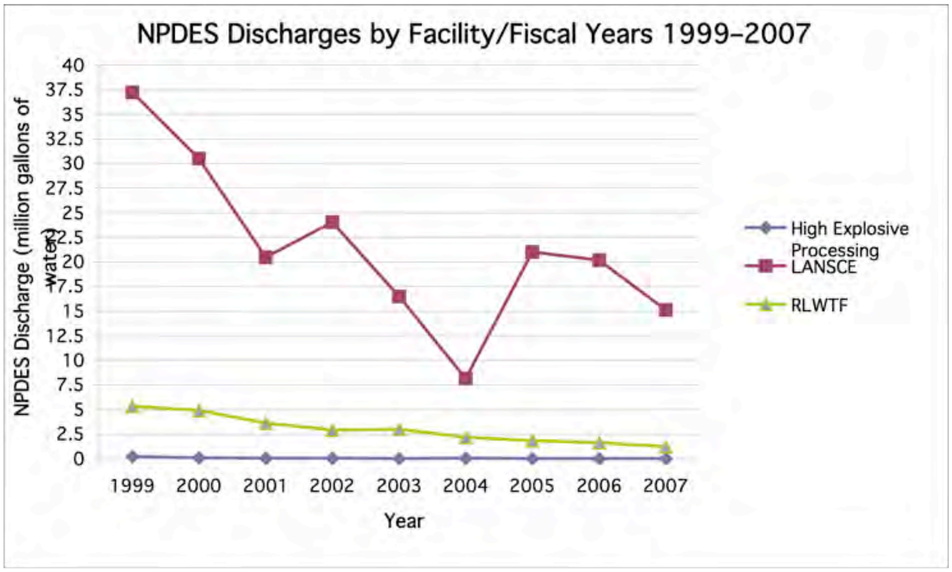

Figure 4-9. NPDES discharges by facility for FY 1999–2007.

4.3 Solid Radioactive and Chemical Wastes

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 nine 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 offsite for disposal at EPA-certified waste treatment, storage, and disposal facilities and do not impact local environs. Figure 4-10 compares the annual LANL chemical waste generation to the SWEIS ROD projections.

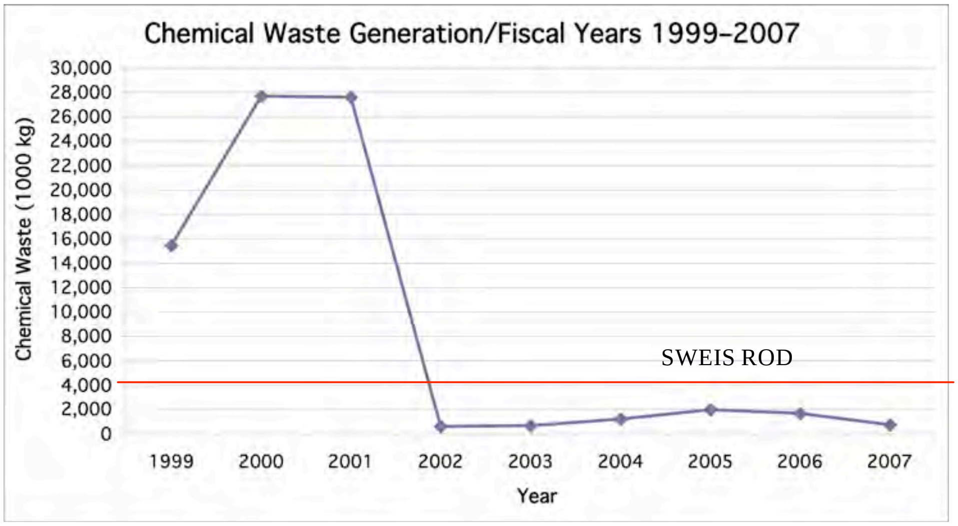

Figure 4-10. Chemical waste generation for FY 1999–2007.

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.

4.3.1 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 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/NNSA 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 was replaced by a transfer station. In compliance with NMED regulations, a landfill 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.

DOE/NNSA has implemented goals for WMin. LANL has instituted an aggressive WMin 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 156 kilograms per person per year in 2008, equivalent to a 41 percent decrease in routine waste generation. This reduction is the result of aggressive WMin programs that include recycling of mixed office paper, cardboard, plastic, and metal and source reduction efforts such as the Stop Mail program, which has decreased the amount of junk mail sent to LANL workers.

LANL's total waste generation can be classified as routine and nonroutine. The waste can also be categorized as recyclable and non-recyclable. Table 4.3.1-1 shows LANL sanitary waste generation for FY 2007. The recycle of total (routine + nonroutine) sanitary waste currently stands at 45 percent compared to 1993 when LANL recycled only about 10 percent of the sanitary waste.

Table 4.3.1-1. LANL Sanitary Waste Generation in FY 2007 (metric tons)

	Routine	Nonroutine	Total
Recycled	743	1,264	2,007
Landfill disposal	1,907	533	2,440
Total	2,650	1,797	4,447

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, as a result, LANL is recycling more construction waste and decreasing landfill disposal.

4.3.2 Chemical Waste

Waste projections for the ERS Program, 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.

The variability in ERS Program waste projections is discussed in the previous paragraphs. 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 offsite, do not impact the local environs, and do not hasten the need to expand the size of Area G. High amounts of chemical waste at Non-Key Facilities during 2001, 2004, and 2006 were mostly due to routine maintenance of aging facilities and some expanded operations.

Low-Level Waste. LANL generation of LLW from 1998–2007 has generally been below that projected in the SWEIS ROD. LLW data from 2000–2007 show that SWEIS projections were exceeded at the Non-Key Facilities due to heightened activities and routine maintenance, however, total waste volumes, with the exception of 2004 remain within SWEIS projections (Figure 4-11).

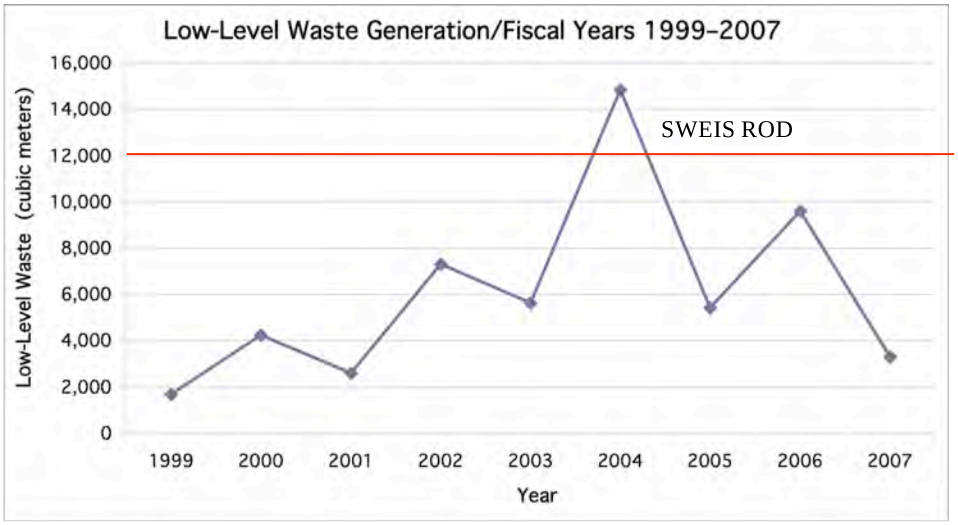

Figure 4-11. Low-level waste generation for FY 1999–2007.

Mixed Low-Level Waste. MLLW increased significantly in 2000. Total LANL MLLW volume for 2000 was 598 cubic meters; 577 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 (Figure 4-12). In 2007, SWEIS projections were exceeded at Non-Key Facilities due to contaminated soil and asphalt generated by construction activities.

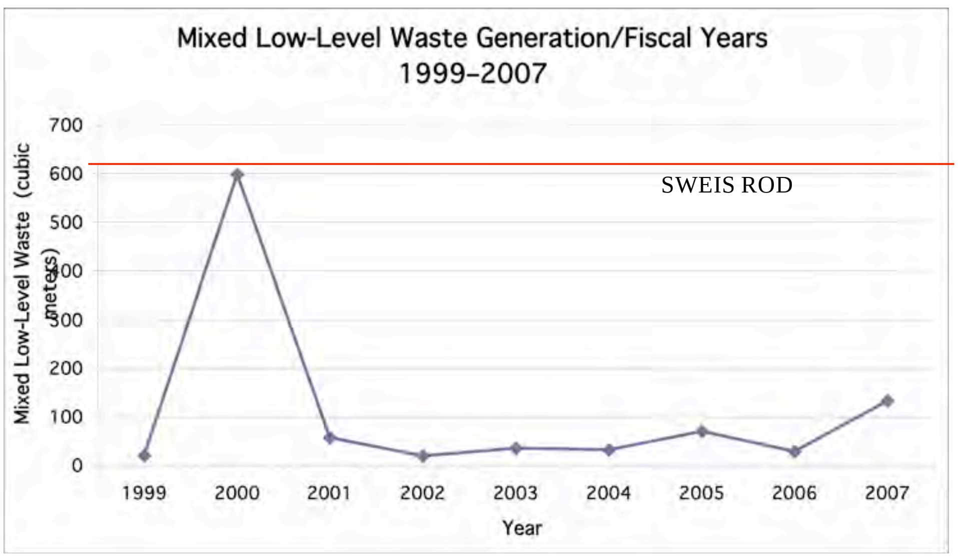

Figure 4-12. Mixed low-level waste generation for FY 1999–2007.

TRU and Mixed TRU. Despite the expected slow, but increasing, levels of activity on pit production and related programs, generation of TRU and mixed TRU waste remained within the projections of the SWEIS ROD with one exception in 2003. Due to the DVRS repackaging of legacy TRU and mixed TRU waste for shipment to WIPP and waste generated through the OSR Project, the TRU and mixed TRU waste numbers exceeded the SWEIS ROD projections in 2003 (Figures 4-13 and 4-14). 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).

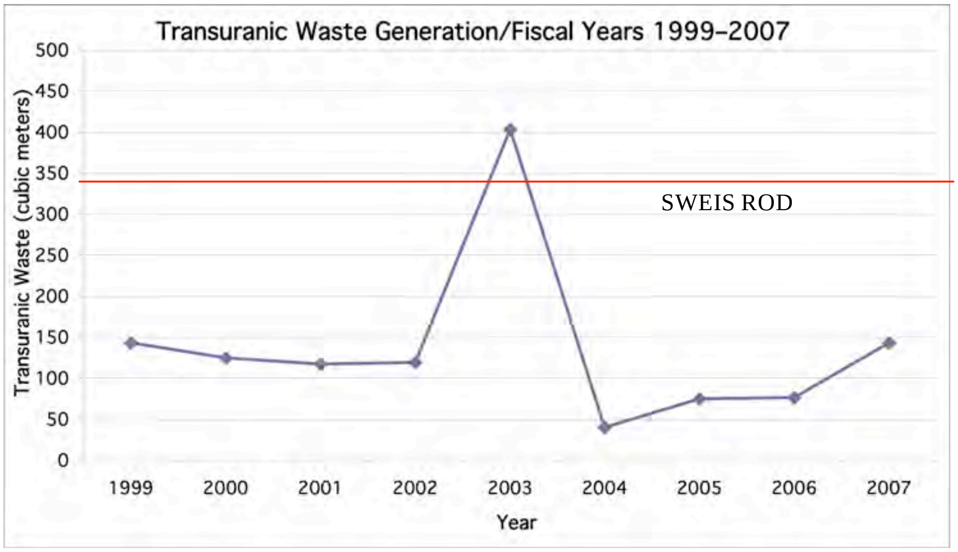

Figure 4-13. TRU waste generation for FY 1999–2007.

