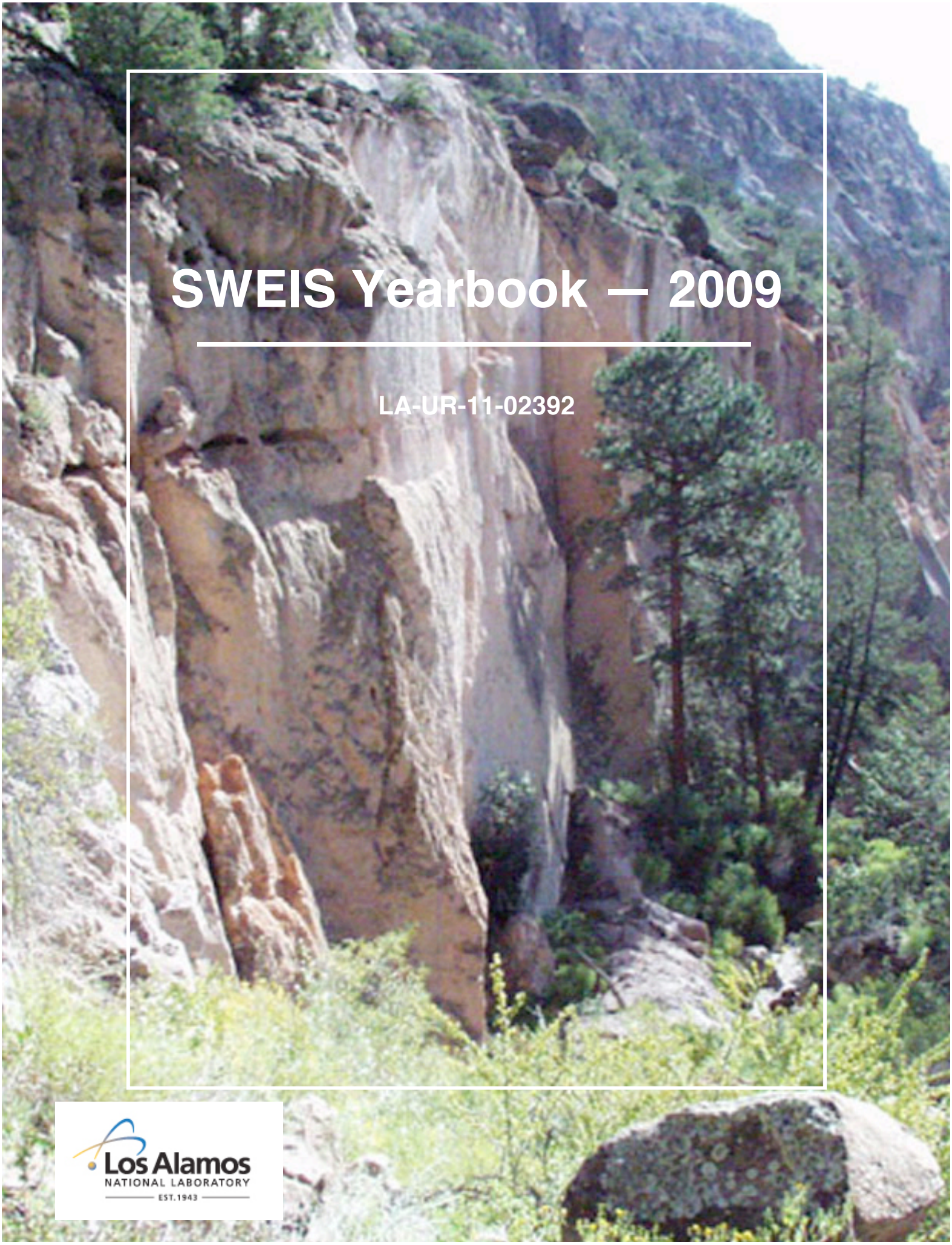


SWEIS Yearbook — 2009

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Cover photo: One of the many steep-sided canyons of the Pajarito Plateau. (Environmental Stewardship Group)

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Title

SWEIS Yearbook—2009

Comparison of 2009 Data to Projections of the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory

Author(s)

Environmental Stewardship Group
Environmental Protection Division



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Contents

Preface P-1
Executive Summary ES-1
Acknowledgments Ack-1
Acronyms Acros-1
1.0 Introduction 1-1
1.1 The Site-Wide Environmental Impact Statement 1-1
1.2 Annual Yearbook 1-2
1.3 CY 2009 Yearbook 1-4
2.0 Facilities and Operations 2-1
2.1 CMR (TA-03) 2-7
2.1.1 Construction and Modifications at the CMR Building 2-7
2.1.2 Operations at the CMR Building 2-8
2.1.3 Operations Data for the CMR Building 2-8
2.2 Sigma Complex (TA-03) 2-9
2.2.1 Construction and Modifications at the Sigma Complex 2-9
2.2.2 Operations at the Sigma Complex 2-9
2.2.3 Operations Data for the Sigma Complex 2-9
2.3 Machine Shops (TA-03) 2-9
2.3.1 Construction and Modifications at the Machine Shops 2-10
2.3.2 Operations at the Machine Shops 2-10
2.3.3 Operations Data for the Machine Shops 2-10
2.4 Materials Science Laboratory (TA-03) 2-10
2.4.1 Construction and Modifications at the Materials Science Laboratory 2-11
2.4.2 Operations at the Materials Science Laboratory 2-11
2.4.3 Operations Data for the Materials Science Laboratory 2-11
2.5 Nicholas C. Metropolis Center for Modeling and Simulation (TA-03) 2-11
2.5.1 Construction and Modifications at the Metropolis Center 2-12
2.5.2 Operations at the Metropolis Center 2-12
2.5.3 Operations Data for the Metropolis Center 2-12
2.6 High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-37) 2-13
2.6.1 Construction and Modifications at High Explosives Processing 2-14
2.6.2 Operations at High Explosives Processing 2-15
2.6.3 Operations Data for High Explosives Processing 2-16
2.7 High Explosives Testing (TA-14, TA-15, TA-36, TA-39, TA-40) 2-16
2.7.1 Construction and Modifications at High Explosives Testing 2-16
2.7.2 Operations at High Explosives Testing 2-16
2.7.3 Operations Data for High Explosives Testing 2-17
2.7.4 Cerro Grande Fire Effects at High Explosives Testing 2-17
2.8 Tritium Facilities (TA-16) 2-17
2.8.1 Construction and Modifications at the Tritium Facilities 2-18
2.8.2 Operations at the Tritium Facilities 2-18
2.8.3 Operations Data for the Tritium Facilities 2-18

2.9 Target Fabrication Facility 2-18
2.9.1 Construction and Modifications at Target Fabrication Facility 2-18
2.9.2 Operations at the Target Fabrication Facility 2-19
2.9.3 Operations Data for the Target Fabrication Facility 2-19
2.10 Bioscience Key Facility (TA-43, TA-03, TA-16, TA-35, and TA-46) 2-19
2.10.1 Construction and Modifications at the Bioscience Facilities 2-19
2.10.2 Operations at Bioscience Facilities 2-20
2.10.3 Operations Data for Bioscience Facilities 2-20
2.11 Radiochemistry Facility (TA-48, TA-46, and TA-59) 2-21
2.11.1 Construction and Modifications at the Radiochemistry Facility 2-21
2.11.2 Operations at the Radiochemistry Facility 2-22
2.11.3 Operations Data for the Radiochemistry Facility 2-22
2.12 Radioactive Liquid Waste Treatment Facility (TA-50) 2-22
2.12.1 Construction and Modifications at the Radioactive Liquid Waste Treatment Facility 2-22
2.12.2 Operations at the Radioactive Liquid Waste Treatment Facility 2-23
2.12.3 Operations Data for the Radioactive Liquid Waste Treatment Facility 2-23
2.13 Los Alamos Neutron Science Center (TA-53) 2-23
2.13.1 Construction and Modifications at the Los Alamos Neutron Science Center 2-24
2.13.2 Operations at the Los Alamos Neutron Science Center 2-25
2.13.3 Operations Data for the Los Alamos Neutron Science Center 2-25
2.14 Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54) 2-25
2.14.1 Construction and Modifications at the Solid Radioactive and Chemical Waste Facility 2-27
2.14.2 Operations at the Solid Radioactive and Chemical Waste Facility 2-28
2.14.3 Operations Data for the Solid Radioactive and Chemical Waste Facility 2-28
2.15 Plutonium Complex (TA-55) 2-28
2.15.1 Construction and Modifications at the Plutonium Complex 2-29
2.15.2 Operations at the Plutonium Complex 2-30
2.15.3 Operations Data for the Plutonium Complex 2-30
2.16 Non-Key Facilities 2-30
2.16.1 Construction and Modifications at the Non-Key Facilities 2-32
2.16.2 Operations at the Non-Key Facilities 2-32
2.16.3 Operations Data for the Non-Key Facilities 2-32
2.17 Environmental Cleanup 2-32
2.17.1 History of Corrective Action Sites at LANL 2-33
2.17.2 Environmental Cleanup Operations 2-34
2.17.3 Site/Facility Categorization 2-44
3.0 Site-Wide 2009 Operations Data 3-1
3.1 Air Emissions 3-1
3.1.1 Radiological Air Emissions 3-1
3.1.2 Non-Radiological Air Emissions 3-2
3.1.2.1 Emissions of Criteria Pollutants 3-2

3.1.2.2 Chemical Usage and Emissions 3-3
3.2 Liquid Effluents 3-4
3.3 Solid Radioactive and Chemical Wastes 3-7
3.3.1 Pollution Prevention Program 3-8
3.3.1.1 FY 2009 EMS Institutional Objectives 3-9
3.3.2 Sanitary Waste 3-10
3.3.3 Chemical Wastes 3-11
3.3.4 Low-Level Radioactive Wastes 3-12
3.3.5 Mixed Low-Level Radioactive Wastes 3-12
3.3.6 Transuranic Wastes 3-12
3.3.7 Mixed Transuranic Wastes 3-13
3.4 Utilities 3-13
3.4.1 Gas 3-13
3.4.2 Electrical 3-14
3.4.3 Water 3-17
3.5 Worker Safety 3-19
3.5.1 Accidents and Injuries 3-19
3.5.2 Ionizing Radiation and Worker Exposures 3-20
3.6 Socioeconomics 3-23
3.7 Land Resources 3-24
3.8 Groundwater 3-25
3.9 Cultural Resources 3-28
3.9.1 Compliance Overview 3-30
3.9.2 Compliance Activities 3-31
3.9.3 Cultural Resources Management Plan 3-32
3.10 Ecological Resources 3-32
3.10.1 Conditions of the Forests and Woodlands 3-33
3.10.2 Threatened and Endangered Species Habitat Management Plan 3-34
3.10.3 Biological Assessments and Compliance Packages 3-34
3.11 Footprint Elimination/Decontamination, Decommissioning, and Demolition 3-35
3.11.1 Footprint Elimination 3-35
3.11.2 Decontamination, Decommissioning, and Demolition 3-35
4.0 Summary and Conclusion 4-1
References Ref-1
Appendix A: Capability and Operations Tables for Key and Non-Key Facilities A-1
Appendix B: Chemical Usage and Estimated Emissions Data B-1
Appendix C: Nuclear Facilities List C-1
Appendix D: Less-than-Hazard-Category-3 Nuclear Facilities List D-1
Appendix E: DOE 2009 Pollution Prevention Awards for LANL E-1

Tables

2.0-1 Key and Non-Key Facilities 2-3
2.1-1 CMR Buildings with Nuclear Hazard Classification 2-7

2.2-1 Sigma Buildings Identified as Less-than HazCat-3 Nuclear Facilities 2-9
2.3-1 Machine Shops Buildings Identified as Less-than-HazCat-3 Nuclear Facilities..... 2-10
2.4-1 MSL Identified as Less-than HazCat-3 Nuclear Facilities..... 2-11
2.6-1 High Explosives Processing Buildings Identified as Less-than-HazCat-3 Nuclear Facilities 2-13
2.7-1 High Explosives Testing Buildings/Sites Identified as Less-than-HazCat-3 Nuclear Facilities 2-16
2.8-1 Tritium Buildings with Nuclear Hazard Classification..... 2-18
2.9-1 TFF Buildings Identified as Less-than-HazCat-3 Nuclear Facilities..... 2-18
2.10-1 Bioscience Buildings Identified as Less-than-HazCat-3 Nuclear Facilities..... 2-19
2.11-1 Radiochemistry Buildings Identified as Less-than-HazCat-3 Nuclear Facilities..... 2-21
2.12-1 Radioactive Liquid Waste Treatment Facility Buildings with Nuclear Hazard Classification 2-22
2.13-1 LANSCE Buildings Identified as Less-than-HazCat-3 Nuclear Facilities..... 2-24
2.14-1 Solid Waste Buildings with Nuclear Hazard Classification 2-26
2.15-1 Plutonium Complex Buildings with Nuclear Hazard Classification..... 2-29
2.15-2 Plutonium Facility Identified as Less-than-HazCat-3 Nuclear Facility 2-29
2.16-1 Non-Key Facilities with Nuclear Hazard Classification 2-31
2.16-2 Non-Key Facilities with Radiological Hazard Classification 2-31
2.17.3-1 Environmental Sites with Nuclear Hazard Classification 2-45
3.1.2.1-1 Emissions of Criteria Pollutants as Reported on LANL's Annual Emissions Inventory..... 3-2
3.1.2.1-2 2009 Emissions for Criteria Pollutants as Reported on LANL's Title V Operating Permit Emissions Reports..... 3-3
3.1.2.2-1 Emissions of VOCs and HAPs from Chemical Use in Research and Development Activities 3-4
3.2-1 NPDES Discharges by Watershed (Millions of Gallons)..... 3-5
3.2-2 NPDES Discharges by Facility (Millions of Gallons)..... 3-5
3.3-1 LANL Waste Types and Generation..... 3-8
3.3.2-1 LANL Sanitary Waste Generation in FY 2009 (metric tons) 3-10
3.3.3-1 Chemical Waste Generators and Quantities 3-11
3.3.4-1 LLW Generators and Quantities..... 3-12
3.3.5-1 MLLW Generators and Quantities..... 3-12
3.3.6-1 Transuranic Waste Generators and Quantities 3-13
3.3.7-1 Mixed Transuranic Waste Generators and Quantities..... 3-13
3.4.1-1 Gas Consumption (decatherms) at LANL/CY 2009..... 3-14
3.4.2-1 Electricity Peak Coincident Demand/CY 2009..... 3-16
3.4.2-2 Electricity Consumption/CY 2009..... 3-16
3.4.3-1 Water Consumption (thousands of gallons) for CY 2009 3-18
3.5.1-1 Total Recordable and Lost Workday Case Rates at LANL..... 3-20
3.5.2-1 Radiological Exposure to LANL Workers 3-21

3.5.2-2 Highest Individual Annual Doses (TED) to LANL Workers (rem)..... 3-21
3.6-1 LANL-Affiliated Work Force..... 3-23
3.6-2 County of Residence for LANS Employees..... 3-23
3.7.1 Potential Land Transfer/Conveyance Tracts 3-25
3.8-1 Wells and Boreholes Installed in 2009 3-26
3.9-1 Acreage Surveyed, Prehistoric Cultural Resource Sites Recorded, and Cultural Resource Sites Eligible for the NRHP at LANL FY 2009 3-29
3.9-2 Historic Period Cultural Resource Properties at LANL 3-29
3.9-3 Historic Building Documentation and Demolition Numbers 3-30
3.11.2-1 CY 2009 DD&D Facilities 3-36
3.11.2-2 CY 2009 DD&D Facilities Chemical, LLW, MLLW, and TRU..... 3-37

Figures

2-1 Location of LANL..... 2-4
2-2 Location of TAs 2-5
2-3 Location of Key Facilities..... 2-6
3-1 Wells and boreholes installed in 2009..... 3-27

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Preface

In the Record of Decision (ROD) for Stockpile Stewardship and Management, the US Department of Energy (DOE)[1] charged Los Alamos National Laboratory (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 ROD issued in September 1999 (DOE 1999b). In 2004, DOE/National Nuclear Security Administration (NNSA) initiated preparation of a Supplement Analysis for the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (NNSA 2004). In August 2005, a memo was issued to LANL from DOE/NNSA to prepare a new SWEIS (NNSA 2005). On September 19, 2008, DOE/NNSA issued the first ROD for the 2008 SWEIS (DOE 2008a). DOE/NNSA issued the second ROD for the 2008 SWEIS in June 2009 (DOE 2009a).

Five years after issuance of a SWEIS, 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 SWEIS. Yearbook publications to date include the following:

- "SWEIS 1998 Yearbook," LA-UR-99-6391, December 1999 (LANL 1999)
- "SWEIS Yearbook – 1999," LA-UR-00-5520, December 2000 (LANL 2000a)
- "A Special Edition of the SWEIS Yearbook, Wildfire 2000," LA-UR-00-3471, August 2000 (LANL 2000b)
- "SWEIS Yearbook – 2000," LA-UR-01-2965, July 2001 (LANL 2001a)
- "SWEIS Yearbook – 2001," LA-UR-02-3143, September 2002 (LANL 2002a)
- "SWEIS Yearbook – 2002," LA-UR-03-5862, September 2003 (LANL 2003)
- "SWEIS Yearbook – 2003," LA-UR-04-6024, September 2004 (LANL 2004a)
- "SWEIS Yearbook – 2004," LA-UR-05-6627, September 2005 (LANL 2005a)
- "SWEIS Yearbook – 2005," LA-UR-06-6020, September 2006 (LANL 2006a)
- "SWEIS Yearbook – 2006," LA-UR-07-6628, October 2007 (LANL 2007a)
- "SWEIS Yearbook – 2007," LA-UR-09-01653, February 2009 (LANL 2009a)
- "SWEIS Yearbook – 2008," LA-UR-10-03439, June 2010 (LANL 2010a)

The 2009 Yearbook will be the second year of data compiled since the first ROD for the LANL SWEIS was issued in September 2008 and the first year of data compiled since the second ROD was issued in June 2009. The Yearbook 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

[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.

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 produced.

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 Calendar Year 2009, and, provides data to assist DOE in its decision-making process.

Executive Summary

Los Alamos National Laboratory (LANL or the Laboratory) Calendar Year (CY) 2009 operations data mostly fell within Site-Wide Environmental Impact Statement (SWEIS) projections. Although operation levels for four LANL Facilities exceeded the SWEIS operation projections, they did not exceed projections of air emissions, outfall discharge, waste, or other impact parameters; therefore, there is no potential for significant impact to the environment from operations of the Laboratory. In addition, waste quantities that exceeded the SWEIS levels were one-time, non-routine events that do not reflect the day-to-day operations of the Laboratory. No other impact parameters were exceeded.

Background

In 1999, the US Department of Energy (DOE) published a SWEIS for the continued operation of LANL. DOE issued a Record of Decision (ROD) for this document in September 1999. In August 2005, a memo was issued to LANL from DOE/National Nuclear Security Administration (NNSA) to prepare a new SWEIS (NNSA 2005). The new SWEIS was issued in June 2008. On September 19, 2008, DOE/NNSA issued the first ROD for the 2008 SWEIS (DOE 2008a). DOE/NNSA issued the second ROD for the 2008 SWEIS in June 2009 (DOE 2009a).

In 1999, DOE and LANL implemented a program, the Annual Yearbook, making comparisons between SWEIS projections and actual operations data. The Yearbooks provide DOE/NNSA with a tool to assist in determining the continued adequacy of the SWEIS in characterizing existing operations. The Yearbooks focus on operations during one CY and specifically address the following:

- facility and/or process modifications or additions,
- types and levels of operations,
- environmental effects of operations, and
- site-wide effects of operations.

The 1999 and 2008 SWEISs analyzed the potential environmental impacts of future operations at LANL. In 1999, 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.

On September 19, 2008, DOE/NNSA issued the first ROD for the 2008 SWEIS. Concurrently, DOE/NNSA was analyzing actions described in the Complex Transformation Supplemental Programmatic Environmental Impact Statement (Complex Transformation SPEIS or SPEIS). DOE/NNSA decided not to make any decisions regarding nuclear weapons production prior to the completion of the SPEIS. As a result, DOE/NNSA chose to implement the No Action Alternative with the addition of some elements of the Expanded Operations Alternative in the September ROD. On June 29, 2009, DOE/NNSA issued the second ROD for the 2008 SWEIS; again DOE/NNSA chose to implement the No Action Alternative with some additional elements of the Expanded Operations Alternative.

The first Supplement Analysis to the 2008 SWEIS was issued in October 2009. This analysis was prepared to determine if the 2008 SWEIS adequately bounded off-site transportation of low-specific-activity low-level radioactive waste by a combination of truck and rail to EnergySolutions in Clive, Utah. DOE/NNSA concluded that the proposed shipment of waste to EnergySolutions by truck and rail is bounded by the 2008 SWEIS transportation analysis.

Current Results

The 2009 Yearbook represents the third full year of operations data reported since LANL transitioned from the University of California (UC) to Los Alamos National Security, LLC (LANS). LANS consists of the UC, Bechtel, BWX Technologies, and Washington Group International, and currently operates LANL for the DOE/NNSA. In addition to the change in management, a major reorganization occurred during CY 2006, resulting in the formation, renaming, and/or dissolution of various LANL groups, divisions, and directorates.

This Yearbook represents data collected for CY 2009. The selected levels of operation from the RODs and the SWEIS provided projections for these operations. This Yearbook compares data from CY 2009 to the 2008 SWEIS projections where appropriate.

The 2009 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, services, and environmental impacts) 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 2009, the types and levels of operations that occurred during 2009, and the 2009 environmental effects of operations. 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.

In 2008, Pajarito Site (TA-18) was placed into Surveillance and Maintenance mode. Operations have ceased and the facility was downgraded to a Less-than-Hazard-Category-3 Nuclear Facility. For the purpose of the 2008 and 2009 SWEIS Yearbooks, Pajarito Site and its nine capabilities have been removed as a Key Facility. In addition, the 2008 SWEIS recognized the Nicholas C. Metropolis Center (formerly known as the Strategic Computing Complex) as a new Key Facility because of the amounts of electricity and water it may consume.

Operation Levels

The 2008 SWEIS No Action Alternative and approved elements of the Expanded Operations Alternative projected a total of 15 facility construction and modification projects within the Key Facilities. During 2009, three construction/modification projects were undertaken. Electrical and mechanical systems were expanded to meet new computer requirements at the Nicholas C. Metropolis Center; construction of the Radiological Laboratory/Utility/Office Building continued at TA-55; and removal or demolition of vacated structures

within the High Explosive Processing Facilities. Within the Non-Key Facilities, one major construction project, the Pro Force Running Track, was started in 2009.

During CY 2009, 80 capabilities were active. There were eight inactive capabilities in CY 2009. At the Chemistry and Metallurgy Research Key Facility, Destructive and Nondestructive Analysis Project, Nonproliferation Training, Actinide Research and Development, Fabrication and Processing, and Large Vessel capabilities were not active. No Radioactive Liquid Waste Treatment took place at Tritium Facilities. Materials Test Station equipment was not installed at the Los Alamos Neutron Science Center (LANSCE). No Waste Retrieval at Solid Radioactive and Chemical Waste Facilities took place.

During 2009, four LANL facilities operated at levels approximating those projected in the SWEIS or beyond what was projected in the SWEIS—Bioscience, the Materials Science Laboratory (MSL), Radiochemistry, and the Non-Key Facilities. Bioscience and the MSL Key Facilities are more akin to the Non-Key Facilities and represent the dynamic nature of research and development at LANL; none of these facilities are major contributors to the parameters that lead to significant potential environmental impacts.

Radiochemistry Facilities exceeded operation level projections in the SWEIS; however, radioactive air emissions, outfall discharge, waste quantities, and electric consumption were well below projections in the SWEIS.

Environmental Effects of Operations

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/NNSA has stewardship responsibility as the administrator of LANL.

Radioactive emissions have decreased significantly since 2007, after an emission control system at LANSCE was repaired. Radioactive airborne emissions from point sources (i.e., stacks) during 2009 totaled approximately 790 curies, approximately 2 percent of the 10-year average of 34,000[1] curies projected in the SWEIS.

During 2009, emissions from criteria pollutants were well below both 2008 SWEIS projections and the New Mexico Administrative Code, Title 20, Chapter 2, Part 73.

Since 1999, the total number of permitted outfalls was reduced from 55 identified in the 1999 SWEIS to 15 that were renewed in the August 2007 National Pollutant Discharge Elimination System (NPDES) permit. As a result of these

[1] The projected radiological air emissions changed from the 10-year annual average of 21,700 curies in the 1999 SWEIS to 34,000 curies in the 2008 SWEIS. Annual radiological air emissions from 1999–2005 were used to project air emissions in the 2008 SWEIS. Emissions of activation products from LANSCE were much higher in those years due to a failure in one component of the emissions control system. The repair of the system in CY 2006 has significantly decreased emissions.

closures, there has been a significant 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[2]. In 2009, 12 outfalls flowed. Calculated NPDES discharges totaled 133.3 million gallons for CY 2009 compared to a projected volume of 279 million gallons per year. This is approximately 25.1 million gallons less than the CY 2008 total of 158.4 million gallons, due largely to the decrease in discharge amount from the Non-Key Facilities. The 2009 total volume of discharge is well below the maximum flow of 279 million gallons that was projected in the SWEIS.

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. In 2009, 10 alluvial monitoring wells, one perched-intermediate monitoring well, and eight regional monitoring wells were installed.

Wastes have been generated at levels below quantities projected in the SWEIS. The 2008 SWEIS combines transuranic (TRU) and mixed TRU into one waste category since they are both managed for disposal at the Waste Isolation Pilot Plant. In 2009, waste quantities from LANL operations were below SWEIS projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities. Waste quantities at Key Facilities that exceeded the SWEIS levels were one-time, non-routine events.

In CY 2009, DOE/NNSA demolished 12 buildings and 11 trailers/transportables. In addition, three trailers were transferred to various federal and state agencies, eliminating approximately 53,835 square feet of the Laboratory's footprint.

In the 2008 SWEIS, actual utility impacts and performance changes were analyzed. Annual electricity and water usage from 1999–2005 remained well below the levels projected in the 1999 SWEIS. In the 2008 No Action Alternative, the total electric consumption and the total water consumption were reduced to a number closer to the average electric and water consumption for the six years analyzed. The electric consumption for CY 2009 was 431 gigawatt-hours. Water consumption for CY 2009 was 384 million gallons. Both electric and water consumption were higher than in CY 2008. Gas consumption for CY 2009 was 1.08 million decatherms, slightly less than CY 2008. The Laboratory is committed to increasing energy efficiency and will continue to make improvements towards that goal in the future.

Radiological exposures to LANL workers are well within the levels projected in the SWEIS. The total effective dose equivalent for the LANL workforce was 116.8 person-rem during 2009, and is slightly higher than the 2008 dose of 104.7

[2] 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. Since 2001, data are collected and reported using actual flows recorded by flow meters at all of the outfalls.

person-rem but lower than the workforce dose of 280 person-rem projected in the 2008 SWEIS.

In the 2008 SWEIS No Action Alternative, the 2005 levels of employment were assumed to remain steady at 13,304. During 2006 and 2007, the size of the workforce slowly began to decrease. The 11,445 employees at the end of CY 2009 represent an increase of 540 employees as compared to the 10,941 employees reported in the 2008 Yearbook.

Measured parameters for ecological resources and groundwater were similar to SWEIS projections, and measured parameters for cultural resources and land resources were below SWEIS projections. For land use, the SWEIS projected the disturbance of 41 acres of new land at TA-54 because of the need for additional disposal cells for low-level radioactive waste. (The 1999 SWEIS projected that 15 prehistoric sites would be affected by the expansion of Area G into Zones 4 and 6 at TA-54.) As of 2009, this expansion had not become necessary. Since 2001, 2,500 acres of land were either transferred to the Department of Interior to be held in trust for the Pueblo of San Ildefonso or conveyed to Los Alamos County or the Los Alamos Public Schools; however, no tracts of land were transferred or conveyed in CY 2009.

Ecological 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.

Cultural resources remained protected in CY 2009, and no excavation occurred of sites at TA-54 or anywhere else on LANL. Ecological and cultural resources remain stable in 2009.

In conclusion, LANL operations in CY 2009 have mostly fallen within SWEIS projections. Although operation levels for four LANL Facilities exceeded the SWEIS operation projections, they did not exceed projections of air emissions, outfall discharge, waste or other impact parameters; therefore, there was no potential for significant impact to the environment from operations of the Laboratory. In addition, waste quantities that exceeded the SWEIS levels were one-time, non-routine events that do not reflect the day-to-day operations of the Laboratory. No other parameters were exceeded. Overall, the operations data from 2009 indicate that LANL has been operating within the 2008 SWEIS projections and regulatory limits.

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Cultural Resources	Kari Garcia
Cultural Resources	Bruce Masse
Decontamination, Decommissioning, and Demolition	Darrik Stafford
Decontamination, Decommissioning, and Demolition	Duane Parsons
Decontamination, Decommissioning, and Demolition	David Schrock
Decontamination, Decommissioning, and Demolition	Charlie Villareal
Ecological Resources	Leslie Hansen
Environmental Cleanup	Linda Nonno
Environmental Cleanup	Rich Mirenda
Footprint Elimination	Randy Parks
Groundwater	David Rogers
High Explosives Processing	Connie Gerth
High Explosives Testing	John Tymkowych
Land Resources	Kirt Anderson
Liquid Effluents	Marc Bailey
Liquid Effluents	Terrill Lemke
Liquid Effluents	Sam Loftin
Liquid Effluents	Shannon Smith
Liquid Effluents	Tim Zimmerly
Los Alamos Neutron Science Center	Patricia Vardaro-Charles
Machine Shops	Marc Gallegos
Materials Science Laboratory	Marc Gallegos
Nicholas C. Metropolis Center	Nicholas Nagy
National Pollutant Discharge Elimination System Data	Marc Bailey
Non-Key Facilities–Protective Force Running Track	Mark Gonzales
Plutonium Complex	Randy Johnson

Area of Contribution	Contributor
Pollution Prevention Program	Ben Poff
Pollution Prevention Program	Sonja Salzman
Pollution Prevention Program	Kim Birdsall
Radioactive Liquid Waste Treatment Facility	Chris Del Signore
Radiochemistry Facility	Marc Gallegos
Sanitary Waste/Recycling	Monica Witt
Sigma	Marc Gallegos
Socioeconomics	John Pantano
Solid Radioactive and Chemical Waste Facilities	Leonard Sandoval
Solid Radioactive and Chemical Wastes	Tim Sloan
Target Fabrication Facility	Marc Gallegos
Utilities	Monica Witt
Utilities	Maura Miller
Worker Safety/Doses	Tom Courtney
Worker Safety/Doses	Paul Hoover

Acronyms

ALARA	as low as reasonably achievable
AOC	area of concern
ARTIC	Actinide Research and Technology Instruction Complex
BIO	Basis for Interim Operation
BMP	best management practice
BSL	Biosafety Level
BTF	Beryllium Technology Facility
CGP	Construction General Permit
CGTG	Combustion Gas Turbine Generator
CME	Corrective Measures Evaluation
CMI	Corrective Measures Implementation (Plan)
CMR	Chemical and Metallurgy Research (Building)
CMRR	CMR Replacement
CMRR EIS	CMRR Environmental Impact Statement
COPC	chemical of potential concern
COPEC	contaminant of potential ecological concern
CRMP	Cultural Resources Management Plan
CY	calendar year
D&D	decontamination and decommissioning
DD&D	decontamination, decommissioning, and demolition
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
DE	Dynamic and Energetic Materials (Division)
DE-1	Dynamic Experimentation
DOE	US Department of Energy
DPT	direct-push technology
DVRS	Decontamination and Volume Reduction System
EISU	Electrical Infrastructure Safety Upgrades
EMS	Environmental Management System
EP	Environmental Programs (Directorate)
EPA	US Environmental Protection Agency
ER	Environmental Restoration (Project)
ET	evapotranspiration
FONSI	Finding of No Significant Impact
FY	fiscal year
HAP	hazardous air pollutant
HazCat	Hazard Category
HEPA	high-efficiency particulate air (filter)
HEWTF	High Explosive Waste Treatment Facility
HPI	Human Performance Improvement
HRL	Health Research Laboratory
HSWA	Hazardous and Solid Waste Amendment
HX	Hydrodynamic Experiments (Division)
IP	Individual Permit
ITSRs	Interim Technical Safety Requirements
IWM	Integrated Work Management
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
linac	linear accelerator
LLW	low-level radioactive waste
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
MSL	Materials Science Laboratory
MTS	Materials Test Station

NEPA	National Environmental Policy Act
NF	Nuclear Facility
NFA	no further action
NMED	New Mexico Environment Department
NMSSUP	Nuclear Materials Safeguards and Security Upgrades Project
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OSR	Offsite Source Recovery (Project)
P	Physics (Division)
PAHs	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PNM	Public Service Company of New Mexico
P2	Pollution Prevention
PRB	permeable reactive barrier
PRS	potential release site
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
SAD	Safety Assessment Document
SERF	Sanitary Effluent Recycling Facility
SHPO	State Historic Preservation Officer
SNM	special nuclear material
SOC	Securing Our Country (LANL Protective Force)
SPEIS	Supplemental Programmatic Environmental Impact Statement
SST	Safe, Secure Trailer
SVE	soil vapor extraction
SWEIS	Site-Wide Environmental Impact Statement
SWSC	Sanitary Wastewater System Consolidation
SWMU	solid waste management unit
SWPPP	stormwater pollution prevention plan
SWWS	Sanitary Wastewater System
TA	Technical Area
TAL	Target Action Level
TED	total effective dose
TFF	Target Fabrication Facility
TRP	TA-55 Reinvestment Project
TRU	transuranic
TSFF	Tritium Science and Fabrication Facility
TSTA	Tritium Systems Test Assembly (facility)
UC	University of California
VOC	volatile organic compound
VPP	Voluntary Protection Program
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)
WT	Weapons Engineering Technology (Division)

1.0 Introduction

1.1 The Site-Wide Environmental Impact Statement

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

As per DOE regulations, in 2004 DOE/National Nuclear Security Administration (NNSA) initiated preparation of a Supplement Analysis for the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory (NNSA 2004). The purpose of the supplement analysis was to determine if the existing SWEIS remains adequate. In August 2005, DOE/NNSA issued a memo directing LANL to prepare a new SWEIS (NNSA 2005). The new SWEIS was determined to be the appropriate level of analysis for compliance with the National Environmental Policy Act (NEPA) with regard to the required five-year adequacy review of the 1999 LANL SWEIS. Environmental impacts of specific projects for LANL facility replacements and refurbishments, as well as projects having to do with operational changes, were analyzed.

On September 19, 2008, DOE/NNSA issued the first ROD for the 2008 SWEIS (DOE 2008a). Concurrently, DOE/NNSA was analyzing actions described in the Complex Transformation Supplemental Programmatic Environmental Impact Statement (DOE 2008b) (Complex Transformation SPEIS or SPEIS). DOE/NNSA decided not to make any decisions regarding nuclear weapons production prior to the completion of the SPEIS. As a result, DOE/NNSA chose the No Action Alternative with the addition of some elements of the Expanded Operations Alternative in this initial ROD.

The second ROD for the 2008 SWEIS was issued in June 2009 (DOE 2009a). The ROD was based on the information and analyses contained in the SWEIS and other factors, including comments received on the SWEIS, costs, technical and security considerations, and the missions of NNSA. The following elements of the Expanded Operations Alternative were approved:

[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.

- Complete the environmental remediation and closure of Technical Area (TA) 18 Pajarito Site;
- Complete the environmental remediation and closure of TA-21 (also referred to as the Delta Prime or DP Site);
- Refurbish the Plutonium Facility Complex at TA-55;
- Construct and operate a new Radioactive Liquid Waste Treatment Facility (RLWTF) Complex in TA-50 and operate a zero liquid discharge facility in TA-52 as an auxiliary action;
- Install additional processors and equipment to further expand the capabilities and operation level of the Nicholas C. Metropolis Center for Modeling and Simulation in TA-03; and
- Construct and operate a new Science and Engineering Complex at TA-62.

The first Supplement Analysis to the 2008 SWEIS was issued in October 2009 (DOE 2009b). This analysis was prepared to determine if the 2008 SWEIS adequately bounded off-site transportation of low-specific-activity low-level radioactive waste (LLW) by a combination of truck and rail to EnergySolutions in Clive, Utah. DOE/NNSA concluded that the proposed shipment of waste to EnergySolutions by truck and rail is bounded by the 2008 SWEIS transportation analysis.

1.2 Annual Yearbook

To enhance the usefulness of the SWEIS, DOE/NNSA and LANL implemented a program making annual comparisons between SWEIS 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. 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). Types of operations are described using capabilities defined in the 2008 SWEIS. Levels of operations are expressed in units of production, numbers of researchers, numbers of experiments, hours of operation, and other descriptive units (Appendix A).
- Operations data for the Key and Non-Key Facilities, comparable to data projected in the SWEIS. Data for each facility include waste generated, air emissions, and liquid effluents (Appendix A).