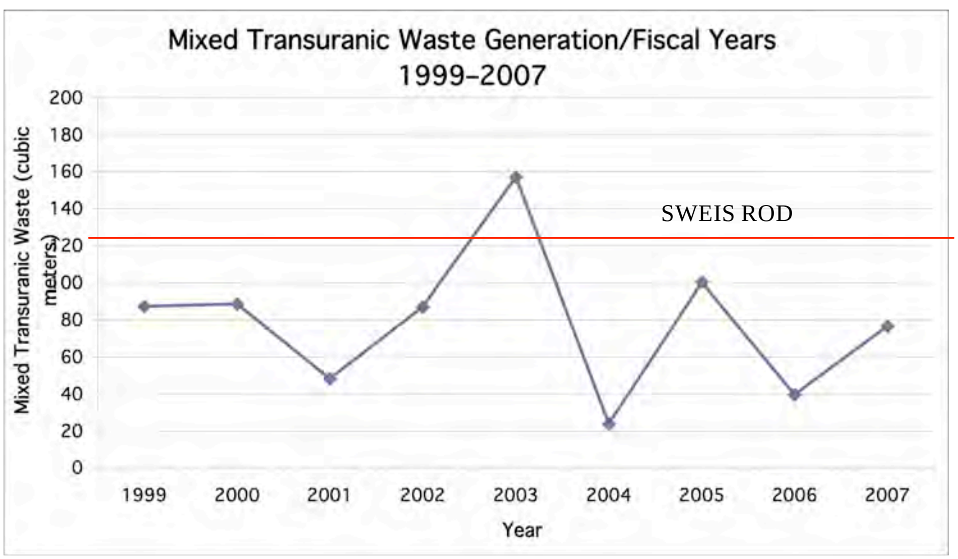

Figure 4-14. Mixed TRU waste generation for FY 1999–2007.

4.4 Utility Consumption

Consumption of electricity, water, and gas 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 over the past 10 years. Based on these data, utility usage remains within the SWEIS ROD environmental envelope for operations (Figures 4-15, -16, and -17).

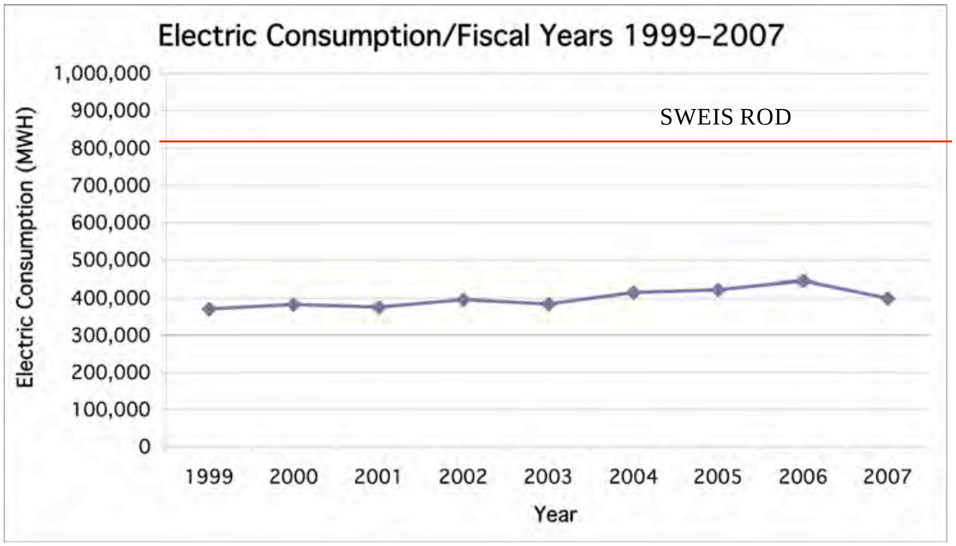

Figure 4-15. Electric consumption for FY 1999–2007.

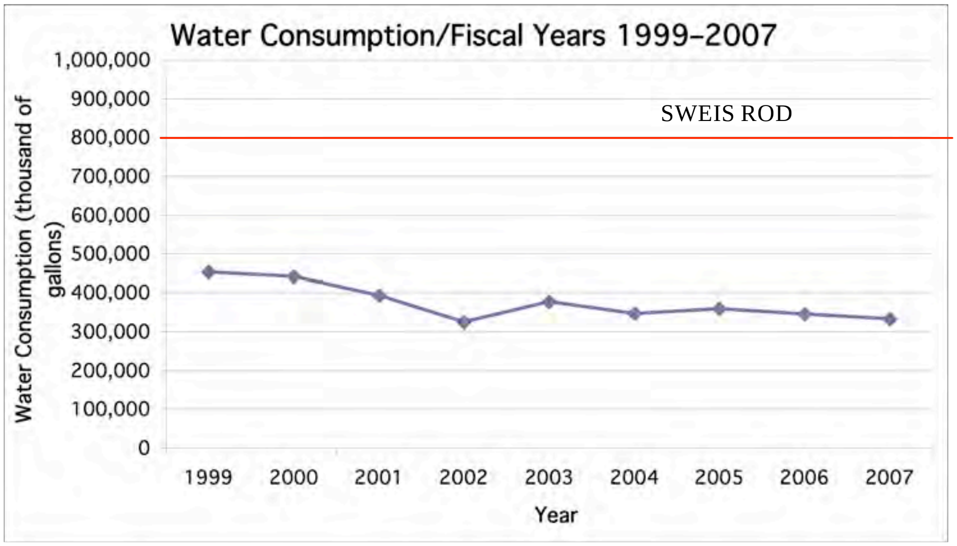

Figure 4-16. Water consumption for FY 1999–2007.

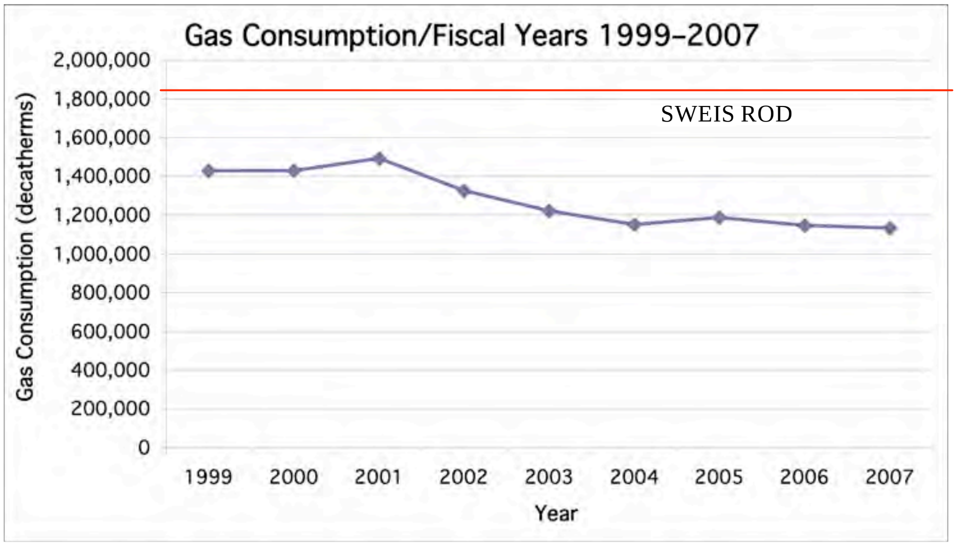

Figure 4-17. Gas consumption for FY 1999–2007.

4.5 Worker Safety

Working conditions at LANL have remained essentially the same as those identified in the SWEIS. The work suspension from July 16, 2004, through most of the year stopped all but essential medium- and high-risk work activities performed during this time period. More than half the workforce remains routinely engaged in activities that are typical of office and computing industries. Much of the remainder of the workforce is engaged in light industrial and bench-scale research activities.

The SWEIS ROD projected 507 reportable occupational injuries (TRI) per year. Despite a small increase in 2004 in TRC (formerly TRI) and DART (formerly Lost Workday Cases), the occupational injury and illness rates for workers continue to be small (Figure 4-18). These rates correlate to reportable injuries and illnesses during the year for 200,000 hours worked.

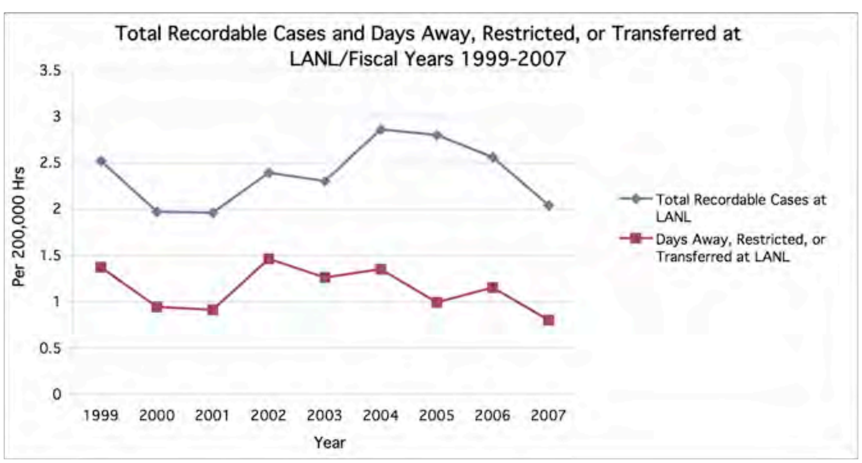

Figure 4-18. TRC and DART for FY 1999–2007.

Radiological exposures to LANL workers are well below the levels projected by the SWEIS ROD. There is considerable variation from year to year but in no case are the doses more than one-third the SWEIS projected levels (Figure 4-19).

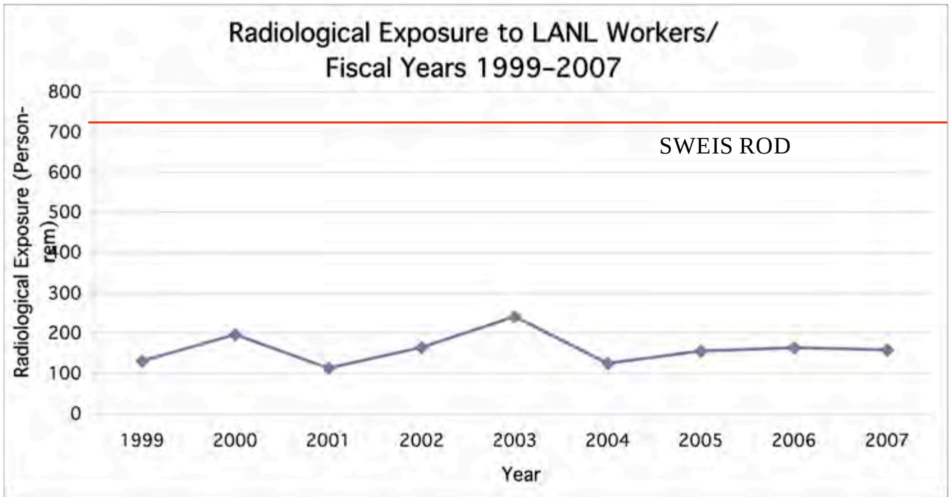

Figure 4-19. Radiological exposure to LANL workers for FY 1999–2007.