- Site-wide effects of operations for the CY. 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.
- Summary and conclusion. This chapter—Chapter 4—summarizes CY 2009 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 2008 SWEIS.
- Chemical usage and emissions data (Appendix B). These data summarize the chemical usage and air emissions by Key Facility.
- Nuclear facilities list (Appendix C). This appendix provides a summary of the facilities identified as having a nuclear Hazard Category[2] (HazCat) at the time the SWEIS was developed through CY 2009.
- A less-than-HazCat-3 nuclear facilities list (Appendix D). These data identify the facilities considered as radiological in CY 2009 and indicate their categorization at the time the SWEIS was developed.
- Pollution Prevention (P2) Awards (Appendix E). This appendix provides a summary of the DOE 2009 P2 Awards for LANL.

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

The annual Yearbooks provide DOE/NNSA with information needed to evaluate adequacy of the SWEIS and enable them 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 Yearbooks serve as a summary of environmental information collected and reported by the various groups at LANL.

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

- Category 2 Nuclear Hazard – has the potential for significant 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, LLW handling operations, and research operations that possess less than Category 2 quantities of material. DOE-STD-1027-92 (DOE 1992b) provides the Category 3 thresholds for radionuclides. The identification of nuclear facilities is based upon the official list maintained by DOE Los Alamos Site Office (LASO) as of December 2002 (LANL 2002b).

1.3 CY 2009 Yearbook

This Yearbook represents data collected for CY 2009. This Yearbook compares data from CY 2009 to the 2008 SWEIS projections. 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 and the description of current operations and indications of future changes in operations are believed to be sufficiently important to warrant an incremental effort.

2.0 Facilities and Operations

The Laboratory has about 1,100 structures with approximately eight million square feet under roof, spread over an area of approximately 36 square miles of land owned by the US Government and administered by DOE/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 845 permanent buildings and 282 temporary structures (trailers and transportables). The Laboratory also leases about 40 buildings within the Los Alamos town site (formal Facility Information Management System snapshot by DOE at the end of fiscal year [FY] 10).

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 1999 and 2008 SWEIS public hearings), or
- would be subject to change because of DOE programmatic decisions.

In 2008, Pajarito Site (TA-18) was placed into Surveillance and Maintenance mode. All operations have ceased and the facility was downgraded to a HazCat 3 Nuclear Facility (LANL 2009b). For the purpose of the 2008 and 2009 SWEIS Yearbooks, Pajarito Site has been removed as a Key Facility. In addition, the 2008 SWEIS recognized the Nicholas C. Metropolis Center (formerly known as the Strategic Computing Complex) as a new Key Facility because of the amounts of electricity and water it may consume.

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).

The Key Facilities, as presented in the 1999 SWEIS, comprised 42 of the 48 HazCat 2 and HazCat 3 Nuclear Structures at LANL. Since the issuance of the 1999 SWEIS, DOE/NNSA and LANL have published 11 lists identifying nuclear facilities at LANL that significantly changed the classification of some buildings. Appendix C provides a summary of the current nuclear facilities; a table has been added to each section of this chapter to explain the differences and identify the 19 nuclear facilities currently listed by DOE/NNSA. Of these 19 facilities, all but nine reside within a Key Facility. Appendix D provides a comparison of the facilities identified as Less-than-HazCat-3 Nuclear Facility

when the 2008 SWEIS was prepared (formerly known as radiological facilities) (LANL 2009b).

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 1999 SWEIS. At the time the 1999 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 HazCat 3 quantities is addressed in a DOE-approved safety analysis (LANL 2002b, 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 six 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 environmental effects of operations that have occurred during 2009. Each of these three aspects is given perspective by comparing them to projections made by the SWEIS. This comparison provides an evaluation of whether or not data resulting from LANL operations continue to fall within the environmental envelope established by the 2008 SWEIS. It should be noted that modifications and construction activities that were completed before 2008 are summarized in the previous Yearbooks.

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 26,058 acres. The Non-Key Facilities include such important buildings and operations as the Nonproliferation and International Security Center (NISC), the National Security Sciences Building (the main administration building), and the TA-46 Sanitary Wastewater System (SWWS). 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.

[3] As used in the 1999 and 2008 SWEISs 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, such as plutonium pits or medical radioisotopes. Examples of services provided to other LANL facilities include utilities and infrastructure support, analysis of samples, environmental surveys, and waste management.

Table 2.0-1. Key and Non-Key Facilities

Facility	Technical Areas	~Size (acres)
Chemistry and Metallurgy Research (CMR) Building	TA-03	14
Sigma Complex	TA-03	10
Machine Shops	TA-03	7
Materials Science Laboratory (MSL)	TA-03	2
Nicholas C. Metropolis Center	TA-03	5
High Explosives Processing	TAs 08, 09, 11, 16, 22, 37	1,115
High Explosives Testing	TAs 15, 36, 39, 40	8,691
Tritium Facility	TA-16	18
TFF	TA-35	3
Bioscience Facilities	TAs 43, 03, 16, 35, 46	4
Radiochemistry Facility	TA-48	116
RLWTF	TA-50	62
LANSCE	TA-53	751
Solid Radioactive and Chemical Waste Facilities	TA-50 & TA-54	943
Plutonium Complex	TA-55	93
Subtotal, Key Facilities	19 TAs	11,834
Non-Key Facilities	30 of 49 TAs	14,224
LANL		26,058

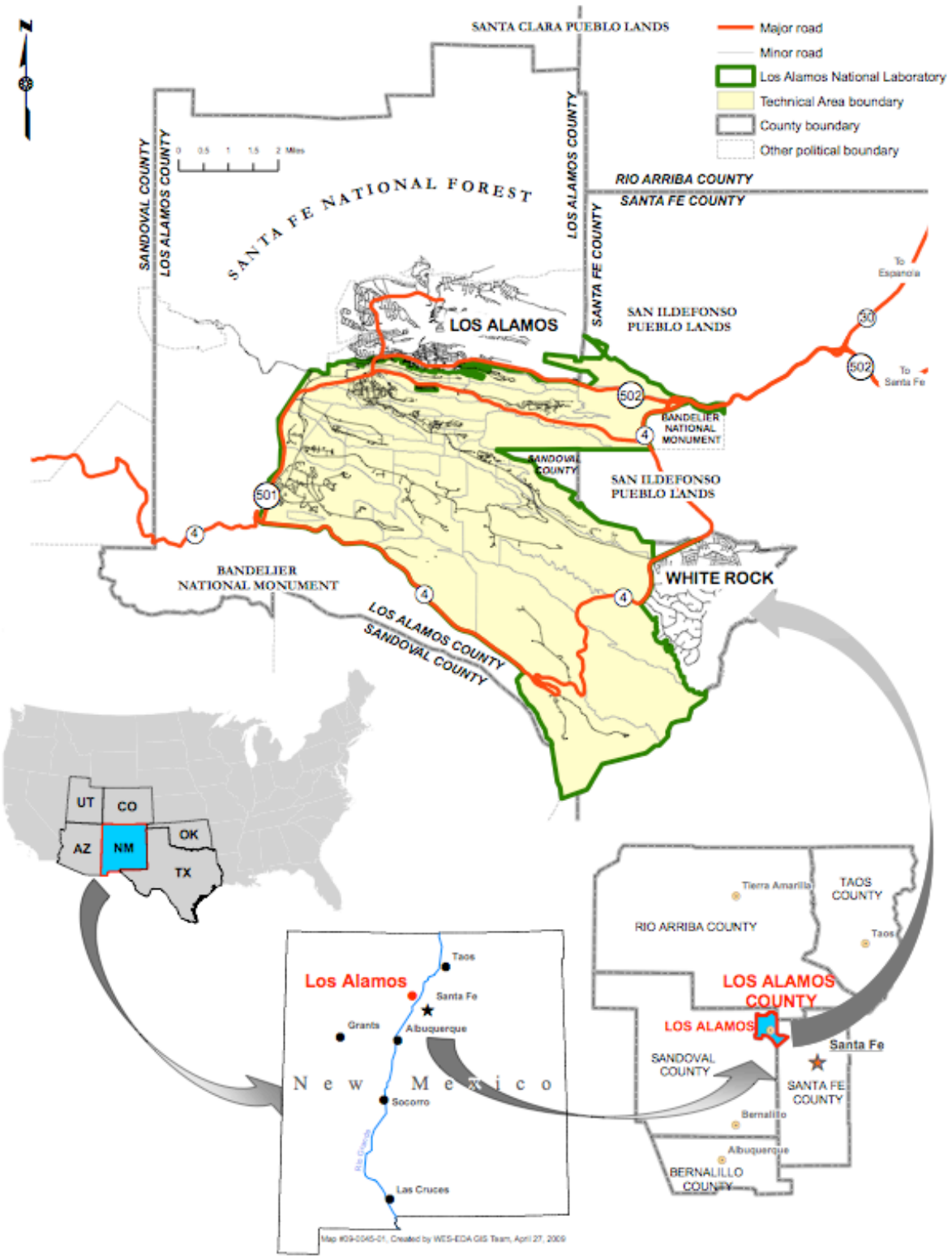


Figure 2-1. Location of LANL

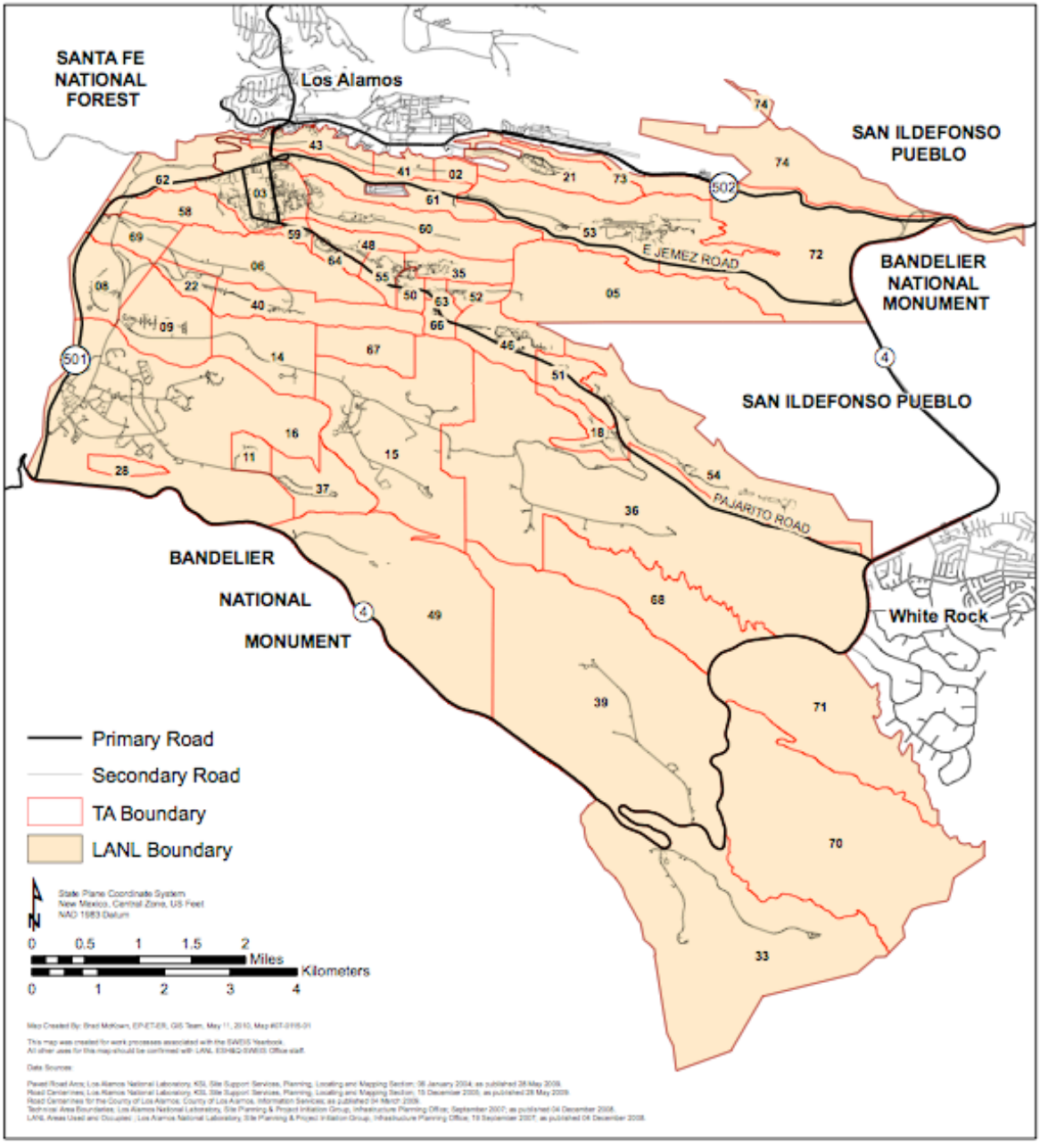


Figure 2-2. Location of TAs

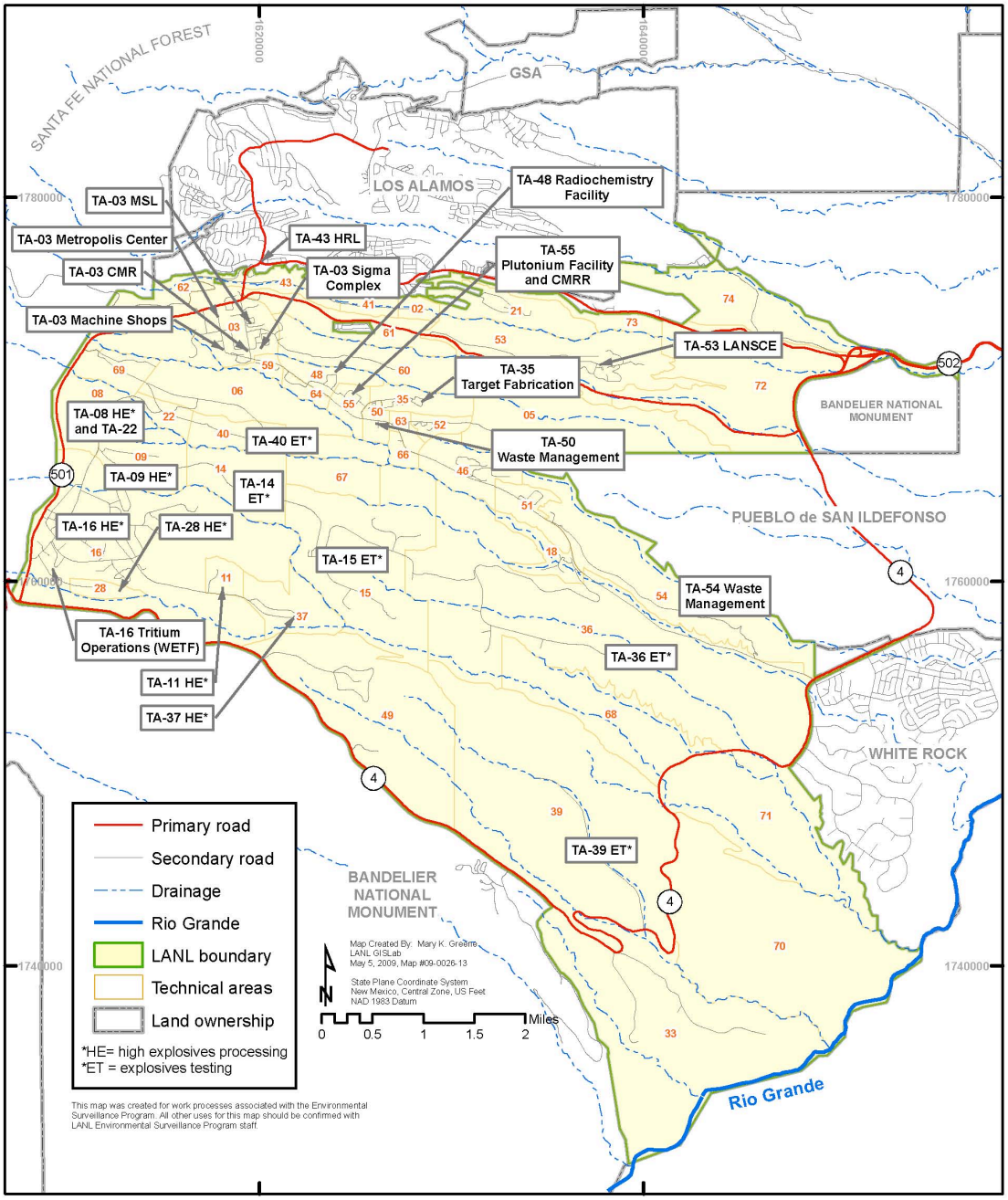


Figure 2-3. Location of Key Facilities

*HE is High Explosives Processing; ET is High Explosives Testing; WETF is Weapons Engineering Tritium Facility; CMRR is Chemistry and Metallurgy Research Building Replacement.

2.1 CMR (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 1999 SWEIS was issued, 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-03-0029) and a LLW Storage and Transfer Facility (TA-03-0154) 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 2.1-1, the CMR Facility has been designated a HazCat 2 Nuclear Facility since the publication of the 1999 SWEIS (DOE 1997, DOE 2009c, LANL 2007b). CMR is also designated a security category 3 nuclear facility.

Table 2.1-1. CMR Buildings with Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2009[a]
TA-03-0029	CMR	2	2

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 2009c).

Table 2.1-1 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 Less-than-HazCat-3 nuclear facilities that applied during the CY under review, in this case 2009. 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.

2.1.1 Construction and Modifications at the CMR Building

The 2008 SWEIS projected two changes to this Key Facility:

- replace the CMR building—construct and operate a CMR Building Replacement (CMRR) Facility in TA-55 and
- conduct DD&D of the CMR Building.

In November 2003, DOE/NNSA issued an *Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project* (CMRR EIS; DOE 2003a), 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 DOE/NNSA decided to replace the CMR Building with a new CMRR Nuclear Facility (NF) 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 HazCat 2 Nuclear Facility. In January 2005, a Supplement Analysis (DOE 2005) to the CMRR EIS was written to determine if the environmental impacts of proposed changes to the location of the CMRR NF components were adequately addressed in the CMRR EIS. NNSA/DOE determined that the proposed actions were adequately bounded by the

analyses of impacts projected by the 2003 CMRR EIS, and no Supplemental CMRR EIS was required. The CMRR NF would replace the CMR Building as the Key Facility.

- CMRR Geotechnical Investigation (LANL 2002c), the first phase in determining the feasibility of constructing the CMRR**.** Geotechnical surveys were performed in CY 2003.
- CMRR Project DOE Pre-conceptual Design (LANL 2001b), ongoing in CY 2009.
- In 2007 construction of the Radiological Laboratory/Utility/Office Building (RLUOB) began. Construction was ongoing in 2009.

During CY 2003, modifications to Wing 9 were started in support of the Containment 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 2003b). 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 and the project moved forward in 2009.

CMR Safety Basis. The CMR Facility Safety Basis documentation currently consists of the 1998 Basis of Interim Operations (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, was approved by DOE/NNSA in CY 2008.

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 the 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. In 2008, Wing 3 was vacated and the Risk Reduction Project started relocating hazards to Wings 5 and 7 and to other facilities at LANL. Work continued on the Risk Reduction Project in 2009.

2.1.2 Operations at the CMR Building

The 2008 SWEIS identified seven capabilities for this Key Facility. One of the seven capabilities was active in 2009 (Table A-1 in Appendix A).

2.1.3 Operations Data for the CMR Building

Operations data from research, services, and production activities at the CMR Building were well below those projected in the SWEIS. Table A-2 provides details.

2.2 Sigma Complex (TA-03)

The Sigma Complex Key Facility consists of four principal buildings: the Sigma Building (03-0066), the Beryllium Technology Facility (BTF; TA-03-0141), the Press Building (TA-03-0035), and the Forming Building (previously referred to as the Thorium Storage Building) (TA-03-0159), and several support and storage facilities. Primary activities are the fabrication of metallic and ceramic items, characterization of materials, and process research and development.

The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified 11 buildings within this Key Facility. Table 2.2-1 provides details.

Table 2.2-1. Sigma Buildings Identified as Less-than-HazCat-3 Nuclear Facilities

Building	Description	LANL 2009[a]
TA-03-0002	X-Ray Machine Lab	RAD
TA-03-0032	Superconducting Tech Center	RAD
TA-03-0035	Press Building	RAD
TA-03-0065	Source Storage Building	RAD
TA-03-0066	Sigma Building	RAD
TA-03-0141	BTF	RAD
TA-03-0159	Forming Building	RAD
TA-03-0169	Warehouse	RAD
TA-03-0317	BTF Graphite Storage	RAD
TA-03-0541	Sigma Storage Shed	RAD
TA-03-2132	Sigma Safety Storage Shed	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

2.2.1 Construction and Modifications at the Sigma Complex

The 2008 SWEIS projected no new construction or major modifications to this Key Facility.

2.2.2 Operations at the Sigma Complex

The 2008 SWEIS identified three capabilities for the Sigma Complex (Table A-3). Activity levels for all capabilities during CY 2009 were less than levels projected in the 2008 SWEIS.

2.2.3 Operations Data for the Sigma Complex

In CY 2009, levels of research and operations were less than those projected in the SWEIS; consequently, all of the operations data were also below projections. Table A-4 provides details.

2.3 Machine Shops (TA-03)

The Machine Shops Key Facility consists of two buildings, the Nonhazardous Materials Machine Shop (Building TA-03-0039) and the Radiological Hazardous Materials Machine Shop (Building TA-03-0102). 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-03-0102 was placed on the Radiological Facilities List (LANL 2001c).

The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified two buildings within this Key Facility. Table 2.3-1 provides details.

Table 2.3-1. Machine Shops Buildings Identified as Less-than-HazCat-3 Nuclear Facilities

Building	Description	LANL 2009[a]
TA-03-0039	Manufacturing Shops	RAD
TA-03-0102	Tuballoy Machine Shop	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

2.3.1 Construction and Modifications at the Machine Shops

The 2008 SWEIS projected no new construction or major modifications to the Machine Shops.

Historically, building 39, room 16 served as a principal beryllium machine shop for LANL from the early 1950s to 1999. Beryllium operations and materials have been relocated to the BTF (TA-03-0141). In 2009, all machinery and facility equipment was removed from room 16 and decontaminated to acceptable release levels for light laboratory use in the future (LANL 2008a).

In CY 2009, a new roof was installed on building 39.

2.3.2 Operations at the Machine Shops

The 2008 SWEIS identified three capabilities at the shops (Table A-5). In CY 2009, all activities occurred at levels well below those projected in the SWEIS. The workload at the Shops is directly linked to research and development and production requirements.

2.3.3 Operations Data for the Machine Shops

Operations data were well below projections by the SWEIS. Table A-6 provides details.

2.4 Materials Science Laboratory (TA-03)

The MSL Key Facility consists of a single laboratory building (TA-03-1698) containing 27 labs, 60 offices, 21 materials research areas, and support rooms. In CY 2004, construction was completed on the Material Science and Technology Office Building (TA-03-1415). In CY 2007, the newly constructed Center for Integrated Nanotechnologies (TA-03-1420) was in full operation. 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. All activities within this Key Facility are related to research and development of materials science. The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) includes the MSL (Table 2.4-1).

Table 2.4-1. MSL Identified as Less-than-HazCat-3 Nuclear Facilities

Building	Description	LANL 2009[a]
TA-03-1698	MSL	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

2.4.1 Construction and Modifications at the Materials Science Laboratory

The 2008 SWEIS projected no new construction or major modifications to this Key Facility.

2.4.2 Operations at the Materials Science Laboratory

The 2008 SWEIS identified four capabilities at the MSL: materials processing, mechanical behavior in extreme environments, advanced materials development, and materials characterization.

In CY 2009, activity levels for all capabilities were as projected in the SWEIS, however materials processing was expanded. Table A-7 compares CY 2009 operations to projections made by the SWEIS.

2.4.3 Operations Data for the Materials Science Laboratory

Operations data levels have been lower than projected in the SWEIS. Radioactive air emissions continue to be negligible and therefore were not measured. Table A-8 provides details.

2.5 Nicholas C. Metropolis Center for Modeling and Simulation (TA-03)

The Nicholas C. Metropolis Center (Metropolis Center) for Modeling and Simulation is a Key Facility in the 2008 SWEIS. The facility is housed in a three-story, 303,000-square-foot structure in TA-03, which began operating in 2002. The Metropolis Center (TA-03-2327), home of the Roadrunner Supercomputer (currently one of the world's fastest and most advanced computers), is an integral part of the tri-laboratory (LANL, Lawrence Livermore National Laboratory, and Sandia National Laboratories) mission to maintain, monitor, and ensure the Nation's nuclear weapons performance through the Advanced Simulation and Computing Program. Together with the Laboratory Data Communication Center, Central Computing Facility, and Advanced Computing Laboratory, the Metropolis Center forms the center for high-performance computing at LANL.

The impacts associated with operating the Metropolis Center (formerly called the Strategic Computing Complex) at an initial capacity of a 50-teraflop platform were analyzed in the *Environmental Assessment for the Proposed Strategic Computing Complex, Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE/EA-1250) (DOE 1998a) and its associated Finding of No Significant Impact (FONSI). The proposed increase in the operating platform beyond 50 teraflops to support approximately 1,000 teraflops (1 petaflop) were analyzed in the SWEIS. The exact level of operations supported cannot be directly correlated to a set amount of water or electrical power consumption. Each new generation of computing capability machinery continues to be designed with enhanced efficiency in terms of both electrical consumption and cooling requirements. Therefore, the computing level that can be

supported by about 15 megawatts of electrical usage and 51 million gallons per year of water has been used as an upper limit for computer acquisition at the Metropolis Center.

2.5.1 Construction and Modifications at the Metropolis Center

The 2008 SWEIS projected one facility modification at this Key Facility:

- Installation of additional processors to increase functional capability. This expansion would involve the addition of mechanical and electrical equipment, including chillers, cooling towers, and air conditioning units.

The first computer to be located in the Metropolis Center was called "Q." The facility was initially constructed to have adequate power and cooling for the first computer, and space was allocated for future expansion of the electrical and mechanical systems as new and more powerful computers arrived.

Since that time, there have been several "supercomputers" housed in the Metropolis Center, including Lightning, Bolt, Redtail, and Hurricane. In preparation for these machines, the electrical and mechanical systems in the facility were expanded to meet the new computers' requirements. The latest supercomputer to be located at the Metropolis Center is a machine called "Roadrunner," and it arrived in the 1st Quarter of FY 2009.

2.5.2 Operations at the Metropolis Center

As described in the 2008 SWEIS, the Metropolis Center computing platform would expand the capabilities and operations levels in support of the Roadrunner Supercomputer. Computer operations are performed 24 hours a day, with personnel occupying the control room to support computer operation activities around the clock. Operations consist of office-type activities, light laboratory work such as computer and support equipment assembly and disassembly, and computer operations and maintenance. The Metropolis Center has capabilities to enable remote-site user access to the computing platform, and its co-laboratories and theatres are equipped for distance operations to allow collaboration between weapons designers and engineers across the DOE weapons complex.

Computer simulations have become the only means of integrating the complex processes that occur in the nuclear weapon lifespan. Large-scale calculations are now the primary tools for estimating nuclear yield and evaluating the safety of aging weapons in the nuclear stockpile. Continued certification of aging stockpile safety and reliability depends upon the ability to perform highly complex, three-dimensional computer simulations. Table A-9 provides details.

2.5.3 Operations Data for the Metropolis Center

The environmental measure of activities at the Metropolis Center is the amount of electricity and water it may use. The 2008 SWEIS analyzed the operating levels to be supported by about 15 megawatts of electrical usage and 51 million gallons (193 million liters) per year of water. Table A-10 presents operations data for CY 2009.

2.6 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 include production and assembly facilities, analytical and synthesis laboratories, test facilities, 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, Science-Based Stockpile Stewardship Program tests and experiments, and global security/threat reduction missions. Environmental and safety tests are performed at TA-11 and TA-09 while TA-08 houses radiography activities.

As identified in the 1999 SWEIS, this Key Facility has one HazCat 2 nuclear building in TA-08 (TA-08-0023). In June 2005, this facility was removed from the Nuclear Facilities list. The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified 30 buildings within this Key Facility. Table 2.6-1 provides details.

Table 2.6-1. High Explosives Processing Buildings Identified as Less-than-HazCat-3 Nuclear Facilities

Building	Description	LANL 2009[a]
TA-08-0022	X-Ray Facility	RAD
TA-08-0023	Betatron Building	RAD
TA-08-0070	Nondestructive Testing and Evaluation	RAD
TA-08-0120	Radiography	RAD
TA-11-0002	Vibration Test	RAD
TA-11-0030	Vibration Test Bldg	RAD
TA-11-0036		RAD
TA-11-0065	Burn Pit	RAD
TA-16-0202	Laboratory	RAD
TA-16-0207	Component Testing	RAD
TA-16-0260	High Explosive Pressing, Machining, and Inspection	RAD
TA-16-0261	Component Storage	RAD
TA-16-0263	Component Storage	RAD
TA-16-0267	Component Storage	RAD
TA-16-0280	Inspection Building	RAD
TA-16-0281	Rest House	RAD
TA-16-0283	Component Storage	RAD
TA-16-0285	Component Storage	RAD
TA-16-0300	Component Storage	RAD
TA-16-0301	Component Storage	RAD
TA-16-0302	Component Storage/Training	RAD
TA-16-0307	Component Storage	RAD
TA-16-0332	Component Storage	RAD
TA-16-0410	Assembly Building	RAD
TA-16-0411	Assembly Building	RAD
TA-16-0413	Component Storage	RAD
TA-16-0414	Storage Building	RAD
TA-16-0415	Component Storage	RAD
TA-16-0955	Component Storage	RAD
TA-37-0010	Storage Magazine	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

Operations at this Key Facility are performed by personnel in multiple directorates, divisions, and groups. Weapons Technology (WT) Division is responsible for the majority of high explosives manufacturing and assembly work. Dynamic Experimentation (DE-1) in the Dynamic and Energetic Materials (DE) Division performs

chemical synthesis of new explosives and provides analytical and testing services. Detonator Design (W-6) in Weapons Systems Engineering (W) Division operates a detonator test laboratory and performs research and development on new initiation systems. Detonator Fabrication (WCM-3) in Weapons Component Manufacturing (WCM) Division produces stockpile detonators and initiation devices. An Applied Engineering and Technology group conducts nondestructive testing and evaluation. In October 2009, WT Division merged with W Division. W/WT Division brings the majority of explosives into LANL, stores them as raw material, presses the raw explosives into solid shapes, and machines these shapes to customers' specifications. The completed shapes are shipped to customers on- and off-site 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. Detonable waste explosives from pressing and machining operations and excess explosives are treated by open burning or open detonation. Non-detonable high explosive contaminated wastes are sent to off-site facilities for treatment/disposal.

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

2.6.1 Construction and Modifications at High Explosives Processing

The 2008 SWEIS projected the following modifications to this Key Facility:

- complete construction of TA-16 Engineering Complex
- removal or demolition of vacated structures that are no longer needed

All high explosives burning operations have been consolidated at TA-16-388 and TA-16-399. Burning operations are generally limited to TA-16-388, although TA-16-399 is still available for burning of bulk high explosives. The TA-16-388 burn unit was upgraded in the 1990s in anticipation of this consolidation to improve capacity and efficiency and minimize environmental impacts. TA-16-387 Flash Pad (Material Disposal Area [MDA] P) was approved for Resource Conservation and Recovery Act (RCRA) closure by the New Mexico Environment Department (NMED) in 2005. The TA-16-394 Solvent Burn Tray was closed under RCRA interim status in November 2002.

In CY 2008, High Explosives Engineering vacated the following structures: TA-16-363, -435, and -437 and 37-1, -2, -3, -6, -8, -9, -16, -17, -19, -20, and -27 in preparation for transfer to Surveillance and Maintenance. High Explosive Packaging and Transportation vacated the 280 line and consolidated their operations in TA-16-305 and TA-16-307. There is no longer plastics development at TA-16. Several small transportable office buildings were removed in CY 2009 in support of footprint reduction (see Section 3.11.2 for details), including TA-16-243, -245, -246, -367, -898, and -1407. Utility disconnects were completed for many other transportable office buildings in anticipation of their removal in CY 2009 (DOE 1996a, b). Removal of transportable office buildings TA-16-0242, -0244, and -0897 was completed in 2009.

The historic restoration of the TA-08 Gun Site was initiated in CY 2008 with Phase 1 completed in 2009 (DOE 1996c). DD&D of structures TA-08-0026, -3032, -0065, and -0127 was completed (DOE 1998b).

Heavy equipment maintenance operations were relocated from TA-15-0185 to TA-09-0028. TA-09-0028 formerly housed a machine shop (DOE 1996d). Refurbishment of laboratories and electrical infrastructure safety upgrades progressed at TA-09-0021 (DOE 1996e, f).

Removal of the historically significant TA-11 Drop Tower was initiated and completed in CY 2008 (DOE 2002b).

Construction of the new Detonator Storage Facility supporting TA-22 production activities was initiated in CY 2008 and completed in CY 2009 (DOE 2003c).

DD&D of TA-16-0193 Change House and TA-16-1489 was also completed in 2009.

2.6.2 Operations at High Explosives Processing

The 2008 SWEIS identified six capabilities for this Key Facility (Table A-11). Activity levels during CY 2009 continued below those projected in the SWEIS. High explosives and characterization operations remained below levels projected in the SWEIS. Plastics research and development is currently being performed in other facilities.

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 in the 2008 SWEIS were 82,700 pounds of explosives and 2,910 pounds of mock explosives. In CY 2009, less than 600 pounds of high explosives and less than 1,000 pounds of mock high explosives material were used in the fabrication of test components for Hydrodynamic Experimentation (HX), DE, W, Physics (P), and WT Divisions and external customers. DE-1 synthesized and/or formulated less than 100 pounds of explosives including HMX, PETN, DAAF, TATB, and XTX compositions. Materials testing by DE-1 at TA-09 expended less than 5 pounds of these explosives. Materials testing by W-6 at TA-22 expended <1 pound of PETN-based detonators.

During CY 2009, WT Division produced pieces of explosives weighing less than 600 pounds. In machining experimental components, less than 500 pounds of water-saturated explosive scrap were generated and treated by open burning. The machined components were sent to HX, W, P, WT, and DE Divisions, Lawrence Livermore National Laboratory, and external customers for experimentation and test detonations. High explosives processing and high explosives laboratory operations generated approximately 16,000 gallons of explosive-contaminated water, which were treated at the High Explosive Wastewater Treatment Facility (HEWTF) using an evaporator system that resulted in zero liquid discharge. Explosive waste treated by open burning at the TA-16 Burn Ground in CY 2009 included less than 500 pounds of detonable explosives-contaminated filters. No explosives-contaminated sand or solvents were treated. Approximately 900 gallons of propane were expended to treat these materials. Non-detonable explosive-contaminated equipment was steam cleaned in the 260 facility and salvaged or sent for recycling.

Efforts continued in CY 2009 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 and energetic materials.

2.6.3 Operations Data for High Explosives Processing

In CY 2009, operations levels were well below projections made by the SWEIS (Table A-12). Under the new NPDES permit outfall 05A-097 was eliminated. Two outfalls remain on the permit: outfall O3A-130, TA11-30 Cooling Tower, and outfall O5A-055, HEWTF. Modification of the TA-11-30 facility to eliminate discharges through the O3A-130 outfall are planned for CY 2010. There have been no discharges through the O5A-055 outfall at HEWTF for several years due to the evaporator system.

2.7 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 situated 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-15-0312) and the Vessel Preparation Building (building TA-15-0534). 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. The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified three buildings within this Key Facility. Table 2.7-1 provides details.

Table 2.7-1. High Explosives Testing Buildings/Sites Identified as Less-than-HazCat-3 Nuclear Facilities

Building	Description	LANL 2009[a]
TA-15-Firing Site	Firing Site (R307)	RAD
TA-15-R183	Vault	RAD
TA-39-0002	Laboratory/Office Building	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

2.7.1 Construction and Modifications at High Explosives Testing

The 2008 SWEIS projected the following modifications to this Key Facility:

- Complete construction of 15 to 25 new structures within the Two-Mile Mesa Complex to replace 59 structures currently used for dynamic experimentation
- Remove or demolish vacated structures that are no longer needed

These projected modifications were not fully realized, construction of new facilities within the Two-Mile Mesa Complex was not pursued in 2009.

2.7.2 Operations at High Explosives Testing

The 2008 SWEIS identified seven capabilities for this Key Facility. No new capabilities have been added (Table A-13).

Levels of research in 2009 were below those predicted by the 2008 SWEIS. The total amount of depleted uranium expended during testing (all capabilities) is an indicator of

overall activity levels at this Key Facility. Less than 10 kilograms of depleted uranium were expended in 2009, compared to approximately 6,900 lbs or 3,136 kilograms projected in the 2008 SWEIS. The quantity of expended depleted uranium includes the quantity of depleted uranium expended during material sanitization.