4.6 Socioeconomics

The SWEIS ROD projected a workforce of 11,351 persons (see Table 3.6-1). Since 1999, the size of the workforce exceeded what was projected in the ROD and has increased steadily up to 2005. During 2006 and 2007, the size of the workforce slowly began to decrease. The 11,481 total employees at the end of CY 2007 reflect a decrease by 931 employees from the 12,412 employees for 1999 (Figure 4-20). Although the size of the workforce has exceeded what was projected in the ROD, these employees have had a positive economic impact on Northern New Mexico.

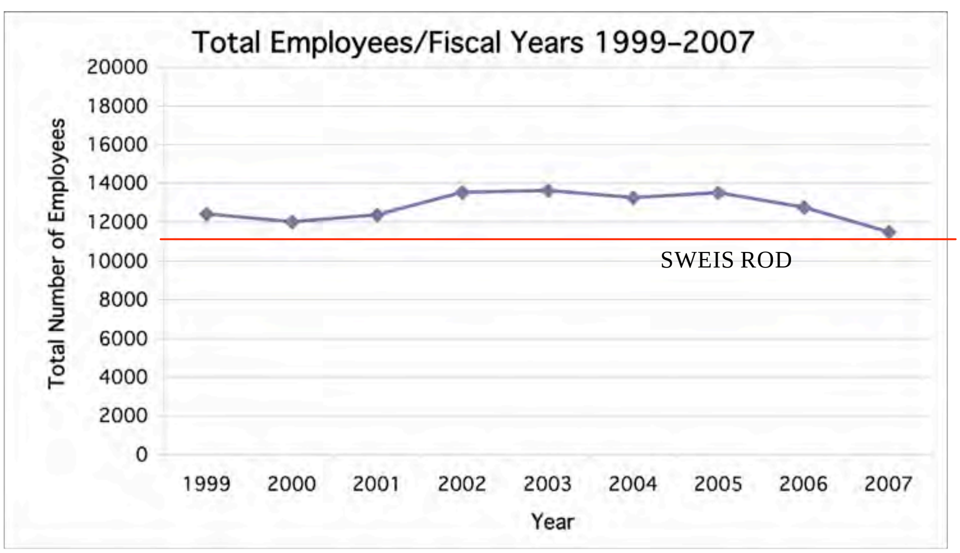

Figure 4-20. Total employees for FY 1999–2007.

4.7 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 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. In CY 2006 no land was transferred, and in CY 2007 one tract was transferred for a total of 22.05 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 1999), Area Development Plans, and TA Master Plans, which guide LANL land development. Refer to Section 3.7, Land Resources, for detailed information on the available planning document developed since the Comprehensive Site Plan 2000.

Though construction and modification often result in substantial loss of greenfields (previously undeveloped areas), this has not been the case for the period 1998–2007. 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 2007 have affected or will affect (in some cases, actual construction has not begun) about 347 acres. About 190 acres of greenfield (about 34 of the CY 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. In CY 2007 the LASO building began construction converting 2.5 acres of undisturbed land to development (refer to Section 2.16, Non-key Facilities, for more information about the LASO building).

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 2007 listed in the Ten-Year Site Plan include the following projects: the TA-55 RLOUB, CMR Replacement, the Criticality Experimental Facility, TA-55 Radiography, Nuclear Material Safeguard & Security Upgrade Phase II, additional Super Vault Type Rooms, and the Computing and Communication Facility. New parking facilities in support of TA-55, upgrades to the Diamond/Eniwetok intersection, TA-54/Pajarito Road intersections improvements for safety, as well as a pedestrian underpass at TA-55, and TA-03 Utility Corridor are included, as well as the Science Complex to be located in a greenfield area west and northwest of the Wellness Center parking lot.

4.8 Long-Term Effects

LANL operations over the past 10 years have fallen, for the most part, well below SWEIS ROD projections. Operation levels that exceeded the SWEIS ROD levels were one-time, non-routine events that do not represent the day-to-day operations of the Laboratory. In addition, utility consumption over the past 10 years remained well below levels projected in the SWEIS ROD and has been trending downward. The Laboratory is committed to reducing energy consumption and will continue to make improvements towards that goal in the future. Data for 1998–2007 indicate that positive impacts (such as number of employees) were greater than SWEIS projections, while negative impacts, such as radioactive air emissions, were, for the most part, well within the SWEIS environmental envelope.

References

DOE (U.S. Department of Energy). 1999. “Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory,” DOE/EIS-0238, Albuquerque, NM.

DOE (U.S. 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.

LANL (Los Alamos National Laboratory). 1999. “Comprehensive Site Plan 2000, Technical Site Information Document,” Los Alamos National Laboratory report LA-UR-99-6704, Los Alamos, NM.

5.0 Summary and Conclusion

5.1 Summary

The 2007 SWEIS Yearbook reviews CY 2007 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 2007, no new construction occurred at the 15 Key Facilities. At the Non-Key Facilities, one major construction project, the Ski Hill By-pass Road was completed in 2007. Construction of the new LASO building continued in 2007. The Security Perimeter Project was completed in 2006, however, the VAPs began operating in January 2007.

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 homeland security.

During CY 2007, 79 capabilities were active. The 17 inactive capabilities were the Cryogenic Separation and Thin Film Loading 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; Waste Retrieval, Size Reduction, and Other Waste Processing at the Solid Radioactive and Chemical Waste Facilities; and all of the nine TA-18 capabilities (Dosimeter Assessment and Calibration, Detector Development, Materials Testing, Sub Critical 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 2,912 hours in 2007, at an average current of 198.2 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 two of LANL's facilities operated during 2007 at levels approximating those projected by the ROD—the MSL and the Non-Key Facilities. The MSL Key Facility is more akin to the Non-Key Facilities and represents 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 14 Key Facilities all conducted operations at or below projected activity levels.

Operations Data and Environmental Parameters. This 2007 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. In addition to the annual comparison of data, additional comparisons and trends were added to Chapter 4 to allow a more comprehensive review of the SWEIS projections compared to actual LANL operating parameters over 10 years.

Since 1998, LANL's radioactive stack emissions have not exceeded 19,100 curies projected by the ROD. Radioactive emissions decreased significantly from 2005 to 2007 due to the repair of the emission control system at LANSCE. Radioactive airborne emissions from point sources (i.e., stacks) during 2007 totaled approximately 477 curies, approximately 2 percent of the 10-year average of 21,700 curies projected by the ROD.

The number of permitted outfalls has decreased significantly since 1998. As a result of these closures, there has been an overall 56 percent decrease in flow. In addition to the decrease of the total number of permitted outfalls, the change in methodology by which flow was measured and reported in the past also has had a significant impact on the flow volumes reported. 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 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. Calculated NPDES discharges totaled 178.23 million gallons for CY 2007 compared to a projected volume of 278 million gallons per year. This is approximately 43.48 million gallons less than the CY 2006 total of 221.70 million gallons, due largely to the change in the number of permitted outfalls. The 2007 total volume of discharge is well below the maximum flow of 278.0 million gallons that was projected in the SWEIS ROD.

Wastes have been generated at levels mostly below quantities projected by the SWEIS ROD. ERS Program chemical wastes from1998–2001 have been generated at levels seven times the SWEIS projection. These wastes result from exhumation of materials placed into the environment during the early history of LANL, which differ from the newly created wastes from routine LANL operations. In addition, LLW data from 2000–2007 show that SWEIS projections were exceeded at the Non-Key Facilities due to heightened activities and routine maintenance of aging facilities, however, total LLW volumes with the exception of 2004 remain within SWEIS projections. MLLW generation remains within SWEIS projections. TRU and mixed TRU generation was within the SWEIS ROD projections with one exception in 2003. Due to the DVRS repackaging of legacy TRU and mixed TRU waste for shipment to WIPP, and waste generated through the OSR Project, SWEIS projections were exceeded. In 2007, waste quantities from 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 2007 ranged from approximately 21 percent of the MLLW projection to about 66 percent of the mixed TRU waste projection.

Since 1998, consumption of gas, water, and electricity has been well below SWEIS ROD projections. The highest peak electricity consumption was 444 gigawatt-hours during 2006 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). The electricity consumption for CY 2007 was 398 gigawatt-hours, which represents 46 gigawatt-hours less than CY 2006. The water consumption for CY 2007 was 332 million gallons, 13 million gallons less than CY 2006. Gas consumption for CY 2007 was 1.13 million decatherms, slightly less than CY 2006.

Radiological exposures to LANL workers are well within the levels projected by the SWEIS ROD. The TEDE for the LANL workforce was 158.2 person-rem during 2007, which is considerably lower than the workforce dose of 704 person-rem projected by the ROD.

The size of the workforce has been above ROD projections since 1997. The workforce has increased steadily up to 2005. During 2006 and 2007, the size of the workforce slowly began to decrease. The 11,481 employees at the end of CY 2007 represent 130 more employees than projected and reflect a decrease of 1,283 employees from CY 2006.

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 CY 2007, 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.)

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 1995–2007 period, and water levels in the regional aquifer have continued a gradual decline that started in about 1977. Two additional characterization wells were completed by the end of 2007.

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

5.2 Conclusions

In conclusion, LANL operations over the past 10 years have fallen, for the most part, well below SWEIS ROD projections. Operation levels that exceeded the SWEIS ROD levels were one time, non-routine events that do not represent the day-to-day operations of the Laboratory. In addition, utility consumption over the past 10 years remained well below levels projected in the SWEIS ROD and has been trending downward. The Laboratory is committed to reducing energy consumption and will continue to make improvements towards that goal in the future. Data for 1998-2007 indicate that positive impacts (such as number of employees) were greater than SWEIS projections, while negative impacts, such as radioactive air emissions, were, for the most part, well within the SWEIS environmental envelope.

Overall, the operations data from 1998–2007 indicate that LANL has been operating within the SWEIS ROD projections and regulatory limits.

5.3 To the Future

This will be the last yearbook based on the preferred alternative described in the 1999 SWEIS ROD. A new ROD is expected to be issued in CY 2008 based on alternatives analyzed in the new SWEIS.

A new Yearbook will be developed to compare LANL operations and relevant parameters in a given year to the SWEIS projections for activity levels chosen by the new ROD.

Appendix A: Chemical Usage and Estimated Emissions Data

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Key Facility	Chemical Name	CAS Number	Units	2007 Estimated Air Emissions	2007 Usage
CMR Building	Acetic Acid	64-19-7	kg/yr	0.18	0.52
CMR Building	Acetone	67-64-1	kg/yr	1.66	4.74
CMR Building	Acetylene	74-86-2	kg/yr	0.00	4.27
CMR Building	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.53	1.50
CMR Building	Copper	7440-50-8	kg/yr	0.00	0.30
CMR Building	Ethanol	64-17-5	kg/yr	1.11	3.16
CMR Building	Hydrogen Bromide	10035-10-6	kg/yr	6.30	18.00
CMR Building	Hydrogen Chloride	7647-01-0	kg/yr	17.66	50.45
CMR Building	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.52	1.48
CMR Building	Hydrogen Peroxide	7722-84-1	kg/yr	1.11	3.17
CMR Building	Magnesium Oxide Fume	1309-48-4	kg/yr	0.16	0.45
CMR Building	Mercury numerous forms	7439-97-6	kg/yr	0.01	1.36
CMR Building	Nitric Acid	7697-37-2	kg/yr	14.69	41.97
CMR Building	Oxalic Acid	144-62-7	kg/yr	1.19	3.40
CMR Building	Paraffin Wax Fume	8002-74-2	kg/yr	0.16	0.45
CMR Building	Phosphoric Acid	7664-38-2	kg/yr	3.21	9.17
CMR Building	Sulfuric Acid	7664-93-9	kg/yr	0.32	0.92
CMR Building	Tantalum Metal	7440-25-7	kg/yr	172.76	493.60
CMR Building	Tin numerous forms	7440-31-5	kg/yr	0.01	0.53
CMR Building	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.01	1.00
CMR Building	Uranium (natural) Sol.&Unsol.Comp. as U	7440-61-1	kg/yr	0.11	0.30
CMR Building	Zirconium Compounds, as Zr	7440-67-7	kg/yr	0.02	2.27
HRL	Acetic Acid	64-19-7	kg/yr	2.02	5.77
HRL	Acetone	67-64-1	kg/yr	0.26	0.75
HRL	Acetonitrile	75-05-8	kg/yr	6.88	19.67
HRL	Acrylamide	79-06-1	kg/yr	0.39	1.12
HRL	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.18	0.50
HRL	Chloroform	67-66-3	kg/yr	1.09	3.11
HRL	Ethanol	64-17-5	kg/yr	51.98	148.50
HRL	Hydrogen Chloride	7647-01-0	kg/yr	0.94	2.67
HRL	Isopropyl Alcohol	67-63-0	kg/yr	11.00	31.42
HRL	Methyl Alcohol	67-56-1	kg/yr	12.74	36.40
HRL	Phenol	108-95-2	kg/yr	0.29	0.82
HRL	Selenium Compounds, as Se	7782-49-2	kg/yr	0.21	0.60
HRL	Tantalum Metal	7440-25-7	kg/yr	0.73	2.09
High Explosive Processing	1,4-Dioxane	123-91-1	kg/yr	0.36	1.03
High Explosive Processing	Acetone	67-64-1	kg/yr	12.70	36.29
High Explosive Processing	Acetonitrile	75-05-8	kg/yr	22.00	62.86
High Explosive Processing	Acetylene	74-86-2	kg/yr	0.00	13.81
High Explosive Processing	Aluminum numerous forms	7429-90-5	kg/yr	0.04	3.95

Key Facility	Chemical Name	CAS Number	Units	2007 Estimated Air Emissions	2007 Usage
High Explosive Processing	Bromine	7726-95-6	kg/yr	0.27	0.78
High Explosive Processing	Chlorine Trifluoride	7790-91-2	kg/yr	0.82	2.34
High Explosive Processing	Chloroform	67-66-3	kg/yr	4.15	11.87
High Explosive Processing	Ethanol	64-17-5	kg/yr	68.37	195.33
High Explosive Processing	Ethyl Acetate	141-78-6	kg/yr	2.52	7.20
High Explosive Processing	Ethyl Ether	60-29-7	kg/yr	0.98	2.80
High Explosive Processing	Ethylene Dichloride	107-06-2	kg/yr	1.30	3.71
High Explosive Processing	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	2.31	6.60
High Explosive Processing	Hydrogen Peroxide	7722-84-1	kg/yr	0.25	0.70
High Explosive Processing	Iron Oxide Fume, as Fe	1309-37-1	kg/yr	0.79	2.27
High Explosive Processing	Isopropyl Alcohol	67-63-0	kg/yr	3.37	9.63
High Explosive Processing	Methyl Alcohol	67-56-1	kg/yr	12.56	35.89
High Explosive Processing	n,n-Dimethylformamide	68-12-2	kg/yr	0.33	0.95
High Explosive Processing	Nitric Acid	7697-37-2	kg/yr	2.40	6.87
High Explosive Processing	Nitromethane	75-52-5	kg/yr	0.52	1.48
High Explosive Processing	Pentaerythritol	115-77-5	kg/yr	41.77	119.35
High Explosive Processing	Pyridine	110-86-1	kg/yr	0.33	0.93
High Explosive Processing	Tetrahydrofuran	109-99-9	kg/yr	47.31	135.16
High Explosive Processing	Toluene	108-88-3	kg/yr	8.50	24.27
High Explosive Testing	Acetone	67-64-1	kg/yr	5.47	15.63
High Explosive Testing	Aluminum numerous forms	7429-90-5	kg/yr	0.00	0.48
High Explosive Testing	Ethanol	64-17-5	kg/yr	87.30	249.42
High Explosive Testing	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	0.92	2.64
High Explosive Testing	Hydrogen Peroxide	7722-84-1	kg/yr	0.31	0.88

High Explosive Testing	Methyl 2-Cyanoacrylate	137-05-3	kg/yr	0.14	0.39
High Explosive Testing	Methyl Alcohol	67-56-1	kg/yr	2.22	6.33
High Explosive Testing	Methylene Chloride	75-09-2	kg/yr	19.04	54.39
High Explosive Testing	n-Butyl Acetate	123-86-4	kg/yr	0.31	0.88
High Explosive Testing	Nitromethane	75-52-5	kg/yr	248.58	710.23
High Explosive Testing	Potassium Hydroxide	1310-58-3	kg/yr	0.18	0.50
High Explosive Testing	Propane	74-98-6	kg/yr	0.00	49.29
High Explosive Testing	Silicon Tetrahydride	7803-62-5	kg/yr	3.37	9.62
High Explosive Testing	Toluene	108-88-3	kg/yr	0.89	2.55
High Explosive Testing	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.11	11.44
LANSCE	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	kg/yr	0.55	1.56
LANSCE	1,4-Dioxane	123-91-1	kg/yr	1.09	3.10
LANSCE	2-Butoxyethanol	111-76-2	kg/yr	0.19	0.54
LANSCE	Acetone	67-64-1	kg/yr	31.12	88.92
LANSCE	Acetylene	74-86-2	kg/yr	0.00	837.71
LANSCE	Allyl Alcohol	107-18-6	kg/yr	4.41	12.60
LANSCE	Aluminum numerous forms	7429-90-5	kg/yr	0.01	0.51
LANSCE	Biphenyl	92-52-4	kg/yr	0.35	1.00
LANSCE	Boron Oxide	1303-86-2	kg/yr	0.35	1.00
LANSCE	Chlorobenzene	108-90-7	kg/yr	0.39	1.11
LANSCE	Chloroform	67-66-3	kg/yr	6.75	19.28
LANSCE	Copper	7440-50-8	kg/yr	0.09	8.72
LANSCE	Cyclohexanone	108-94-1	kg/yr	0.33	0.95
LANSCE	Ethanol	64-17-5	kg/yr	37.05	105.86
LANSCE	Ethyl Ether	60-29-7	kg/yr	5.39	15.40
LANSCE	Ethyl Formate	109-94-4	kg/yr	0.32	0.92
LANSCE	Ethylene Oxide	75-21-8	kg/yr	1.95	5.57
LANSCE	Formic Acid	64-18-6	kg/yr	0.18	0.50
LANSCE	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	0.92	2.64
LANSCE	Hydrogen Bromide	10035-10-6	kg/yr	1.05	3.00
LANSCE	Hydrogen Chloride	7647-01-0	kg/yr	10.73	30.64
LANSCE	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.17	0.49
LANSCE	Isobutane	75-28-5	kg/yr	100.59	287.40
LANSCE	Isopropyl Alcohol	67-63-0	kg/yr	7.39	21.12
LANSCE	Isopropylamine	75-31-0	kg/yr	0.84	2.41
LANSCE	Lead, el.&inorg.compounds, as Pb	7439-92-1	kg/yr	0.01	0.50
LANSCE	Methyl Alcohol	67-56-1	kg/yr	11.06	31.60
LANSCE	Methylene Chloride	75-09-2	kg/yr	10.21	29.19
LANSCE	Molybdenum	7439-98-7	kg/yr	2.11	6.03

Key Facility	Chemical Name	CAS Number	Units	2007 Estimated Air Emissions	2007 Usage
LANSCE	n,n-Dimethyl Acetamide or Dimethyl Acetamide	127-19-5	kg/yr	0.33	0.94
LANSCE	n,n-Dimethylformamide	68-12-2	kg/yr	0.66	1.90
LANSCE	n-Heptane	142-82-5	kg/yr	1.68	4.79
LANSCE	Nickel, metal (dust) or Soluble & Inorganic Comp.	7440-02-0	kg/yr	0.18	0.50
LANSCE	Nitric Acid	7697-37-2	kg/yr	0.27	0.76
LANSCE	Phenol	108-95-2	kg/yr	0.18	0.50
LANSCE	Propane	74-98-6	kg/yr	0.00	31.21
LANSCE	Sulfuric Acid	7664-93-9	kg/yr	1.83	5.22
LANSCE	Tantalum Metal	7440-25-7	kg/yr	3.46	9.87
LANSCE	Tetrahydrofuran	109-99-9	kg/yr	3.73	10.67
LANSCE	Tin numerous forms	7440-31-5	kg/yr	0.01	0.50
LANSCE	Toluene	108-88-3	kg/yr	0.86	2.46
LANSCE	Triethylamine	121-44-8	kg/yr	0.25	0.73
LANSCE	VM & P Naphtha	8032-32-4	kg/yr	1.58	4.50
LANSCE	Zinc Chloride Fume	7646-85-7	kg/yr	0.58	1.67
LANSCE	Zinc Oxide Fume	1314-13-2	kg/yr	0.03	3.15
Machine Shops	Acetylene	74-86-2	kg/yr	0.00	10.52
Machine Shops	Ethanol	64-17-5	kg/yr	4.42	12.63
Machine Shops	Kerosene	8008-20-6	kg/yr	1.12	3.20
Machine Shops	Propane	74-98-6	kg/yr	0.00	1.07
MSL	Acetic Acid	64-19-7	kg/yr	0.37	1.05
MSL	Acetone	67-64-1	kg/yr	9.12	26.07
MSL	Acetonitrile	75-05-8	kg/yr	1.10	3.14
MSL	Ethanol	64-17-5	kg/yr	0.52	1.49
MSL	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	0.92	2.64
MSL	Isopropyl Alcohol	67-63-0	kg/yr	2.20	6.28
MSL	Methyl Alcohol	67-56-1	kg/yr	6.23	17.81
MSL	Methylene Chloride	75-09-2	kg/yr	3.71	10.61
MSL	Nickel, metal (dust) or Soluble & Inorganic Comp.	7440-02-0	kg/yr	0.26	0.75
MSL	Tetrahydrofuran	109-99-9	kg/yr	0.31	0.89
MSL	VM & P Naphtha	8032-32-4	kg/yr	0.26	0.75
Pajarito Site	Propane	74-98-6	kg/yr	0.00	0.25
Plutonium Facility Complex	Acetone	67-64-1	kg/yr	1.11	3.16
Plutonium Facility Complex	Ammonium Chloride (Fume)	12125-02-9	kg/yr	499.21	1426.32
Plutonium Facility Complex	Carbon Disulfide	75-15-0	kg/yr	0.22	0.63
Plutonium Facility Complex	Chlorine	7782-50-5	kg/yr	5.02	14.33
Plutonium Facility Complex	Diethylene Triamine	111-40-0	kg/yr	0.17	0.48
Plutonium Facility Complex	Ethanol	64-17-5	kg/yr	38.00	108.58