In 2009, one hydrotest was performed at DARHT. Intermediate-scale dynamic experiments containing beryllium, single-walled steel containment vessels continued at the Eenie Firing Point (TA-36-0003) along with other programmatic experiments. The use of a steel vessel mitigates essentially all of the fragments and particulate emissions associated with an experiment.

2.7.3 Operations Data for High Explosives Testing

The operational data levels were well below what was projected in the 2008 SWEIS. Table A-14 provides details.

2.7.4 Cerro Grande Fire Effects at High Explosives Testing

Continuing Effects. The LANL Environmental Programs (EP) Directorate's Project Management and Field Services Organization continues to monitor the stormwater 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 Explosives Testing Key Facility area of LANL by minimizing run-off and reducing stormwater flows onto High Explosives Testing Key Facility property. These inspection and monitoring efforts continued through CY 2009.

Other fire-related activities involve fuel wood mitigation efforts and continued tree and undergrowth thinning throughout the High Explosives Testing Key Facility.

2.8 Tritium Facilities (TA-16)

This Key Facility consists of tritium operations at TA-16. In 2008, tritium operations at TA-21, the Tritium Science and Fabrication Facility (TSFF, Building TA-21-0209) and the Tritium Systems Test Assembly (TSTA) were put in Surveillance and Maintenance mode. DD&D of these facilities and remediation of the TA-21 site began in CY 2009. Tritium operations in 2009 were conducted in the Weapons Engineering Tritium Facility (WETF, Building TA-16-0205).

Limited operations involving the removal of tritium from actinide materials are conducted at LANL's TA-55 Plutonium Complex; however, these operations are small in scale and this operation was not included as part of the Tritium Facilities in the SWEIS. The tritium emissions from TA-55, however, are included in the Plutonium Complex Key Facility.

WETF is listed as a HazCat 2 Nuclear Facility (Table 2.8-1). In CY 2009, the tritium inventory was greater than 30 grams.

Table 2.8-1. Tritium Buildings with Nuclear Hazard Classification

Building	Description	NHC SWEIS ROD	NHC DOE 2009[a]	NHC LANL 2009[b]
TA-16-0205[c]	WETF	2	2	2
TA-16-0205A[c]	WETF	2		2
TA-16-0450[c]	WETF	2		2

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 2009c)
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.

2.8.1 Construction and Modifications at the Tritium Facilities

The 2008 SWEIS projected one major facility modifications to this Key Facility:

- DD&D of TA-21 continued in 2009.

2.8.2 Operations at the Tritium Facilities

The 2008 SWEIS identified nine capabilities for this Key Facility.

Operations in CY 2009 were within projections by the SWEIS, with WETF performing fewer than the projected 65 gas processing operations. Table A-15 lists the nine capabilities identified in the SWEIS and presents CY 2009 operational data for each of these capabilities. In addition to the capabilities listed in the SWEIS, other activities included disposition of legacy containers and shipment and receipt of bulk tritium.

2.8.3 Operations Data for the Tritium Facilities

Data for operations at the Tritium Facility were well below levels projected in the SWEIS. Operational data are summarized in Table A-16. Outfalls 02A-129 and 03A-158 are not active.

2.9 Target Fabrication Facility (TA-35)

The TFF is a two-story building (TA-35-0213) housing activities related to weapons production and laser fusion research. This Key Facility is categorized as a Low Hazard non-nuclear facility. The TFF laboratories and shops are specialized to provide precision machining, polymer science, physical and chemical vapor deposition, and target assembly.

The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified one building within this Key Facility. Table 2.9-1 provides details.

Table 2.9-1. TFF Buildings Identified as Less-than-HazCat-3 Nuclear Facilities

Building	Description	LANL 2009[a]
TA-35-0213	TFF	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

2.9.1 Construction and Modifications at the Target Fabrication Facility

The 2008 SWEIS projected no major facility modifications to this Key Facility.

2.9.2 Operations at the Target Fabrication Facility

The 2008 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).

The number of targets and specialized components fabricated for testing purposes was consistently less than the 6,100 targets per year projected in the SWEIS. As seen in Table A-17, operations at the TFF were below levels projected in the SWEIS.

2.9.3 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. In CY 2009, operation levels were lower than those projected in the SWEIS. Table A-18 details operations data for CY 2009.

2.10 Bioscience Key Facility (TA-43, TA-03, TA-16, and TA-35)

The Bioscience Key Facility definition includes the main Health Research Laboratory (HRL) facility (Buildings TA-43-0001, -0037, -0045, and -0020) plus additional offices and labs located at TA-35-0085, and -0254, and TA-03-0562 and -1076. Operations at TA-43 and TA-35-0085 include chemical and laser activities that maintain hazardous materials inventory and generate hazardous chemical wastes and very small amounts of LLW. Activities at TA-03-0562 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., DNA sequencing, flow cytometry, nuclear magnetic resonance spectroscopy, 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). The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified four buildings within this Key Facility. Table 2.10-1 provides details.

Table 2.10-1 Bioscience Buildings Identified as Less-than-HazCat-3 Nuclear Facilities

Building	Description	LANL 2009[a]
TA-43-0001	HRL	RAD
TA-43-0028	Storage	RAD
TA-43-0047	Storage	RAD
TA-43-0049	Storage	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

2.10.1 Construction and Modifications at the Bioscience Facilities

The 2008 SWEIS projected one construction or major modification to this Key Facility.

- Construct and operate Los Alamos Science Complex in TA-62.

The Los Alamos Science Complex is proposed to be constructed at TA-62 on approximately 15 acres. It will consist of two buildings totaling 450 square feet and a 1,600-vehicle parking garage. The project is ongoing in 2009 (LANL 2008b).

During CY 2004, Bioscience finalized construction on the BSL-3 facility. The BSL-3 facility is a 3,202-square-foot, stand-alone, containment facility located remotely from the Los Alamos town site, east 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 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 FONSI (DOE 2002c). However, the FONSI 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 preparation.

2.10.2 Operations at Bioscience Facilities

The 2008 SWEIS identified 12 capabilities for this Key Facility (Table A-19). In CY 2009, some capabilities were expanded due to Work for Others/Non-Federal Entities proposals and new sponsor funding.

There is no radioactive work at HRL. This is attributed to technological advances and new methods of research, such as the use of laser-based instrumentation and chemi-luminescence, which do not require the use of radioactive materials. For example, DNA sequencing predominantly uses laser analysis of fluorescent dyes adhering to DNA bases instead of radioactive techniques.

The HRL facility has BSL-1 and -2 work, which includes 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.

2.10.3 Operations Data for Bioscience Facilities

Table A-20 presents the operations data as measured by radioactive air emissions, NPDES discharges, and generated waste volumes. The generation of most waste has decreased from historical levels and was lower than the SWEIS projections. However, LLW generation exceeded the SWEIS projections due to a water pipe burst in the parking lot of TA-43-0001 near an old abandoned radioactive acid line. Excavated material was disposed of as LLW.

2.11 Radiochemistry Facility (TA-48, TA-46 and TA-59)

The Radiochemistry Key Facility includes all of TA-48 (116 acres). Since the issuance of the 1999 SWEIS, this Key Facility has expanded into buildings within TA-46. 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-48-0001), the Assembly Checkout Building (TA-48-0017), the Diagnostic Instrumentation and Development Building (TA-48-28), the Clean Chemistry/Mass Spectrometry Building (TA-48-0045), the Weapons Analytical Chemistry Facility (48-0107), and the Machine and Fabrication Shop (TA-48-0008).

The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified 25 buildings within this Key Facility. Table 2.11-1 provides details.

Table 2.11-1 Radiochemistry Buildings Identified as Less-than-HazCat-3 Nuclear Facilities

Building	Description	LANL 2009[a]
TA-48-0001	RC-1	RAD
TA-48-0008	Isotope Separator Building	RAD
TA-48-0017	Assembly and Checkout Building	RAD
TA-48-0026	Office Building	RAD
TA-48-0027	Transportable	RAD
TA-48-0028	Advanced Analytical Development Building	RAD
TA-48-0033	Transportable	RAD
TA-48-0038	Metal Building	RAD
TA-48-0039	Metal Building	RAD
TA-48-0045	Clean Chemistry/Mass Spec Building	RAD
TA-48-0063	Transportainer	RAD
TA-48-0107	Weapons Analytical Chemistry Building	RAD
TA-48-0111	Transportainer	RAD
TA-48-0168	Chemical/Storage Building	RAD
TA-48-0180	Chemical/Storage Building	RAD
TA-48-0181	Chemical/Storage Building	RAD
TA-48-0215	Transportainer	RAD
TA-48-0236	Walk-in Cooler	RAD
TA-46-0024	Laboratory/Office	RAD
TA-46-0031	Test Building #2	RAD
TA-46-0041	Laser Isotope Support Facility	RAD
TA-46-0154	Physical Chemistry Lab	RAD
TA-46-0158	Laser Induced Chemistry Lab	RAD
TA-46-0208	FEL Lab Building	RAD
TA-46-0416	Morgan Shed	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

2.11.1 Construction and Modifications at the Radiochemistry Facility

The 2008 SWEIS projected no major facility modifications to this Key Facility.

2.11.2 Operations at the Radiochemistry Facility

The 2008 SWEIS identified 11 capabilities for the Radiochemistry Key Facility. As seen in Table A-21, four of the 11 capabilities were at higher levels than projected in the SWEIS: Radionuclide Transport Studies, Isotope Production, Actinide and Transuranic (TRU) Chemistry, and Sample Counting. The remaining seven capabilities were below levels projected in the SWEIS.

2.11.3 Operations Data for the Radiochemistry Facility

In CY 2009, some operations within this Key Facility increased, however the operation data levels were below those projected in the SWEIS. Table A-22 provides details.

2.12 Radioactive Liquid Waste Treatment Facility (TA-50)

The RLWTF is located at TA-50 and consists of the treatment facility (Building TA-50-0001), 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 these treatment operations.

This Key Facility is a Nuclear HazCat-3 facility and includes the following structures: the RLWTF itself (Building TA-50-0001), influent tanks and pumping station (TA-50-0002), the acid and caustic waste storage tank vault (TA-50-0066), a 100,000-gallon influent storage tank (TA-50-0090), and a building that houses evaporator storage tanks (TA-50-0248) (Table 2.12-1).

Table 2.12-1. Radioactive Liquid Waste Treatment Facility Buildings with Nuclear Hazard Classification

Building	Description	NHC LANL 2009[a]
TA-50-0001	Main Treatment Plant	3
TA-50-0002	Influent tanks and pumps	3
TA-50-0066	Acid and Caustic Waste Tanks	3
TA-50-0090	Holding Tank	3
TA-50-0248	Evaporator Storage Tanks	3

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 2009c)
b DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2009b)

2.12.1 Construction and Modifications at the Radioactive Liquid Waste Treatment Facility

The 2008 SWEIS projected two modifications to this Key Facility:

- Construct and operate a replacement for the existing RLWTF at TA-50
- Construct and operate evaporation tanks in TA-52

The craft shop was relocated 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 (TA-50-0250) started during 2004; it was about 95 percent complete by the end of 2009.

2.12.2 Operations at the Radioactive Liquid Waste Treatment Facility

The 2008 SWEIS projected two capabilities for this Key Facility (Table A-23).

The primary measurement of activity for this facility is the volume of radioactive liquid processed through the main treatment plant. In CY 2009, discharge volumes were 4.4 million liters, much less than the projected discharge volume of 35 million liters per year in the SWEIS. 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.

2.12.3 Operations Data for the Radioactive Liquid Waste Treatment Facility

In CY 2009, operations data levels were below those projected in the SWEIS with one exception. Chemical waste generation exceeded SWEIS projections due to the disposition of excess construction waste as part of the RLWTF cleanup campaign; Table A-24 provides details.

2.13 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-53-0003, which houses the linac, is 315,000 square feet. 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. In addition, the Isotope Production Facility completed its fifth full run cycle in 2009.

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 2002d). Experimental Area A, formerly used for materials irradiation experiments and isotope production, is currently inactive and was emptied of all beam and experimental equipment this year. A second accelerator facility located at TA-53-0365, the Low-Energy Demonstration Accelerator, was decommissioned and dismantled in 2006. Building 365 is currently being used for buildup of a Free Electron Laser prototype.

The 1999 SWEIS identified two HazCat-3 nuclear facilities (Buildings 53-07 and 53-30). 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 two main safety basis documents. Document one is the LANSCE Safety Assessment Document (SAD), which has seven volumes that describe the accelerator and the experimental areas. The SAD volumes are as follows: Volume I—LINAC, Volume II—Isotope Production Facility (IPF), Volume III—Experimental Area C, Volume IV—Experimental Area B, Volume V—Experimental Area A, Volume VI—Lujan Center, Volume VII—Weapons Neutron Research Facility. The second safety basis document is the LANSCE Accelerator Safety Envelope, which provides the operating bounds for the seven areas discussed in SAD Volumes I–VII.

The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified two buildings within this Key Facility. The two structures in Table 2.13-1 make up the TA-53 RLWTF that is managed and operated by TA-55 Radioactive Liquid Waste personnel.

Table 2.13-1. LANSCE Buildings Identified as Less-than-HazCat-3 Nuclear Facilities

Building	Description	LANL 2009[a]
TA-53-0945	Liquid Waste Treatment Facility	RAD
TA-53-0954	Rad Liquid Waste Basins	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

2.13.1 Construction and Modifications at the Los Alamos Neutron Science Center

The 2009 SWEIS projected two modifications to LANSCE:

- Installation of Materials Test Station (MTS) equipment in Experimental Area A
- Construct Neutron Spectroscopy Facility within existing buildings (under High-Powered Microwaves and Advanced Accelerators capability)

In 2008, execution of the MTS began. In 2009, Area A was renovated where experimental equipment, beam line components, and shielding block were removed to ready the experimental area for MTS.

In addition to the projected facility modifications, additional construction and modification projects were completed. A complete description of these projects can be found in the 2008 SWEIS Yearbook (LANL 2010a).

Several projects were initiated in 2009. Restoration of TA-53-0003 Area A to ready the space for the MTS was the largest project undertaken at LANSCE during 2009 (LANL 2008c). Hundreds of tons of experimental equipment, shielding, steel plates, beam line components, and ancilliary hardware were removed. A large majority of the shielding and steel plates were set aside for reuse and moved down to the TA-53 old lagoons, which were prepared in 2009 for use as storage of shielding. The access road around the lagoons was reconditioned to allow heavy equipment movement. An additional project in support of the Area A restoration portion of MTS was to design and build a new access road off of the south side of Area A for materials movement by heavy equipment out of Area A. Other noteworthy projects included installation and field testing of a real time arsenic analyzer in support of new NPDES discharge requirements for metal (DOE 2007), the replacement of the accelerator cooling tower pumps due to a

large sewage overflow into the 979 pump pit (DOE 2008c), installation of several earthen berms around high-voltage equipment to meet new Spill Prevention Control and Countermeasure secondary containment requirements for oil-filled equipment, and finally, installation of a concrete pad and groundwater monitoring well in support of monitoring requirements related to the NMED Consent Order.

2.13.2 Operations at the Los Alamos Neutron Science Center

The 2008 SWEIS identified eight capabilities for this Key Facility (Table A-25).

During CY 2009, LANSCE operated the accelerator and four of the five experimental areas. Area A has been idle for more than eight years. The primary indicator of activity for this facility is production of the 800-million-electron-volt LANSCE proton beam as shown in Table A-25. These production figures are all less than the 6,400 hours at 1,250 microamps projected in the SWEIS. There were no experiments conducted for transmutation of wastes.

The most significant accomplishment in CY 2009 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 1,160 user visits during the seven-month 2009 run cycle. The facility operated at an average of 85.3 percent availability for the Lujan Center and 90.7 percent for WNR, allowing the completion of 362 experiments for internal and external neutron scattering and neutron nuclear physics users. Another significant accomplishment was the third production run for the ultracold neutron experimental area.

2.13.3 Operations Data for the Los Alamos Neutron Science Center

In CY 2009, routine waste generation and NPDES discharge volumes were well below projected quantities. Radioactive air emissions are a key parameter since LANSCE emissions have historically accounted for more than 95 percent of the total LANL off-site dose. 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 2009; however, operations in Line D resulted in the majority of emissions reported for 2009. Table A-26 provides details of LANSCE operations.

2.14 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.

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-50-0069) was updated to a HazCat 2 Nuclear Facility (LANL 2007b). In addition, there are several other HazCat 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-54-0038), and outdoor operations at the WCRR Facility. In addition to the nuclear facilities, the Decontamination and Volume Reduction System (DVRS), TA-54-0412, was added to the Less-than-HazCat-3 Nuclear Facility list in CY 2002 (LANL 2002d). The Actinide Research Training and Instruction Center (ARTIC), formerly the Radioactive Materials Research Operations and Demonstration facility, was downgraded from a HazCat 3 Nuclear Facility to a Less-than-HazCat-3 Nuclear Facility.

As shown in Table 2.14-1, the SWEIS recognized 22 structures as having HazCat 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 HazCat 2 in the SWEIS, but because of inventories and the newer guidelines, it was downgraded to a HazCat 3. In September 2007 the WCRR Facility was again updated to a HazCat 2 facility.

Table 2.14-1. Solid Waste Buildings with Nuclear Hazard Classification

Building	Description	1999 SWEIS	NHC LANL 2009[a]
TA-50-0069	WCRR Facility Building	2	2
TA-50-0069 Outside	Nondestructive Analysis Mobile Activities		2
TA-50-0069 Outside[b]	Drum Storage		
TA-54-Area G[c]	LLW Storage/Disposal	2	2
TA-54-0002	TRU Storage Building		2
TA-54-0008	Storage Building		
TA-54-0033	TRU Drum Preparation	2	2
TA-54-0038	Radioassay and Nondestructive Testing Facility	2	2
TA-54-0048	TRU Waste Management Dome	2	2
TA-54-0049	TRU Waste Management Dome	2	2
TA-54-0153	TRU Waste Management Dome	2	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[d]	Storage Pad	2	2

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2007b).

b 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.
c 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); TRU legacy waste in pits and shafts; low-level disposal of asbestos in pits and shafts. Operations building: TRU waste storage.
d Pad 10 was originally designated as Pads 2 and 4 in the SWEIS.

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

The 2008 SWEIS projected one major modification to this Key Facility:

- plan, design, construct, and operate waste management facilities transition projects to facilitate actions required by the Consent Order

These projects will replace LANL's existing facilities for solid waste management. The existing facilities at TA-54 are scheduled for closure and remediation under the Consent Order.

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

- present a risk to public health and safety;
- present a potential loss of control by a US Nuclear Regulatory Commission or agreement state licensee;
- are excess and unwanted and are a DOE responsibility under Public Law 99-240[4] (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 and focuses on the problem of sources and devices held under US Nuclear Regulatory Commission or 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 sources 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. As of February 2008, about 15,300 sources had been brought to LANL. Of these, about 3,500 were sent offsite for disposition (DOE 2008c). Approximately 636 sources were collected for storage at TA-54 during CY 2009. Eventually, these sources will be shipped to the Waste Isolation Pilot Plant (WIPP) for final disposition. The OSR Project received NEPA coverage under an environmental assessment and subsequent FONSI (DOE 1995), Accession Numbers 6279 (DOE 1996g), 7405 (DOE 1999c), and 7570 (DOE 1999d), the 1999 SWEIS (DOE 1999a), and the 2008 SWEIS (DOE 2008c).

[4] 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.

2.14.2 Operations at the Solid Radioactive and Chemical Waste Facility

The 2008 SWEIS identified seven capabilities for this Key Facility (Table A-27).

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 mixed LLW (MLLW) in storage. A comparison of CY 2009 to projections made by the SWEIS can be summarized as follows:

Chemical wastes. During CY 2009, approximately 2,812 metric tons of chemical wastes were generated at LANL. This compares to an average quantity of 3,250 metric tons per year projected in the SWEIS.

LLW. During CY 2009, approximately 1,415 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 in the SWEIS. No new disposal cells were constructed, and disposal operations did not expand into either Zone 4 or Zone 6 at TA-54.

MLLW. During CY 2009, 14 cubic meters were generated and delivered to TA-54, compared to an average volume of 632 cubic meters per year projected in the SWEIS.

TRU wastes. During CY 2009, 520 cubic meters of TRU wastes were shipped to WIPP, and 77 cubic meters of newly generated TRU wastes (non-hazardous) were added to storage.

Mixed TRU wastes. During CY 2009, 285 cubic meters of mixed TRU wastes were shipped to WIPP, approximately 38 cubic meters of mixed TRU wastes were received for storage.

In summary, chemical and radioactive waste management activities were at levels below those projected in the SWEIS at this Key Facility. These and other operational details are in Table A-27.

2.14.3 Operations Data for the Solid Radioactive and Chemical Waste Facility

Levels of activity in CY 2009 were less than projected in the SWEIS. Table A-28 provides details.

2.15 Plutonium Complex (TA-55)

The Plutonium Facility Complex consists of six primary buildings and a number of support, storage, security, and training structures located throughout TA-55. The Plutonium Facility, Building 55-0004, is categorized as a HazCat 2 Nuclear Facility, but was built to comply with the seismic standards for HazCat 1 buildings. In addition, TA-55 includes two low hazard chemical facilities (Buildings 55-0003 and 55-0005) and one low hazard energy source facility (55-0007). In CY 2003, the Associate Directorate for Stockpile Manufacturing acquired and took ownership of the TA-50-0037 building, designated as the ARTIC. A new structure for TA-55, the TA-55-314 Fire Safe Storage Building, was completed in October of 2004. In May 2005, a staging facility, PF-185 (55-185), was upgraded to HazCat 2. A third HazCat 2 Nuclear Facility, the Safe Secure Transport (SST) Facility (55-355), was constructed and became operational in November 2005.

The DOE/NNSA listing of LANL nuclear facilities for 2009 (DOE 2009c, LANL 2009c) retained Building TA-55-0004 as a HazCat 2 Nuclear Facility. The LANL Nuclear Facilities List revised in 2005 added Buildings TA-55-0185 and TA-55-055 to the list of Nuclear HazCat 2 facilities (LANL 2009b) (Table 2.15-1). TA-55-0185 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. In January 2007, TA-55-0185 was removed from the Nuclear Facilities List. In January 2008, the SST pad (55-0355) was removed as a nuclear facility. The SWEIS also identified one potential HazCat 2 Nuclear Facility (TA-55-0041, 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). DD&D of this building began in November 2007, and was completed in late summer 2008.

Table 2.15-1. Plutonium Complex Buildings with Nuclear Hazard Classification

Building	Description	1999 SWEIS[a]	NHC LANL 2009[b]
TA-55-0004	Plutonium Processing	2	2
TA-55-0041	Nuclear Material Storage	2	[c]
TA-55-0185	Drum Storage Building		[d]
TA-55-0355	SST Facility		[d]

a DOE List of Los Alamos National Laboratory Nuclear Facilities (DOE 2009c)
b DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2009b)
c PF-41 was DD&D'd in 2008
d Removed from DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2009b)

The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified one building within this Key Facility. Table 2.15-2 provides details.

Table 2.15-2. Plutonium Facility Identified as Less-than-HazCat-3 Nuclear Facility

Building	Description	LANL 2009[a]
TA-50-0037	ARTIC	RAD

a LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b)

2.15.1 Construction and Modifications at the Plutonium Complex

The 2008 SWEIS projected two facility modifications:

- TA-55 Reinvestment Project (TRP; formerly Plutonium Facility Complex Refurbishment Project)—
    - The TRP consists of three line items (TRP I, TRP II, and TRP III), each line item was split into subprojects. TRP I included the repair and replacement of mission-critical cooling system components for buildings in TA-55 to allow these facilities to continue to operate and for NNSA to install a new cooling system that meets current standards regarding phase-out of Class 1 ozone-depleting substances. TRP I construction activities were ongoing in CY 2009. TRP II was in the planning stages during CY 2009.
- TA-55 Radiography Facility Project—

- TA-55 Radiography/Interim (LANL 2001d). Completed in 2008. TA-55 Radiography, complements TA-55 Radiography/Interim, remained on hold in CY 2009 due to funding (LANL 2001d).

In addition, the following construction/modification projects continued in 2009.

- CMRR NF Project DOE Pre-conceptual Design (LANL 2001b), ongoing in CY 2009.[5] In 2007 construction of the RLUOB began. Construction was ongoing in 2009.
- Decommissioning and decontamination (D&D) and upgrades of equipment were initiated in order to upgrade small sample fabrication with a new machining line for plutonium samples. This upgrade work continued through 2009.
- Nuclear Materials Safeguards and Security Upgrades Project (NMSSUP) Phase II. The project provides physical security upgrades at the Plutonium Facility Complex. NMSSUP Phase II construction activities began in 2009.

2.15.2 Operations at the Plutonium Complex

TA-55, located just southeast of TA-3, includes the Plutonium Facility Complex and is the chosen location for the CMRR NF. This facility replaces the current CMR facility and provides chemical and metallurgical processes for recovering, purifying, and converting plutonium and other actinides into many compounds and forms. Additional capabilities include the means to ship, receive, handle, and store nuclear materials, as well as to manage the wastes and residues produced by TA-55 operations. Relocated chemistry and metallurgy research, actinide chemistry, and materials characterization capabilities that may be provided at the site through the Project currently are in the pre-conceptual phase of construction.

The 2008 SWEIS identified seven capabilities for this Key Facility (Table A-29). In CY 2009, all seven capabilities activity levels were below those projected in the SWEIS.

2.15.3 Operations Data for the Plutonium Complex

Operations data at this Key Facility remained below levels projected in the SWEIS with one exception. Chemical waste generated exceeded SWEIS projection numbers due to the disposal of cooling tower treatment solution. Details of the Plutonium Complex operational data are presented in Table A-30.

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 26,058 acres.

[5] The CMRR Project was covered by an environmental impact statement (DOE 2003a).

As shown in Table 2.16-1, the 1999 SWEIS identified six buildings within the Non-Key Facilities with Nuclear Hazard Categories. The High-Pressure Tritium Facility (Building TA-33-0086), classified in 2001 as a HazCat 2 Nuclear Facility, was removed from the Nuclear Facilities List in March 2002 and downgraded to a radiological facility. The DD&D of the formerly used tritium facility, TA-33-0086, was completed in 2002. In November 2003, five potential release sites (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	2008 SWEIS	NHC LANL 2009[a]
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	
TA-35-0002	Non-American National Standards Institute Uranium Sources	3	
TA-35-0027	Safeguard Assay and Research	3	
TA-10 PRS 10-002(a)-00	Former Liquid Disposal Complex		3

a DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities (LANL 2007b)

Additionally, several Non-Key Facilities were identified as Less-than-HazCat-3 nuclear facilities. The updated LANL Less-than-HazCat-3 Nuclear Facilities List (LANL 2009b) identified 32 buildings within this Non-Key Facility. Table 2.16-2 provides details.

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

Building	Description	LANL 2009[a]
TA-03-0016	Ion Beam Facility	RAD
TA-03-0034	Cryogenics Bldg. B	RAD
TA-03-0040	Physics Bldg., office and lab	RAD
TA-03-0169	Warehouse	RAD
TA-03-0215	Physics Analytical Center	RAD
TA-03-0216	Weapons Test Facility	RAD
TA-03-0217		RAD
TA-03-0494	Geochemical Analytical Facility	RAD
TA-03-1819	Experiment Mat'l Lab	RAD
TA-03-2002	X-Ray Machine Lab	RAD
TA-03-2322	NISC	RAD
TA-21-0005	Lab Bldg	RAD
TA-21-0150	Molecular Chemistry	---
TA-21-0152	Laboratory	RAD
TA-21-0155	TSTA Facility	RAD
TA-21-0209	TSFF Labs and Offices	RAD
TA-21-0213	Lab Supply Warehouse	RAD
TA-21-0257	Manhole Station	RAD
TA-33-0086	High Pressure Tritium	RAD
TA-35-0002	Nuclear Safeguards Research	RAD
TA-35-0027	Nuclear Safeguards Lab	RAD
TA-35-0034	Nuclear Safeguards Research Bldg.	RAD
TA-35-0087	Laboratory and offices	RAD
TA-35-0124	Antares Target Hall	RAD
TA-35-0125	Atlas Bldg.	RAD
TA-35-0126	Mechanical Bldg.	RAD
TA-35-0189	Trident Laser Lab	RAD
TA-35-0374	Morgan Shed	RAD
TA-36-0001	Laboratory and offices	RAD

TA-36-0214	Central HP Calibration Facility	RAD
TA-41-0001	Underground Vault	RAD
TA-41-0004	Laboratory	---

a LANL Radiological Facilities List (LANL 2009b)

2.16.1 Construction and Modifications at the Non-Key Facilities

The 2008 SWEIS projected no major modifications to the Non-Key Facilities under the No Action Alternative.

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

Protective Force Running Track

Description. A regulation four-lane, 400-meter running track was installed at TA-58. This track was installed to provide the Laboratory's protective force the capabilities to meet and maintain the demanding fitness standards required by federal regulations. It is sited on approximately 4.4 acres in an area previously used for outdoor fitness training. Utilities were not required for this project.

Status. The project received NEPA coverage through the 2008 SWEIS, Non-key document, Section 1.3 Support Activities. Construction began in August 2009 and will be completed in 2010.

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 2008c) as shown in Table A-31. The eighth category, environmental restoration, is discussed in Section 2.17. During CY 2009, no new capabilities were added to the Non-Key Facilities, and none of the eight existing capabilities was deleted.

2.16.3 Operations Data for the Non-Key Facilities

The Non-Key Facilities occupy more than half of LANL. In 2009, the Non-Key Facilities generated about 56 percent of the total LANL chemical waste volume; about eight percent of the total LLW volume; about 18 percent of the MLLW volume; and about 11 percent of the total TRU waste volume. Table A-32 presents details of the operations data from CY 2009.

The combined flows of the SWWS and the TA-03 Steam Plant account for about 89 percent of the total discharge from Non-Key Facilities and about 64 percent of all water discharged by LANL. Section 3.2 has more detail.

2.17 Environmental Cleanup

The Laboratory through the EP Directorate performs cleanup of sites and facilities formerly involved in weapons research and development.

The EP Directorate includes the operations and responsibilities of the previous Environmental Restoration (ER) Project, which generates a significant amount of waste during characterization and remediation activities; therefore, the EP cleanup programs are included as a section in Chapter 2. The 2008 SWEIS projected that implementation

of the Consent Order would contribute 80 percent chemical waste, 65 percent LLW, 97 percent MLLW, and 44 percent TRU and mixed TRU at the Laboratory.

2.17.1 History of Corrective Action Sites at LANL

The DOE established the ER Project in 1989 to characterize and, if necessary, remediate Solid Waste Management Units (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 and some properties containing SWMUs and AOCs have been conveyed to Los Alamos County or to private (within Los Alamos town site) ownership. Characterization and remediation efforts are regulated by the NMED for chemical constituents, by the New Mexico Solid Waste Act and by DOE/NNSA for radionuclides under the Atomic Energy Act implemented through DOE Order 458.1 (formerly 5400.5), "Radiation Protection of the Public and the Environment," and DOE Order 435.1, "Radioactive Waste Management."

In 1990, in accordance with the requirements of RCRA, 2,124 corrective action sites were identified by LANL. Of these sites, 1,099 were subsequently listed by the US Environmental Protection Agency (EPA) in Module VIII of LANL's Hazardous Waste Facility Permit and became subject to the RCRA Hazard and Solid Waste Amendments of 1984 (HSWA) requirements as regulated under the administrative authority of the EPA. EPA determined that the remaining 1,025 sites did not require regulation under the same corrective action requirements of Module VIII and that 543 of these were also suitable for "no further action" (NFA), leaving only 482 non-HSWA sites. As the owner of the LANL facility, the DOE retained the regulatory administrative authority for these remaining non-HSWA sites. This administrative action reduced the total number of corrective action sites remaining in the investigation process at LANL to 1,581.

On January 1, 1996, EPA transferred their authority for implementing HSWA requirements to the NMED. From 1996 through 2007, NMED granted 166 approvals of NFA for the corrective action sites under its administrative authority and removed these sites from Module VIII of LANL's Hazardous Waste Facility Permit. Also during this time period, six previously unknown corrective action sites were identified and reported to the administrative authority. Combined, these administrative actions reduced the total number of corrective action sites remaining in the investigation process to 1,421.

During 1999 and 2000, LANL undertook an effort to consolidate corrective action sites. The consolidation effort was undertaken pursuant to NMED's Hazardous Waste Fee Regulations and to account for the number of corrective action sites subject to annual fees but did not affect the number of sites tracked in Module VIII. Sites having geographic proximity and similar operating history, contaminant types, or migration pathways were combined into consolidated units. Sites not meeting the consolidation criteria remained as discrete units. A few sites that consisted of multiple unrelated components were split into individual sites. For example, SWMU 16-017 was split into 24 individual sites and SWMUs 01-002 and 00-033 were split into two individual sites each. Splitting these sites added a total of 25 sites, altering the number of corrective action sites remaining in the investigation process at LANL to 1,446.

On March 1, 2005, the NMED, the DOE, and the University of California entered into a Compliance Order on Consent (Consent Order), which superseded Module VIII. Under the agreement of the Consent Order, all 2,124 original corrective action sites, the six newly identified sites, and the 25 sites split during the consolidation effort were subject to the new Consent Order requirements with the exception of the 166 sites removed from Module VIII by NMED and the 543 sites approved for NFA by EPA. Therefore, 1,446 sites are regulated under the Consent Order. The Consent Order provides that the status of all 1,446 sites (those requiring corrective action and those with completed corrective actions) will be tracked in LANL's Hazardous Waste Facility Permit.

The Consent Order replaced the determination for NFA with a "Certificate of Completion." Since the start of the Consent Order through the end of 2009, NMED issued 32 Certificates of Completion without Controls and 12 Certificates of Completion with Controls. Of the 44 Certificates of Completion issued, four overlapped former EPA approvals for NFA and one overlapped NMED removals from Module VIII of LANL's Hazardous Waste Facility Permit; thus, only 39 are subtracted. This administrative action reduced the total number of corrective action sites remaining in the investigation process at LANL to 1,407.

From the March 1, 2005, effective date of the Consent Order through the end of 2009, corrective actions have been completed at 94 additional sites. Recommendations for Certificates of Completion for these sites have been made to NMED in various investigation reports. For the majority of these sites, NMED has approved the report but delayed issuing Certificates of Completion contingent upon implementation of the Laboratory's NPDES permit for individual SWMUs and AOCs. Although not administratively complete, no additional corrective actions under the Consent Order will be undertaken for the NPDES permit sites, thus reducing the total number of corrective action sites remaining in the investigation process at the close of FY 2009 to 1,313.

In Table IV-2 of the Consent Order, 45 sites within Testing Hazard Zones are deferred for investigation and corrective action until the firing site used to delineate the relevant Testing Hazard Zone is closed or inactive and the DOE determines that it is not reasonably likely to be reactivated. NMED has also approved delayed corrective action: 1) at 28 sites where investigation is not feasible until future D&D of associated operational facilities, 2) at five sites that are currently active units, and 3) at four sites until operations cease at nearby non-deferred firing sites. It is expected that corrective actions for both the deferred and the delayed sites will ultimately be implemented under LANL's Hazardous Waste Facility Permit, as facility closure is not likely to occur before the end date of the Consent Order (currently 2015).

2.17.2 Environmental Cleanup Operations

Corrective actions are complete at a site when LANL has demonstrated and documented to the regulatory authority that the site poses no unacceptable risk or dose to humans and ecological resources, such as plants and animals. The determination of no unacceptable risk or dose is based upon the comparison of the analytical data gathered from investigation sampling at each site to the risk-based screening levels derived by EPA, NMED, or LANL. When the risks and doses are less than the

regulatory authority's target levels, the site is determined to pose no unacceptable risk or dose to a human and/or ecological receptor.

The projects wrote and/or revised 26 work plans and 22 reports and submitted them to the NMED during 2009. A work plan proposes investigation activities designed to characterize SWMUs, AOCs, consolidated units, aggregate areas, canyons, or watersheds. An investigation report presents the data, evaluates the results, determines the site status, and recommends additional investigation, remediation, monitoring, or NFA, as appropriate. Eighty-six other plans, reports, and miscellaneous documents were submitted to NMED in 2009.

The following section provides summaries of the investigations for which activities were started, continued, and/or completed in 2009 and those investigations for which reports were submitted in 2009.