Plutonium Facility Complex	Hydrogen Chloride	7647-01-0	kg/yr	110.10	314.56
Plutonium Facility Complex	Hydrogen Fluoride, as F	7664-39-3	kg/yr	3.90	11.13
Plutonium Facility Complex	Isopropyl Alcohol	67-63-0	kg/yr	0.27	0.79
Plutonium Facility Complex	Magnesium Oxide Fume	1309-48-4	kg/yr	1.05	3.00
Plutonium Facility Complex	Methyl Alcohol	67-56-1	kg/yr	1.35	3.86
Plutonium Facility Complex	Nitric Acid	7697-37-2	kg/yr	38.19	109.11
Plutonium Facility Complex	Oxalic Acid	144-62-7	kg/yr	2.54	7.25
Plutonium Facility Complex	Potassium Hydroxide	1310-58-3	kg/yr	70.63	201.81
Plutonium Facility Complex	Tantalum Metal	7440-25-7	kg/yr	0.24	0.67
Plutonium Facility Complex	Toluene	108-88-3	kg/yr	1.08	3.08
Plutonium Facility Complex	Tributyl Phosphate	126-73-8	kg/yr	2.04	5.84
Radiochemistry Site	1,4-Dioxane	123-91-1	kg/yr	0.14	0.41
Radiochemistry Site	Acetic Acid	64-19-7	kg/yr	0.18	0.52
Radiochemistry Site	Acetone	67-64-1	kg/yr	85.65	244.70
Radiochemistry Site	Acetonitrile	75-05-8	kg/yr	1.65	4.71
Radiochemistry Site	Acrylamide	79-06-1	kg/yr	0.18	0.50
Radiochemistry Site	Ammonia	7664-41-7	kg/yr	1.67	4.76
Radiochemistry Site	Arsenic, el.&inorg.,exc. Arsine, as As	7440-38-2	kg/yr	0.20	0.56
Radiochemistry Site	Benzene	71-43-2	kg/yr	0.37	1.05
Radiochemistry Site	Bromine	7726-95-6	kg/yr	0.31	0.88
Radiochemistry Site	Carbon Disulfide	75-15-0	kg/yr	0.09	0.25
Radiochemistry Site	Carbon Tetrachloride	56-23-5	kg/yr	1.67	4.78
Radiochemistry Site	Chloroform	67-66-3	kg/yr	0.52	1.48
Radiochemistry Site	Dicyclopentadiene	77-73-6	kg/yr	0.34	0.98
Radiochemistry Site	Diethanolamine	111-42-2	kg/yr	0.38	1.10
Radiochemistry Site	Diethylene Triamine	111-40-0	kg/yr	0.08	0.24
Radiochemistry Site	Dipropylene Glycol Methyl Ether	34590-94-8	kg/yr	1.94	5.55
Radiochemistry Site	Ethanol	64-17-5	kg/yr	16.50	47.15
Radiochemistry Site	Ethyl Ether	60-29-7	kg/yr	10.19	29.12
Radiochemistry Site	Ethylene Diamine	107-15-3	kg/yr	0.27	0.77
Radiochemistry Site	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	7.17	20.47
Radiochemistry Site	Hydrogen Bromide	10035-10-6	kg/yr	5.25	15.00
Radiochemistry Site	Hydrogen Chloride	7647-01-0	kg/yr	105.91	302.60
Radiochemistry Site	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.56	1.60
Radiochemistry Site	Hydrogen Peroxide	7722-84-1	kg/yr	4.92	14.07
Radiochemistry Site	Hydrogen Sulfide	7783-06-4	kg/yr	0.12	0.35
Radiochemistry Site	Indium & compounds, as In	7440-74-6	kg/yr	0.13	0.37
Radiochemistry Site	Isopropyl Alcohol	67-63-0	kg/yr	8.93	25.51
Radiochemistry Site	Methyl Alcohol	67-56-1	kg/yr	6.65	18.99

Key Facility	Chemical Name	CAS Number	Units	2007 Estimated Air Emissions	2007 Usage
Radiochemistry Site	Methyl Chloride	74-87-3	kg/yr	5.12	14.64
Radiochemistry Site	Methylene Chloride	75-09-2	kg/yr	7.66	21.90
Radiochemistry Site	Molybdenum	7439-98-7	kg/yr	0.18	0.51
Radiochemistry Site	Nickel, metal (dust) or Soluble & Inorganic Comp.	7440-02-0	kg/yr	0.31	0.89
Radiochemistry Site	Nitric Acid	7697-37-2	kg/yr	190.02	542.92
Radiochemistry Site	Pentane (all isomers)	109-66-0	kg/yr	3.51	10.02
Radiochemistry Site	Phosphoric Acid	7664-38-2	kg/yr	2.57	7.34
Radiochemistry Site	Potassium Hydroxide	1310-58-3	kg/yr	2.19	6.26
Radiochemistry Site	Propane	74-98-6	kg/yr	0.00	259.95
Radiochemistry Site	Propionic Acid	79-09-4	kg/yr	0.17	0.50
Radiochemistry Site	Propionitrile	107-12-0	kg/yr	0.14	0.39
Radiochemistry Site	Pyridine	110-86-1	kg/yr	0.13	0.37
Radiochemistry Site	Silica, Quartz	14808-60-7	kg/yr	1.75	5.00
Radiochemistry Site	Silver (metal dust & soluble comp., as Ag)	7440-22-4	kg/yr	0.18	0.53
Radiochemistry Site	Sulfuric Acid	7664-93-9	kg/yr	0.97	2.76
Radiochemistry Site	Tetrahydrofuran	109-99-9	kg/yr	11.28	32.23
Radiochemistry Site	Toluene	108-88-3	kg/yr	15.79	45.11
Radiochemistry Site	Triethylamine	121-44-8	kg/yr	0.25	0.73
Radiochemistry Site	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.16	16.00
Radiochemistry Site	Uranium (natural) Sol.&Unsol.Comp. as U	7440-61-1	kg/yr	4.82	13.78
Sigma Complex	Acetone	67-64-1	kg/yr	56.81	162.31
Sigma Complex	Acetonitrile	75-05-8	kg/yr	0.55	1.57
Sigma Complex	Aluminum numerous forms	7429-90-5	kg/yr	0.01	1.35
Sigma Complex	Arsenic, el.&inorg.,exc. Arsine, as As	7440-38-2	kg/yr	0.20	0.56
Sigma Complex	Beryllium	7440-41-7	kg/yr	412.06	1177.31
Sigma Complex	Chloroform	67-66-3	kg/yr	0.52	1.48
Sigma Complex	Copper	7440-50-8	kg/yr	0.16	16.00
Sigma Complex	Diethylene Triamine	111-40-0	kg/yr	0.34	0.96
Sigma Complex	Ethanol	64-17-5	kg/yr	65.80	188.00
Sigma Complex	Ethyl Acetate	141-78-6	kg/yr	3.78	10.81
Sigma Complex	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	1.39	3.96
Sigma Complex	Hydrogen Chloride	7647-01-0	kg/yr	3.53	10.09
Sigma Complex	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.16	0.45
Sigma Complex	Indium & compounds, as In	7440-74-6	kg/yr	0.19	0.55
Sigma Complex	Isopropyl Alcohol	67-63-0	kg/yr	4.40	12.57
Sigma Complex	Methyl Alcohol	67-56-1	kg/yr	7.20	20.58
Sigma Complex	Methylene Chloride	75-09-2	kg/yr	3.71	10.61
Sigma Complex	Molybdenum	7439-98-7	kg/yr	0.36	1.02
Sigma Complex	Nitric Acid	7697-37-2	kg/yr	217.16	620.45
Sigma Complex	Phosphorus	7723-14-0	kg/yr	0.08	0.23
Sigma Complex	Propane	74-98-6	kg/yr	0.00	0.42
Sigma Complex	Silica, Quartz	14808-60-7	kg/yr	0.35	1.01

Sigma Complex	Sulfuric Acid	7664-93-9	kg/yr	16.74	47.84
Sigma Complex	Tantalum Metal	7440-25-7	kg/yr	0.21	0.60
Sigma Complex	Trimethylamine	75-50-3	kg/yr	0.14	0.40
Sigma Complex	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.00	0.45
Sigma Complex	Uranium (natural) Sol.&Unsol.Comp. as U	7440-61-1	kg/yr	2.99	8.55
TFF	Acetone	67-64-1	kg/yr	10.51	30.02
TFF	Acetylene	74-86-2	kg/yr	0.00	7.46
TFF	Ammonia	7664-41-7	kg/yr	7.94	22.68
TFF	Aniline & Homologues	62-53-3	kg/yr	2.10	6.00
TFF	Bromoform	75-25-2	kg/yr	0.20	0.57
TFF	Cadmium, el.&compounds, as Cd	7440-43-9	kg/yr	0.35	1.00
TFF	Chlorine	7782-50-5	kg/yr	7.94	22.68
TFF	Chloroform	67-66-3	kg/yr	11.58	33.08
TFF	Ethanol	64-17-5	kg/yr	6.45	18.44
TFF	Ethyl Bromide	74-96-4	kg/yr	0.51	1.46
TFF	Ethylene Dichloride	107-06-2	kg/yr	0.43	1.24
TFF	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	12.02	34.34
TFF	Hydrogen Bromide	10035-10-6	kg/yr	0.48	1.36
TFF	Hydrogen Chloride	7647-01-0	kg/yr	4.59	13.10
TFF	Hydrogen Sulfide	7783-06-4	kg/yr	0.56	1.59
TFF	Isobutane	75-28-5	kg/yr	0.33	0.96
TFF	Isopropyl Alcohol	67-63-0	kg/yr	8.52	24.35
TFF	Magnesium Oxide Fume	1309-48-4	kg/yr	0.35	1.00
TFF	Methacrylic Acid	79-41-4	kg/yr	0.36	1.02
TFF	Methyl Alcohol	67-56-1	kg/yr	5.54	15.83
TFF	Methyl Ethyl Ketone (MEK)	78-93-3	kg/yr	1.13	3.22
TFF	Methyl Silicate	681-84-5	kg/yr	0.21	0.60
TFF	Methylene Bisphenyl Isocyanate (MDI)	101-68-8	kg/yr	0.40	1.15
TFF	Methylene Chloride	75-09-2	kg/yr	6.04	17.25
TFF	Molybdenum	7439-98-7	kg/yr	0.35	1.00
TFF	n,n-Dimethyl Acetamide or Dimethyl Acetamide	127-19-5	kg/yr	0.66	1.89
TFF	n-Butyl Glycidyl Ether (BGE)	2426-08-6	kg/yr	0.09	0.25
TFF	n-Heptane	142-82-5	kg/yr	0.25	0.73
TFF	Nickel Carbonyl, as Ni	13463-39-3	kg/yr	0.35	1.00
TFF	Nitric Acid	7697-37-2	kg/yr	1.07	3.05
TFF	Pyridine	110-86-1	kg/yr	0.33	0.93
TFF	Tetrahydrofuran	109-99-9	kg/yr	1.00	2.85
TFF	Thionyl Chloride	7719-09-7	kg/yr	0.57	1.63
TFF	Tin numerous forms	7440-31-5	kg/yr	0.01	1.00
TFF	Toluene	108-88-3	kg/yr	0.91	2.60
TFF	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.05	4.55
Tritium Operations	Propane	74-98-6	kg/yr	0.00	0.33
Waste Management Operations	Acetone	67-64-1	kg/yr	2.10	6.00
Waste Management Operations	Acetylene	74-86-2	kg/yr	0.00	447.17

Key Facility	Chemical Name	CAS Number	Units	2007 Estimated Air Emissions	2007 Usage
Waste Management Operations	Ethanol	64-17-5	kg/yr	1.05	2.99
Waste Management Operations	Mercury numerous forms	7439-97-6	kg/yr	0.02	1.70
Waste Management Operations	Methyl Ethyl Ketone (MEK)	78-93-3	kg/yr	0.53	1.52
Waste Management Operations	Nitric Acid	7697-37-2	kg/yr	3.09	8.83
Waste Management Operations	Propane	74-98-6	kg/yr	0.00	43.25
Waste Management Operations	Sulfuric Acid	7664-93-9	kg/yr	2.90	8.28

Appendix B: Nuclear Facilities List

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Safety Basis Division	**Documentation and Records**	**SB 401 Rev. 9 September 2007**

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
Safety Basis Division

APPROVED FOR USE

LANL Safety Basis Division	9-6-7 Date
LASO Safety Basis Team Leader	10/1/07 Date
LASO Manager	10/3/07 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
8	January 2007	Removed LANSCE 1L Target, Lujan Center, and component storage facilities due to PCM-06-016; Removed TA-55, PF-185 per

		SBT:5485.3:5SS-06-003; Removed TWISP per SABT:5485.3:CMK:103105; Updated RDL to be the current FODs relative to 5485.1 SABT:8JF-001; Updated general editorial elements (e.g., PS-SBO to SB, summary of Table 5-1, deletion of "Performance Surety", etc.)
9	September 2007	Removed TA-18 due to facility downgrade per FRT:5RA-001; Removed DVRS per EO:2JEO-007 dated 4/2/2007; Removed TA-10 due to SBT:5KK-003; updated WCRR due to ABD-WFM-005, R. 0; updated NES to be referenced to NES-ABD-0101, R.1.0

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 Aetivated 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
1/07	Removed TWISP from the Nuclear Facility List per "Authorization for Removal of TWISP Mission from the LANL Nuclear Facility List as a hazard Category 2 Activity; SABT:5485.3:CMK:103105; Removed TA-55 PF-185 from the List per "Authorization for Removal of TA-55-PF-185 from the Nuclear Facility List; SBT:5485.3:5SS-06-003; Remove LANSCE 1L Target, Lujan Center, and component storage facilities due to PCM-06-016 Titles of positions updated to reflect current operations model (RDL to FODs, SABM to SBT Leader)
9/07	Removed TA-18 from the Nuclear Facility List per FRT:5RA-001, " Downgrade of TA 18 from a Hazard Category 2 Nuclear Facility to a Radiological Low Hazard Facility," dated 4/5/2007 Removed DVRS from the Nuclear Facility List per EO:2JEO-007, "Approval of Strategy for Future Operations at the Decontamination and Volume Reduction System (DVRS) Facility," dated 4/2/2007 Removed TA-10 per SBT:5KK-003, "Re-categorization of TA-10, Bayo Canyon Nuclear Environmental Site," dated 8/10/2007. Updated WCRR due to ABD-WFM-005, R.0, Basis for Interim Operation for Waste Characterization, Reduction, and Repackaging Facility (WCRRF)," dated 4/23/2007. Updated NESs to be referenced "Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R1.0, dated 6/26/07.

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), document has been prepared by the LASO Safety Basis Team (SBT) and Safety Basis personnel at LANL. This document provides a tabulation and summary information concerning hazard category 1, 2 and 3 nuclear facilities at LANL. Currently, there are no hazard category 1 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
NES	Nuclear Environmental Site

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
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
SBD........................Safety Basis Division
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)
TSR ....technical safety requirement
USQ........................unreviewed safety question
WCRRF..................Waste Characterization, Reduction and Repackaging Facility
WETF.....................Weapons Engineering Tritium 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)
2	TA-3 Chemistry and Metallurgy Research Facility (CMR)
2	TA-55 Plutonium Facility
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 Radioactive Assay Nondestructive Testing (RANT) Facility
2	TA-21 MDA A NES
3	TA-21 MDA B NES
2	TA-21 MDA T NES
3	TA-35 MDA W NES
3	TA-35 WWTP NES
3	TA-35 Pratt Canyon NES
2	TA-49 MDA AB NES
2	TA-50 MDA C NES
2	TA-53 Resin Tank NES
3	TA-54 MDA H NES

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	Haz Cat	Facility Name	Description	Categorization Basis	FOD
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.	OSD
16	0205	2	Weapons Engineering and Tritium Facility (WETF)	Tritium Research	Safety Evaluation Report (SER) for WETF, SER-Rev.0, March 27, 2002.	Engr. Fac. Ops
3	0029	2	Chemistry and Metallurgy Research Facility CMR	Actinide chemistry research and analysis	*CMR Basis for Interim Operations*, dated August 26, 1998	CMR
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.	TA-55
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.*	TA-55
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.	EMO
	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	2	TA-50 Waste Characterization Reduction and Repackaging Facility (WCRR)	Waste characterization, reduction, and repackaging facility	*Basis for Interim Operation for Waste Characterization, Reduction, and Repackaging Facility (WCRRF),* ABD-WFM-005, R.0, April 23, 2007	EMO
	External	2		Drum staging 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.	EMO
54	0038	2	TA-54 Radioactive Assay Nondestructive Testing (RANT) Facility	TRUPACT-II and HalfPACT loading of drums for shipment to WIPP	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	EMO
21	21-014	2	TA-21 MDA A NES	An inactive Material Disposal Area containing two buried 50,000 gal. storage tanks (the "General's Tanks") and three disposal pits	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO

21	21-015	3	TA-21 MDA B NES	An inactive Material Disposal Area consisting of four major pits, a small trench, and miscellaneous small disposal sites.	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO
21	TA-21	2	TA-21 MDA T NES	An inactive Material Disposal Area consisting of four inactive absorption beds, a distribution box, a portion of the subsurface retrievable waste storage area, and disposal shafts.	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO

35	35-001	3	TA-35 MDA W NES	An inactive Material Disposal Area consisting of two vertical shafts or "tanks" that were used for the disposal of sodium coolant used in LAMPRE-1 research reactor.	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO
35	TA-35	3	TA-35 WWTP NES	An area consisting of residual contamination at depth that remained after the decommissioning and decontamination of the TA-35 Waste Water Treatment Plant (WWTP).	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO
35	TA-35	3	TA-35 Pratt Canyon NES	An area of sediment contamination resulting from former WWTP discharges.	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO

49	TA-49	2	TA-49 MDA AB NES	An underground, former explosive test site comprised of three distinct areas, each with a series of deep shafts used for subcritical testing.	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO
50	50-009	2	TA-50 MDA C NES	A former Material Disposal Area consisting of pits and shafts that were used for burial of chemical waste, uncontaminated classified materials, and radioactive waste.	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO

53	TA-53	2	TA-53 Resin Tank NES	An inactive underground tank associated with the former radioactive liquid waste system at TA-53. The tank (Structure 53-59) contains spent ion exchange resin.	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO
54	54-004	3	TA-54 MDA H NES	An inactive Material Disposal Area located on Mesita del Buey containing nine shafts that were used for disposal of classified materials.	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	EMO

UNITED STATES GOVERNMENT **DEPARTMENT OF ENERGY**

memorandum

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

DATE: OCT 0 5 2007

REPLY TO ATTN OF: SBT:5KK-005

SUBJECT: Revision 9 to the Department of Energy/Los Alamos National Laboratory List of Los Alamos National Laboratory Nuclear Facilities

IRM-RMMSO Record Copy

U0703112

TO: Robert McQuinn, ADNHHO: Nuclear and High Hazard Ops, LANL, MS-E517

Reference:

1) Resubmittal of Revision 9 to the Department of Energy/Los Alamos National Laboratory List of Los Alamos National Laboratory Nuclear Facilities

The National Nuclear Security Administration has approved Revision 9 of the Department of Energy/Los Alamos National Laboratory List of Los Alamos National Laboratory Nuclear Facilities. The signed document, "SB 401 Rev. 9 September 2007" is attached.

The Government considers this action to be within the scope of the existing contract and, therefore, the action does not involve or authorize any delay in delivery or additional cost to the Government, either direct or indirect. If you believe there is such an impact, you should immediately notify me and not implement this performance direction.

If you have any question regarding this transmittal, please contact Karol Kriens at (505) 667-3168.

Donald L. Winchell, Jr.
Manager

'07 OCT 16 AM 9:50:56

COR-50- 10/10/2007- 26421

Associate Director
Nuclear & High Hazard Operations
P.O. Box 1663, Mail Stop K778
Los Alamos, New Mexico 87545
505-665-6446/Fax 505-667-6440

Date: September 6, 2007
Refer To: AD-NHHO:07-224

Mr. Phil Roebuck
National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, NM 87544

Subject: Resubmittal of Revision 9 to the DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities

References: 1. DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities, SB 401, Rev. 9, dated September 2007.

Dear Mr. Roebuck,

The attached document, "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Revision 9 has been updated to reflect the current categorization of the Laboratory's Nuclear Facilities [Ref. 1]. The Laboratory intends to review and update the Nuclear Facilities List in a reasonable time frame 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 proposed Nuclear Facility List as the SBT Leader, forward to the LASO Site Manager, then return the signed original to the Safety Basis Division. This office will provide the production and distribution, and will post it on the Laboratory's internal web site.

Concurrence of the most current Nuclear Facility List by the Los Alamos Site Office is requested. If you have any questions or concerns, please feel free to contact me at 665-6446.

Sincerely,

Robert L. McQuinn
Associate Director
Nuclear High Hazards Operations

RLM:lh

Attachment

Cys:

A. E. MacDougall, DOE-LASO, A316
J. C. Vozella, DOE-LASO, A316
C. H. Keilers Jr., DNFSB, A316
B. P. Broderick, DNSFB, A316
E. R. Christie, DOE-LASO, A316
M. B. Mallory, PADOPS, A102
R. L. McQuinn, AD-NHHO, K778
R. M. Mobley, SB-DO, E578
D. J. Gordon, SB-DO, E578
K. Fife, SB-PF, MS E578
M. E. Pansoy-Hjelvik, SB, E578
D. G. Satterwhite, SB-PG, K561
J. L. Tingey, SB-TANN, C927
P. R. McClure, SB-AS, C347
IRM-RMMO, A150
SB-DO File, E578
ADNHHO File, K778

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**

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

memorandum

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

50P

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

<table>
<tr><th>No.</th><th>Page</th><th>Section/Para/Line</th><th>Reviewer Comment</th><th>Response/Resolution</th></tr>
<tr><td></td><td></td><td></td><td>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.</td><td></td></tr>
<tr><td>6</td><td>11</td><td>Table 28</td><td>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</td><td>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.</td></tr>
</table>

Attachment 2

Response/Resolution of NNSAComments on
LANL's Radiological Facilities Inventory of Radioactive Material

<table>
<tr><th>No.</th><th>Page</th><th>Section/Para/Line</th><th>Reviewer Comment</th><th>Response/Resolution</th></tr>
<tr><td></td><td></td><td></td><td>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.</td><td></td></tr>
<tr><td>7</td><td>12</td><td>Table 29</td><td>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;

<table>
<tr><th>Isotope ,</th><th>Inventory (Ci),</th><th>1027 HC3 TQ (Ci),</th><th>HC3 Ration</th></tr>
<tr><td>H-3</td><td>2.91E+0</td><td>1.6E+4</td><td>0.000</td></tr>
<tr><td>Cf-252</td><td>2.09E-2</td><td>3.2E+0</td><td>0.007</td></tr>
<tr><td>Am-241</td><td>3.88E-2</td><td>5.2E-1</td><td>0.074</td></tr>
<tr><td>Cs-137</td><td>2.84E-3</td><td>6.00E+1</td><td>0.000</td></tr>
<tr><td>Pu-238</td><td>5.18E-4</td><td>6.2E-1</td><td>0.000</td></tr>
<tr><td>Pu-239</td><td>4.58E-1</td><td>5.2E-1</td><td>0.881</td></tr>
<tr><td>Pu-240</td><td>5.27E-2</td><td>5.2E-1</td><td>0.101</td></tr>
<tr><td>Pu-241</td><td>3.31E-3</td><td>3.2E+1</td><td>0.000</td></tr>
<tr><td>Pu-242</td><td>1.5E-2</td><td>6.2E-1</td><td>0.024</td></tr>
<tr><td>Ra-226</td><td>4.43E+0</td><td>1.20E+1</td><td>0.369</td></tr>
<tr><td>U-235</td><td>9.96E+3</td><td>4.2E+00</td><td>2.37E+3</td></tr>
<tr><td>U-238</td><td>1.39E+6</td><td>4.2E+00</td><td>3.31E+5</td></tr>
<tr><td></td><td></td><td>HC3 Ratio Sum</td><td>3.312E+5</td></tr>
</table>

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</td><td>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.</td></tr>
</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 2007 Pollution Prevention Awards for LANL

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NNSA P2 Awards

Los Alamos led the field in Pollution Prevention awards in 2007, winning seven awards, including two Best-in-Class awards and five Environmental Stewardship awards from the Department of Energy/National Nuclear Security Administration.