Upper Los Alamos Canyon Aggregate Area. Sampling and other investigation/remediation activities were started in 2008 and completed in 2009. The results of the Upper Los Alamos Canyon Aggregate Area investigation were provided in an investigation report in 2009, which was revised in early 2010. Nature and extent have been defined at 20 of the 47 sites (27 sites do not have nature and extent defined) investigated during the 2008–2009 investigation. Nineteen sites do not pose a potential unacceptable risk or dose under the current and reasonably foreseeable land use scenario. The 27 sites require additional characterization for certain chemicals of potential concern (COPCs). At nine of the 27 sites for which the extent of contamination is not defined, enough data have been collected to determine that removal actions are warranted. A Phase II investigation work plan will be developed to provide detailed plans for removing soil, fill, sediment, or tuff to reduce concentrations of COPCs and the associated risks to the extent practicable. Confirmation and/or additional extent sampling will be conducted at all sites. Excavation of PCB-contaminated sediment and confirmatory sampling in the drainage below SWMU 01-001(f) was commenced in late 2009. The remediation, sampling, and other actions to mitigate contaminant migration from the SWMU 01-001(f) drainage continued in 2010.

Guaje/Barrancas/Rendija Canyons Aggregate Area. AOC C-00-041 was inspected in October 2009 for remnants of tar and asphalt exposed at the surface by runoff or erosion. Exposed asphalt fragments were found and removed during the site inspection. Asphalt was removed only if it was visible at the surface and involved no excavation or significant soil disturbance. Seven 55-gal. drums were filled with the removed asphalt and tar from the site during this monitoring effort. The asphalt was recycled at the Los Alamos County Eco-Station. A report was submitted documenting the observations and actions resulting from the inspection (LANL 2008d).

TA-16-340 Complex (Consolidated Units 13-003[a]-99 and 16-003[n]-99 and SWMUs 16-003[o], 16-026[j2], and 16-029[f]). The Phase II investigation report was submitted in 2008 and revised in early 2009 (LANL 2008e). The lateral and vertical extent of inorganic, organic, and radionuclide COPCs was defined using data from all investigations. Although VOCs were detected in the pore-gas samples in the intermediate borehole next to the former TA-16-340 drain line, the screening evaluation

indicated that VOCs in subsurface pore gas are not a potential source of groundwater contamination.

The human health risk screening assessments determined there are no potential unacceptable risks or doses under the industrial and construction worker scenarios. The ecological risk screening assessment indicated no potential risk to ecological receptors. Based on the results, the Laboratory recommended corrective action complete with controls for the TA-16-340 Complex sites. The controls required include continuation of the current land use (i.e., industrial) and maintenance of current site conditions.

In addition, surface water and alluvial groundwater will continue to be monitored at this site. Monitoring of the three alluvial wells downgradient from SWMU 16-003(o) is recommended as a site condition for characterizing chemical concentrations and variability in the alluvial groundwater.

Consolidated Unit 16-021(c)-99 (260 Outfall) Corrective Measures Implementation. The Corrective Measures Implementation (CMI) Plan was implemented in 2009 and mostly completed in early 2010. The CMI activities consisted of the following actions.

260 Outfall Drainage Channel Remediation – Excavation and removal of the concrete trough and underlying soil was conducted. After the concrete trough was excavated, samples were collected from the base of the excavation, and the trench was backfilled, compacted, and re-graded. Three locations with elevated high explosive screening concentrations were excavated to depths of 7 to 10 feet below ground surface; a total of approximately 8 cubic yards of soil was removed. Three removal locations within the former settling pond were excavated. Removal activities were also conducted at five 260 Outfall drainage channel locations. A total of 9.3 cubic yards of soil and tuff was excavated, but additional soil removal needs to be done at one location. Confirmation sample results for each of these activities indicated contaminant concentrations were below cleanup levels.

Sanitary Wastewater Systems Consolidation (*SWSC) Cut Soil Investigation* – The Phase III RCRA Facility Investigation indicated that soil in the vicinity of the SWSC sewer pipeline near the SWSC Cut contained elevated concentrations of silver and failed sediment toxicity testing of chironomids. Five samples from the SWSC Cut were collected, analyzed for metals, and found to contain elevated concentrations of barium and silver. The location will be resampled and submitted to an off-site laboratory for sediment toxicity testing of chironomids. If the sample is found to contain elevated concentrations of silver and fails the toxicity tests, further removal actions may be required.

Former Settling Pond Surge Bed Remediation – The remedial objective of surge bed injection grouting is to prevent groundwater from making contact with the contaminated upper surge bed within the settling pond area. More specifically, isolation of the contaminated horizon is needed to prevent contaminants from leaching into groundwater, migrating off-site, and threatening drinking water supplies or the environment. To avoid potential hydraulic fracturing of the subsurface formation in and around the surge bed, low pressure grouting was used. Low-pressure grouting, otherwise known as permeation or area grouting, is a technique where a low-viscosity

grout is injected in a formation filling pores and fissures, thereby decreasing formation permeability.

Maintain Existing Low-permeability Cap on the Former Settling Pond – The low-permeability cap in the former settling pond was replaced in the excavated areas after attaining the appropriate soil concentrations in those locations. The purpose of the cap is to prevent surface water from infiltrating to groundwater. Soil/bentonite cover material was applied in 6-inch lifts and compacted to 95 percent compaction. The cover is 1 to 2 feet thick and is designed to prevent surface and groundwater from coming into contact with potentially contaminated tuff.

Spring Carbon Filters at SWSC Cut and Burning Ground Spring and Modification of Existing Carbon Filter at Martin Spring – The spring carbon filters are designed to optimize hydraulic head difference across the filter and to preserve any existing wetlands associated with the spring, both during and after construction for cleanup of the SWSC Cut and Burning Ground Spring in Cañon de Valle and Martin Spring in Martin Spring Canyon.

Permeable Reactive Barrier (PRB) – The primary remedial objective for the PRB is to reduce RDX and barium concentrations in alluvial groundwater to below their respective groundwater standards, which will in turn reduce the concentrations of contaminants infiltrating to intermediate and regional groundwater zones. Groundwater is funneled by diversion walls through a gate into a reactive cell where the contaminants are treated by the reactive media: zero valent iron, zeolite, and gravel mixture. A total of 16 alluvial groundwater wells were drilled to monitor the PRB performance; five wells were installed upgradient and 11 wells were installed down gradient. In addition, four 2-inch piezometers were installed to monitor water levels and water chemistry.

To confirm the effectiveness of the CMI characterization and remediation activities, the springs, and alluvial and intermediate-perched groundwater will be sampled and monitored.

Bayo Canyon Aggregate Area. Two locations south of SWMU 10-002(b) are contaminated with strontium-90 and were recommended for removal. Remediation and confirmatory sampling were conducted in 2009. Excavation 1 was approximately 10 feet by 20 feet and was excavated to 3 feet below ground surface. Excavation 2 was west of Excavation 1, was approximately 5 feet by 5 feet, and was also excavated to 3 feet below ground surface. Confirmation sampling was conducted at the base of both excavations. Approximately 15 samples were collected from the base of Excavation 1, and five samples were collected from the base of Excavation 2. All shallow subsurface samples were collected from 0 to 1 feet below ground surface (0 is defined as the base of the excavation) and analyzed for strontium-90 only. Because results indicated elevated strontium-90 concentrations remained, additional removal and sampling need to be conducted.

Middle Cañada del Buey Aggregate Area. Investigation sampling was conducted and completed in December 2008. The results were presented in an investigation report submitted in early 2009 and subsequently revised (LANL 2009d). Based on information and data presented in the investigation report, remediation and characterization activities are complete at the four Middle Cañada del Buey Aggregate Area sites. The

nature and extent of contamination are defined at all sites, and there are no unacceptable risks or doses to human and ecological receptors. The Laboratory recommended corrective action complete without controls for the four sites. Because these sites do not pose a potential unacceptable risk to human health under a residential scenario and no potential ecological risk, neither site controls nor future actions are necessary.

Upper Mortandad Canyon Aggregate Area. The investigation report describing the sampling, analyses, and evaluation of the data was submitted in 2009 (LANL 2009e). The sampling data indicated the extent of contamination has been defined for nine sites. These sites also have been determined to pose no potential unacceptable risk or dose to human health under the residential and/or industrial scenarios and the environment. No further investigation or remediation activities are warranted at the nine sites. The Laboratory recommended corrective action complete without controls for seven sites and recommended corrective action complete with controls for two sites. The Laboratory intends to retain ownership of the property indefinitely and will continue to restrict the property to industrial use only. The controls required include continuation of the current land use (i.e., industrial) and maintenance of current site conditions.

The extent of contamination has not been defined at 31 sites. Additional sampling is needed to define the vertical and/or lateral extent of one or more COPCs at each of these sites. The Laboratory will provide a Phase II investigation work plan to address the additional sampling required to define extent at the sites.

Twenty sites are proposed for delayed characterization and investigation pending the decommissioning and demolition of certain buildings and structures within the Upper Mortandad Canyon Aggregate Area.

North Ancho Canyon Aggregate Area. The investigation included the sampling of 14 SWMUs and AOCs. The investigation report was completed and submitted in 2009 (LANL 2009f) and subsequently revised in 2010.

The nature and extent of contamination are defined at six sites, but are not defined at five sites. The results of the investigation of potential contamination at three active firing sites and of canyon alluvial sediment outside and downgradient of the North Ancho Canyon Aggregate Area within the ephemeral drainage channel (the extended drainages) indicated that contaminants are not migrating off-site.

The human health risk-screening assessments indicated no potential unacceptable risks or doses for the industrial and residential scenarios at five sites. Following remediation and sampling, the risks and doses were less than the NMED and DOE target levels for the residential scenario at three sites. No potential ecological risks exist at the sites within the North Ancho Canyon Aggregate Area.

Five sites [SWMUs 39-001(b) and 39-005 and AOCs 39-002(c), 39-002(f), and 39-007(d)] are recommended for corrective action complete without controls (i.e., they meet cleanup goals for the residential scenario). Additional remediation and/or sampling are recommended for four sites. The complete characterization of five other sites (including the three active firing sites) will be delayed until operations cease.

A Phase II work plan to address the sampling needed to define extent and conduct remediation at the sites will be prepared

MDA C. The results of the Phase II investigation of MDA C were presented in an investigation report. Based on the characterization data from all investigations conducted at the site, the nature and extent of contamination are defined. The human health and ecological risk screening assessments indicated that MDA C does not pose an unacceptable present day risk and dose to human health under the industrial and residential scenarios and to ecological receptors. Further investigation activities are required to better define the lateral and vertical extent of subsurface VOC and tritium pore gas contamination at MDA C, install two downgradient regional groundwater monitoring wells, and characterize background concentrations of inorganic chemicals detected in dacite rocks.

It was recommended that the 14 Phase II boreholes currently configured as vapor-monitoring wells be used to monitor potential changes in subsurface pore-gas concentrations of VOCs and tritium. The vapor-monitoring wells will be sampled for VOCs and tritium on a quarterly basis.

MDA G. The Laboratory continued to monitor VOCs and tritium in subsurface pore gas at MDA G. The VOC and tritium pore gas results are reported in periodic monitoring reports. The Laboratory submitted a work plan for the implementation of a supplemental pilot study. The data to be collected under the work plan and the analysis of existing pore-gas data will be used to refine the conceptual site model by developing an estimate of vapor-phase VOC mass, determining mass distribution with respect to stratigraphic unit, and addressing the potential impact of soil vapor extraction (SVE) on the behavior of soil vapor beneath the disposal units at MDA G. The supplemental SVE pilot test report will discuss results in the context of the ability of SVE to achieve possible remediation goals, including the prevention of contaminant migration to groundwater.

The revised Corrective Measures Evaluation (CME) report was submitted in 2009. The CME screened 14 corrective measure alternatives based on their ability to meet regulatory thresholds and other qualitative screening criteria. Seven of the 14 alternatives met the screening criteria and were retained: 1) monitoring and maintenance of the existing cover combined with a SVE system; 2) construction of an engineered evapotranspiration (ET) cover combined with a SVE system for the removal of vapor-phase VOCs; 3) ET cover with partial waste excavation, monitoring and maintenance, and extraction of vapor-phase organic compounds using an SVE system; 4) ET cover with partial waste excavation, targeted stabilization, monitoring and maintenance, and SVE; 5) complete excavation, waste treatment, off-site disposal of all MDA G waste, and SVE; 6) complete waste excavation, on-site waste treatment, disposal of wastes in a RCRA Subtitle C landfill, and SVE; and 7) complete waste excavation, on-site waste treatment, disposal of wastes in a RCRA corrective action management unit, and SVE. The alternatives must meet the cleanup objectives of the Consent Order, RCRA closure standards for Pit 29 and Shaft 124, and DOE performance objectives for LLW disposal sites.

The Laboratory will implement a comprehensive groundwater monitoring network at TA-54.

MDA H. A work plan describing activities to install a new vapor-monitoring well and new vapor-sampling systems in two existing vapor-monitoring wells at MDA H was submitted in 2009. The new vapor-monitoring well and reconfiguration of two of the three existing vapor-monitoring wells are designed to collect additional data to evaluate the lateral and vertical extent of vapor-phase contamination at MDA H. Installation of the vapor-monitoring wells was completed in late 2009 and sampling was initiated. The results will be reported in the periodic monitoring reports.

Los Alamos/Pueblo Canyons. An interim measure work plan was developed to reduce the migration of contaminated stormwater and sediment within the watershed as part of an overall watershed-scale approach. A supplemental interim measure work plan was also developed, which provides details of additional mitigation actions that will be implemented in the Los Alamos and Pueblo canyons watershed to reduce the transport of contaminated sediment. These mitigation measures are intended to substantially reduce off-site transport of contaminated sediment and complement other actions implemented by the Laboratory and Los Alamos County.

All interim actions proposed in the work plans were implemented in 2009. The effectiveness of the actions for reducing the transport of contaminants will be evaluated using stream discharge data and sampling and analysis of stormwater collected upcanyon and downcanyon from the primary sediment deposition areas in Los Alamos and Pueblo canyons. A monitoring plan was developed to evaluate the effect of mitigation measures installed in the Los Alamos and Pueblo canyons watershed.

Pajarito Canyon. The Pajarito Canyon investigation report was revised in 2009. Sediment COPCs in the Pajarito Canyon watershed are derived from a variety of sources, including Laboratory SWMUs and AOCs, runoff from developed areas, ash from the area burned in the May 2000 Cerro Grande Fire, and natural sources such as uncontaminated soil, sediment, and bedrock. Monitoring COPC concentrations transported in sediment continues, particularly in fine-grained sediment deposited after large flood events that have the highest potential for erosion and downcanyon transport. A sampling and analysis plan outlining an annual sediment monitoring program was submitted.

Surface water and groundwater are monitored to evaluate long-term trends in contaminant concentrations and for protection of supply wells. The configuration of wells in the existing monitoring network is sufficient to meet the groundwater monitoring objectives for the watershed. The results of the Pajarito Canyon investigation indicate that human health risks and doses based on a recreational exposure scenario are acceptable. In addition, no adverse ecological effects were observed within terrestrial and aquatic systems in the Pajarito Canyon watershed. However, additional monitoring of cavity-nesting birds and their food will be conducted and a nest box monitoring plan was submitted in late 2009.

Sandia Canyon. The results of the sediment sampling and the biota investigation were reported in the Sandia Canyon investigation report. The sediment investigations focused on characterizing the nature, extent, and inventory of contaminants in post-

1942 sediment deposits for 12 reaches in Sandia Canyon. The water investigations focused on watershed-scale characterization of surface-water base-flow, springs, alluvial groundwater, vadose-zone pore water, perched-intermediate groundwater, and regional groundwater within and beneath Sandia Canyon. Groundwater information from beneath adjacent watersheds (primarily Mortandad and Los Alamos canyons) was also considered in the report because, in the Sandia Canyon area, contaminants have been transported laterally across watershed boundaries in the subsurface.

Investigations of sediment, surface water, and groundwater in the Sandia watershed indicated inorganic, organic, and radionuclide COPCs are present at concentrations above screening levels and federal and/or state groundwater standards. The COPCs are derived from several sources, including Laboratory SWMUs and AOCs, runoff from developed areas, and natural sources such as uncontaminated soil, sediment, and bedrock. The nature and extent of these COPCs have been defined in sediment, surface water, the vadose zone, and regional groundwater. Groundwater is monitored as part of the annual Interim Facility-Wide Groundwater Monitoring Plan for potential changes in concentrations or distribution of contaminants for each of the zones, particularly with respect to chromium and nitrate in perched intermediate and regional groundwater.

The human health risk assessment indicated that for the recreational scenario, no areas in Sandia Canyon have unacceptable risk for noncarcinogens or dose for radionuclides. However, potential carcinogenic risk is twice the target risk level in reach S-1N, primarily from polycyclic aromatic hydrocarbons (PAHs) in sediment. These PAHs may have originated from the former asphalt batch plant located near the reach and/or runoff from developed areas at the head of the watershed.

A baseline ecological risk assessment indicated exposures to contaminants of potential ecological concern (COPECs) may cause potential adverse effects to terrestrial and aquatic receptors in the upper part of Sandia Canyon, including the Sandia wetland. For the terrestrial environment, the main COPECs are polychlorinated biphenyls (PCBs) for which there is the potential for adverse effects through the food ingestion pathway for shrews and other wildlife, particularly in reach S-2. For the aquatic environment, both the field macroinvertebrate surveys and the chironomid bioassay results point toward potential ecological impacts that could be related to contaminants from Laboratory operations or other sources. However, other non-COPEC factors related to habitat quality also correlate to decreased growth or survival from the bioassay measures and may be the cause of the findings.

Cañada del Buey. The results of the investigations were reported in the Cañada del Buey investigation report. Investigations of sediment and shallow groundwater in Cañada del Buey indicate that inorganic, organic, and radionuclide COPCs are present in these media, in some cases at concentrations above screening levels or standards. These COPCs are derived from several sources, including Laboratory SWMUs and AOCs; ash from the Cerro Grande Fire burn area; and natural sources, such as uncontaminated soil, sediment, and bedrock. The conceptual model indicates that these conditions for sediment are likely to stay the same or improve because of decreases in contaminant concentrations after peak releases; therefore, no further monitoring of sediment in Cañada del Buey is necessary. However, stormwater runoff from SWMUs

and AOCs in the Cañada del Buey watershed will be monitored under the requirements of the "National Pollutant Discharge Elimination System Individual Permit for Stormwater Discharges from Certain SWMUs and AOCs at Los Alamos National Laboratory."

The spatial distribution of sediment COPCs in Cañada del Buey indicates that low levels of contaminants have been released and transported downcanyon from several TAs in the watershed. Concentrations are highest in reaches close to the sources and decrease rapidly downcanyon and do not pose an unacceptable risk in the canyon bottom. No Laboratory-derived COPCs have been identified in the farthest downcanyon reach above NM 4 and White Rock, indicating that Laboratory sites in this watershed are not a recognizable source of contaminants for White Rock or the Rio Grande.

The results of this investigation indicate that potential human health risks in Cañada del Buey are within acceptable limits for current and reasonably foreseeable future land uses. In addition, concentrations of COPECs in Cañada del Buey derived from Laboratory SWMUs or AOCs are unlikely to produce adverse ecological impacts, and no additional biota investigations, mitigation, or monitoring is required.

North Canyons. The Bayo, Barrancas, Rendija, and Guaje canyons systems are referred to as the "north canyons systems." The results of the investigations were reported in the North Canyons investigation report. Investigations of sediment, surface water, and groundwater in the north canyons indicate that inorganic, organic, and radionuclide COPCs are present. The COPCs are derived from several sources, including Laboratory SWMUs and AOCs; runoff from developed areas in the Los Alamos town site; ash from the Cerro Grande Fire burn area; and natural sources, such as uncontaminated soil, sediment, and bedrock. Stormwater runoff from SWMUs and AOCs in the north canyons watershed will be monitored under the requirements of the "National Pollutant Discharge Elimination System Individual Permit for Stormwater Discharges from Certain SWMUs and AOCs at Los Alamos National Laboratory."

The spatial distribution of sediment COPCs in the north canyons indicates that contaminants have been or may have been released and transported downcanyon from former TA-10 in Bayo Canyon and several SWMUs or AOCs in Rendija Canyon. Contaminants in sediment that were or may have been released from these sources are identifiable as COPCs for varying distances downcanyon. Most are COPCs only in reaches close to the sources, but none has been detected in lower Los Alamos Canyon.

In groundwater, arsenic exceeds regulatory drinking water standards in a single detection from water supply well G-1A. This single result most likely reflects naturally occurring arsenic. In surface water, aluminum exceeds a surface-water standard. Aluminum commonly exceeds the standard in surface water on the Pajarito Plateau, including background locations, and therefore likely reflects naturally occurring aluminum. Regional well R-24, located downgradient of former TA-10, will continue to be monitored.

The results of this investigation indicate that potential human health risks in the north canyons are within acceptable limits for current and reasonably foreseeable future land uses. In addition, concentrations of COPECs in the north canyons derived from

Laboratory SWMUs or AOCs are unlikely to produce adverse ecological impacts, and no additional biota investigations, mitigation, or monitoring is required.

MDA V. A vapor-monitoring well was installed to investigate the nature and extent of subsurface tritium contamination. The vapor-monitoring well is installed within 10 feet of the original borehole location. The additional characterization sampling will contribute to a better understanding of the hydrology of the vadose zone below TA-21 and will assist in characterizing the vertical extent of subsurface tritium in pore-water vapor at MDA V. Sampling of the newly installed well began in the first quarter of CY 2010.

MDA T. The Phase III investigation report was submitted and revised. Evaluation of all 2009 solid media analytical results obtained from boreholes 21-25262 and 21-607955 core samples confirm that nature and extent of contamination are defined. Evaluation of the pore-gas analytical results from samples collected from vapor-monitoring wells 21-25262, 21-25264, 21-603058, and 21-603059 also showed no significant deviation from results of previous investigations.

Pore-gas results obtained from samples collected during the initial round of sampling in early December 2009 at vapor-monitoring well 21-607955 (the new well located along the North Perimeter Road) reflect the VOC concentration trends observed in the other vapor-monitoring wells, with the exception of acetone and tritium. Additional rounds of vapor sampling at vapor-monitoring well 21-607955 will help ascertain whether concentrations of acetone and tritium are indicative of conditions beneath MDA T or whether the well had not reached equilibrium conditions when the first-quarter sampling was conducted.

Continued collection of vapor-monitoring samples from all current MDA T vapor-monitoring wells, including the new, deep vapor-monitoring well 21-607955 and the future vapor-monitoring well near building 21-257, will provide additional information concerning extent of contamination, corroborate potential contamination sources, and verify time-dependent trends to support the CME.

MDA B. An investigation report presenting the data obtained using the direct-push technology (DPT) core sampling investigation at MDA B was submitted. The MDA B DPT sampling activities are designed to provide operational data for 1) safely performing waste-retrieval and sorting activities by establishing correlations between field instrument readings and laboratory analysis before actual excavation begins; 2) revising the estimated quantity and distribution of radioactive material at risk; and 3) analyzing waste samples for hazardous materials before excavation to aid in initial waste-sorting activities. The systematic sampling data using DPT are intended to supplement, but not to replace, any sampling performed during waste excavation. Direct-push core sampling has provided a strong indication at several areas that a waste trench is not present; however, these areas will be further examined to determine the contamination present and possibly identify areas of low or no contamination.

DP Site Aggregate Area. A Phase II investigation was conducted in 2009. Phase II data were combined with data presented in the Phase I investigation report that met current Laboratory data-quality requirements. The Phase II investigation activities included collecting 243 surface and subsurface soil and tuff samples from 175 locations to define extent. At the PCB site, a total of 142 pre-excavation samples and 368 post-

excavation samples were collected and analyzed for PCBs. Approximately 1,400 cubic yards of PCB-contaminated material was removed. The Phase II investigation report was submitted in early 2010.

American Reinvestment and Recovery Act for TA-21 Site. The status of the Recovery Act projects as of January 2010 is as follows:

TA-21 DD&D – Six buildings (buildings 21-0370, 21-0167, 21-0166, 21-0210, 21-0328 and 21-0018) have been demolished. The footprint of TA-21 has been reduced by about 27,000 square feet. At the TSTA facility, the entire tritium inventory has been removed and utility isolation is complete. Hazardous and radioactive waste removal is more than 85 percent complete and a contaminated exhaust system was removed from the roof of the building.

MDA B – The metal structures that will be erected over MDA B during excavation were delivered and are ready to assemble when the site is graded. All three phases of geoprobe activity have been completed.

Groundwater monitoring wells – Two of 16 groundwater monitoring wells have been completed ahead of schedule, and drilling is underway for three additional wells. Total depth of the new wells, which monitor groundwater in the regional aquifer, is 1,050 feet.

To date, the Laboratory has shipped 143 tons of asbestos waste, 1,309 tons of low-level radioactive plus PCB waste, 6.7 tons of New Mexico Special Waste, and 88 tons of industrial waste off-site. In addition, 56 tons of metal have been shipped for recycling.

Interim Facility-Wide Groundwater Monitoring Plan. The 2009 Interim Facility-Wide Groundwater Monitoring Plan was approved. Water monitoring in 2009 included base flow, alluvial groundwater, intermediate-perched groundwater, and regional aquifer groundwater 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 beyond LANL boundaries has been conducted in areas affected by LANL operations and in areas unaffected by LANL for the purpose of establishing baseline data.

2.17.3 Site/Facility Categorization

No new Nuclear Environmental Sites were added to the DOE/LANL Nuclear Facilities List during CY 2009 (Table 2.17.3-1).

Table 2.17.3-1. Environmental Sites with Nuclear Hazard Classification

Technical Area	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 DD&D activities, and radioactive liquids generated at TA-21.	2
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-49	SWMUs 49-001(a), 49-001(b), 49-001(c), and 49-001(d)	This Area 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	2
TA-54	SWMU 54-004	MDA H is a 0.3-acre site on Mesita del Buey containing nine inactive shafts that were used for disposal of LANL waste.	3
TA-54	Consolidated Unit 54-013(b)-99 [as an element of TA-54 Waste Storage and Disposal Facility, Area G]	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 pits, shafts, and trenches that received waste until 1997. Other units at Area G continue to be used for LLW disposal and storage and processing of TRU waste for disposal at the WIPP.	2

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3.0 Site-Wide 2009 Operations Data

The Yearbook's role is to provide data that could be used to develop an impact analysis. This chapter 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.

In the September 2008 ROD, DOE/NNSA decided to continue operation of LANL pursuant to the No Action Alternative analyzed in the 2008 SWEIS with the addition of some elements of the Expanded Operations Alternative. The parameters of this alternative are set by the 2008 and 2009 RODs and other decisions that DOE/NNSA has made regarding the continued operation of LANL.

Chapter 3 compares actual operating data to projected environmental effects for about half of the parameters discussed in the SWEIS, including effluent, workforce, regional, and long-term environmental effects.

3.1 Air Emissions

3.1.1 Radiological Air Emissions

In the 2008 SWEIS No Action Alternative, radiological air emissions are projected to remain at levels similar to those projected in the 1999 SWEIS. However, short-term increases could occur during construction or DD&D activities as well as MDA remediation, canyon cleanup, and other actions related to the implementation of the Consent Order.

Radiological airborne emissions from point sources (i.e., stacks) during 2009 totaled approximately 790 curies, approximately 2 percent of the annual projected radiological air emissions of 34,000[6] curies projected in the SWEIS.

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 48 curies.

The total point source emissions from LANSCE were approximately 737 curies.

Non-point sources of radioactive air emissions are present at LANSCE, Area G, 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 60 curies. Additional detail about radioactive air

[6] The projected radiological air emissions changed from the 10-year annual average of 21,700 curies in the 1999 SWEIS to 34,000 curies in the 2008 SWEIS. Annual radiological air emissions from 1999–2005 were used to project the air emissions in the 2008 SWEIS. Emissions of activation products from LANSCE were much higher in those years due to a failure in one component of the emissions control system. The system was repaired in CY 2006, which has significantly decreased emissions.

emissions is provided in LANL's 2009 annual compliance report to the EPA (LANL 2010b), submitted in June 2010, and in the 2009 Environmental Surveillance Report (LANL 2010c).

Maximum off-site dose for 2009 to the maximum exposed individual was 0.55 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 off-site receptor location 24 hours per day, eating food grown at that same site. No actual person received a dose of this magnitude.

3.1.2 Non-Radiological Air Emissions

3.1.2.1 Emissions of Criteria Pollutants

The 2008 SWEIS projects criteria pollutants would be smaller than those shown in the operating permit and well below the ambient standards established to protect human health with an adequate margin of safety. Minor non-radiological air quality impacts are projected to occur from the construction of the CMRR NF at TA-55, completion of the TA-16 Engineering Complex, demolition of structures at TA-16, construction of new buildings at the consolidated Two-mile Mesa Complex within TA-22, and implementation of the Consent Order.

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 2009 emissions of criteria pollutants are far below the estimated emissions presented in the SWEIS.

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

Pollutants	Units	2008 SWEIS	2009 Operations
Carbon monoxide	Tons/year	58	15.8
Nitrogen oxides	Tons/year	201	21.8
Particulate matter	Tons/year	11	2.6
Sulfur oxides	Tons/year	0.98	0.4

a Emissions included on the annual Emissions Inventory Report do not include insignificant sources.

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, the TA-3 combustion turbine, 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 Emissions Inventory Report for 2009 (LANL 2010d). In CY 2009, 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 emissions and presents the 2009 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.

Table 3.1.2.1-2. 2009 Emissions for Criteria Pollutants as Reported on LANL's Title V Operating Permit Emissions Reports[a]

Pollutants	Units	2008 SWEIS	Title V Facility-Wide Emission Limits	2009 Emissions
Carbon monoxide	Tons/year	58	225	33.5
Nitrogen oxides	Tons/year	201	245	46.6
Particulate matter	Tons/year	11	120	4.3
Sulfur oxides	Tons/year	0.98	150	0.7

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

Chemical usage and calculated emissions for Key Facilities are reported using ChemLog. The quantities presented here 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 2010d).

Air emissions presented in Appendix B are listed as emissions by Key Facility. Emission estimates (expressed as kilograms per year) were performed in the same manner as that reported in previous Yearbooks. First, usage of listed chemicals was calculated per facility. It was then estimated that 35 percent of the chemical used was released into 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 for VOCs and HAPs were expressed as concentrations rather than emissions; therefore, direct comparisons cannot be made, and projections from the SWEIS 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)	
	2008	2009
HAPs	4.5	5.2
VOCs	9.0	13.5

Emissions of VOCs and HAPs from chemical use in research and development activities in 2009 are similar to previous years.

3.2 Liquid Effluents

To reduce the potential impacts of LANL activities on water resources, LANL has several programs that monitor and protect surface water quality and quantity.

LANL implemented the Outfall Reduction Program to reduce the total number of outfalls discharging to the environment. From January 1, 2009, through December 31, 2009, LANL had 15 (14 industrial outfalls and one sanitary outfall) wastewater outfalls that were regulated under NPDES Permit No. NM0028355. Based on discharge monitoring reports prepared by LANL's Water Quality and RCRA Group, 12 permitted outfalls had recorded flows in CY 2009 totaling an estimated 133.3 million gallons. This is approximately 25.1 million gallons less than the CY 2008 total of 158.4 million gallons. The 2009 total volume of discharge is below the maximum flow of 278.0 million gallons that was projected in the SWEIS. Treated wastewater released from LANL's NPDES outfalls rarely leaves the site. Details on NPDES noncompliance during 2009 is provided in the 2009 Environmental Surveillance Report (LANL 2010c).

CY 2009 discharges are summarized by watershed and compared with watershed totals projected in the SWEIS in Table 3.2-1. The bulk of the CY 2009 discharges came from Non-Key Facilities (Table 3.2-2).

Key Facilities accounted for approximately 37.8 million gallons of the 2009 total. LANSCE discharged approximately 17.8 million gallons in 2009, about 0.8 million gallons less than in 2008, accounting for about 47.1 percent of the total discharge from all Key Facilities (Table 3.2-2). Table 3.2-2 compares NPDES discharges by Key and Non-Key Facilities.

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 HEWTF at TA-16 (one of the Key Facilities). The TA-16 HEWTF did not discharge in CY 2009.

The RLWTF, TA-50 building 01, Outfall 051 discharges into Mortandad Canyon. During CY 2009, about 1.1 million gallons of treated radioactive liquid effluent, about 0.25 million gallons less than CY 2008, were released to Mortandad Canyon from the RLWTF, compared to 9.3 million gallons projected in the SWEIS.

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

Watershed	# Outfalls 2008 SWEIS	Discharge 2008 SWEIS	Discharge CY 2009
Cañada del Buey	1[a]	0	0
Guaje	0	0	0
Los Alamos	5	45.6	17.4
Mortandad	5	44.3	3.04
Pajarito	0	0	0
Pueblo	0	0	0
Sandia	6	187.3	111.9
Water[b]	5	2.26	0.88
Totals	**22**	**279.5**	**133.2**

a 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.
b Includes 05A-055 discharge to Cañon de Valle, a tributary to Water Canyon.

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

Key Facility	# Outfalls 2008 SWEIS	Discharge 2008 SWEIS	Discharge CY 2009
Plutonium Complex	1	4.1	1.2
Tritium Facility	2	17.4	0
CMR Building	1	1.9	0
Sigma Complex	1	5.8	0.5
High Explosives Processing	3	0.06	0
High Explosives Testing	1	2.2	0.8
LANSCE	2	28.2	17.7
Metropolis Center	1	13.6	16.1
Biosciences	None	0	0
Radiochemistry Facility	None	0	0
RLWTF	1	4.0	1.1
Pajarito Site	None	0	0
MSL	None	0	0
TFF	None	0	0
Machine Shops	None	0	0
Waste Management Operations	None	0	0
Non-Key Facilities	5	200.9	95.5[a]
Totals	**15**	**279.5**	**133.2**

a Mainly due to discharge from SWWS and the TA-03 steam plant.

Discharges from the Non-Key Facilities made up the majority of the total CY 2009 discharge from LANL. This total, 95.5 million gallons, was about 46.6 million gallons less than the 142.1-million-gallon total discharge from the Non-Key Facilities that was projected in the SWEIS. Two Non-Key Facilities, the TA-46 SWWS and the TA-03 steam plant, account for about 89 percent of the total discharge from Non-Key Facilities and about 64 percent of all water discharged by LANL. The SWWS at TA-46 processed about 85.3 million gallons of treated wastewater during CY 2009, all of which was pumped to TA-03, to be either recycled at the TA-03 power plant (as potential make-up water for the cooling towers), or discharged into Sandia Canyon via Outfall 001.

The NPDES Multi-Sector General Permit (MSGP) Program regulates stormwater discharges from identified industrial activities and their associated facilities. These activities include metal fabrication; hazardous waste treatment, storage, and disposal; vehicle and equipment maintenance; recycling activities; electricity generation; and asphalt manufacturing.

The current permit for MSGP was issued by EPA on September 29, 2008. In December 2008, Los Alamos National Security, LLC (LANS) submitted to EPA a Notice of Intent for coverage under the MSGP.

The MSGP-2008 required the development and implementation of site-specific stormwater 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 stormwater runoff meet EPA and state water quality standards. The Permit requirement also includes monitoring of stormwater discharges from permitted sites.

Compliance with the MSGP-2008 requirements for the LANL permitted facilities was 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.
- Perform routine facility inspections and conduct required corrective action.
- Perform required benchmark and impaired waters stormwater monitoring of specific analytical parameters for the seven different sectors listed under the permit.

To achieve compliance with the MSGP during CY 2009, LANL operated about 29 stormwater-monitoring stations at 19 different locations.

On February 13, 2009, EPA Region 6 issued NPDES Individual Permit (IP) No. NM0030759 to co-permittees LANS and the DOE. Immediately following issuance of the IP by EPA, the Permit was publicly appealed. During the remainder of CY 2009 the IP was in the process of revision and modification by EPA.

The purpose of the IP is to regulate stormwater discharges from specified SWMUs and AOCs. It also establishes a schedule for monitoring and reporting that requires the Laboratory to minimize erosion and the transport of pollutants or contaminants from regulated sites in stormwater runoff. The IP requires monitoring at 250 Site Management Areas. The purpose of stormwater monitoring is to compare against applicable Target Action Levels (TALs) set forth in the IP. If a TAL is exceeded, permittees must take corrective action measures identified in the Permit. The 2008 SWEIS projects a temporary increase in soil disturbance and removal of vegetation as MDA remediation, canyon cleanup, and other actions related to the implementation of the Consent Order are executed. This work would be addressed by the NPDES Construction General Permit (CGP) Program, which regulates stormwater 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.

LANL and the general contractor apply individually for NPDES CGP coverage and both are permittees at most construction sites. Compliance with the NPDES CGP includes the development and implementation of a SWPPP before soil disturbance can begin and site inspections once soil disturbance has commenced. A SWPPP describes the project activities, site conditions, BMPs, and permanent control measures required for reducing pollution in stormwater discharges and protecting endangered or threatened species and critical habitat. Compliance with the NPDES CGP is demonstrated through periodic inspections that document the condition of the site and identify corrective actions required to keep pollutants from moving off the construction site. Data collected from these inspections are tabulated monthly and annually in the form of Site Inspection Compliance Reports.

During 2009, the Laboratory implemented CGP requirements at 53 permitted construction sites and performed 470 site-specific stormwater inspections. The percentage of compliant inspections for the year was 99.1, compared to 99.6 in 2008. During the summer months, when most high-intensity precipitation events occur, all 134 of the inspections conducted during this period were compliant.

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's 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.

The 2008 SWEIS projected cumulative waste generation rates for all waste types to be substantially large due to future remediation and DD&D of facilities. Actual

waste volumes from remediation may be smaller, depending on regulatory decisions by the NMED, and because of waste volume reduction techniques.

LANL generates radioactive and chemical wastes as a result of research, production, maintenance, and construction. In addition, EP Directorate performs cleanup operations of sites and facilities formerly involved in weapons research and development. EP Directorate includes the operations and responsibilities of the previous ER Project. See Table 3.3-1 for details.

Waste generators are assigned to one of three categories—Key Facilities, Non-Key Facilities, and EP. Waste types are defined by differing regulatory requirements. Compliance with the Consent Order is projected to cause remediation of a large number of PRSs and MDAs from FY 2007 through FY 2016. Waste volumes associated with the Removal Option are presented in the 2008 SWEIS, Appendix I, Table I-70. The annual waste volume projection from Table I-70 will be used as the projection for EP waste types for the SWEIS Yearbooks.

Table 3.3-1. LANL Waste Types and Generation[a]

Waste Type	Units	2008 SWEIS	CY 2009
Chemical	10^3 kg/yr	6,207	1,722.9
LLW	m^3/yr	25,995	3,771.9
MLLW	m^3/yr	3,256	13.45
TRU	m^3/yr	780	37.25
Mixed TRU	m^3/yr	[b]	75.3

a Waste projections for Key and Non-Key Facilities were based off the 2008 SWEIS, Chapter 5 (page 5-139), Table 5-39, Radioactive and Chemical Waste from routine operations, No Action Alternative. ER waste projections were based off the 2008 SWEIS, Appendix I (I-185), Table I-70, Removal Option Annual Waste Generation Rates (Implementation of the Consent Order for 2008).

b The 2008 SWEIS combines TRU and Mixed TRU into one waste category since they are managed for disposal at WIPP.

Waste quantities from CY 2009 LANL operations were significantly below SWEIS 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 P2 Program improves LANL operations by minimizing environmental damage and adverse regulatory findings. LANL's commitment to P2 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) complying with the many regulatory requirements necessary to operate LANL. To attain these goals, LANL's P2 Program approach focuses on the following:

- ensuring that LANL policies and procedures highlight prevention as the preferred methodology to address waste issues;
- integrating waste minimization (WMin) and P2 principles into the planning process;
- supporting the development of new technologies to reduce or eliminate waste;

- working with waste generators to identify WMin and P2 opportunities;
- using appropriate material substitution and process improvements;
- complying with DOE Order 430.2B,
    - by use of energy- and water-efficient equipment,
    - by procurement of environmentally sustainable products, and
    - by sustainable design in new buildings and major renovations;
- recycling and reusing materials; and
- tracking, projecting, and analyzing waste data to identify waste generation targets and continually reduce waste.

LANL implemented a prevention-based Environmental Management System (EMS) in 2004 to comply with DOE Order 450.1. 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, and re-certified in April 2009, 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 Laboratory's environmental policy states:

> 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 2009 EMS Institutional Objectives

The following are LANL's EMS Institutional Objectives for FY 2009:

1. Ensure environmental compliance
    a. Maintain compliance with all environmental requirements, and reduce risk through WMin and early identification and mitigation of environmental issues
2. Reduce waste generation
    a. Reduce waste generation by implementing waste avoidance and WMin strategies; meet or exceed recycling performance indicators; reduce cost and risk to programs. [Includes office trash, solid, sanitary, hazardous, low-level and mixed low-level (radioactive) waste, and radioactive liquid waste]
3. Energy and fuel conservation

   a. Actively reduce cost and increase operating capacity through reduction in energy, fuel, and water consumption
4. Disposition excess items, equipment, chemicals, documents, and materials
   a. Effectively manage excess items, equipment, chemicals, documents, and materials generated during historical, current, and future laboratory operations
5. Zero liquid discharge
   a. Achieve zero liquid discharge by 2012; reduce unnecessary water usage, and support NPDES outfall elimination and zero liquid discharge project plans, as appropriate

3.3.2 Sanitary Waste

LANL sanitary waste generation and transfer of waste to the Los Alamos County Landfill, now the Eco Station, has varied considerably over the last decade, with a peak (more than 14,000 tons) transferred to the landfill in 2000 that was due to removal of Cerro Grande Fire debris.

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 total waste generation can be classified as routine and non-routine. The waste can also be categorized as recyclable and non-recyclable. Table 3.3.2-1 shows LANL sanitary waste generation for CY 2009. The recycle of total (routine and non-routine) sanitary waste currently stands at 45 percent compared to 1993 when LANL recycled only about 10 percent of the sanitary waste.

Table 3.3.2-1 LANL Sanitary Waste Generation in CY 2009 (metric tons)

	Routine	Non-routine	Total
Recycled	512	2,046[a]	2,558
Landfill disposal	1,874	687[b]	2,562
Total	2,386	2733	5,120

a Brush, dirt, concrete, and asphalt
b Construction and demolition debris, non-hazardous solid waste from TA-54.

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

Non-routine sanitary waste is typically derived from construction and demolition projects, including all recycled metal. 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.

3.3.3 Chemical Wastes

The 2008 SWEIS projected chemical waste to decline for normal operations at LANL; however, significant quantities of this waste type are expected due to environmental restoration activities. Chemical waste includes not only construction and demolition debris, but also all other non-radioactive wastes passing through the Solid Radioactive and Chemical Waste Facility. In addition, construction and demolition debris is a component of those chemical wastes that in most cases are sent directly to off-site disposal facilities. Construction and demolition debris consists primarily of asbestos and construction debris from DD&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.) DD&D waste volumes are tracked in Section 3.11.2.

Chemical waste generation in CY 2009 was about 17 percent of the chemical waste volumes projected in the 2008 SWEIS. Table 3.3.3-1 summarizes chemical waste generation during CY 2009.

EP wastes accounted for only about 6 percent of the chemical waste volumes projected in the 2008 SWEIS.

Table 3.3.3-1. Chemical Waste Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2009
Key Facilities	10^3 kg/yr	596	105.5
Non-Key Facilities	10^3 kg/yr	650	980.7[a]
EP	10^3 kg/yr	8,409.5[b,c]	636.6
LANL	10^3 kg/yr	9,655.5	1,722.9[d]

a Chemical waste generation at the Non-Key Facilities exceeded the SWEIS projections due to disposition of large amounts of asbestos associated with DD&D of TA-43-0041 and other buildings within LANL as part of the Footprint Elimination Project.
b Used conversion 1,100 kg/1 m^3. 1,100 kg was derived from adding all of EP waste for CY 2008.
c Projected annual waste generation for FY 2009 from Implementation of the Consent Order, Removal Option, 2008 SWEIS (Table I-70).
d Discrepancy in the additive chemical waste volumes is due to round-off error.

3.3.4 Low-Level Radioactive Wastes

The 2008 SWEIS projected that LLW generation would increase from waste generated from MDA removal and LLW would exceed the TA-54, Area G capacity, which would require offsite disposal. In CY 2009 LLW volumes were well below volumes projected in the SWEIS (Table 3.3.4-1). LLW generation in CY 2009 was about 2 percent of the LLW volumes projected in the 2008 SWEIS.

Table 3.3.4-1. LLW Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2009
Key Facilities	m^3/yr	7,646	924.3
Non-Key Facilities	m^3/yr	1,529	320.2
EP	m^3/yr	125,478[ab]	2,527.3
LANL	m^3/yr	134,653	3,771.9

a Includes low-level, alpha low-level, and remote-handled LLW.
b Projected annual waste generation for FY 2009 from Implementation of the Consent Order, Removal Option, 2008 SWEIS (Table I-70).

3.3.5 Mixed Low-Level Radioactive Wastes

The 2008 SWEIS projected MLLW generation to increase, but the quantity is projected to be less than two percent of the quantity of LLW generation. EP produced less than one cubic meter of MLLW in 2009, less than one percent of the volumes projected in the 2008 SWEIS. Table 3.3.5-1 examines these wastes by generator categories.

Table 3.3.5-1. MLLW Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2009
Key Facilities	m^3/yr	68	10.1
Non-Key Facilities	m^3/yr	31	2.5
EP	m^3/yr	33,650[a,b]	0.83
LANL	m^3/yr	33,749	13.4

a Includes mixed low-level, mixed alpha low-level, and mixed remote-handled low-level radioactive waste.
b Projected annual waste generation for FY 2009 from Implementation of the Consent Order, Removal Option, 2008 SWEIS Table I-70)

3.3.6 Transuranic Wastes

As projected in the 2008 SWEIS, TRU wastes are 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 EP, which did not produce any TRU wastes in CY 2009. Table 3.3.6-1 examines TRU wastes by generator categories.

Table 3.3.6-1. Transuranic Waste Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2009
Key Facilities	m^3/yr	413[a]	33.0
Non-Key Facilities	m^3/yr	23[a]	4.1
EP	m^3/yr	3,610[a,b]	0
LANL	m^3/yr	4,046[a]	37.25

a The 2008 SWEIS combines TRU and mixed TRU into one waste category since they are both managed for disposal at WIPP.
b Projected annual waste generation for FY 2009 from Implementation of the Consent Order, Removal Option, 2008 SWEIS (Table I-70).

3.3.7 Mixed Transuranic Wastes

In 2009, mixed TRU wastes were generated at only two facilities—the Plutonium Facility and the Solid Radioactive and Chemical Waste Facility. The 2008 SWEIS combines TRU and mixed TRU into one waste category since they are both managed for disposal at WIPP for SWEIS projections, see Table 3.3.6-1 for 2008 SWEIS projections. Table 3.3.7-1 examines mixed TRU wastes by generator categories for CY 2009.

Table 3.3.7-1. Mixed Transuranic Waste Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2009
Key Facilities	m^3/yr	[a]	75.3
Non-Key Facilities	m^3/yr	[a]	0
EP	m^3/yr	[a,b]	0
LANL	m^3/yr	[a]	75.3

a The 2008 SWEIS combines TRU and mixed TRU into one waste category since they are both managed for disposal at WIPP.
b Projected annual waste generation from Implementation of the Consent Order, Removal Option, 2008 SWEIS (Table I-70).

3.4 Utilities

Ownership and distribution of utility services continue to be split between DOE/NNSA and Los Alamos County as members of the Los Alamos Power Pool, which is a partnership agreement with Los Alamos County and LANL established in 1985. 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. Previous Yearbooks collected routine data for both gas and electricity on a FY basis; however, starting with the 2008 Yearbook, all data will be collected and summarized by CY.

Utility infrastructure demands for electricity, natural gas, and water are projected to increase for LANL through 2020, and among other Los Alamos County users who rely upon the same utility systems as LANL through 2013.

3.4.1 Gas

Los Alamos County and LANL receive their natural gas from the Public Service Company of New Mexico (PNM). The gas pipeline comes from Bloomfield, NM,

to Los Alamos. At the end of 2009, the Combustion Gas Turbine Generator (CGTG) was installed and operational. The CGTG serves as one of LANL's on-site energy sources by producing electricity from the combustion of fuel. The CGTG is capable of producing 27 megawatts and is available to serve the Los Alamos Power Pool and regional utility network on an as required basis for peak-load shaving and emergency situations. Metering information for the CGTG will be included in the 2010 SWEIS Yearbook.

Table 3.4.1-1 presents LANL's CY 2009 gas usage. Approximately 98 percent of the gas used by LANL was for heating (both steam and hot air). The remainder was used for electricity production. LANL electricity generation is used to fill the difference between peak loads and the electricity import capability and for training of the power plant operators in turbine operation.

Total gas consumption for CY 2009 was less than projected in the 2008 SWEIS. During CY 2009, less natural gas was used for heating than in CY 2008, due to the failure of the #3 steam turbine generator. Steam turbine generators #1 and #2 have also been unavailable for much of the last three years.

Table 3.4.1-1. Gas Consumption (decatherms[a]) at LANL/CY 2009

Category	Total LANL Consumption Base	Total Used for Electricity Production	Total Used for Heat Production	Total Steam Production (klb)[b]
2008 SWEIS	1,197,000[a]	Not projected	Not projected	Not projected
CY 2009	1,087,769[a]	18,700[a]	1,069,068[a]	333,623[c]

a A decatherm is equivalent to 1,000 to 1,100 cubic feet of natural gas.
b klb: Thousands of pounds
c TA-03 steam production has two components: that used for electricity production (3,456 klb in CY 2009) and that used for heat (315,859 klb in CY 2009).

3.4.2 Electrical

LANL is supplied with electricity through the Los Alamos Power Pool. The DOE and Los Alamos County entered into a 10-year contract (with extensions) known as the Electric Coordination Agreement whereby each entity's electricity resources are consolidated or pooled. Changes in transmission agreements with PNM 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 electricity generation 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 10 megawatts of electricity with the steam driven turbine generators #1 and #2 and 27 megawatts from the CGTG for a total of 37 megawatts that is shared by the Power Pool under contractual arrangement. The #3 steam turbine at the Co-generation Complex is

a 10-megawatt unit, but is out of service due to the condenser failure and costs to repair it are prohibitive at this time. Currently, there are no plans to upgrade existing equipment.

The ability to accept additional power into the Los Alamos Power Pool grid is limited by the regional electricity import capability of the existing northern New Mexico power transmission system. Population growth in northern New Mexico, together with expanded industrial and commercial usage, has greatly increased power demands on the regional power system. LANL has completed several construction projects to expand the existing power capabilities (LANL 2009a).

The current transmission line configuration is no longer vulnerable to a single failure taking out both incoming transmission lines. The LANL 115-kilovolt system includes redundancies to enhance reliability of our sources. The construction of the portion of the line from the Norton substation to Southern Technical Area is still under consideration, and various options are being evaluated.

Within the existing underground ducts, LANL's 13.2-kilovolt distribution system must be upgraded to fully realize the capabilities of the Western Technical Area substation and the upgraded Eastern Technical Area substation. Upgrades will provide for redundant feeders to critical facilities, and upgrading the aging TA-03 substation will complete the 13.2-kilovolt distribution and 115-kilovolt transmission systems.

In September 2008, DOE/NNSA issued the first ROD for the new SWEIS, and a second ROD was issued in 2009. The decision was made to continue to implement the No Action Alternative with the addition of a few elements of the Expanded Operations Alternative. In the 2008 SWEIS No Action Alternative, LANL total electricity consumption was reduced to a number closer to the average actual electricity consumption for the six years analyzed making the new total 495,000 megawatt-hours. In addition, the electricity peak load under the No Action Alternative is 91,200 kilowatts.

Elements of the Expanded Operations alternative were discussed in the two SWEIS RODs. Expansion of the capabilities and operational levels at the Metropolis Center to support the Roadrunner Super Computer platform was one of the few elements of the Expanded Operations Alternative that was approved to go forward. This decision would impact the total electricity peak demand and the total electricity consumption at LANL; therefore, the LANL total in Table 3.4.2-1 under the 2008 SWEIS represents 91,200 kilowatts for LANL plus 18,000 kilowatts operating requirements for the Metropolis Center.

Table 3.4.2-2 shows annual use of electricity for CY 2009. LANL's electricity use remains below projections in the SWEIS. Actual use has fallen below these values and projected 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. Electricity Peak Coincident Demand/CY 2009[a]

Category	LANL Base	LANSCE	Metropolis Center	LANL Total	County Total	Pool Total
2008 SWEIS	57,200	34,000	18,000[c]	103,200[d]	19,800	111,000
CY 2009	40,018	18,048	7,615	65,681	16,990	82,921

a All figures in kilowatts.
b Metropolis Center became a new Key Facility in the 2008 SWEIS.
c Expanded Operations Alternative limit for Metropolis Center.
d This number represents 91,200 kilowatts for LANL as part of the No Action Alternative in the 2008 SWEIS plus 12,000 kilowatts (18,000 kilowatts Expanded Operations Alternative limit – 6,000 kilowatts No Action Alternative) to expand the capabilities and operational levels of the Metropolis Center as stated in the SWEIS RODs. This was corrected from the 2008 SWEIS Yearbook.

Table 3.4.2-2. Electricity Consumption/CY 2009[a]

Category	LANL Base	LANSCE	Metropolis Center[b]	LANL Total	County	Pool Total
2008 SWEIS	356,000	139,000	131,400[c]	582,400[d]	150,000	645,000
CY 2009	270,562	94,071	66,434	431,067	120,385	547,826

a All figures in megawatt-hours.
b Metropolis Center became a new Key Facility under the 2008 SWEIS.
c Expanded Operations Alternative limit for Metropolis Center.
d This number represents 495,000 megawatt-hours for LANL under the No Action Alternative plus 87,400 (131,400 Expanded Operations limit – 44,000 No Action Alternative) megawatt-hours to expand the capabilities and operational levels of the Metropolis Center as stated in the SWEIS ROD dated September 2008. This was corrected from the 2008 Yearbook.

Operations at several of the large-LANL-load facilities changed during 2004. In 2004 LANSCE changed their operating schedule. For the past several years their electricity 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 changes the overall electricity demand for LANL. Since LANSCE's load is such a large part of LANL's total load, 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.

It is proposed that ground will be broken on the CMRR NF near TA-55 off Pajarito Road in the near future. This building will replace the old CMR building, which is served by the TA-03 substation. The CMRR NF is proposed to be served by upgraded feeders from the TA-03 and Eastern Technical Area substations. The new load will be shared between the substations, and the present CMR load will be removed so that very little additional load will be added to the system.

Electrical Infrastructure Safety Upgrades Project

Project Overview

The Electrical Infrastructure Safety Upgrades (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.

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 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.

Elements of the Expanded Operations alternative were discussed in the two RODs. Expansion of the capabilities and operational levels at the Metropolis Center to support the Roadrunner Super Computer platform, and MDA

remediation were two of the few elements of the Expanded Operations Alternative that was approved to go forward.

Expansion of the Metropolis Center to support the Roadrunner Super Computer platform would impact water usage at LANL. Expanding to a 15-megawatt maximum operating platform is expected to potentially increase current water usage to 51 million gallons (193 million liters) per year. This higher usage would include the additional water lost to cooling tower evaporation and blowdown. Improvements to the Sanitary Effluent Recycling Facility (SERF) will lead to increased use of recycled effluent in the cooling towers. Metropolis Center water consumption is not metered. Water usage will be reported once the facility is metered. Also, 58 million gallons of water over 10 years is projected for MDA remediation activities.

Table 3.4.3-1 shows water consumption in million gallons for CY 2009. Under the No Action Alternative of the 2008 SWEIS, water use at LANL is projected to be 380 million gallons plus the elements of the Expanded Operations Alternative. In CY 2009, LANL consumed approximately 384 million gallons. Actual use by LANL in 2009 was about 33.8 million gallons less than the 2008 SWEIS projection. In addition, the calculated NPDES discharge of 133.2 million gallons (see Table 3.2-2) in CY 2009 was about 35 percent of the total LANL usage of 384 million gallons.

Table 3.4.3-1. Water Consumption (million gallons) for CY 2009

Category	LANL Base	Metropolis Center[a]	Los Alamos County	Total
2008 SWEIS ROD	417.8[b]	51[c]	1,241	1,621
CY 2008	383.8	Not Available[d]	Not Available[e]	Not Available[e]

a Metropolis Center became a new Key Facility under the 2008 SWEIS.
b This number represents 380 million gallons for LANL under the No Action Alternative plus 32 million gallons (51 Expanded Operations limit – 19 No Action Alternative) to expand the capabilities and operational levels of the Metropolis Center, and 5.8 million gallons of water to be used during MDA remediation activities as stated in the SWEIS RODs. This was corrected from the 2008 Yearbook.
c Cooling water needed in support of Metropolis Center expansion to support Roadrunner. Improvements to the SERF will lead to increased use of recycled effluent in the cooling towers.
d Metropolis Center water consumption is not metered. Water use will be reported once system is metered.
e In September 2001, Los Alamos County acquired the water supply system and LANL no longer collects this information.

The County 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 primarily gravity fed with pumps available for high-demand fire situations at limited locations.

3.5 Worker Safety

It is the policy of LANL to conduct work safely and responsibly; ensure a safe and healthful working environment for workers, contractors, visitors, and other on-site personnel; and protect the health, safety, and welfare of the general public. It is LANL's policy not to compromise safety for personal, programmatic, operational, or any other reason.

In CY 2009, LANS continued to make significant progress in the area of worker safety at LANL. Efforts focused on implementing an effective Voluntary Protection Program (VPP) and improving electrical safety, exposure assessments, Integrated Work Management (IMW), Human Performance Improvement (HPI), radiation protection, and explosives safety. Worker Safety and Security Teams drove worker involvement in resolving issues and improving safety and security. These teams were worker-led and represented all workers with the overall mission to improve safety and security at LANL through direct involvement of all people performing work.

In 2009, LANL met VPP milestones, with the exception of one, and in September 2009 submitted its VPP application to the LASO with an improvement plan that outlined how LANL will continue to improve by

- trending to better predict injuries and illnesses so they can be prevented,
- strengthening working relationships between workers and managers,
- continuing communication of VPP goals, objectives, and benefits, and
- formally evaluating LANL's safety and health programs to identify opportunities to strengthen these programs.

LANL developed, piloted, and implemented a Work Package Review Program that provided feedback on Work Control and related IWM processes. LANL continued to expand knowledge of HPI as more than 1,000 workers attended HPI training courses. The training focused on reducing the consequences of events and on event prediction to help workers anticipate and prevent accidents.

3.5.1 Accidents and Injuries

Analysis of LANL's injury and illness performance shows no marginal improvement over the past year with respect to Total Recordable Case rate and a slight decrease in the Days Away, Restricted or Transferred rate. This has been influenced by a decrease in some types of injuries that have been historically high, such as repetitive trauma and push/pull/lift injuries.

LANL experienced a series of serious electrical safety events in March of 2009, which led to extensive actions to understand the causes for the adverse trends, and events which led to several actions being identified to clearly establish accountability for line management.

LANL continues to strengthen the interface between line managers, Occupational Medicine, and the Injury and Illness Group with respect to timely reporting of

injuries and the completion and analysis of injury investigation reports. The Injury and Illness and Case Management processes were validated through parent organization and DOE oversight reviews.

The 2008 SWEIS under the No Action Alternative projected that occupational injury and illness rates would show a significant decrease from the patterns observed from 1999 through 2005. However, the number of annual occupational injuries and illness could be higher during construction or DD&D activities as well as MDA remediation, canyon cleanup, and other actions related to the implementation of the Consent Order because these activities have higher incidence rates of occupational injuries and illness than the other types of work being performed at LANL.

For 2009, there were approximately 164 recordable cases of occupational injury and illness with approximately 63 cases that resulted in days away of restricted or transferred duties per year. Table 3.5.1-1 summarizes CY 2009 occupational injury and illness rates. 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

	LANL (all workers)	
	TRC[a]	DART[b]
2008 SWEIS	2.04	1.18
CY 2009	1.90	0.73

a Total Recordable Cases (number per 200,000 hours worked)
b Days Away, Restricted, or Transferred

3.5.2 Ionizing Radiation and Worker Exposures

Occupational radiation exposures for workers at LANL during CY 2009 are summarized in Table 3.5.2-1. The collective total effective dose, or collective TED, for the LANL workforce during CY 2009 was 116.8 person-rem. Data in Table 3.5.2-1 show 189 more radiation workers received measurable dose in CY 2009 than CY 2008; with more workers and slightly higher collective dose, the average non-zero dose per worker was lower by 4.0 mrem. Of the 116.8 person-rem collective TED reported for CY 2009, 1.0 person-rem was from internal exposures to radioactive materials, consisting of small plutonium, uranium, and tritium intakes. These reported doses could change with time because estimates of committed effective dose 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.

Note: Dose terms were changed in the 2007 amendment of 10 CFR 835, *Occupational Radiation Protection*; the new terms are implemented at LANL and used in this update (e.g., total effective dose, committed effective dose, and committed equivalent dose).

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

Parameter	Units	2008 SWEIS	CY 2009
Collective TED (external + internal)	person-rem	280	116.8
Number of workers with measurable dose	number	2,018	1,396
Average non-zero dose: • external + internal radiation exposure • external radiation exposure only	millirem millirem	Not projected Not projected	83 83

[a] Data in this report are current as of 08/12/2010.

The highest individual doses in CY 2009 indicate a decrease from typical doses received since CY 2000; senior management and the Institutional Radiation Safety Committee have set expectations and put in place mechanisms to further reduce individual (and collective) doses through performance goals and other ALARA (as low as reasonably achievable) measures. For whole body doses, no worker exceeded the DOE's five-rem-per-year dose limit, and no worker's dose was above the two-rem-per-year LANL administrative control level established for external exposures.

Table 3.5.2-2 summarizes the highest individual dose data for CYs 2001–2009.

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

CY 2001	CY 2002	CY 2003	CY 2004	CY 2005	CY 2006	CY 2007	CY 2008	CY 2009
1.284	2.214	25.960	2.500	2.300	1.238	7.430	2.106	1.142
1.225	1.897	8.700	1.510	2.051	1.148	1.642	1.198	0.933
1.123	1.783	5.700	1.148	2.000	1.060	1.573	1.132	0.932
1.002	1.644	3.500	1.061	1.603	1.053	1.508	1.096	0.885
0.934	1.534	1.935	1.055	1.398	0.971	1.503	0.952	0.877

[a] Data in this report are current as of 08/12/2010.

Comparison with the SWEIS Baseline. The collective TED for CY 2009 is about 42 percent of the 280 person-rem per year baseline in the 2008 SWEIS.

Work and Workload: Changes in workload and types of work at nuclear and radiological facilities, particularly the TA-55 Plutonium Facility, TA-53 LANSCE, and the TA-50 and TA-54 waste facilities, tend to increase or decrease the LANL collective TED. Worker exposure under the 2008 SWEIS No Action Alternative is projected to increase because of the dose associated with achieving a production level of 20 pits per year at TA-55, as well as the dose from increased activity and associated personnel at the proposed CMRR NF. In addition, collective worker dose and annual average worker dose are projected to increase due to the implementation of the actions related to the Consent Order, but long-term effects

associated with MDA cleanup and closure of waste management facilities at TA-54 should reduce worker dose.

TA-55 operations accounted for about half of occupational dose at LANL. CY 2009 doses in this facility were only slightly higher than CY 2008, as radiological work was less than in typical years. Besides occupational exposure from both weapons manufacturing and Pu-238 work (relatively less than typical years), work on repackaging materials, access to storage areas, and providing radiological control support for radiological work and system maintenance were major contributors to worker dose at TA-55.

In addition to TA-55 operations, significant portions of LANL collective dose were accrued by workers performing maintenance at TA-53, subcontractors performing DD&D of a major experimental facility at TA-53, and workers performing retrieval, repackaging, and shipping of radioactive solid waste at LANL waste facilities at TA-50 and TA-54.

Internal doses reflect a combination of routine tritium doses from LANL tritium operations, routine uranium doses from LANL uranium operations, and unanticipated low-level intakes of plutonium and americium. The highest reported internal dose (621 mrem committed effective dose) was detected through routine bioassay and attributable to 2009, although there was no obvious event in 2009 that would have caused this dose.

ALARA Program: LANL occupational exposure continues to be deliberately managed, with associated processes and documentation regarding these occupational doses, work performed, dose optimization efforts, ALARA goal tracking, and other performance indicators. Based on established ALARA goals, dose accrual to date, and expected workload, CY 2010 collective doses are again expected to reach on the order of 100 rem. Improvements in maintaining radiation exposures ALARA, such as improved dose tracking during work activities, additional shielding, and better radiological safety designs being implemented for new and recurring radiological work, should result in continually lower LANL radiological worker doses.

Collective TEDs for Key Facilities. In general, extracting collective TEDs by Key Facility or TA is difficult because these data are collected at the group level, and members of many groups receive doses at several locations. The fraction of a group's collective TED coming from a specific Key Facility or TA can only be estimated. For example, personnel from the Health Physics Operations group and crafts workers are distributed across the Laboratory, and these two organizations account for a significant fraction of the LANL collective TED. Approximately 80 percent of the collective TED that these groups incur is estimated to come from operations at TA-55. The total collective TED for TA-55 residents in CY 2009 (four Plutonium Materials Technology groups, Weapon Component Manufacturing, Materials Science & Technology, Health Physics Operations, Actinide Analytical Chemistry, and crafts) was approximately 59.2 person-rem or about 50 percent of the LANL collective TED. As discussed

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

3.6 Socioeconomics

LANL continues to be a major economic force within the region of influence consisting of Santa Fe, Los Alamos, and Rio Arriba counties.

The LANL-affiliated workforce continues to include LANS employees and subcontractors. In the 2008 SWEIS No Action Alternative, the 2005 levels of employment are assumed to remain steady at 13,504 employees. After 2005 the workforce decreased each year until 2009 when there was an increase in the number of workers already in the region with construction, DD&D activities, and actions related to the implementation of the Consent Order. As shown in Table 3.6-1, the number of employees has decreased from 2008 SWEIS projections by 15 percent. The 11,445 total employees at the end of CY 2009 reflects an increase of 5 percent as compared to the 10,941 employees reported in the 2008 Yearbook (LANL 2010a).

Table 3.6-1. LANL-Affiliated Work Force

Category	LANS Employees	Technical Contractor	Non-Technical Contractor	KSL	SOC[a]	Total
2008 SWEIS[b]	12,019	945	Not projected[c]	[d]	540	13,504
CY 2009	10,458	393	106	0	488	11,445

a Securing Our Country (SOC) (formerly Protection Technology-Los Alamos)
b Total number of employees was presented in the SWEIS, the breakdown had to be calculated based on the percentage distribution shown in the 1999 SWEIS for the base year.
c Data were not presented for non-technical contractors or consultants.
d KSL Employees converted to LANS under "CRAFT" Type of Appointment effective 12/2008.

LANL has had a positive economic impact on northern New Mexico. A University of New Mexico report (Bhandari 2011) indicated that, in 2009, the economic impact on northern New Mexico included $2.47 billion indirect output (operation and construction) and $1.4 billion on labor income. In addition, the report indicated an additional $1.6 billion in value added income to northern New Mexico (e.g., employee compensation, proprietor income, other property income, and indirect business income).

The residential distribution of LANS employees reflects the housing market dynamics of three counties. As seen in Table 3.6-2, 81 percent of the LANS employees reside in Los Alamos, Rio Arriba, and Santa Fe counties.

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
2008 SWEIS[b]	6,617	2,701	2,566	1,080	12,964	540	13,504
CY 2009	4,536	1,696	2,196	895	9,323	1,135	10,458

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 2008 SWEIS, the breakdown was calculated based on the percentage distribution calculated from the 1999 SWEIS.

3.7 Land Resources

Land resources were examined during the development of the 2008 SWEIS. Since the 1999 SWEIS until 2009, the land resources (i.e., undeveloped and developed lands) available for use at LANL have been reduced. Between CY 2001 and CY 2009, the following lands were transferred under Public Law 105-119[7] (42 USC 2391), which were analyzed in the Land Conveyance and Transfer Environmental Impact Statement (DOE 1999e) and managed by the Land Conveyance and Transfer Project Office:

- 2,104.8 acres of land were transferred to the Department of Interior to be held in trust for the Pueblo of San Ildefonso and
- 402.3 acres of land were conveyed to Los Alamos County.

No tracts were transferred or conveyed in CY 2009. Table 3.7-1 provides a summary of the potential land parcels remaining to be transferred or conveyed. Projects under construction in CY 2009 include the RLUOB, TA-55 Covered Storage Pad, and the DD&D of TA-21. CY 2009 land use was similar to the previous CYs.

The EP Directorate 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 may make several large tracts of land available for use (DOE 1999e).

MDA remediation, canyon cleanup, and other actions related to the implementation of the Consent Order could cleanup several tracts of land identified for conveyance or transfer and, pending cleanup, may be made available for future use.

[7] 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.

Table 3.7-1. Potential Land Transfer/Conveyance Tracts Analyzed in the Land Conveyance and Transfer Environmental Impact Statement

Land Tract	Acreage	Location
TA-21/A-16	252	On the eastern end of the same mesa on which the central business district of Los Alamos is located.
DP Canyon/A-10	13	Between the western boundary of TA-21 and the major commercial districts of the Los Alamos town site.
DOE LASO/A-13	8	Within the Los Alamos town site between Los Alamos Canyon and Trinity Drive.
Rendija Canyon/ A-14	900	North of and below Los Alamos town site's Barranca Mesa residential subdivision.
TA-74 South/ A-18a	519	Southern reach of Pueblo Canyon between the White Rock Y and Airport.

3.8 Groundwater

Under the No Action Alternative in the 2008 SWEIS, operation levels would be similar to the current levels; therefore, there would be little change in the flow of contaminants to the alluvial or regional groundwater. MDA remediation, canyon cleanup, and other actions related to the implementation of the Consent Order would not appreciably change the rate of transport of contaminants in the short term, but would likely reduce long-term contaminant migration and impacts on the environment.

The Laboratory performed most groundwater compliance work in 2009 pursuant to the Consent Order. These activities included groundwater monitoring, groundwater investigations, and groundwater well construction.

In 2009, LANL installed 10 alluvial monitoring wells, one perched-intermediate monitoring well, and eight regional monitoring wells (Table 3.8-1; Figure 3-1). The alluvial wells were installed in Pajarito Canyon as part of the Pajarito Work Plan (LANL 1998a) investigation. Wells SCI-2, R-36, and R-43 were installed in Sandia Canyon as part of the ongoing chromium contamination investigation. Well R-42 was installed in Mortandad Canyon as part of the same investigation. Wells R-25b and R-25c were installed adjacent to existing well R-25. Well R-38 (Cañada del Buey) and R-39 (Pajarito Canyon) were installed to augment the existing groundwater-monitoring network around MDAs G, H, and L.

In 2009, the rehabilitation of older characterization wells was completed at R-22 and R-16. These wells were selected for redevelopment because of their importance as locations for groundwater monitoring.

The Laboratory plugged and abandoned five wells in 2009: CdV-16-2(i), Test Well 8, MCOBT-4.4, 03-B-09, and 03-B-10. The wells were plugged and abandoned so they would not provide conduits for contaminants.

In 2009 LANL sampled 244 groundwater wells, well ports, and springs in 599 separate sampling events.