The seven projects saved the Laboratory more than $1.6 million in waste disposal costs and labor, and reduced the generation of liquid transuranic waste by 2,700 liters. Together the projects avoided the generation of 291 55-gallon drums of solid transuranic waste, which equals seven WIPP shipments. The projects reduced the generation of low-level waste by 80 cubic meters, sanitary waste by 120 cubic meters, and recycled 1,400 pounds of copper.

Best-in-Class Winners

Slip Top Can Reduction Project

The Slip Top Can Reduction Project prevented 11,000 containers at the Lab from becoming useless and thereby reduced transuranic waste, saved time, reduced worker exposure, and avoided about $1.4 million in costs. Slip top cans the Lab uses to store transuranic waste did not meet new standards for pressure relief and were going to be replaced until this team was able to solve the problem by replacing only the lids. The people who implemented this project are from Waste Services Division and Plutonium Manufacturing and Technology Divisions.

Green Primaries – Environmentally Friendly Primary Explosives

The Green Primaries group invented a new set of primary explosives that do not contain toxic components and do not create hazardous waste during manufacturing or use. Once the new primaries are in widespread use, the project has the potential to eliminate thousands of pounds of lead use and environmental dispersion and increase the safety of those who routinely handle primaries. The people who worked on this project are from the Dynamic and Energetic Materials, Weapons Technology, Waste Services, and Technology Transfer Divisions.

Environmental Stewardship Award Winners

Institutional Improvement Projects Developed from the Environmental Management System

The materials disposition project and the chemical life cycle project, two projects identified by the Environmental Management System, were recognized because they help the Lab minimize the accumulation and storage of unneeded materials. The materials disposition project helped ensure materials were salvaged and recycled during the cleanout of TA-59, while the chemical life cycle team streamlined chemical procurement and created a database of alternatives to twenty-four high hazard chemicals. The many people who helped with these projects represent the Environmental Protection, Environment and Remediation Support Services, Chemistry, Acquisition Services Management, Waste Services, LANSCE, Security, Infrastructure Planning, and Radiation Protection Divisions.

Power Grid Infrastructure Upgrades Transmission Line

The innovative use of materials during a power transmission line construction project, which required new utility poles and the disturbance of twenty-five acres of ground, saved $72,000. In order to comply with regulatory requirements, log and rock displaced during the project were used for sediment control. In addition, ninety cubic yards of wood mulch from the Los Alamos County landfill was used to stabilize three acres of the project from March until May. The people who worked on this project represent the Environmental Protection, Facility and Infrastructure Recapitalization Project, and Construction Divisions.

Removal and Asset Recovery of Copper-lined Faraday Cage

A pilot program for the removal of a copper Faraday Cage from TA-39 saved $21,611 and allowed for the recycling of 1,400 pounds of copper. The project was managed as a deactivation and decommissioning project rather than a remodeling project. The value of the copper offset the majority of the cost of the deactivation and decommissioning work; re-categorizing the project also allowed it to be finished earlier. The people who helped with this project are from the Waste Services, Facility and Infrastructure Recapitalization Project, Dynamic and Energetic Materials, and Industrial Hygiene and Safety Divisions.

Improvements to the Plutonium Electrorefining Process

The cathode used in the plutonium electrorefining process was redesigned to eliminate cathode failure. This reduced the need to reprocess material, which decreased the waste generated by a factor of three. The new cathode saves fifteen days of labor, $18,450, and prevents the generation of excess liquid and solid transuranic waste. The people who implemented this project are from the Plutonium Manufacturing and Technology Division.

Low-Level Waste Minimization at DARHT

The DARHT facility at TA-15 implemented several new practices to reduce the amount of beryllium-contaminated low-level waste generated during explosive diagnostic experiments. The new process reduces low-level waste generation, saves more than $60,000 in waste disposal costs each year, and reduces the turnaround time between shots. The staff minimized the amount of material entering the test area, reused equipment, and began to use water bladders to minimize the amount of waste generated. The people who implemented this project are from the Waste Services, Hydrodynamic Experiments, and Radiation Protection Divisions.

The Laboratory administers internal pollution prevention awards as part of the Earth Day activities. In 2007, pollution prevention awards were given for 40 different projects involving 183 employees. These projects resulted in the following waste reductions:

- 1 million liters per year of Radioactive Liquid Waste effluent eliminated
- 1.1 million liters per year in Radioactive Liquid Treatment Plant process wastes reduced
- 136,000 liters of Radioactive Liquid Waste evaporator bottoms reduced
- 3.5 cubic meters of low level waste reduced
- 32,000 tons of sanitary waste reused or recycled
- 17 tons of halon reused
- 564,000 gallons of water use avoided
- 22 billion btus of natural gas use avoided
- 735 million cubic feet of natural gas use avoided
- 2.6 million kilowatt hours of electricity avoided
- 600 gallons of diesel fuel saved
- 24 tons of hazardous waste eliminated
- 1615 chemical containers reduced
- One project eliminated 199 hazardous waste streams and reduced low level waste by 50%

Award descriptions are as follows:

Technical Area 55 Steam Generator Lay-up

In Technical Area (TA) 55, building 6 there are 2 steam generators that produce condensate in the Plutonium Facility (PF) 4 at a rate of 0.3 gallons per minute or approximately 597,240 liters per year when used 24 hours per day, 365 days per year. This volume of condensate accounts for approximately 38% of the Low-Level Waste (LLW) water volume discharged as industrial liquid waste from TA-55. The steam generators are operated whether there is a need for steam in the facility or not. An agreement was reached between the programs requiring the use of steam and Facility Engineering who operate and maintain the steam generators. They agreed to only operate them when needed and to conduct more frequent sampling of the water while in lay-up. This resulted in a savings of 511,920 liters per year of LLW with a cost savings of $987,847 per year.

C-Division Installation of Perchlorate Acid Exhaust System

A new perchlorate acid exhaust system was installed at Technical Area (TA) 48 by Personnel in the Chemistry Division of Los Alamos. Fuming perchloric acid activities at TA-48 generate over 1,000,000 liters per year of radioactive liquid wastewater from the wash down of four large perchloric exhaust systems. Almost all of the use of perchloric acid was consolidated by the Chemistry Division into on laboratory at TA-48. The consolidation of perchlorate activities allowed the construction of a separate exhaust system for this laboratory eliminating the need to continue to wash down the four larger systems weekly. It is estimated that this new exhaust system will reduce the amount of radioactive liquid wastewater by at least 500,000 liters per year and will save the Laboratory approximately $1,000,000 per year.

Radioactive Liquid Waste Treatment Reverse Osmosis Concentrate Recycle

The low level radioactive liquid waste treatment facility conducted an experiment designed to reduce the amount of reverse osmosis concentrate (ROC) needing treatment by the evaporator. Instead of sending all of the ROC directly to the evaporator feed, it was recycled to an intermediate storage tank where the super-saturated solution would come to equilibrium prior to being recycled and blended with influent as feed to the first stage of the low level treatment system. A portion of the ROC was sent to the evaporator feed tanks in order to maintain the dissolved solid concentration at a level that would be treatable by the reverse osmosis membranes, and continue to meet discharge requirements. Prior to this recycling test approximately 12.5% of the ROC was waste; once recycling was instituted the amount of ROC that is wasted is reduced to 3%. The total cost savings, including outside contractors, labor, and utilities exceed $1.3 million per year.

Chemistry and Metallurgy Research Replacement Project Reuse/Recycle of Soil, Asphalt, Mulch from Vegetation

The Chemistry and Metallurgy Research Replacement (CMRR) Project made the decision to reuse and or recycle soil, asphalt, and mulch from vegetation instead of paying for the disposal of these products. The reused/recycled soil, approximately 207,000 cubic yards, will be used at various locations across the laboratory as well as the county landfill. The recycled asphalt, 486 cubic yards, will be used as a base course for construction vehicle traffic. Trees, brush, and bushes will be turned into mulch for dust suppression for the Storm Water Pollution Prevention Plan best management practice and other uses. The total savings for Los Alamos National Laboratory could be up to $889,000.

LANL Environmental Stewardship Awards

FIRP-DISP Demolition and Removal of the R40 Complex: High Yield Recycling and Salvage Emphasis Resulted in Significant Waste Avoidance

Facilities and Infrastructure Recapitalization Program (FIRP) Disposition (FIRP-DISP) projects eliminate facilities and infrastructure that no longer are required to support mission requirements. This Project achieved pollution prevention by incorporating significant waste avoidance practices, but also, materials that were procured to finish the site were obtained from onsite Los Alamos Nation Laboratory (LANL) resources, enabling a reuse of those materials and ensuring waste avoidance by the LANL projects which provided the materials. Overall, the volumetric percentage of waste avoidance compared to actual waste disposition exceeded 77% (not including salvaged equipment or recyclable copper). For the project had an overall waste avoidance of 4,031 cubic yards of demolition products, salvaged 4,300 gross square feet of building space, and reused more than 3,000 cubic yards of available LANL materials. This project saved over $351,000 in disposal costs.

Appendix E: NPDES Outfalls

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	NPDES Category	Outfall No.	TA	Bldg	FMU No.	Drainage Basin	EPA Delete Date
1		01S	3		80	Sandia	Prior to 95
2		001	3	22	80	Sandia	Remaining
3		02S	9		N/A	Pajarito	Prior to 94
4	01A	002	3	22			Combined with 001
5		03S	16		N/A	Water	Prior to 94
6	01A	003	3	22			Combined with 001
7		04S	18		N/A	Pajarito	Prior to 94
8	01A	004	3	22			Combined with 001
9		05S	21	STP	80	Los Alamos	3/10/98
10	01A	005	3	22			Combined with 001
11		06S	41	STP			Prior to 94
12	02A	006	21	357			Eliminated
13		07S	46		N/A	Canada del Buey	Prior to 94
14	02A	007	16	540	80	Valle	5/15/98
15		08S	48	5			Combined with 10S
16	02A	008	22	6			Eliminated 6/84
17		09S	53		N/A	Los Alamos	Prior to 94
18	03A	009	3	102	70	Two Mile	7/31/96
19		10S	35		N/A	Mortandad	Prior to 94
20	04A	010	3	105			Eliminated 4/87
21		11S	8	9			Combined with 02S
22	04A	011	22	5			Eliminated 4/87
23		12S	46		N/A	Canada del Buey	Prior to 94
24	04A	012	35	67			Eliminated 4/87
25		13S	46	SWWS	80	Canada del Buey	Remaining
26	04A	013	46	30	66	Canada del Buey	12/6/95
27	04A	014	46	88	66	Canada del Buey	7/11/95
28	04A	015	48	1			Combined with 045
29	04A	016	48	1	66	Mortandad	9/19/97
30	04A	017	53	2			Combined with 114
31	04A	018	46	24, 59, 76	66	Canada del Buey	12/6/95
32	03A	019	2	44			Eliminated 5/16/90

	NPDES Category	Outfall No.	TA	Bldg	FMU No.	Drainage Basin	EPA Delete Date
33	03A	020	2	49	66	Los Alamos	7/11/95
34	03A	021	3	29	65	Mortandad	Remaining
35	03A	022	3	2274	73	Mortandad	Remaining
36	03A	023	3	163, 287	77	Sandia	7/11/95
37	03A	024	3	187	73	Sandia	Not re-permitted 8/07
38	03A	025	3	208	77	Two Mile	7/20/98
39	03A	026	3	208			Combined with 025
40	03A	027	3	2327	63	Sandia	Remaining
41	03A	028	15	185, 202	67	Water	Not re-permitted 8/07
42	03A	029	16	340			Combined with 054
43	03A	030	21	2			Eliminated 4/87
44	03A	031	21	143	80	Los Alamos	7/11/95
45	03A	032	21	150	66	Los Alamos	7/31/96
46	03A	033	21	152	70	Los Alamos	3/1/86
47	03A	034	21	166, 167	70	Los Alamos	9/19/97
48	03A	035	21	210	71	Los Alamos	9/19/97
49	03A	036	21	152, 155, 220	70	Los Alamos	9/19/97
50	03A	037	21	314	66	Los Alamos	7/31/96
51	03A	038	33	114	75	Chaquehi	9/19/97
52	03A	039	35	33			Eliminated
53	03A	040	43	1	72	Los Alamos	Eliminated 1999
54	03A	041	43	1			Combined with 040
55	03A	042	46	1	70	Canada del Buey	3/10/98
56	03A	043	46	31	66	Canada del Buey	7/31/96
57	03A	044	46	86			Eliminated 4/87
58	03A	045	48	1	66	Mortandad	12/6/99
59	03A	046	48	1			Combined with 045
60	03A	047	53	60	61	Los Alamos	Not re-permitted 8/07
61	03A	048	53	62	61	Los Alamos	Remaining
62	03A	049	53	64	61	Los Alamos	Not re-permitted 8/07
63		050	21	257	N/A	Los Alamos	Last dmr 6/85
65		051	50	1 RLWTF	84	Mortandad	Remaining

66	05A	052	16	380	70	Water	Prior to 94
67	05A	053	16	410	70	Water	1/14/98
68	05A	054	16	340	70	Valle	7/20/98
69	05A	055	16	1507 HEWTF	70	Valle	Remaining
70	05A	056	16	260	70	Valle	1/14/98
71	05A	057	16	265, 267	70	Valle	Prior to 94
72	05A	058	16	300-306	70	Water	7/31/96
73	04A	059	16	460			Combined with 072
74	03A	060	16	430	70	Water	7/31/96
75	05A	061	16	280	70	Valle	7/31/96
76	05A	062	16	342	70	Valle	7/31/96
77	05A	063	16	400	70	Water	12/5/95
78	05A	064	22	34		Pajarito	Eliminated
79	05A	065	22	1		Pajarito	Eliminated
80	05A	066	9A	21, 28, 29, 32, 33,34, 35, 37, 38, 40	67	Valle	3/10/98
81	05A	067	9B	-41, 42, 43, 45, & 46	67	Valle	3/10/98
82	05A	068	9	48	67	Valle	3/10/98
83	05A	069	11	50	70	Water	5/15/98
84	04A	070	16	220	70	Valle	9/19/97
85	05A	071	16	430	70	Water	3/10/98
86	05A	072	16	460	70	Water	9/19/97
87	06A	073	16	222	70	Valle	1/14/98
88	06A	074	8	22	70	Valle	9/19/97
89	06A	075	8	21	67	Valle	1/14/98
90	04A	076	8	70		Valle	Combined with 115
91	06A	077	22	52	67	Pajarito	Eliminated
92	06A	078	22	34	67	Pajarito	7/31/96
93	06A	079	40	4	67	Pajarito	5/15/98
94	06A	080	40	5	67	Pajarito	5/15/98
95	06A	081	40	8	67	Pajarito	3/10/98
96	06A	082	40	12	67	Pajarito	1/14/98
97	04A	083	16	202	70	Water	9/19/97
98	04A	084	22	5			Eliminated 4/87
99	04A	085	22	6			Eliminated
100	04A	086	3	216			Eliminated 4/87
101	04A	087	35	46			Eliminated 4/87
102	04A	088	35	67			Eliminated 4/87
103	04A	089	35	34			Eliminated
104	04A	090	35	85			Eliminated 4/87
105	04A	091	16	450	70	Water	9/19/97
106	04A	092	16	370	70	Water	1/14/98
107	04A	093	15	203	67	Valle	Prior to 94
108	04A	094	3	170	62	Sandia	9/19/97

	NPDES Category	Outfall No.	TA	Bldg	FMU No.	Drainage Basin	EPA Delete Date
109		095	3	170			Eliminated 4/87
110	05A	096	11	51	70	Valle	5/15/98
111	05A	097	11	52	70	Water	Not re-permitted 8/07
112	03A	098	59	1	71	Two Mile	12/6/95
113	06A	099	40	23	67	Pajarito	9/19/97
114	06A	100	40	15	67	Pajarito	5/15/98
115	04A	101	40	9	67	Pajarito	9/19/97
116	04A	102	1	40			Eliminated 6/25/91
117	04A	103	15	40			Eliminated 6/25/91
118	06A	104	18	30, 31			Eliminated 4/87
119	04A	105	15	138			Eliminated
120	06A	106	36	1	74	Three Mile	1/11/99
121	02A	108	0				Eliminated
122	07A	109	Mar-73	73	80	Sandia	8/4/95
123	04A	110	Mar-73	73			Eliminated 2/89
124	04A	111	52-1	1			Eliminated 4/87
125	04A	112	52-11	11			Eliminated 4/87
126	03A	113	53	293, 972 (LEDA)	61	Sandia	Remaining
127	03A	114	53-2		61	Sandia	7/11/95
128	04A	115	Aug-70		70	Valle	9/19/97
129	04A	116	35-29				Eliminated 4/87
130	04A	117	46-41		66	Canada del Buey	7/11/95
131	04A	118	Paj #4		80	Canada del Buey	10/13/99
132	04A	119	Paj #5				Eliminated 4/87
133		120	3		Geotherm.	discharge	Eliminated
134	04A	121	15-263				Eliminated 4/87
135	04A	122	15-45				Eliminated 4/87
136	06A	123	15-R183		67	Valle	1/14/98
137	03A	124	46-169		66	Canada del Buey	12/6/95
138	03A	125	53-28		61	Sandia	7/20/98
139	04A	126	48-8		66	Mortandad	12/6/95
140	04A	127	35-213		73	Mortandad	9/19/97
141		128	22-91		67	Two Mile	12/5/95

142	02A	129	21	357	80	Los Alamos	Remaining
143	03A	130	11	30	70	Water	Remaining
144	04A	131	48-1		66	Mortandad	1/14/98
145	06A	132	35-87		75	Mortandad	3/10/98
146	04A	133	53-19		61	Sandia	Eliminated
147	04A	134	16-478				Eliminated 5/16/90
148	04A	135	53-18		61	Sandia	8/16/95
149	03A	136	46-200		66	Canada del Buey	12/6/95
150	04A	137	48-46		66	Mortandad	12/6/95
151	03A	138	3-127				Eliminated 12/90
152	04A	139	15-184		67	Water	9/19/97
153	04A	140	3-141		73	Mortandad	8/16/95
154	04A	141	39-69		67	Ancho	9/19/97
155	04A	142	21-5, 149		66	Los Alamos	7/11/95
156	04A	143	15-306		67	Three Mile	5/15/98
157	03A	145	53-6		61	Sandia	1/14/98
158	03A	146	53-14		61	Sandia	9/19/97
159	04A	147	33-86		70	Chaquehui	7/11/95
160	03A	148	3-1498, 1807		63	Sandia	9/19/97
161	05A	149	16-267		70	Valle	Prior to 94
162	03A	150	41-30			Los Alamos	Eliminated
163	04A	151	22-Mar		80	Sandia	8/16/95
164	04A	152	48-28		66	Mortandad	9/19/97
165	04A	153	48-1		66	Mortandad	7/20/98
166	05A	154	40-41		67	Two Mile	12/5/95
167	04A	155	Sep-50		67	Water	12/6/95
168	04A	156	39-89		67	Ancho	9/19/97
169	04A	157	16-460		70	Water	9/19/97
170	03A	158	21	209	70	Los Alamos	Not re-permitted 8/07
171	05A	159	16-360		70	Water	8/16/95
172	03A	160	35	124	73	Mortandad	Remaining
173	04A	161	Otowi #1		80	Pueblo	10/13/99
174	04A	163	Paj #1		80	Sandia	10/13/99
175	04A	164	Paj #2		80	Pajarito	10/13/99
176	04A	165	Paj #3		80	Sandia	10/13/99
177	04A	166	Paj #5		80	Canada del Buey	10/13/99
178	04A	167	LA Well #1B		80	Los Alamos	Prior to 94
179	04A	168	LA Well #2		80	Los Alamos	Prior to 94
180	04A	169	LA Well #3		80	Los Alamos	Prior to 94
181	04A	170	LA Well #5		80	Los Alamos	Prior to 94
182	04A	171	Guaje #1		80	Guaje	8/23/99
183	04A	172	Guaje #1A		80	Guaje	10/13/99
184	04A	173	Guaje #2		80	Guaje	9/21/99
185	04A	174	Guaje #4		80	Guaje	7/20/98
186	04A	175	Guaje #5		80	Guaje	8/23/99
187	04A	176	Guaje #6		80	Rendija	8/23/99

	NPDES Category	Outfall No.	TA	Bldg	FMU No.	Drainage Basin	EPA Delete Date
188	04A	177	Guaje Booster 1		80	Guaje	10/13/99
189	04A	178	LA Booster 1		80	Los Alamos	Prior to 94
190	04A	179	Paj.		Potable	Water blwdwn	
191	03A	180	43-44		72	Los Alamos	7/11/95
192	03A	181	55	6	76	Mortandad	Remaining
193	04A	182	21-1003		80	Los Alamos	5/15/98
194	06A	183	3-510		63	Sandia	8/16/95
195	03A	184	53-17		N/A	Sandia	8/16/95
196	03A	185	15	312 DARHT	67	Water	Remaining
197	04A	186	Otowi #4		80	Los Alamos	10/13/99
198	03A	199	3	1837	63	Sandia	Remaining