Table 3.8-1. Wells and Boreholes Installed in 2009

Type[a]	Identifier	Watershed (Canyon)	Total depth (ft bgs)[b]	Screened interval (ft bgs)	Water level (ft bgs)	Comments
R	R-35a	Sandia	1086.2	1013.1–1062.2	792.1	Lower Sandia Canyon immediately southwest of municipal supply well PM-3
A	PCAO-5	Pueblo	30	14.7–24.7	6.42	Approximately 100 ft upstream from the flood retention structure
A	PCAO-6	Pueblo	20	8–15	11.0	Approximately 300 ft downstream from the flood retention structure
A	PCAO-7A	Pajarito	25	9.7–19.7	11.0	North side of Pajarito Road approximately 100 ft from the TA-18 entrance
A	PCAO-7B1	Pajarito	60	44–54	56.92	North side of Pajarito Road directly across from the TA-18 entrance
A	PCAO-7B2	Pajarito	25	10–20	12.02	North side of Pajarito Road directly across from the TA-18 entrance
A	PCAO-7C	Pajarito	25	9.7–19.7	10.55	South side of Pajarito Road approximately 50 ft from the TA-18 entrance
A	PCAO-8	Pajarito	25	9.7–19.7	22.5	In TA-36 on the south side of Pajarito Road
A	PCAO-9	Pajarito	21	6–16	7.75	In TA-36 on the south side of Pajarito Road (a quarter-mile west of the security checkpoint)
A	3MAO-2	Pajarito	30	14.7–24.7	26.6	In TA-18 in lower Three Mile Canyon just above the confluence with Pajarito Canyon
A	TMO-1	Pajarito	6.5	3.5–6.5	1.00	Lower Two Mile Canyon above the confluence with Pajarito Canyon
I	SCI-2	Sandia	570	548–568	514.3	Lower Sandia Canyon due south of TA-53 adjacent to R-43
R	R-25b	Cañon de Valle	782	750–770.8	748.6	Adjacent to existing well R-25 above Cañon de Valle
R	R-25c	Cañon de Valle	1080.8	1039.6–1060.0	Dry	Adjacent to existing well R-25 above Cañon de Valle
R	R-36	Sandia	803.7	766.9–789.9	749.1	Lower Sandia Canyon southeast of PM-3 and R-35a&b
R	R-38	Cañada del Buey	853.4	821.2–831.2	810.2	Cañada del Buey northeast of MDA L
R	R-39	Pajarito	875.6	859–869	824	Pajarito Canyon southeast of MDA G
R	R-42	Mortandad	973.5	931.8–952.9	918.8	Mortandad Canyon due south of TA-53 and southeast from R-43/SCI-2
R	R-43	Sandia	990.4	903.9–924.6 969.1–979.1	893.0 (composite)	Lower Sandia Canyon due south of TA-53 adjacent to SCI-2

a A = alluvial aquifer well; I = perched intermediate aquifer well; R = regional aquifer well
b feet below ground surface

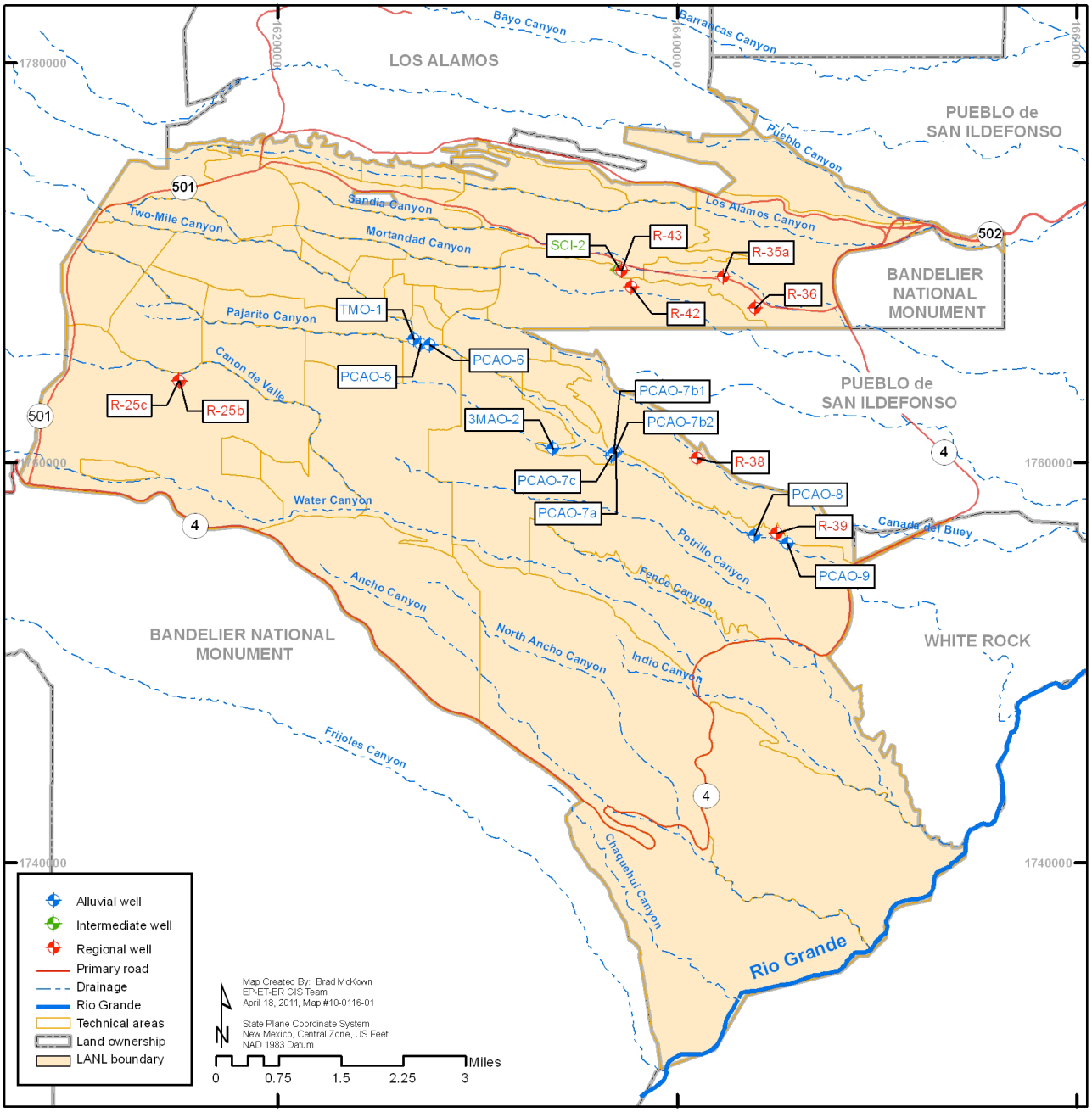


Figure 3-1. Wells and boreholes installed in 2009

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. More than 1,800 prehistoric sites have been recorded (Table 3.9-1). During FY 2007, sites excavated since the 1950s were removed from the site count numbers, lowering LANL's number of recorded sites. More than 85 percent of these archaeological sites date from the 14th and 15th centuries. Most of the sites are situated 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. 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[8] communities as traditional cultural properties.

To date, LANL has identified no sites associated with the Spanish Colonial or Mexican periods. During FY 2004, the historic periods (Historic Pueblo, US Territorial, Statehood, and Undetermined Athabascan) were combined 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 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, LANL historians have 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 759 (Table 3.9-2). 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.

LANL continues to evaluate buildings and structures from the Manhattan Project and the Early Cold War period (1943–1963) for eligibility to the National Register of Historic Places (NRHP).

[8] 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.

Table 3.9-1. Acreage Surveyed, Prehistoric Cultural Resource Sites Recorded, and Cultural Resource Sites Eligible for the NRHP at LANL FY 2009[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	Not reported	Not reported	1,295	1,092	84	23
2007	4	23,134[d]	1,719[e]	1,623[e]	94	4
2008	0	23,130[f]	1,727[e]	1,625[e]	94	2
2009	52	23,046[f]	1,745[d]	1,642[d]	94	3

a Source: Information on LANL provided by DOE/NNSA and LANL to the Secretary of Interior for a Report to Congress on Federal Archaeological Activities.
b In the CY 1999 and CY 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 The total acreage surveyed was recalculated and corrected due to changes in the new DOE/NNSA boundary. Therefore, the total acres surveyed using the new DOE/NNSA boundary and the corrected archaeological area surveyed is a total of 23,134 acres.
e As part of ongoing work to field verify sites recorded 20 to 25 years ago, LANL has identified sites that have been recorded more than once and have multiple Laboratory of Anthropology site numbers. Therefore, the 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 likely be identified.
f Two tracts of land were transferred to Los Alamos County during FY 2009. Therefore, the total acres surveyed using the new DOE/NNSA boundary are 23,046.

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	Percentage of Eligible Properties	Evaluated Buildings Demolished[d]
1999 SWEIS	2,319	164	98	Not reported	Not reported	Not reported
2007	754	593	336	257	57	138
2008	758	623	346	277	55	144
2009	759	631	352	279	56	150

a Source: Information on LANL provided by DOE/NNSA and LANL 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 142 historic sites. As stated previously, during FY 2006, sites excavated since the 1950s were removed from the overall site count numbers. All have been given unique New Mexico Laboratory of Anthropology site numbers. Some of the 142 are experimental areas and artifact scatters dating from the Manhattan Project and Early Cold War periods. The majority, 118 sites,

are structures or artifact scatters associated with the Early Historic Pajarito Plateau or Homestead periods. Of these 142 sites, 99 are eligible for the NRHP. There are 617 Manhattan Project and Early Cold War period buildings.

Demolished Buildings. Table 3.9-3 indicates the extent of historic building documentation and demolition to date. To date, not all buildings that have been documented as part of the DD&D Program have been demolished.

Table 3.9-3. Historic Building Documentation and Demolition Numbers

Fiscal Year	Number of Buildings for which Documentation was Completed	Number of Buildings Actually Demolished in Fiscal Year
2007	18	3
2008	4	6
2009	4	6
TOTAL	26	15

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 2009, LANL evaluated 701 LANL-proposed actions, and no new field surveys to identify cultural resources were conducted. DOE/NNSA sent eight 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 three reports to identify any traditional cultural properties that a proposed action could affect.

The Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601) states that if burials or cultural objects are inadvertently disturbed by federal activities, work must stop in that location for 30 days, and the closest lineal descendant must be consulted for disposition of the remains (25 USC 1996). One discovery of human remains occurred in FY 2009 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 2009.

3.9.2 Compliance Activities

Nake'muu. LANL completed its long-term monitoring program to assess the impact of LANL mission activities on cultural resources at the ancestral pueblo of Nake'muu as part of the *Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility Mitigation Action Plan* (DOE 1996i). Nake'muu is the only pueblo at LANL with standing walls. The site was occupied 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 is revisited annually and in 2008 the site experienced an unusually high percentage of new displaced masonry blocks. LANL is in the process of evaluating possible mitigation efforts. Representatives from the Pueblo of San Ildefonso visited Nake'muu on October 23, 2009.

Traditional Cultural Properties Comprehensive Plan. During FY 2009, LANL continued to assist DOE/NNSA in implementing the *Traditional Cultural Properties Comprehensive Plan* (LANL 2000c). This included 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. A Memorandum of Agreement was completed and signed in CY 2009.

Land Conveyance and Transfer. The Laboratory continued a multiyear program in support of the Land Conveyance and Transfer Project. Thirty-nine archaeological sites were excavated during 2002 to 2007, with more than 200,000 artifacts and 2,000 samples being recovered (LANL 2008f). This work was conducted under a Programmatic Agreement amongst 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.

Cerro Grande Fire Recovery. During 2009, LANL continued to monitor 34 Ancestral Pueblo and Archaic period archaeological sites rehabilitated by the Pueblo of San Ildefonso in CY 2004 (LANL 2010e). The monitoring was in support of the *Mitigation Action Plan for the Special Environmental Analysis for the Cerro Grande Rehabilitation Project* (DOE 2000a, 2000b). The monitoring is part of a long-term program to evaluate the success of erosion control measures and other aspects of rehabilitation. Based on recommendations made during the FY 2009 field season, eight sites were removed from the monitoring plan as they have returned to pre-fire conditions. This leaves 18 sites and two traditional cultural property fences for continued monitoring in FY 2010.

3.9.3 Cultural Resources Management Plan

The Cultural Resources Management Plan (CRMP; LANL 2006b) 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 CRMP provides high-level guidance for implementation of the *Traditional Cultural Properties Comprehensive Plan* and all other aspects of cultural resources management at LANL. It presents a framework for collaborating with Native American Tribes and other ethnic groups and organizations in identifying traditional cultural properties and sacred sites.

Status. The CRMP was finalized and approved by LANL and DOE/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 CRMP will be updated every five years. During FY 2009, implementing activities included 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.

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 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 2009 support this projection. These data are reported in the 2009 Environmental Surveillance Report (LANL 2010c).

The SWEIS Biological Assessment, completed in 2006, covers actions that were described in the 2008 SWEIS No Action Alternative and some actions that were included as part of the Expanded Operations Alternative. Actions included as part of the Expanded Operations Alternative include remediation of MDAs, DD&D of TA-21, and elimination or reduction of outfall releases in Mortandad Canyon and its tributaries.

LANL management approved a LANL Biological Resources Management Plan in September 2007 (LANL 2007c). LANL subject matter experts updated a source document for migratory bird protection BMPs in 2009 (LANL 2010f).

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 2004b). 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. In CY 2007, the Wildland Fire Management Plan (LANL 2007d) was completed and implemented. The overall goals of the Wildland Fire Management Plan are to 1) protect the public, LANL workers, facilities, and the environment from catastrophic wildfire; 2) prevent interruptions of LANL operations from wildfire; 3) minimize impacts to cultural and natural resources while conducting fire management activities; 4) improve forest health and wildlife habitat at LANL and, indirectly, across the Pajarito Plateau; and promote and support interagency collaboration for wildfire-related activities. 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.

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 2002e). Four years after rehabilitation treatment implementation, burned areas have maintained total ground cover but vegetation cover has declined, probably as a result of drought (LANL 2005b). 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 LANL area has received an average of approximately 18 inches of precipitation from CYs 2004–2007. In CY 2008, the Pajarito Plateau received 19 inches, and 18 inches in 2009. There has been a cycle of alternating wet and dry years which make 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, by defining core and buffer habitat important for the survival of these species. 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 2008g).

In CY 2009, LANL continued conducting annual surveys for Mexican spotted owls and southwestern willow flycatchers. Surveys were also conducted for two state-listed species, the Jemez Mountains salamander and the gray vireo. 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.

Floodplain or wetland assessments were completed for the following projects in 2009:

- Burning Ground Spring Carbon Filtration System
- DP Canyon Grade Control Structure
- LA Canyon PCB Remediation
- Pueblo Canyon Grade Control Structure

During 2009, the Biological Resources Compliance and Monitoring Team completed one biological assessment, for soil sampling in Three-Mile Canyon (LANL 2009g), and two amendments of a biological assessment, one for the realignment of Pajarito Road to support the CMRR (LANL 2009h) and one for monitoring wells and water sampling at LANL (LANL 2009i). The US Fish and Wildlife Service concurred in the determination that the projects may affect, but were not likely to adversely affect, federally listed species for all three assessments.

3.11 Footprint Elimination/Decontamination, Decommissioning, and Demolition

3.11.1 Footprint Elimination

Footprint reduction efforts funded by multiple programs contribute to the reduction of the LANL footprint as required to meet all related goals and mandates in place since 2006, and is a cornerstone facility strategy necessary to achieve the robust sustainable infrastructure required for current and future missions. The consolidation of people and functions into facilities that represent a better-built environment, coupled with the elimination of aged permanent and temporary structures, is the goal. This strategy allows the reduction of operational and maintenance costs of the eliminated facilities to more appropriately fund the remaining sustainable facilities. It also allows the associated deferred maintenance backlog and the energy/water usage of those same facilities to be avoided.

The institutionally funded Footprint Reduction Project is dedicated to forwarding specific facilities toward their ultimate elimination. These activities include

- funding the moves of functions/people to vacate a building,
- funding modifications in enduring facilities to house organizations that are vacating obsolete structures,
- addressing the specific institutional requirements necessary to formally declare a facility “excess” to maintain a backlog of structures ready for elimination once DD&D funding is acquired (approximately 0.75 million gross square feet), and
- in some cases, removing small structures.

In CY 2009, DOE/NNSA demolished 12 buildings and 11 trailers/transportables. In addition, three trailers were transferred to various federal and state agencies, eliminating 53,835 square feet of the Laboratory’s footprint.

3.11.2 Decontamination, Decommissioning, and Demolition

DD&D are those actions taken at the end of the useful life of a building or structure to reduce or remove substances that pose a substantial hazard to human health or the environment, retire it from service, and ultimately eliminate all or a portion of the building or structure.

When DOE/NNSA declares a LANL facility as surplus (no longer needed) it is shut down and prepared for DD&D. NEPA for DD&D activities at LANL are covered under the 2008 SWEIS, however, all waste volumes generated from these activities will be tracked in the SWEIS Yearbook.

The 2008 SWEIS projects DD&D actions would produce large quantities of demolition debris, bulk LLW, and smaller quantities of TRU, mixed low-level, sanitary, asbestos, and hazardous wastes. Most waste is expected to be disposed of off-site.

In CY 2009, DOE/NNSA demolished 12 buildings and 11 trailers/transportable. In addition, three trailers were transferred to various federal and state agencies. Tables 3.11.2-1 and 3.11.2-2 summarize the waste volumes for all buildings DD&Ded in CY 2009.

Table 3.11.2-1. CY 2009 DD&D Facilities Construction and Demolition Debris[a]

Building number[b]	DD&D completed	Waste Volumes (cubic meters)						
		Construc-tion/ demolition debris	Asbetos[c]	Univer-sal waste	Recy-clable metal	Recy-clable asphalt/ concrete	Recy-clable wood	Equip-ment salvaged
TA-08-0026, -0030, -0065, -0127	06/26/09	42	2	1	7	0	0	0
TA-16-0193, -1498	07/06/09	1,486	69	3	170	1275	0	0
TA-16-0375, -0376, -0659, -0660, -0661	02/10/09	199	6	1	18	37	0	0
TA-16-0243, -0245, -0246	09/12/08[d]	234	10	2	22	46	0	0
TA-16-0242, -0244, -0897	09/30/09	152	1	1	23	30	0	0
TA-21-0080	12/8/09	0	0	0	0	0	0	0
TA-21-0166	10/08/09	0	231.6	0	13.7	0	0	0
TA-21-0167	10/08/09		165.1	0	23.7	0	0	13.7
TA-21-0210	12/15/09	1,172.8	316.5	0	282.1	0	0	19.1
TA-21-0370	09/29/09	111	5	1	10	20	0	0
TA-43-0041	01/21/09	0	125	0	[e]	[e]	0	0
TA-54-0117, -0185, -0210, -0211, -0221	8/28/09	91	0.5	0	30	0	19	0
	Total	**3,487.8**	**922.7**	**9**	**599.5**	**1,408**	**19**	**32.8**

a Construction/demolition debris totaled 246,409 cubic meters in CY 2009 and included uncontaminated wastes such as steel, brick, concrete, pipe, and vegetative matter from land clearance.
b DD&D covered under existing environmental assessments are not included here.
c Asbestos volumes are tracked within the LANL waste database at TA-54.
This number represents 151,382 cubic meters from the No Action Alternative, 2,293 cubic meters from the RLWTF upgrade, 2,133 cubic meters from the Plutonium Refurbishment, 35,934 cubic meters from the TA-21 DD&D Option, 12,998 cubic meters from the TA-18 DD&D Option, and 41,669 cubic meters from the Waste Management Facilities Transition.
d Buildings were DD&D in 2008 and not reported in the 2008 SWEIS Yearbook.
e Recyclable waste volumes not available for this project.

Table 3.11.2-2. CY 2009 DD&D Facilities Chemical, LLW, MLLW, and TRU

Wastes projections for DD&D 2008 SWEIS	Building Number[b]	DD&D com-pleted	Waste Volumes			
			Chemical Waste[a]	LLW[b]	MLLW[b]	TRU[b]
Chemical Waste 1,417 10^3 kg[a,c]	TA-21-0080	12/08/09	0	6	0	0
LLW Waste[f] 91,891$m^{3d,e}$	TA-21-0210	12/15/09	0	61.1	0	0
MLLW Waste 649 m^{3f}	TA-21-0328	12/15/09	0	53.8	0	0
TRU Waste 437 m^{3g}						
TOTAL			**0**	**120.9**	**0**	**0**

a Units = kilograms per year
b Units = cubic meters per year
c This number represents 837,781 from the No Action Alternative, 96,161 kg from the RLWTF Upgrade, 907 kg from the Plutonium Refurbishment, 34,019 kg from the TA-21 DD&D Option, 191,415 kg from the TA-18 DD&D Option, and 256,732 from the Waste Management Facilities Transition.
d LLW included bulk and packaged LLW.
e This number represents 29,588 m^3 from the No Action Alternative, 7,875 m^3 from the RLWTF Upgrade, 986 m^3 from the Plutonium Refurbishment, 26,453 m^3 from the TA-21 DD&D Option, 3,593 m^3 from the TA-18 DD&D Option, and 23,396 m^3 from the Waste Management Facilities Transition.
f This number represents 306 m^3 from the No Action Alternative, 115 m^3 from the RLWTF Upgrade, 168 m^3 from the Plutonium Refurbishment, 50 m^3 from the TA-21 DD&D Option, 4 m^3 from the TA-18 DD&D Option, and 6 m^3 from the Waste Management Facilities Transition.
g This number represents 176 m^3 from the RLWTF Upgrade, 260 m^3 from the Plutonium Refurbishment, 0.76 m^3 from the TA-21 DD&D Option.

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4.0 Summary and Conclusion

The 2009 SWEIS Yearbook reviews CY 2009 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 RODs. The Yearbook also reviews the environmental effects 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 2008 SWEIS No Action Alternative and approved elements of the Expanded Operations Alternative projected a total of 15 facility construction and modification projects. During 2009, three construction/modification projects occurred. Electrical and mechanical systems were expanded to meet new computer requirements at the Nicholas C. Metropolis Center; construction of the RLUOB continued at TA-55; and removal or demolition of vacated structures within the High Explosive Processing Facilities. Within the Non-Key Facilities, one major construction project, the Proforce Running Track, was started in 2009.

In 2008, Pajarito Site (TA-18) was placed into Surveillance and Maintenance mode. Operations have ceased and the facility was downgraded to a Less-than-HazCat-3 Nuclear Facility. For the purpose of the 2008 and 2009 SWEIS Yearbooks, Pajarito Site and its nine capabilities have been removed as a Key Facility. In addition, the 2008 SWEIS recognized the Nicholas C. Metropolis Center (formerly known as the Strategic Computing Complex) as a new Key Facility because of the amounts of electricity and water it may consume.

During CY 2009, 80 capabilities were active. There were eight inactive capabilities in CY 2009. At CMR, Destructive and Nondestructive Analysis Project, Nonproliferation Training, Actinide Research and Development, Fabrication and Processing and Large Vessel capabilities were not active. No Radioactive Liquid Waste Treatment took place at Tritium Facilities. MTS equipment was not installed at the LANSCE. No Waste Retrieval at Solid Radioactive and Chemical Waste Facilities took place.

During 2009, four of LANL's facilities operated at levels approximating those projected in the SWEIS or beyond what was projected in the SWEIS—Bioscience, the MSL, Radiochemistry, and the Non-Key Facilities. Bioscience and the MSL Key Facilities are more akin to the Non-Key Facilities and represent the dynamic nature of research and development at LANL; none of these facilities are major contributors to the parameters that lead to significant potential environmental impacts.

Radiochemistry Facilities exceeded operation level projections in the SWEIS; however, radioactive air emissions, outfall discharge, waste quantities, and electricity consumption were well below projections in the SWEIS.

This Yearbook evaluates the effects of LANL operations in three general areas—effluent to the environment, workforce and regional consequences, and changes to environmental areas for which the DOE/NNSA has stewardship responsibility as the administrator of LANL.

Radioactive emissions have decreased significantly since 2007, after an emission control system at LANSCE was repaired. Radioactive airborne emissions from point sources (i.e., stacks) during 2009 totaled approximately 790 curies, approximately 2 percent of the 10-year average of 34,000[9] curies projected in the SWEIS.

During 2009, emissions from criteria pollutants were well below both 2008 SWEIS projections and the New Mexico Administrative Code, Title 20, Chapter 2, Part 73.

Since 1999, the total number of permitted outfalls was reduced from 55 identified in the 1999 SWEIS to 15 that were renewed in the August 2007 NPDES permit. As a result of these closures, there has been a significant 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[10]. In 2009, 12 outfalls flowed. Calculated NPDES discharges totaled 133.3 million gallons for CY 2009 compared to a projected volume of 279 million gallons per year. This is approximately 25.1 million gallons less than the CY 2008 total of 158.4 million gallons, due largely to the decrease in discharge amount from the Non-Key Facilities. The 2009 total volume of discharge is well below the maximum flow of 279 million gallons that was projected in the SWEIS.

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. In 2009, 10 alluvial monitoring wells, one perched-intermediate monitoring well, and eight regional monitoring wells were installed.

Wastes have been generated at levels below quantities projected in the SWEIS. The 2008 SWEIS combines TRU and mixed TRU into one waste category since they are both managed for disposal at the WIPP. In 2009, waste quantities from

[9] The projected radiological air emissions changed from the 10-year annual average of 21,700 curies in the 1999 SWEIS to 34,000 curies in the 2008 SWEIS. Annual radiological air emissions from 1999–2005 were used to project air emissions in the 2008 SWEIS. Emissions of activation products from LANSCE were much higher in those years due to a failure in one component of the emissions control system. The repair of the system in CY 2006 has significantly decreased emissions.

[10] 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. Since 2001, data are collected and reported using actual flows recorded by flow meters at all of the outfalls.

LANL operations were below SWEIS projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities. Waste quantities at Key Facilities that exceeded the SWEIS levels were one-time, non-routine events.

In CY 2009, DOE/NNSA demolished 12 buildings and 11 trailers/transportables. In addition, three trailers were transferred to various federal and state agencies, eliminating approximately 53,835 square feet of the Laboratory's footprint.

In the 2008 SWEIS, actual utility impacts and performance changes were analyzed. Annual electricity and water usage from 1999–2005 remained well below the levels projected in the 1999 SWEIS. In the 2008 No Action Alternative, the total electricity consumption and the total water consumption were reduced to a number closer to the average electricity and water consumption for the six years analyzed. The electricity consumption for CY 2009 was 431 gigawatt-hours. Water consumption for CY 2009 was 384 million gallons. Both electricity and water consumption were higher than in CY 2008. Gas consumption for CY 2009 was 1.08 million decatherms, slightly less than CY 2008. The Laboratory is committed to increasing energy efficiency and will continue to make improvements towards that goal in the future.

Radiological exposures to LANL workers are well within the levels projected in the SWEIS. The total effective dose equivalent for the LANL workforce was 116.8 person-rem during 2009, and is slightly higher than the 2008 dose of 104.7 person-rem, but lower than the workforce dose of 280 person-rem projected in the 2008 SWEIS.

In the 2008 SWEIS No Action Alternative, the 2005 levels of employment were assumed to remain steady at 13,304. During 2006 and 2007, the size of the workforce slowly began to decrease. The 11,445 employees at the end of CY 2009 represent an increase of 540 employees as compared to the 10,941 employees reported in the 2008 Yearbook.

Measured parameters for ecological resources and groundwater were similar to SWEIS projections, and measured parameters for cultural resources and land resources were below SWEIS projections. For land use, the SWEIS projected the disturbance of 41 acres of new land at TA-54 because of the need for additional disposal cells for LLW. As of 2009, this expansion had not become necessary. Since 2001, 2,500 acres of land were either transferred to the Department of Interior in trust for the Pueblo of San Ildefonso or conveyed to Los Alamos County or the Los Alamos Public Schools; however, no tracts of land were transferred or conveyed in CY 2009.

Ecological 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.

Cultural resources remained protected in CY 2009 and no site excavation was undertaken at TA-54 or elsewhere on LANL. (The 1999 SWEIS projected that 15 prehistoric sites would be affected by the expansion of Area G into Zones 4 and 6 at TA-54.) Ecological and cultural resources remain stable in 2009.

In conclusion, LANL operations in CY 2009 have mostly fallen within SWEIS projections. Although operation levels for four of LANL's facilities exceeded the SWEIS operation projections, they did not exceed projections of air emissions, outfall discharge, waste, or other impact parameters, therefore, there was no potential for significant impact to the environment from operations of the Laboratory. In addition, waste quantities that exceeded the SWEIS levels were one-time, non-routine events that do not reflect the day-to-day operations of the Laboratory. No other parameters were exceeded. Overall, the operations data from 2009 indicate that LANL has been operating within the 2008 SWEIS projections and regulatory limits.

References

Bhandari, D. 2011. "Impact of Los Alamos National Laboratory on the Economies of Northern New Mexico and the State as a Whole," University of New Mexico Bureau of Business and Economic Research, Albuquerque.

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, 1995. "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 Footprint Reduction of Structures TA-16-242, -245, -367, -375, -376, -897, -898, -1407," LAN-96-010, Accession Number 14938, Los Alamos, NM.

Department of Energy, 1996b. "Categorical Exclusion for Footprint Reduction of Structures TA-16-243, -244, -246, -659, -660 and -661," LAN-96-010, Accession Number 14840, Los Alamos, NM.

Department of Energy, 1996c. "Categorical Exclusion for Gun Site Restoration Project - Phase 1," LAN-96-010, Accession Number 15077, Los Alamos, NM.

Department of Energy, 1996d. "Categorical Exclusion for TA-09-28 WFO Vehicle and Heavy Equipment Maintenance Facility," LAN-96-010, Accession Number 14917, Los Alamos, NM.

Department of Energy, 1996e. "Categorical Exclusion for TA-9-21 Lab Refurbishment," LAN-96-022, Accession Number 12985, Los Alamos, NM.

Department of Energy, 1996f. "Categorical Exclusion for TA-09-21 Electrical Infrastructure Safety Upgrades," LAN-96-012, Accession Number 13501, Los Alamos, NM.

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

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

Department of Energy, 1997. "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, 1998a. "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, 1998b. "Categorical Exclusion for Decontamination and Decommissioning of Vacant Structure," LAN-98-052, Accession No. 6137, Los Alamos, NM.

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.

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

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

Department of Energy, 1999e. "Final Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts Administered by the U.S. Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico," DOE/EIS-0293, Albuquerque Operations Office.

Department of Energy, 2000a. "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.

Department of Energy, 2000b. Letter to Dr. John Browne, Director, Los Alamos National Laboratory from David A. Gurule, Area Manager, Los Alamos Area Office on December 15, 2000.

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. "Environmental Assessment for the D&D of TA-11 Drop Tower," DOE/EA-1407, Accession Number 14947, Los Alamos, NM.

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

Department of Energy, 2003a. “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, 2003b. “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, 2003c. “Environmental Assessment for the Detonator Storage Facility (WCM-3),” DOE/EA-1447, Accession Number 13902, 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, 2005. “Supplement Analysis: Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement (CMRR) Project at Los Alamos National Laboratory—Changes to the Location of the CMRR Facility Components,” DOE/NNSA Los Alamos Site Office DOE/EIS-0350-SA-01.

Department of Energy, 2007. “Site-Wide Operations in Support of the Mission of Los Alamos National Laboratory,” DOE/NNSA Los Alamos Site Office LA-UR-08-2983.

Department of Energy, 2008a. “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 73, p 55833. Washington, DC. September 26, 2008.

Department of Energy, 2008b. “Final Complex Transformation Supplemental Programmatic Environmental Impact Statement Summary,” DOE/NNSA DOE/EIS-0236-S4, Washington, DC.

Department of Energy, 2008c. “Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory,” DOE/EIS-0238, Albuquerque, NM.

Department of Energy, 2009a. “Record of Decision: Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory in the State of New Mexico,” *Document no. E9-16343*. Washington, DC. July 10, 2009.

Department of Energy, 2009b. "Supplement Analysis: Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory—Proposed Transport of Low Level Radioactive Waste by Truck and Rail from Los Alamos National Laboratory (LANL) for Disposal at EnergySolutions at Clive Utah," DOE/NNSA Los Alamos Site Office DOE/EIS-0380-SA-01.

Department of Energy, 2009c. "DOE List of Los Alamos National Laboratory Nuclear Facilities," DOE Albuquerque Operations Office Memorandum, Albuquerque, 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, 1998a. "Work Plan for Pajarito Canyon," Los Alamos National Laboratory document LA-UR-98-2550, Los Alamos, New Mexico.

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

Los Alamos National Laboratory, 1999. "SWEIS 1998 Yearbook," Los Alamos National Laboratory report LA-UR-99-6391, Los Alamos, NM.

Los Alamos National Laboratory, 2000a. "SWEIS Yearbook – 1999," Los Alamos National Laboratory report LA-UR-00-5520, Los Alamos, NM.

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.

Los Alamos National Laboratory, 2000c. "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.

Los Alamos National Laboratory, 2001a. "SWEIS Yearbook – 2000," Los Alamos National Laboratory report LA-UR-01-2965, Los Alamos, NM.

Los Alamos National Laboratory, 2001b. "CMR Replacement Project Preconceptual Design," ESH-ID 01-0194, 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. "TA-55 Radiography/Interim," ESH-ID 01-0258, Los Alamos, NM.

Los Alamos National Laboratory, 2002a. "SWEIS Yearbook – 2001," Los Alamos National Laboratory report LA-UR-02-3143, Los Alamos, NM.

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

Los Alamos National Laboratory, 2002d. "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, 2002e. "Progress Report on Los Alamos National Laboratory Activities One Year After Burned Area Rehabilitation," Los Alamos National Laboratory report LA-UR-02-4921, 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. "SWEIS Yearbook – 2003," Los Alamos National Laboratory report LA-UR-04-6024, Los Alamos, NM.

Los Alamos National Laboratory, 2004b. "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.

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

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

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

Los Alamos National Laboratory, 2006b. "A Plan for the Management of the Cultural Heritage at Los Alamos National Laboratory, New Mexico," Los Alamos National Laboratory report LA-UR-04-8964, Los Alamos, NM.

Los Alamos National Laboratory, 2007a. "SWEIS Yearbook – 2006," Los Alamos National Laboratory report LA-UR-07-6628, 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. "Biological Resources Management Plan for Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-07-2595, Los Alamos, NM.

Los Alamos National Laboratory, 2007d. "Los Alamos National Laboratory Wildland Fire Management Plan," Los Alamos National Laboratory document LA-UR-07-6478, Los Alamos, NM.

Los Alamos National Laboratory, 2008a. "TA-3-39 Rm. 16 Phase II D&D," PR-ID 08P-0144, Los Alamos, NM.

Los Alamos National Laboratory, 2008b. "Los Alamos Science Complex," PR-ID 08P-0061, Los Alamos, NM.

Los Alamos National Laboratory, 2008c. "Materials Test Station," PR-ID 05P-0075 V1, Los Alamos, NM.

Los Alamos National Laboratory, 2008d. "Asphalt Monitoring and Removal Plan for Area of Concern C-00-041, Guaje/Barrancas/Rendija Canyons Aggregate Area," Los Alamos National Laboratory document LA-UR-08-2666, Los Alamos, NM.

Los Alamos National Laboratory, 2008e. "Phase II Investigation Report for the TA-16-340 Complex [Consolidated Units 13-003(a)-99 and 16-003(n)-99 and Solid Waste Management Units 16-003(o), 16-026(j2), and 16-029(f)]," Los Alamos National Laboratory document LA-UR-08-6071, Los Alamos, NM.

Los Alamos National Laboratory, 2008f. "The Land Conveyance and Transfer Data Recovery Project: 7000 Years of Land Use on the Pajarito Plateau," Los Alamos National Laboratory report LA-UR-07-6205, Los Alamos, NM.

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

Los Alamos National Laboratory, 2009a. "SWEIS Yearbook—2007," Los Alamos National Laboratory report LA-UR-09-01653, Los Alamos, NM.

Los Alamos National Laboratory, 2009b. "LANL Less than Hazard Category 3 Nuclear Facilities List."

Los Alamos National Laboratory, 2009c. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Rev.10, DOE/LASO and LANL/Safety Basis Division.

Los Alamos National Laboratory, 2009d. "Investigation Report for Middle Cañada del Buey Aggregate Area," Los Alamos National Laboratory document LA-UR-09-0228, Los Alamos, NM.

Los Alamos National Laboratory, 2009e. "Investigation Report for Upper Mortandad Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-09-6081, Los Alamos, NM.

Los Alamos National Laboratory, 2009f. "Investigation Report for North Ancho Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-09-5314, Los Alamos, NM.

Los Alamos National Laboratory, 2009g. "Biological Assessment of the Potential Effects of Sample Collection in Three-mile Canyon on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory," Los Alamos National Laboratory report LA-CP-09-01685.

Los Alamos National Laboratory, 2009h. "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 report LA-CP-09-00626.

Los Alamos National Laboratory, 2009i. "Amended Consultation for 22420-2006-I-0090: Biological Assessment of the Potential Effects of Monitoring and Maintenance of Monitoring Stations and Wells on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratry," Los Alamos National Laboratory report LA-CP-09-00071.

Los Alamos National Laboratory, 2010a. "SWEIS Yearbook—2008," Los Alamos National Laboratory report LA-UR-10-03439, Los Alamos, NM.

Los Alamos National Laboratory, 2010b. "2009 LANL Radionuclide Air Emissions," Los Alamos National Laboratory report LA-14423, Los Alamos, NM.

Los Alamos National Laboratory, 2010c. "Environmental Surveillance at Los Alamos during 2009," Los Alamos National Laboratory report LA-14427-ENV, Los Alamos, NM.

Los Alamos National Laboratory, 2010d. "Emissions Inventory Report Summary for Los Alamos National Laboratory for Calendar Year 2009," Los Alamos National Laboratory report LA-14430-SR, Los Alamos, NM.

Los Alamos National Laboratory, 2010e. "FY 2010 2008 Site Wide Environmental Impact Statement Mitigation Action Plan Annual Report," Los Alamos National Laboratory report LA-UR-10-07245, Los Alamos, NM.

Los Alamos National Laboratory, 2010f. "Migratory Bird Best Management Practices Source Documents for Los Alamos National Laboratory, Revision 1," Los Alamos National Laboratory report LA-UR-07-8434, 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.

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.

Appendix A: Capability and Operations Tables for Key and Non-Key Facilities

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

Capability	2008 SWEIS Projections	2009 Operations
Analytical Chemistry	Support actinide research and processing activities by processing approximately 7,000 samples/yr.	Analytical Chemistry received approximately 2,000 samples during CY 2009 and conducted over 8,000 analytical processes involving microgram quantities of nuclear material.
Uranium Processing	Recover, process, and store LANL's highly enriched uranium inventory.	No activity to recover or process highly enriched uranium occurred in 2009. Some storage and inventory activities did take place.
Destructive and Nondestructive Analysis (Design Evaluation Project)	Evaluate up to 10 secondary assemblies/yr through destructive/nondestructive analyses and disassembly.	No activity in CY 2009. Project has not been active since 1999.
Nonproliferation Training	Conduct nonproliferation training using special nuclear material (SNM).	No nuclear measurement schools were conducted in CY 2009. This activity has been suspended indefinitely at the CMR.
Actinide Research and Development[a]	Characterize approximately 100 samples/yr using microstructural and chemical metallurgical analyses. Perform compatibility testing of actinides and other metals to study long-term aging and other material effects. Analyze TRU waste disposal related to validation of WIPP performance assessment models. Perform TRU waste characterization. Analyze gas generation as could occur in TRU waste during transportation to WIPP. Demonstrate actinide decontamination technology for soils and materials. Develop actinide precipitation method to reduce mixed wastes in LANL effluents. Process up to 400 kilograms of actinides/yr between TA-55 and the CMR building.	No microstructural/chemical analysis and compatibility testing of actinides were performed in CY 2009. Process activity was moved to TA-55 in 2007. Project was completed in 2001. No activity in CY 2009.

Table A-1 (cont.)

Capability	2008 SWEIS Projections	2009 Operations
Fabrication and Processing	Process up to 5,000 curies of neutron sources/yr (both plutonium-238 and beryllium and americium-241 and beryllium sources). Process neutron sources other than sealed sources. Stage a total of up to 1,000 plutonium-238 and beryllium and americium-241 and beryllium neutron sources in Wing 9 floor holes. Produce 1,320 targets/yr for isotope production. Separate fission products from irradiated targets. Support fabrication of metal shapes using highly enriched uranium (as well as related uranium processing activities) with an annual throughput of approximately 2,200 pounds (1,000 kilograms).	Project was terminated in CY 1999. No process activity in CY 2009. Casting furnace capability was removed in 1999. No enriched uranium solution processing was conducted in CY 2009.
Large Vessel Handling[b]	Process up to two large vessels from the Dynamic Experiments Program annually.	No vessels processed in 2009.

a 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.

b Currently referred to as the Containment Vessel Disposition Project.

Table A-2. CMR Building (TA-03)/Operations Data

Parameter	Units[a]	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions:			
Total Actinides[b]	Ci/yr	7.60E-4	2.66E-05
Krypton-85	Ci/yr	1.00E+2	None detected
Xenon-131m	Ci/yr	4.50E+1	Not measured
Xenon-133	Ci/yr	1.50E+3	Not measured
NPDES Discharge:			
03A–021	MGY	1.9	0
Wastes:			
Chemical	kg/yr	10,886	458.8
LLW	m^3/yr	1,835	106.1
MLLW	m^3/yr	19	0.7
TRU	m^3/yr	42[c]	3.9
Mixed TRU	m^3/yr	[c]	0

a Ci/yr = curies per year; MGY = million gallons per year; kg/yr = kilograms per year; m^3/yr = cubic meters per year.
b Includes plutonium -239
c 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-3. Sigma Complex (TA-03)/Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
Research and Development on Materials Fabrication, Coating, Joining, and Processing	Fabricate items from metals, ceramics, salts, beryllium, enriched and depleted uranium, and other uranium isotope mixtures.	Capability maintained and enhanced, as projected.
Characterization of Materials	Perform research and development on properties of ceramics, oxides, silicides, composites, and high-temperature materials.	Totals of 187 assignments and 830 specimens were characterized.
	Analyze up to 36 tritium reservoirs/yr.	Total of 12 tritium reservoirs analyzed in CY 2009.
	Develop a library of aged non-SNM material 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 up to 80 pits/yr.	Fabricated approximately 72 stainless steel and beryllium pit components.
	Fabricate up to 200 reservoirs for tritium/yr.	Fewer than 25 reservoirs fabricated.
	Fabricate components for up to 50 secondary assemblies/yr (of depleted uranium, depleted uranium alloy, enriched uranium, deuterium, and lithium).	Fabricated components for fewer than 50 secondary assemblies.
	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.
	Fabricate targets and other components for accelerator production of tritium research.	On hold in 2009.
	Fabricate test storage containers for nuclear materials stabilization.	Produced approximately 20 containers.

Table A-4. Sigma Complex (TA-03)/Operations Data

Parameter	Units	2008 SWEIS Projections	2009 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:			
03A–022	MGY	5.8	0.5
Wastes:			
Chemical	kg/yr	9,979	3,644.8
LLW	m^3/yr	994	45.1
MLLW	m^3/yr	4	0
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a Stacks are no longer monitored. Emissions now based on process knowledge and inventory.
b 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-5. Machine Shops (TA-03)/Comparison of Operations

Capability	2008 SWEIS Projections	2009 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 in the SWEIS.
Fabrication Utilizing Unique Materials	Fabricate items using unique and unusual materials such as depleted uranium and lithium.	Fabrication with unique materials was conducted at levels below those projected in the SWEIS.
Dimensional Inspection of Fabricated Components	Perform dimensional inspection of finished components. Perform other types of measurements and inspections.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.

Table A-6. Machine Shops (TA-03)/Operations Data

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions:			
Uranium-238	Ci/yr	1.50E-4	None detected
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	474,002	73,577.9
LLW	m^3/yr	604	14.8
MLLW	m^3/yr	0	0
TRU	m^3/yr	0[a]	0
Mixed TRU	m^3/yr	0[a]	0

a 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-7. Materials Science Laboratory (TA-03)/Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
Materials Processing	Support development and improvement of technologies for materials formulation. Support development of chemical processing technologies, including recycling and reprocessing techniques to solve environmental problems.	These capabilities were maintained as projected in the SWEIS. Single crystal growth, amorphous alloy research, powder processing, and materials characterization were expanded in CY 2009. Cold mock up of weapons assembly and processing as well as other technologies continued to be expanded in CY 2009.
Mechanical Behavior in Extreme Environments	Study fundamental properties of materials and characterize their performance, including research on the ageing of weapons. Develop and improve techniques for these and other types of studies.	These two capabilities were maintained as projected in the SWEIS and additional capabilities continued to be expanded as projected in the SWEIS. Fabrication, assembly, and prototype experiments were expanded in CY 2009. Improvements were accomplished in the conduct of dynamic load and crack testing and measurement.
Advanced Materials Development	Synthesize and characterize single crystals and nanophase and amorphous materials. Perform ceramics research, including solid-state, inorganic chemical studies involving materials synthesis. A substantial amount of effort in this area would be dedicated to producing new high-temperature superconducting materials. Provide facilities for synthesis and mechanical characterization of materials systems for bulk conductor applications. Develop and improve techniques for development of advanced materials.	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	Perform materials characterization activities to support materials development.	Improvements occur on a continual basis, including expansion of electron microscopy to include atomic-scale microscopy and improvement of X-ray capabilities.

Table A-8. Materials Science Laboratory (TA-03)/Operations Data

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions	Ci/yr	Negligible	Not Measured
NPDES Discharge Volume	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	590	271.5
LLW	m^3/yr	0	0
MLLW	m^3/yr	0	0
TRU	m^3/yr	0[a]	0
Mixed TRU	m^3/yr	0[a]	0

a 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-9. Metropolis Center (TA-03)/Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
Computer Simulations	Perform complex three-dimensional computer simulations to estimate nuclear yield and ageing effects to demonstrate nuclear stockpile safety. Apply computing capability to solve other large-scale, complex problems.	As projected.

Table A-10. Metropolis Center (TA-03)/Operations Data[a]

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions	Ci/yr	Not Estimated	Not Measured
NPDES Discharge Volume[b]	MGY	13.6	11.4
Wastes:			
Chemical	kg/yr	0	0
LLW	m^3/yr	0	0
MLLW	m^3/yr	0	0
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a The Metropolis Center became a Key Facility in the 2008 SWEIS. In earlier yearbooks it was part of the Non-Key Facility section.
b 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

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

Capability	2008 SWEIS Projections[a]	2009 Operations
High Explosives Synthesis and Production	Perform high explosives synthesis and production research and development. Produce new materials for research, stockpile, security interest, and other applications. Formulate, process test, and evaluate explosives.	The high explosives synthesis and production operations were below limits projected in the SWEIS.
High Explosives and Plastics Development and Characterization	Evaluate stockpile returns and materials of specific interest. Develop and characterize new plastics and high explosives for stockpile, military, and security interest improvements. 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 in the SWEIS. Plastics research and development is currently being performed at other facilities.
High Explosives and Plastics Fabrication	Perform stockpile surveillance and process development. Supply parts to the Pantex Plant for surveillance and stockpile rebuilds and joint test assemblies. Fabricate materials for specific military, security interest, hydrodynamic, and environmental testing.	Fewer than 1,000 parts were fabricated in support of the weapons program in CY 2009, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests. Plastics research and development is currently being performed at other facilities.
Test Device Assembly	Assemble test devices. Perform radiographic examination of assembled devices to support stockpile related hydrodynamic tests, joint test assemblies, environmental and safety tests, and research and development activities. Support up to 100 major hydrodynamic test device assemblies/yr.	W Division provided fewer than 100 major assemblies for Nevada Test Site subcritical and joint environmental test programs.
Safety and Mechanical Testing	Conduct safety and environmental testing related to stockpile assurance and new materials development. Conduct up to 15 safety and mechanical tests/yr.	HX Division performed fewer than 15 stockpile related safety and mechanical tests during CY 2009.
Research, Development, and Fabrication of High-Power Detonators	Continue to support stockpile stewardship and management activities. Manufacture up to 40 major product lines/yr. Support DOE-wide packaging and transport of electro-explosive devices.	High-power detonator activities by WCM Division resulted in the manufacture of fewer than 40 product lines in CY 2009.

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 in the SWEIS are 82,700 pounds of explosives and 2,910 pounds of mock explosives. Actual amounts used in CY 2009 were less than 600 pounds of high explosive and less than 1,000 pounds of mock high explosives.

Table A-12. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, and TA-37)/Operations Data

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions:			
Uranium-238	Ci/yr	9.96E-7	Not measured
Uranium-235	Ci/yr	1.89E-8	Not measured
Uranium-234	Ci/yr	3.71E-7	Not measured
NPDES Discharge:			
Number of outfalls			
Total Discharges	MGY	0.06	0.003
03A-130 (TA-11)	MGY	[a]	0.003
05A-055 (TA-16)	MGY	[a]	0
Wastes:			
Chemical	kg/yr	13,154	10,670.7
LLW	m^3/yr	15	5.1
MLLW	m^3/yr	<1	0
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a The 2008 SWEIS did not calculate individual flow per outfall.
b 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-13. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
Hydrodynamic Tests	Develop containment technology. Conduct baseline and code development tests of weapons configuration. Conduct 100 major hydrodynamic test/yr.	One hydrodynamic test in 2009.
Dynamic Experiments	Conduct dynamic experiments to study properties and enhance understanding of the basic physics and equation of state and motion for nuclear weapons materials, including some SNM experiments.	Dynamic experiments for 2009 were conducted below 2008 SWEIS projected levels.
Explosives Research and Testing	Conduct tests to characterize explosive materials.	Explosives research and testing experiments for 2009 were conducted below 2008 SWEIS projected levels.
Munitions Experiments	Support the US Department of Defense with research and development of conventional munitions. Conduct experiments to study external-stimuli effects on munitions.	Munitions experiments for 2009 were conducted below 2008 SWEIS projected levels.
High-Explosives Pulsed-Power Experiments	Conduct experiments using explosively driven electromagnetic power systems.	High Explosive Pulsed Power experiments for 2009 were conducted below 2008 SWEIS projected levels.
Calibration, Development, and Maintenance Testing	Perform experiments to develop and improve techniques to prepare for more involved tests.	Calibration, Development, and Maintenance testing for 2009 were conducted below 2008 SWEIS projected levels.
Other Explosives Testing	Conduct advanced high explosives or weapons evaluation studies.	Other explosives testing for 2009 was conducted below 2008 SWEIS projected levels.

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

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions:			
Depleted Uranium[a]	Ci/yr	1.5E-1	Not measured
Uranium-234	Ci/yr	3.4E-2	Not measured
Uranium-235	Ci/yr	1.5E-3	Not measured
Uranium-238	Ci/yr	1.4E-1	Not measured
Chemical Usage:[b]			
Aluminum[c]	kg/yr	45,450	217.1
Beryllium	kg/yr	90	1.6
Copper[c]	kg/yr	45,630	8.6
Depleted Uranium	kg/yr	3,130[d]	30.5
Lead	kg/yr	240	0
Tantalum	kg/yr	300	0.0012
Tungsten	kg/yr	300	0
NPDES Discharge:			
03A–185 (TA-15)	MGY	2.2	0.87
Wastes:			
Chemical	kg/yr	35,380	188.4
LLW	m^3/yr	918	153.9
MLLW	m^3/yr	8	0
TRU[e]	m^3/yr	<1[f]	0
Mixed TRU	m^3/yr	[f]	0

a The isotopic composition of depleted uranium is approximately 72 percent uranium-238, approximately 1 percent uranium-235, and approximately 27 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 Usage listed for the SWEIS 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 1995).

c 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.

d The SWEIS 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).

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

f 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-15. Tritium Facilities/Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
High-Pressure Gas Fills and Processing: WETF	Handle and process tritium gas in quantities of about 100 grams approximately 65 times/yr.	High-pressure gas fills/processing operations were performed within SWEIS projections in 2009 with the capability at or near 65 times/yr.
Gas Boost System Testing and Development: WETF	Conduct gas boost system research and development and testing and gas processing operations approximately 35 times/yr using quantities of about 100 grams of tritium.	Gas boost tests within SWEIS projections were performed in 2009.
Diffusion and Membrane Purification	Conduct research on gaseous tritium movement and penetration through materials—perform up to 100 major experiments/yr. Use this capability for effluent treatment.	Capability was used within SWEIS projections in 2009.
Metallurgical and Material Research	Conduct metallurgical and materials research and applications studies and tritium effects and properties research and development. Small amounts of tritium would be used for these studies.	Activities resulted in less than 2% tritium emissions from WETF.
Gas Analysis	Measure the composition and quantities of gases (in support of tritium operations).	Gas analysis operations were continued at WETF within SWEIS projections during 2009. No changes in facility emissions occurred from this activity.
Calorimetry	Perform calorimetry measurements in support of tritium operations.	Calorimetry activities were conducted at WETF. No changes occurred in facility emissions from this activity.
Solid Material and Container Storage: WETF	Store about 1,000 grams of tritium inventory in process systems and samples, inventory for use, and waste.	Inventory is stored and maintained at the WETF.
Hydrogen Isotopic Separation	Perform research and development of tritium gas purification and processing in quantities of about 200 grams of tritium per test.	Capability was used within SWEIS projections in 2009.
Radioactive Liquid Waste Treatment	Pretreat liquid LLW at TA-21 prior to transport for treatment. Activity ends with decommissioning of TA-21 tritium buildings.	No activity[a]

a TSFF and TSTA were put into Surveillance and Maintenance Mode in 2008.

Table A-16. Tritium Facilities (TA-16)/Operations Data

Parameter	Units	2008 SWEIS	2009 Operations
Radioactive Air Emissions:			
TA-16/WETF, Elemental tritium	Ci/yr	3.00E+2	1.36E+01
TA-16/WETF, Tritium in water vapor	Ci/yr	5.00E+2	3.39E+01
NPDES Discharge:			
Total Discharges	MGY	17.4	0
02A-129 (TA-21)	MGY	[a]	0[b]
03A-158 (TA-21)	MGY	[a]	0[b]
Wastes:			
Chemical	kg/yr	1,724	32.6
LLW	m^3/yr	482	97.1
MLLW	m^3/yr	3	0.31
TRU	m^3/yr	0[c]	0
Mixed TRU	m^3/yr	0[c]	0

a The 2008 SWEIS did not calculate individual flow per outfall.
b DD&D of TA-21 facilities began in 2009.
c 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-17. Target Fabrication Facility (TA-35)/Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
Precision Machining and Target Fabrication	Provide targets and specialized components for approximately 12,400 laser and physics tests/yr. Perform approximately 100 high-energy-density physics tests/yr. Analyze up to 36 tritium reservoirs/yr.	Provided targets and specialized components for about 800 tests. Provided components to HX and P divisions for high-energy-density physics tests. Did not support high-explosive pulsed-power tests at levels identified in the SWEIS.
Polymer Synthesis	Produce polymers for targets and specialized components for approximately 12,400 laser and physics tests/yr. Perform approximately 100 high-energy-density physics tests/yr.	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 in the SWEIS.
Chemical and Physical Vapor Deposition	Coat targets and specialized components for about 12,400 laser and physics tests/yr. Support approximately 100 high-energy-density physics tests/yr. Support plutonium pit rebuild operations.	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 in the SWEIS.

Table A-18. Target Fabrication Facility (TA-35)/Operations Data

Parameter	Units	2008 SWEIS	2009 Operations
Radiological Air Emissions	Ci/yr	Negligible	Not Measured[a]
NPDES Discharge:	MGY	No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	3,810	1,949.9
LLW	m^3/yr	10	0
MLLW	m^3/yr	<1	0
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a The emissions continue to be sufficiently low that monitoring is not required.
b 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-19. Bioscience Key Facilities/Comparison of Operations

Capabilities	SWEIS ROD	2009 Operations (FTEs)[a]
Biologically Inspired Materials and Chemistry	Determine formation and structure of biomaterials for bioenergy. Synthesize biomaterials. Characterize biomaterials.	In CY 2009, 7 FTEs were associated with Biologically Inspired Materials and Chemistry.
Cell Biology	Study stress-induced effects and responses on cells. Study host-pathogen interactions. Determine effects of beryllium exposure.	In CY 2009, 5 FTEs were associated with Cell Biology.
Computational Biology	Collect, organize, and-manage information on biological systems. Develop computational theory to analyze and model biological systems.	In CY 2009, 20 FTEs were associated with Computational Biology. Capability expanded in 2009.
Environmental Microbiology	Study microbial diversity in the environment, Collect and analyze environmental samples. Study biomechanical and genetic processes in microbial systems.	In CY 2009, 14 FTEs were associated with Environmental Biology.
Genomic Studies	Analyze genes of living organisms such as humans, animals, microbes, viruses, plants, and fungi.	In CY 2009, 28 FTEs associated with Genomic Studies.
Genomic and Proteomic Science	Develop and implement high-throughput tools. Perform genomic and proteomic analysis. Study pathogenic and nonpathogenic systems.	In CY 2009, 14 FTEs associated with Genomic and Proteomic Science.
Measurement Science and Diagnostics	Develop and use spectroscopic tools to study molecules and molecular systems. Perform genomic, proteomic, and metabolomic studies.	In CY 2009, 12 FTEs associated with Measurement Science and Diagnostics. Slight decrease in activity levels.
Molecular Synthesis and Isotope Applications	Synthesize molecules and materials. Perform spectroscopic characterization of molecules and materials. Develop new molecules that incorporate stable isotopes. Develop chem-bio sensors and assay procedures. Synthesize polymers and develop applications for them. Utilize stable isotopes in quantum computing systems.	In CY 2009, 11 FTEs associated with Molecular Synthesis and Isotope Applications.
Structural Biology	Research three·dimensional structure and dynamics of macromolecules and complexes. Use various spectroscopy techniques. Perform neutron scattering. Perform X-ray scattering and diffraction.	In CY 2009, 10 FTEs associated with Structural Biology. Slight decrease in activity.
Pathogenesis	Perform genome-scale, focused, and computationally enhanced experimental studies on pathogenic organisms.	In CY 2009, 4 FTEs associated with Pathogenesis.
Biothreat Reduction and Bioforensics	Analyze samples for biodefense and national security purposes. Identify pathogen strain signatures using DNA sequencing and other molecular approaches.	In CY 2009, 17 FTEs associated with Biothreat Reduction and Bioforensics. Capability expected to expand.

Table A-19 (cont.)

Capabilities	SWEIS	2009 Operations
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.	Conducted more than 1,193 lung and whole-body scans and about and 1,124 other counts (detector studies, quality assurance, etc.). In CY 2009, 4 FTE's were associated with this capability.

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

Table A-20. Bioscience Facilities/Operations Data

Parameter	Units	2008 SWEIS	2009 Operations
Radioactive Air Emissions	Ci/yr	Not estimated	Not measured
NPDES Discharge:		No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	13,154	2,319.4
LLW	m^3/yr	34	51.9[a]
MLLW	m^3/yr	3	0
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a LLW generation exceeded the SWEIS projections due to water pipe burst in the parking lot of TA-43-0001 near an old abandoned radioactive acid line. Excavated material was disposed of as LLW.

b 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-21. Radiochemistry Facility (TA-48)/Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
Radionuclide Transport Studies	Conduct 80 to 160 actinide transport, sorption, and bacterial interaction studies/yr. Develop models for evaluation of groundwater. Assess performance of risk of release for radionuclide sources at proposed waste disposal sites.	During CY 2009, operations continued at approximately twice the levels identified in the SWEIS.
Environmental Remediation Support	Conduct background contamination characterization pilot studies. Conduct performance assessments, soil remediation research and development, and field support. Support environmental remediation activities.	During CY 2009, operations continued at approximately half the levels identified in the SWEIS.
Ultra-Low-Level Measurements	Perform chemical isotope separation and mass spectrometry at current levels.	Level of operations decreased during 2009.
Nuclear and Radiochemistry Separations	Conduct radiochemical operations involving quantities of alpha-, beta-, and gamma-emitting radionuclides at current levels for nonweapons and weapons work.	Decrease in quantities of alpha-emitting radionuclides used in operations.
Isotope Production	Conduct target preparation, irradiation, and processing to recover medical and industrial application isotopes to support approximately 150 offsite shipments/yr.	Slightly increased level of operations, but approximately the same as levels identified in the SWEIS.
Actinide and TRU Chemistry	Perform radiochemical operations involving alpha-emitting radionuclides.	Slightly increased level of operations, but approximately the same as levels identified in the SWEIS.
Data Analysis	Re-examine archive data and measure nuclear process parameters of interest to weapons radiochemists.	Below levels projected in the SWEIS.
Inorganic Chemistry	Conduct synthesis, catalysis, and actinide chemistry activities: • Conduct chemical synthesis of organo-metallic complexes • Conduct structural and reactivity analysis, organic product analysis, and reactivity and mechanistic studies • Conduct synthesis of new ligands for radiopharmaceuticals Conduct environmental technology development activities: • Ligand design and synthesis for selective extraction of metals • Soil washing • Membrane separator development • Ultrafiltration	Below levels projected in the SWEIS.
Structural Analysis	Perform synthesis and structural analysis of actinide complexes at current levels. Conduct X-ray diffraction analysis of powders and single crystals.	Below levels projected in the SWEIS.
Sample Counting	Measure the quantity of radioactivity in samples using alpha-, beta-, and gamma-ray counting systems.	During CY 2009, maintained slightly higher sample processing than the number of samples projected in the SWEIS.
Hydrotest Sample Analysis	Measure beryllium contamination from simulated nuclear weapons hydrotesting.	Capability active in CY 2009.

Table A-22. Radiochemistry Facility (TA-48)/Operations Data

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions:			
Mixed Fission Products[a]	Ci/yr	1.5E-4	Not measured
Plutonium-239	Ci/yr	1.2E-5	None detected[b]
Uranium--235	Ci/yr	4.8E-7	None detected[b]
Arsenic-72	Ci/yr	1.2E-4	None detected[b]
Arsenic-73	Ci/yr	2.5E-3	1.68E-07
Arsenic-74	Ci/yr	1.3-3	1.04E-06
Beryllium-7	Ci/yr	1.6E-5	None detected[b]
Bromine-77	Ci/yr	9.3E-4	2.76E-06
Germanium-68[c]	Ci/yr	8.9-3	3.63E-03
Rubidium-86	Ci/yr	3.0E-7	None detected[b]
Selenium-75	Ci/yr	3.8E-4	1.08E-04
Other Activation Products[d]	Ci/yr	5.5E-6	Not measured
NPDES Discharge:		No outfalls	No outfalls
Wastes:			
Chemical	kg/yr	3,311	535.5
LLW	m^3/yr	268	24.4
MLLW	m^3/yr	4	1.1
TRU	m^3/yr	0[e]	0
Mixed TRU	m^3/yr	0[e]	0

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 Germanium-68 was assumed to be in equilibrium with gallium-68.
d Other Activation Products are a mixed group of activation products represented by strontium-90 and yttrium-90 in equilibrium.
e 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-23. Radioactive Liquid Waste Treatment Facility (TA-50)/ Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
Waste Transport, Receipt, and Acceptance	Collect radioactive liquid waste from generators and transport it to the RLWTF at TA-50.	As projected.
	Support, certify, and audit generator characterization programs.	As projected.
	Maintain the waste acceptance criteria for the RLWTF.	As projected.
	Send approximately 250,000 liters of evaporator bottoms to an offsite commercial facility for solidification/yr. (Approximately 20 m^3 of solidified evaporator bottoms would be returned/yr for disposal as LLW at TA-54 Area G.)	No evaporator bottoms were shipped during 2009 and, consequently, no solidified bottoms were returned for disposal at Area G.
	Transport annually to TA-54 for storage or disposal: • 250 m^3 of LLW • 2 m^3 of mixed LLW • 10 m^3 of TRU waste • 400 kg of hazardous waste	Transported to Area G for storage or disposal: • 54 m^3 of LLW • 0.1 m^3 of mixed LLW • no TRU waste • 130 kg of hazardous waste
Radioactive Liquid Waste Treatment	Pretreat 110,000 liters/yr of liquid TRU waste.	No pretreatment took place.
	Solidify, characterize, and package 12 m^3/yr of TRU waste sludge.	No TRU waste sludge was solidified in 2009.
	Treat 15 million liters/yr of liquid LLW.	Processed 4.5 million liters of liquid LLW.
	Dewater, characterize, and package 50 m^3/yr of LLW sludge.	No LLW sludge was treated during 2009.
	Process 1 million liters/yr of secondary liquid waste generated by the RLWTF treatment processes through the RLWTF evaporator.	Processed 500,000 liters through the evaporator.
	Discharge treated liquids through an NPDES outfall.	Discharged 4.4 million liters in 2009.

Table A-24. Radioactive Liquid Waste Treatment Facility (TA-50)/ Comparison of Operations

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions:			
Americium-241	Ci/yr	Negligible	None detected
Plutonium-238	Ci/yr	Negligible	None detected
Plutonium-239	Ci/yr	Negligible	None detected
Thorium-228	Ci/yr	Negligible	None detected
Thorium-230	Ci/yr	Negligible	None detected
Thorium-232	Ci/yr	Negligible	None detected
Uranium-234	Ci/yr	Negligible	None detected
NPDES Discharge:			
051	MGY	4.0	1.1
Wastes:			
Chemical	kg/yr	399	870.5[a]
LLW	m^3/yr	252	127.5
MLLW	m^3/yr	2	0
TRU	m^3/yr	10[b]	0
Mixed TRU	m^3/yr	[b]	0

a Chemical waste generation exceeded SWEIS projections due to the disposition of excess construction waste, part of the RLWTF cleanup campaign.

b 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-25. Los Alamos Neutron Science Center (TA-53)/ Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
Accelerator Beam Delivery, Maintenance, and Development	Operate 800-million-electron-volt linac beam and deliver beam to Areas A, B, C, WNR facility, Manuel Lujan Center, Dynamic Test Facility, and Isotope Production Facility for 10 months/yr (6,400 hrs). The H+ beam current would be 1,250 microamps; the H- beam current would be 200 microamps. Reconfigure beam delivery and support equipment to support new facilities, upgrades, and experiments.	In 2009, H+ beam was delivered to the Isotope Production Facility for 3,255 of 3,421 scheduled hours at an average current of 223 microamperes with 95.2% reliability. H- beam was delivered as follows: (a) to the Lujan Center for 2,839 of 3,330 scheduled hours at an average current of 106 microamperes with 85.3% total availability; (b) to WNR Target 2 for 178 of 195 scheduled hours in a "pulse on demand" mode of operation with 91.5% total availability; (c) to WNR Target 4 for 2,896 of 3,220 scheduled hours at an average current of 2 microamperes with 89.9% total availability; (d) through Line X to Line B (ultracold neutron) for 881 of 1,039 scheduled hours in a "pulse on demand" mode of operation with 84.8% total availability; (e) through Line X to Line C (pRad) for 1,138 of 1,241 scheduled hours in a "pulse on Accelerator Beam Delivery, Maintenance, and Development demand" mode of operation with 91.7% total availability. No major upgrades to the beam delivery complex.
Experimental Area Support	Provide support to ensure availability of the beam lines, beam line components, handling and transport systems, and shielding, as well as radio-frequency power sources. Perform remote handling and packaging of radioactive material, as needed.	Support activities were conducted per the projections of the SWEIS. Remote handling and packaging were performed.
Neutron Research and Technology	Conduct 1,000 to 2,000 experiments/yr using neutrons from the Lujan Center and WNR facility. Support contained weapons-related experiments using small to moderate quantities of high explosives, including: - Approximately 200 experiments/yr using nonhazardous materials and small quantities of high explosives - Approximately 60 experiments/yr using up to 4.5 kilograms of high explosives and depleted uranium - Approximately 80 experiments/yr using small quantities of actinides, high explosives, and sources	293 experiments were conducted at the Lujan Center and 69 experiments at WNR. Weapons-related experiments were conducted: A total of 37 dynamic experiments in CY 2009. - No actinide experiments; - Some with nonhazardous materials and high explosives; - Some with high explosives; - No depleted uranium;

Table A-25 (cont.)

Capability	2008 SWEIS Projections	2009 Operations
Neutron Research and Technology (cont.)	Support contained weapons-related experiments using small to moderate quantities of high explosives, including: - Shock wave experiments involving small amounts, up to nominally 50 grams of plutonium - Support for static stockpile surveillance technology research and development.	Weapons-related experiments were conducted: - Some shock wave experiments; - No plutonium experiments. Support was provided for surveillance research and development.
Materials Test Station	Irradiate materials and fuels in a fast-neutron spectrum and in a prototype temperature and coolant environment.	No activity
Subatomic Physics Research	Conduct 5 to 10 physics experiments/yr at Manuel Lujan Center and WNR facility. Conduct up to 100 proton radiography experiments, including using small to moderate quantities of high explosives, including: • Dynamic experiments in containment vessels with up to 4.5 kilograms of high explosives and 45 kilograms of depleted uranium. • Dynamic experiments in powder launcher with up to 300 grams of gun powder. Conduct 2 to 4 active interrogation experiments per year at Line C. • Proton interrogation using up to 19 kg of 20% enriched uranium. • Pion production and captive measurements. Conduct research using ultracold neutrons; operate up to 10 microamperes/yr of negative beam current.	Conducted 4 experiments at Manuel Lujan Center and 1 experiment at WNR in 2009. 37 of 42 experiments conducted in CY 2009 involved the use of propellants containing either black powder or high explosives. Conducted 2 experiments in CY 2009 involving uranium targets and 2 experiments for captive measurement of pions. During CY 2009 Ultracold Neutron Research focused on accelerator data gathering during the entire run cycle.
Medical Isotope Production	Irradiate up to 120 targets/yr for medical isotope production at the Isotope Production Facility.	A total of 44 targets were irradiated in 2009 (28 RbCl targets for Sr-82; 14 Gallium targets for Ge-68 production; 1 Aluminum target for Na-22 production; 1 Niobium target for Y-88).
High-Power Microwaves and Advanced Accelerators	Conduct research and development in high-power microwaves and advanced accelerators in areas including microwave research for industrial and environmental applications.	Research and development were conducted.
Radioactive Liquid Waste Treatment (Solar Evaporation at TA-53)	Treat about 520,000 liters/yr of radioactive liquid waste.	The TA-53 RLWTF received 448,400 liters of radioactive liquid waste into its holding tanks and discharged 379,600 liters into the evaporation tanks during CY 2009.

Table A-26. Los Alamos Neutron Science Center (TA-53)/Operations Data

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions:			
Argon-41	Ci/yr	8.87E+2	1.79E+01
Particulate & Vapor Activation Products	Ci/yr	Not projected[a]	6.02E-03
Carbon-10	Ci/yr	2.65E+0	1.06E+00
Carbon-11	Ci/yr	2.25E+4	6.03E+02
Nitrogen-13	Ci/yr	3.10E+3	3.05E+01
Oxygen-15	Ci/yr	3.88E+3	1.20E+02
Tritium as Water	Ci/yr	Not projected[a]	2.17E+01
NPDES Discharge:			
Total Discharges	MGY	28.2[b]	17.7
03A-048	MGY	Not projected [c]	17.4
03A-113	MGY	Not projected [c]	0.34
Wastes:			
Chemical	kg/yr	16,783	1,901.4
LLW	m^3/yr	1,070	237.8
MLLW	m^3/yr	1	0
TRU	m^3/yr	0[d]	0
Mixed TRU	m^3/yr	0[d]	0

a The radionuclide was not projected in the SWEIS because it was either dosimetrically insignificant or not isotopically identified.
b Transcription error in 2008 Yearbook. 2008 SWEIS value is 28.2 MGY, not 1.3 MGY.
c The 2008 SWEIS did not calculate individual flow per outfall.
d 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-27. Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)/Comparison of Operations

Capability	2008 SWEIS Projections	2009 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 420 cubic meters of newly generated TRU waste.	Characterized 192 cubic meters.
	Characterize 8,400 cubic meters of legacy TRU waste.	Characterized approximately 751 cubic meters of TRU waste in 2009.
	Characterize LLW, MLLW, and chemical waste, including waste from DD&D and remediation activities.	As projected.
	Characterize additional LLW, MLLW, and chemical waste, including waste from DD&D and remediation activities	As projected.
	Characterize approximately 2,400 cubic meters of contact-handled and 100 cubic meters of remote-handled legacy TRU waste retrieved from belowground storage.	
	Maintain waste acceptance criteria for offsite treatment, storage, and disposal facilities.	As projected.
	Overpack and bulk small waste, as required.	As projected.
	Perform coring and visual inspection of a percentage of TRU waste packages.	Performed visual examinations on 80 TRU waste packages in CY 2009; no drums were cored in 2009.
	Ventilate TRU waste retrieved from belowground storage.	No activity.
	Maintain WIPP waste acceptance criteria compliance and liaison with WIPP operations.	As projected.
Waste Transport, Receipt, and Acceptance	Collect chemical and mixed wastes from LANL generators and transport to Consolidated Remote Storage Sites and TA-54.	Collected and transported chemical and mixed wastes.
	Ship 320 cubic meters/yr of newly generated TRU waste to WIPP.	Shipped 173 cubic meters.
	Ship 8,400 cubic meters/yr of legacy TRU waste to WIPP.	Shipments to WIPP began 3/26/1999.
	Ship approximately 2,340 cubic meters of contact-handled and 100 cubic meters of remote-handled legacy TRU waste to WIPP.	
	Ship 55 cubic meters of MLLW for offsite treatment and disposal in accordance with EPA land disposal restrictions.	Approximately 39 cubic meters of MLLW were shipped for offsite treatment and disposal from the Solid Radioactive and Chemical Waste Facility.
	Ship LLW to offsite disposal facilities.	As projected.
	Ship 6,400 metric tons of chemical wastes for offsite treatment and disposal in accordance with EPA land disposal restrictions.	Approximately 2,812 metric tons of chemical waste was shipped for offsite treatment and disposal from the Solid Radioactive and Chemical Waste Facility.

Table A-27 (cont.)

Capability	2008 SWEIS Projections	2009 Operations
Waste Transport, Receipt, and Acceptance (cont.)	Ship LLW, MLLW, and chemical waste from DD&D and remediation activities.	As projected.
	Ship additional LLW, MLLW, and chemical waste from DD&D and remediation activities.	As projected.
	Receive, on average, 5 to 10 shipments/yr of LLW and TRU waste from offsite locations.	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 TRU waste until it is shipped to WIPP.	As projected.
	Store MLLW pending shipment to a treatment facility.	As projected.
	Store LLW uranium chips until sufficient quantities are accumulated for stabilization campaigns.	No uranium chips were stored for stabilization in CY 2009.
	Store TRU waste generated by DD&D and remediation activities.	No TRU waste generated from DD&D and remediation activities in CY 2009.
	Manage and store sealed sources for the OSR Project.	As projected.
	Increase types and quantities of sealed sources for the OSR Project.	As projected.
Waste Retrieval	Retrieve remaining legacy TRU waste, 2,400 cubic meters of contact-handled, and 100 cubic meters of remote-handled from belowground storage in TA-54 Area G, including: Pit 9, above Pit 29, Trenches A–D, and Shafts 200–232, 235–243, 246–253, 262–266, and 302–306.	No retrieval occurred in 2009.
Waste Treatment	Demonstrate treatment (e.g., electrochemical) of liquid MLLW.	No activity.
	Compact up to 2,540 cubic meters/yr of LLW.	63 cubic meters of LLW was compacted in 2009.
	Process 2,400 cubic meters of TRU waste through size reduction at the DVRS.	No waste was processed at the DVRS.
	Process newly generated TRU waste through new TRU Waste Facility	No activity.
	Stabilize 870 cubic meters of uranium chips.	No activity.
Waste Disposal	Dispose 84 cubic meters of LLW in shafts, 23,000 cubic meters of LLW in pits, and small quantities of radioactively contaminated PCBs in shafts in Area G/yr.	Approximately 17 cubic meters of LLW were disposed of in shafts at Area G.
	Dispose additional LLW generated by DD&D and remediation activities.	No activity.
	Migrate operations in Area G to Zones 4 and 6, as necessary, to allow continued onsite disposal of LLW.	No activity.
Decontamination Operations	Decontaminate approximately 700 personnel respirators and 300 air-proportional probes for reuse per month.	In 2009, decontaminated approximately 500 personnel respirators and 40 faces and 40 bodies per month at TA-54-1009.

Table A-27 (cont.)

Capability	2008 SWEIS Projections	2009 Operations
Decontamination Operations (cont.)	Decontaminate vehicles and portable instruments for reuse (as required).	No activity in 2009.
	Decontaminate precious metals for resale using an acid bath.	No activity in 2009.
	Decontaminate scrap metals for resale by sandblasting the metals.	No activity in 2009.
	Decontaminate 200 cubic meters of lead for reuse by grit blasting.	No activity in 2009.

Table A-28. Solid Radioactive and Chemical Waste Facilities (TA-54 and TA-50)/Operations Data

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions:[a]			
Tritium	Ci/yr	6.09E+1	Not monitored [a]
Americium-241	Ci/yr	2.87E-6	None detected [a]
Plutonium-238	Ci/yr	2.24E-5	2.23E-10
Plutonium-239	Ci/yr	8.46E-6	None detected [a]
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]
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes:[b]			
Chemical	kg/yr	907	93.8
LLW	m^3/yr	229	1.7
MLLW	m^3/yr	8	2.5
TRU	m^3/yr	27[c]	7.9
Mixed TRU	m^3/yr	[c]	0.2

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 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.

c 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-29. Plutonium Complex/Comparison of Operations

Capability	2008 SWEIS Projections	2009 Operations
Plutonium Stabilization	Recover, process, and store existing plutonium inventory.	Highest priority items have been stabilized. The implementation plan has been modified between DOE and the Defense Nuclear Facilities Safety Board.
Manufacturing Plutonium Components	Produce nominally 20 plutonium pits/yr.	Fewer than 20 qualified pits were produced in CY 2009.
	Fabricate parts and samples for research and development activities, including parts for dynamic and subcritical experiments.	Research and development of plutonium materials continued.
Surveillance and Disassembly of Weapons Components	Disassemble, survey, and examine up to 65 plutonium pits/yr.	Fewer than 65 pits were disassembled during CY 2009. Fewer than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in CY 2009.
Actinide Materials Science and Processing Research and Development	Perform plutonium (and other actinide) materials research, including metallurgical and other characterization of samples and measurements of mechanical and physical properties.	Research and development of plutonium (and other actinide) materials continued.
	Operate the 40-millimeter Impact Test Facility and other test apparatus.	The 40-millimeter Impact Test Facility was operated.
	Develop expanded disassembly capacity and disassemble up to 200 pits/yr.	Fewer than 200 pits were disassembled/converted in CY 2009. Fewer than 12 pits were processed through tritium separation in CY 2009.
	Process up to 5,000 curies of neutron sources (including plutonium and beryllium and americium-241 and beryllium).	Neutron sources were processed in CY 2009 but well below the 5,000 curies/yr level.
	Process neutron sources other than sealed sources.	Continued processing neutron sources other than sealed sources.
	Process up to 400 kilograms/yr of actinides between TA-55 and the CMR Building.[a]	Fewer than 400 kilograms of actinides were processed in CY 2009.
	Process pits through the Special Recovery Line (tritium separation).	Continued processing of pits through the Special Recovery Line.
	Perform oralloy decontamination of 28 to 48 uranium components per month.	In CY 2009, fewer than 48 uranium components were decontaminated per month.
	Conduct research in support of DOE actinide cleanup activities and on actinide processing and waste activities at DOE sites.	Research supporting DOE actinide cleanup activities continued at low levels.
	Fabricate and study nuclear fuels used in terrestrial and space reactors.	The DOE/Office of Nuclear Energy Advanced Fuel Cycle and Mixed Oxide Fuel Initiative is fabricating actinide nitride fuels for irradiation in a reactor environment.
	Fabricate and study prototype fuel for lead test assemblies.	The DOE/Office of Nuclear Energy Advanced Fuel Cycle and Mixed Oxide Fuel Initiative is fabricating actinide nitride fuels for irradiation in a reactor environment.

Table A-29 (cont.)

Capability	2008 SWEIS Projections	2009 Operations
Actinide Materials and Science Processing, Research, and Development (cont.)	Develop safeguards instrumentation for plutonium assay.	Continued support of safeguards instrumentation development during CY 2009.
	Analyze samples.	Analysis of actinide samples at TA-55 continued in CY 2009 in support of actinide reprocessing and research and development activities.
Fabrication of Ceramic-Based Reactor Fuels	Make prototype MOX fuel.	Research and development activities occurred in CY 2009.
	Build test reactor fuel assemblies.	No assembly or fabrication of fuel assemblies were conducted in CY 2009.
	Continue research and development on other fuels.	Research and development activities occurred in CY 2009.
Plutonium-238 Research, Development, and Applications	Process, evaluate, and test up to 25 kilograms/yr plutonium-238 in production of materials and parts to support space and terrestrial uses.	Less than 25 kilograms of plutonium-238 were processed, evaluated, and/or tested in CY 2009.
	Recover, recycle and blend up to 18 kilograms/yr plutonium-238.	Less than 18 kilograms of plutonium-238 were recovered, recycled and blended in CY 2009.
Storage, Shipping, and Receiving	Provide interim storage of up to 6.6 metric tons of the LANL SNM inventory, mainly plutonium.	SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4).
	Store working inventory in the vault in Building 55-4; ship and receive SNM as needed to support LANL activities.	Building 55-4 vault levels remained approximately constant at levels identified during preparation of the SWEIS.
	Provide temporary storage of Security Category I and II materials removed in support of TA-18 closure, pending shipment to the Nevada Test Site and other DOE Complex locations.	Continued temporary storage for TA-18 Category I and II material.
	Store sealed sources collected under DOE's OSR Project.	Continued temporary storage of OSR Project sources.
	Store MOX fuel rods and fuel rods containing archive and scrap metals from MOX fuel lead assembly fabrication.	Continued storage of MOX fuel rods until a shipping container is available to transport the material to another DOE site where the fuel rods will be evaluated.

a 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.

Table A-30. Plutonium Complex/Operations Data

Parameter	Units	2008 SWEIS Projections	2009 Operations
Radioactive Air Emissions:			
Plutonium-239[a]	Ci/yr	1.95E-5	8.59E-10
Tritium in Water Vapor	Ci/yr	7.50E+2	3.99E+00
Tritium as a Gas	Ci/yr	2.50E+2	3.45E+00
NPDES Discharge			
03A–181	MGY	4.1	1.2
Wastes:			
Chemical	kg/yr	8,618	9039.9[b]
LLW	m^3/yr	757	58.2
MLLW	m^3/yr	15	5.29
TRU	m^3/yr	336[c]	21.2
Mixed TRU	m^3/yr	[c]	75.1

a Projections for the SWEIS were reported as plutonium or plutonium-239, the primary material at TA-55.
b Chemical waste generated exceeded the SWEIS projection due to disposal of cooling tower treatment solution.
c The 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

Table A-31. 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).

Table A-32. Non-Key Facilities/Operations Data

Parameter	Units	2008 SWEIS	2009 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	200.9	95.4
001	MGY	[b]	[c]
013	MGY	[b]	85.3[c]
03A-160	MGY	28.5	0.10
03A-199	MGY	[b]	10.0
Wastes:			
Chemical	kg/yr	651,000	980,700[d]
LLW	m^3/yr	1,529	320.2
MLLW	m^3/yr	31	2.5
TRU	m^3/yr	23[e]	4.1
Mixed TRU	m^3/yr	[e]	0

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 The 2008 SWEIS did not calculate individual flow per outfall. Three outfalls in Sandia Canyon are projected to discharge 172.4 MGY.
c Discharge totals for Outfalls 001 and 013 have been combined.
d Chemical waste generation at the Non-Key Facilities exceeded the SWEIS projections due to disposition of large amounts of asbestos associated with DD&D of TA-43-0041 and other buildings within LANL as part of the Footprint Elimination Project.
e The 2008 SWEIS combined TRU and mixed TRU waste. Both waste categories are managed for disposal at WIPP.

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Appendix B: Chemical Usage and Estimated Emissions Data

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Key Facility	Chemical Name	CAS Number	Units	2009 Estimated Air Emissions	2009 Usage
CMR Building	Acetone	67-64-1	kg/yr	1.66	4.74
CMR Building	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.28	0.79
CMR Building	Arsenic, el.&inorg.,exc. Arsine, as As	7440-38-2	kg/yr	0.98	2.80
CMR Building	Ethanol	64-17-5	kg/yr	1.11	3.16
CMR Building	Hydrogen Bromide	10035-10-6	kg/yr	0.79	2.25
CMR Building	Hydrogen Chloride	7647-01-0	kg/yr	0.10	0.30
CMR Building	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.26	0.74
CMR Building	Hydrogen Peroxide	7722-84-1	kg/yr	0.74	2.11
CMR Building	Kerosene	8008-20-6	kg/yr	1.12	3.20
CMR Building	Nitric Acid	7697-37-2	kg/yr	20.10	57.42
CMR Building	Tin numerous forms	7440-31-5	kg/yr	0.01	1.00
Sigma Complex	Acetic Acid	64-19-7	kg/yr	0.73	2.10
Sigma Complex	Acetone	67-64-1	kg/yr	4.70	13.43
Sigma Complex	Acetonitrile	75-05-8	kg/yr	0.30	0.86
Sigma Complex	Acetylene	74-86-2	kg/yr	0.00	23.67
Sigma Complex	Antimony and Compounds, as Sb	7440-36-0	kg/yr	0.23	0.67
Sigma Complex	Cadmium, el.&compounds, as Cd	7440-43-9	kg/yr	0.30	0.86
Sigma Complex	Diethylene Triamine	111-40-0	kg/yr	0.50	1.44
Sigma Complex	Ethanol	64-17-5	kg/yr	9.41	26.89
Sigma Complex	Formic Acid	64-18-6	kg/yr	0.43	1.22
Sigma Complex	Hydrogen Chloride	7647-01-0	kg/yr	6.23	17.81
Sigma Complex	Hydrogen Fluoride, as F	7664-39-3	kg/yr	12.86	36.74
Sigma Complex	Indium & compounds, as In	7440-74-6	kg/yr	0.26	0.73
Sigma Complex	Isopropyl Alcohol	67-63-0	kg/yr	7.70	21.99
Sigma Complex	Manganese Dust & Compounds or Fume	7439-96-5	kg/yr	0.25	0.72
Sigma Complex	Mercury numerous forms	7439-97-6	kg/yr	0.25	25.00
Sigma Complex	Methyl Alcohol	67-56-1	kg/yr	1.11	3.17
Sigma Complex	Nitric Acid	7697-37-2	kg/yr	302.06	863.02
Sigma Complex	Propyl Alcohol	71-23-8	kg/yr	5.64	16.11
Sigma Complex	Tantalum Metal	7440-25-7	kg/yr	0.58	1.67
Sigma Complex	Uranium (natural) Sol.&Unsol.Comp. as U	7440-61-1	kg/yr	0.67	1.90
Machine Shops	Ethanol	64-17-5	kg/yr	6.83	19.52
MSL	Acetone	67-64-1	kg/yr	5.81	16.59
MSL	Acetonitrile	75-05-8	kg/yr	0.74	2.12
MSL	Ethanol	64-17-5	kg/yr	3.32	9.47

Key Facility	Chemical Name	CAS Number	Units	2009 Estimated Air Emissions	2009 Usage
MSL	Ethyl Ether	60-29-7	kg/yr	0.98	2.80
MSL	Hydrogen Chloride	7647-01-0	kg/yr	0.21	0.59
MSL	Hydrogen Peroxide	7722-84-1	kg/yr	1.23	3.52
MSL	Isopropyl Alcohol	67-63-0	kg/yr	13.20	37.70
MSL	Magnesium Oxide Fume	1309-48-4	kg/yr	0.35	1.00
MSL	Methyl Alcohol	67-56-1	kg/yr	2.77	7.91
MSL	n,n-Dimethylformamide	68-12-2	kg/yr	0.83	2.37
MSL	Toluene	108-88-3	kg/yr	2.12	6.07
High Explosive Processing	2-Methoxyethanol (EGME)	109-86-4	kg/yr	0.68	1.93
High Explosive Processing	Acetone	67-64-1	kg/yr	122.20	349.14
High Explosive Processing	Acetylene	74-86-2	kg/yr	0.00	2.30
High Explosive Processing	Bromine	7726-95-6	kg/yr	0.70	2.00
High Explosive Processing	Carbon Black	1333-86-4	kg/yr	0.18	0.50
High Explosive Processing	Dichlorodifluoromethane	75-71-8	kg/yr	0.79	2.27
High Explosive Processing	Ethanol	64-17-5	kg/yr	23.42	66.92
High Explosive Processing	Ethyl Ether	60-29-7	kg/yr	0.98	2.80
High Explosive Processing	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	1.85	5.28
High Explosive Processing	Hydrogen Chloride	7647-01-0	kg/yr	11.43	32.64
High Explosive Processing	Hydrogen Fluoride, as F	7664-39-3	kg/yr	6.91	19.74
High Explosive Processing	Indium & compounds, as In	7440-74-6	kg/yr	0.11	0.30
High Explosive Processing	Lead, el.&inorg.compounds, as Pb	7439-92-1	kg/yr	0.01	1.00
High Explosive Processing	Methyl Alcohol	67-56-1	kg/yr	2.22	6.33
High Explosive Processing	Methylene Chloride	75-09-2	kg/yr	7.43	21.23
High Explosive Processing	Propane	74-98-6	kg/yr	0.00	0.41
High Explosive Processing	Tantalum Metal	7440-25-7	kg/yr	5.25	15.00
High Explosive Processing	Tin numerous forms	7440-31-5	kg/yr	0.00	0.25
High Explosive Processing	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.15	15.00
High Explosive Processing	Zirconium Compounds, as Zr	7440-67-7	kg/yr	0.01	0.75

Key Facility	Chemical Name	CAS Number	Units	2009 Estimated Air Emissions	2009 Usage
High Explosive Testing	Acetone	67-64-1	kg/yr	4.42	12.64
High Explosive Testing	Acetonitrile	75-05-8	kg/yr	0.27	0.79
High Explosive Testing	Cyclohexane	110-82-7	kg/yr	0.27	0.78
High Explosive Testing	Cyclohexanone	108-94-1	kg/yr	0.50	1.42
High Explosive Testing	Ethanol	64-17-5	kg/yr	59.67	170.49
High Explosive Testing	Ethyl Acetate	141-78-6	kg/yr	0.63	1.80
High Explosive Testing	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	0.28	0.79
High Explosive Testing	Hydrogen Chloride	7647-01-0	kg/yr	0.42	1.19
High Explosive Testing	Hydrogen Peroxide	7722-84-1	kg/yr	0.25	0.70
High Explosive Testing	Isopropyl Alcohol	67-63-0	kg/yr	13.20	37.70
High Explosive Testing	n,n-Dimethylformamide	68-12-2	kg/yr	1.00	2.85
High Explosive Testing	Nitric Acid	7697-37-2	kg/yr	1.07	3.05
High Explosive Testing	Nitromethane	75-52-5	kg/yr	82.86	236.74
High Explosive Testing	Pentane (all isomers)	109-66-0	kg/yr	3.29	9.39
High Explosive Testing	Sulfur Hexafluoride	2551-62-4	kg/yr	255.76	730.74
High Explosive Testing	Toluene	108-88-3	kg/yr	14.87	42.48
Tritium Operations	Propane	74-98-6	kg/yr	0.00	11.47
TFF	2-Methoxyethanol (EGME)	109-86-4	kg/yr	0.68	1.93
TFF	Acetone	67-64-1	kg/yr	9.40	26.86
TFF	Acetonitrile	75-05-8	kg/yr	4.40	12.57
TFF	Aluminum numerous forms	7429-90-5	kg/yr	0.00	0.25
TFF	Benzene	71-43-2	kg/yr	4.91	14.02
TFF	Dicyclopentadiene	77-73-6	kg/yr	1.37	3.92
TFF	Divinyl Benzene	1321-74-0	kg/yr	0.08	0.23
TFF	Ethanol	64-17-5	kg/yr	6.55	18.72
TFF	Ethyl Acetate	141-78-6	kg/yr	0.32	0.90
TFF	Ethyl Ether	60-29-7	kg/yr	10.05	28.70
TFF	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	3.70	10.56
TFF	Isopropyl Alcohol	67-63-0	kg/yr	4.40	12.57
TFF	Methyl Alcohol	67-56-1	kg/yr	15.23	43.53
TFF	Methyl Iodide	74-88-4	kg/yr	0.09	0.25
TFF	Methyl Silicate	681-84-5	kg/yr	0.14	0.40
TFF	Methylene Chloride	75-09-2	kg/yr	9.75	27.86
TFF	n,n-Dimethyl Acetamide or Dimethyl Acetamide	127-19-5	kg/yr	0.33	0.94
TFF	n-Heptane	142-82-5	kg/yr	0.24	0.68
TFF	Stoddard Solvent	8052-41-3	kg/yr	4.31	12.32
TFF	Tetrahydrofuran	109-99-9	kg/yr	4.98	14.23

Key Facility	Chemical Name	CAS Number	Units	2009 Estimated Air Emissions	2009 Usage
TFF	Toluene	108-88-3	kg/yr	1.52	4.33
TFF	Tributyl Phosphate	126-73-8	kg/yr	0.34	0.97
TFF	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.01	0.50
Bioscience	Acetic Acid	64-19-7	kg/yr	1.32	3.78
Bioscience	Acetone	67-64-1	kg/yr	27.37	78.20
Bioscience	Acetonitrile	75-05-8	kg/yr	26.12	74.64
Bioscience	Chlorine	7782-50-5	kg/yr	0.11	0.32
Bioscience	Chloroform	67-66-3	kg/yr	0.62	1.78
Bioscience	Dibutyl Phosphate	107-66-4	kg/yr	0.29	0.82
Bioscience	Dimethyl Phthalate	131-11-3	kg/yr	0.09	0.25
Bioscience	Ethanol	64-17-5	kg/yr	34.79	99.39
Bioscience	Ethyl Acetate	141-78-6	kg/yr	55.60	158.86
Bioscience	Ethyl Ether	60-29-7	kg/yr	19.11	54.60
Bioscience	Formamide	75-12-7	kg/yr	0.35	1.00
Bioscience	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	39.06	111.59
Bioscience	Hydrogen Chloride	7647-01-0	kg/yr	1.87	5.35
Bioscience	Hydrogen Peroxide	7722-84-1	kg/yr	11.50	32.85
Bioscience	Isopropyl Alcohol	67-63-0	kg/yr	7.62	21.76
Bioscience	Methyl Alcohol	67-56-1	kg/yr	23.43	66.95
Bioscience	Methyl Cyclohexane	108-87-2	kg/yr	0.56	1.60
Bioscience	Methyl Iodide	74-88-4	kg/yr	0.18	0.50
Bioscience	Methylene Chloride	75-09-2	kg/yr	74.76	213.59
Bioscience	Molybdenum	7439-98-7	kg/yr	1.69	4.83
Bioscience	n,n-Dimethylformamide	68-12-2	kg/yr	9.76	27.89
Bioscience	Naphtalene	91-20-3	kg/yr	0.35	1.00
Bioscience	n-Heptane	142-82-5	kg/yr	0.24	0.68
Bioscience	Nitric Acid	7697-37-2	kg/yr	1.34	3.82
Bioscience	Octane	111-65-9	kg/yr	0.25	0.71
Bioscience	o-Dichlorobenzene	95-50-1	kg/yr	0.46	1.30
Bioscience	Potassium Hydroxide	1310-58-3	kg/yr	175.00	500.01
Bioscience	Propane	74-98-6	kg/yr	0.00	0.33
Bioscience	Propyl Alcohol	71-23-8	kg/yr	0.14	0.40
Bioscience	Silica, Fused (respirable)	60676-86-0	kg/yr	0.70	2.00
Bioscience	Tetrahydrofuran	109-99-9	kg/yr	4.10	11.70
Bioscience	Toluene	108-88-3	kg/yr	24.88	71.09
Bioscience	Tributyl Phosphate	126-73-8	kg/yr	0.34	0.97

Key Facility	Chemical Name	CAS Number	Units	2009 Estimated Air Emissions	2009 Usage
Bioscience	Triethylamine	121-44-8	kg/yr	0.25	0.73
Bioscience	Xylene (o-,m-,p-Isomers)	1330-20-7	kg/yr	4.82	13.78
Radiochemistry Site	1,4-Dioxane	123-91-1	kg/yr	0.14	0.41
Radiochemistry Site	Acetic Acid	64-19-7	kg/yr	2.02	5.77
Radiochemistry Site	Acetone	67-64-1	kg/yr	73.26	209.33
Radiochemistry Site	Acetonitrile	75-05-8	kg/yr	4.50	12.87
Radiochemistry Site	Acetylene	74-86-2	kg/yr	0.00	7.89
Radiochemistry Site	Ammonia	7664-41-7	kg/yr	0.90	2.58
Radiochemistry Site	Cadmium, el.&compounds, as Cd	7440-43-9	kg/yr	0.76	2.16
Radiochemistry Site	Carbon Tetrachloride	56-23-5	kg/yr	1.67	4.78
Radiochemistry Site	Ethanol	64-17-5	kg/yr	10.61	30.31
Radiochemistry Site	Ethyl Acetate	141-78-6	kg/yr	1.26	3.60
Radiochemistry Site	Ethyl Ether	60-29-7	kg/yr	6.13	17.50
Radiochemistry Site	Ethylene Dichloride	107-06-2	kg/yr	0.52	1.48
Radiochemistry Site	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	9.94	28.39
Radiochemistry Site	Hydrogen Bromide	10035-10-6	kg/yr	4.20	12.00
Radiochemistry Site	Hydrogen Chloride	7647-01-0	kg/yr	164.21	469.17
Radiochemistry Site	Hydrogen Fluoride, as F	7664-39-3	kg/yr	5.53	15.79
Radiochemistry Site	Hydrogen Peroxide	7722-84-1	kg/yr	6.50	18.57
Radiochemistry Site	Iodine	7553-56-2	kg/yr	0.21	0.60
Radiochemistry Site	Isopropyl Alcohol	67-63-0	kg/yr	4.40	12.57
Radiochemistry Site	Isopropyl Ether	108-20-3	kg/yr	0.25	0.72
Radiochemistry Site	Manganese Dust & Compounds or Fume	7439-96-5	kg/yr	0.32	0.90
Radiochemistry Site	Methyl Alcohol	67-56-1	kg/yr	2.66	7.60
Radiochemistry Site	Methyl Isobutyl Ketone	108-10-1	kg/yr	0.28	0.80
Radiochemistry Site	Methyl Methacrylate	80-62-6	kg/yr	0.33	0.94
Radiochemistry Site	Methylene Chloride	75-09-2	kg/yr	7.99	22.82
Radiochemistry Site	n,n-Dimethyl Acetamide or Dimethyl Acetamide	127-19-5	kg/yr	0.33	0.94
Radiochemistry Site	n,n-Dimethylformamide	68-12-2	kg/yr	0.66	1.90
Radiochemistry Site	Nitric Acid	7697-37-2	kg/yr	795.09	2271.69
Radiochemistry Site	Pentane (all isomers)	109-66-0	kg/yr	1.32	3.76
Radiochemistry Site	Platinum Metal	7440-06-4	kg/yr	0.75	2.15
Radiochemistry Site	Potassium Hydroxide	1310-58-3	kg/yr	0.53	1.51
Radiochemistry Site	Propane	74-98-6	kg/yr	0.00	6.49
Radiochemistry Site	Propionic Acid	79-09-4	kg/yr	0.17	0.50
Radiochemistry Site	Propylene Oxide	75-56-9	kg/yr	1.58	4.50

Key Facility	Chemical Name	CAS Number	Units	2009 Estimated Air Emissions	2009 Usage
Radiochemistry Site	Tellurium & Compounds, as Te	13494-80-9	kg/yr	0.44	1.25
Radiochemistry Site	Tetrahydrofuran	109-99-9	kg/yr	6.26	17.87
Radiochemistry Site	Toluene	108-88-3	kg/yr	9.71	27.74
Radiochemistry Site	Tributyl Phosphate	126-73-8	kg/yr	0.34	0.97
Radiochemistry Site	Trimethylamine	75-50-3	kg/yr	0.13	0.38
Radiochemistry Site	Uranium (natural) Sol.&Unsol.Comp. as U	7440-61-1	kg/yr	2.49	7.13
Radiochemistry Site	VM & P Naphtha	8032-32-4	kg/yr	1.05	3.00
RLWTF	Acetylene	74-86-2	kg/yr	0.00	1.33
RLWTF	Ethanolamine	141-43-5	kg/yr	32.50	92.84
RLWTF	Hydrogen Chloride	7647-01-0	kg/yr	6.23	17.81
RLWTF	Nitric Acid	7697-37-2	kg/yr	13.38	38.22
RLWTF	Potassium Hydroxide	1310-58-3	kg/yr	3.70	10.57
LANSCE	Acetone	67-64-1	kg/yr	2.49	7.11
LANSCE	Acetylene	74-86-2	kg/yr	0.00	0.33
LANSCE	Chloroform	67-66-3	kg/yr	1.04	2.97
LANSCE	Cyclohexane	110-82-7	kg/yr	0.14	0.39
LANSCE	Ethanol	64-17-5	kg/yr	34.12	97.49
LANSCE	Ethyl Ether	60-29-7	kg/yr	2.94	8.40
LANSCE	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	1.39	3.96
LANSCE	Iso-Amyl Alcohol	123-51-3	kg/yr	0.56	1.60
LANSCE	Methyl Alcohol	67-56-1	kg/yr	7.06	20.18
LANSCE	n,n-Dimethylformamide	68-12-2	kg/yr	0.66	1.90
LANSCE	Naphtalene	91-20-3	kg/yr	0.35	1.00
LANSCE	Nitric Acid	7697-37-2	kg/yr	1.07	3.05
LANSCE	Pentane (all isomers)	109-66-0	kg/yr	4.16	11.90
LANSCE	Potassium Hydroxide	1310-58-3	kg/yr	2.11	6.04
LANSCE	Propane	74-98-6	kg/yr	0.00	2.05
LANSCE	Sulfur Hexafluoride	2551-62-4	kg/yr	198.92	568.35
LANSCE	Toluene	108-88-3	kg/yr	7.28	20.81
LANSCE	Xylene (o-,m-,p-Isomers)	1330-20-7	kg/yr	0.51	1.46
Waste Management Operations	Ethanol	64-17-5	kg/yr	26.66	76.17
Waste Management Operations	Isopropyl Alcohol	67-63-0	kg/yr	1.04	2.97
Waste Management Operations	Propane	74-98-6	kg/yr	0.00	215.62
Plutonium Facility Complex	Acetone	67-64-1	kg/yr	0.28	0.79

Key Facility	Chemical Name	CAS Number	Units	2009 Estimated Air Emissions	2009 Usage
Plutonium Facility Complex	Acetylene	74-86-2	kg/yr	0.00	7.89
Plutonium Facility Complex	Diethylene Triamine	111-40-0	kg/yr	0.34	0.96
Plutonium Facility Complex	Ethanol	64-17-5	kg/yr	13.84	39.54
Plutonium Facility Complex	Hydrogen Chloride	7647-01-0	kg/yr	33.24	94.96
Plutonium Facility Complex	Hydrogen Peroxide	7722-84-1	kg/yr	0.10	0.28
Plutonium Facility Complex	n,n-Dimethylformamide	68-12-2	kg/yr	0.17	0.47
Plutonium Facility Complex	Nitric Acid	7697-37-2	kg/yr	1.40	4.00

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Appendix C: Nuclear Facilities List

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Safety Basis Division	Documentation and Records	Rev. 11 September 2009

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	R.M. Holley Date 9/21/09
LASO Safety Basis Team Leader	for B.E. Date 9/28/09
LASO Manager	Date 9/30/09

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

Revision Record		
Revision	**Date**	**Summary**
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
10	January 2008	Re-categorized RLWT Facility per memo SBT:CMK-002, Removed SST Pad per 5485.3/SBT:JF-39193
11	September 2009	Removed MDA B per SBT:25BLJ-56803; Removed WWTP per SBT:25BLJ-49261; Removed Pratt Canyon per SBT:25BLJ-49261. Added EF Firing Site per AD-NHHO:09-93; editorial changes (e.g., removed SB-401 since the old EWMO-document numbering system is no longer utilized by the Safety Basis Division).

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.

Changes in Nuclear Facility Status

Date	Description
10/01	TA-53 LANSCE Actinide BIO approved as hazard category 3 nuclear activity.
3/02	TA-33-86, High Pressure Tritium Facility (HPTF) removed from nuclear facilities list.
4/02	TA-53 LANSCE, DOE NNSA approves BIO for Storing Activated Components (A6, etc.) in Bldg 53-3 Sector M "Area A East" and added as hazard category 3 nuclear activity.
7/02	TA-53 LANSCE, WNR Facility Target 4 downgraded to below hazard category 3 and removed 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.

Changes in Nuclear Facility Status

Date	Description
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.
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)

Changes in Nuclear Facility Status

Date	Description
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.
11/08	TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) was approved to be re-categorized as a Hazard Category 3 Nuclear Facility per SBT:CMK-002. SST Pad removed as a Nuclear Facility per 5485.3/SBT:JF-39193, "Revocation of the Authorization Agreement for the Technical Area (TA)-55 Safe Secure Transport Facility, dated 1/16/08.
9/09	Removed MDA B per SBT:25BLJ-56803 which approved final hazard categorization MDAB-ADB-1004; Removed WWTP per SBT:25BLJ-49261 which approved final hazard categorization NES-ABD-0501 R1; Removed Pratt Canyon per SBT:25BLJ-49261 which approves final hazard categorization NES-ABD-0401 R1; Added EF Firing Site per AD-NHHO:09-093.

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
3	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
2	TA-21 MDA T NES
3	TA-35 MDA W 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
3	EF Site

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	SER TSD.01, Safety Evaluation Report, Rev 3, approving Los Alamos National Laboratory (LANL) Transportation Safety Document (TSD) P&T-SA-002, R5 Technical Safety Requirements (TSRs) P&T-TSR-001, R2, September 2008	OSD
16	0205 0450	2	Weapons Engineering and Tritium Facility (WETF)	Tritium Research	Safety Evaluation Report (SER) for WETF, SER-Rev.0, March 27, 2002.	WFO
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
50	0001	3	TA-50 Radioactive Liquid Waste Treatment Facility (RLWT)	Main treatment plant, pretreatment plant, decontamination operation	LANL Letter: Comment Response Regarding the RLWTF Hazard Category 3 Confirmation, AD-NHHO:08-100, April 2008.	TA-55
	0002	3		Low level liquid influence tanks, treatment effluent tanks, low level sludge tanks		
	0066	3		Acid and Caustic waste holding tanks		
	0090	3		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		

TA	Bldg	Haz Cat	Facility Name	Description	Categorization Basis	FOD
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	TA-21
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	TA-21
5	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	TA-21

TA	Bldg	Haz Cat	Facility Name	Description	Categorization Basis	FOD
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	TA-21
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	TA-21
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	TA-21
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	TA-21
15	EF Site	3	EF Site	An inactive site where experiments utilizing depleted uranium was historically conducted.	"EF Site Study Phase A", ENREGS Report LANL-07-1	WFO

Appendix D: Less-than-Hazard-Category-3 Nuclear Facilities List

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LISTING OF LOS ALAMOS NATIONAL LABORATORY LESS-THAN HAZARD CATEGORY 3 NUCLEAR FACILITIES

Safety Basis Technical Services	**Date**
Safety Basis Division Leader	**Date**
Associate Director, NHHO	**Date**

Record of Document Revisions

Revision Record		
Revision	**Date**	**Summary**
0	April 2009	Original Issue.

1 SCOPE

Department of Energy 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 a methodology to develop the hazard categorization of a nuclear facility based only on the quantities of radioactive material in the facility. This document lists the less-than-hazard category 3 (HC-3) nuclear facilities that must comply with requirements in 10CFR830, Nuclear Safety Management, Subpart A, "Quality Assurance Requirements", as well as the appropriate safety management programs necessary based on their non-nuclear facility categorization. These facilities do not have to comply with the requirements in Subpart B of 10CFR830.

2 PURPOSE

This document provides the enumeration of less-than HC-3 nuclear facilities at the Laboratory. These facilities are also known as "Radiological Facilities", however that term has no precise definition if the Code of Federal Law, Department of Energy Directives, nor Department of Energy Standards.

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.

3 APPLICABILITY

This document is intended for use by Laboratory personnel, any contractors who support Laboratory functions, DOE/NNSA personnel, and any other persons interested in nuclear safety management at the Laboratory.

4 REFERENCES

4.1 10 CFR 830, Title 10, *Code of Federal Regulations*, Part 830, "Nuclear Safety Management."

4.2 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.

4.3 49 CFR 173.469, Title 49, *Code of Federal Regulations,* Part 173 "Shippers - General Requirements for Shipments and Packagings."

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

5 RADIOLOGICAL FACILITIES LIST

Table 1 lists the less-than HC-3 nuclear facilities at the Los Alamos National Laboratory. These 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 safety basis document 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.

6 LANL LESS-THAN HAZARD CATEGORY-3 NUCLEAR FACILITIES SUMMARY TABLES

Table 1: Less-than HC-3 Nuclear Facility Categorization Information

	TA-Bldg	FOD	RAD	Facility	Description	Inventory Document Either delete or change to Haz Cat Document
1.	TA-03-0016	IFCS		Ion Beam Facility	Radiological contamination	
2.	TA-03-0032	STO	ADEPS	Superconduc. Tech Center(STC)	Depleted Uranium	MST-AB-FOM-ALL-04-0002, rev.0
3.	TA-03-0034	STO	ADEPS	Cryogenics Bldg "B"	Various	MST-AB-FOM-ALL-04-0002, rev.0
4.	TA-03-0035	STO	ADEPS	Press Bldg	U-235, Depleted Uranium	PRO-0010-MCFO-AB-SIG RAM
5.	TA-03-0039	STO	ADEES	Manufacturing Shops	Contamination; possible DU storage	
6.	TA-03-0040	STO	ADEPS	Physics Bldg, office and lab	Sealed sources*, various	TRPFOD-OPS-SORD-011.0
7.	TA-03-0065	IFCS		Source Storage Bldg	Radiation effect Lab.	
8.	TA-03-0066	STO	ADEPS	Sigma	U-235, Depleted Uranium	PRO-0010-MCFO-AB-SIG RAM
9.	TA-03-0102	STO	ADEES	Tuballoy Machine Shop	Depleted Uranium	
10.	TA-03-0130	IFCS		Source Storage Bldg	Co-60	
11.	TA-03-0141	STO	ADEES	BTF	Depleted Uranium	PRO-0010-MCFO-AB-SIG RAM
12.	TA-03-0159	STO	ADEPS	Forming Bldg	Th-232; DU	PRO-0010-MCFO-AB-SIG RAM
13.	TA-03-0215	STO	ADEPS		Sealed sources*, various	TRPFOD-OPS-SORD-011.0
14.	TA-03-0216	STO	ADEPS		Sealed sources*, various	TRPFOD-OPS-SORD-011.0
15.	TA-03-0218	STO	ADEPS		Sealed sources*, various	TRPFOD-OPS-SORD-011.0
16.	TA-03-0169	STO	ADEPS	Warehouse	Depleted Uranium	PRO-0010-MCFO-AB-SIG RAM

	TA-Bldg	FOD	RAD	Facility	Description	Inventory Document Either delete or change to Haz Cat Document
17.	TA-03-0317	STO	ADEES	BTF - Graphite Storage	Depleted Uranium	PRO-0010-MCFO-AB-SIG RAM
18.	TA-03-0451	STO	ADEPS	Sigma Office	None	
19.	TA-03-0494	STO	ADEPS		Sealed sources*, various	TRPFOD-OPS-SORD-011.0
20.	TA-03-0541	STO	ADEPS	Sigma Storage Shed		PRO-0010-MCFO-AB-SIG RAM
21.	TA-03-1698	STO	ADEPS	Material Science Lab	Depleted Uranium	MST-AB-FOM-ALL-04-0002, rev.0
22.	TA-03-1819	STO	ADEPS	Experimental Material Science	Depleted Uranium	MST-AB-FOM-ALL-04-0002, rev.0
23.	TA-03-2002	STO	ADEPS	X-Ray Machine Lab	Depleted Uranium	MST-AB-FOM-ALL-04-0002, rev.0
24.	TA-03-2132	STO	ADEPS	Sigma Safety Storage Shed		PRO-0010-MCFO-AB-SIG RAM
25.	TA-03-2322	STO	ADTR	NISC	Sealed Source Work* and Radiography	N-OP-PLN-0010.3
26.	TA-08-0022	WFO	ADEES	X-Ray Facility	Depleted Uranium	ESA-WOI-OP-41.0, R.1
27.	TA-08-0023	WFO	ADEES	Betatron Bldg	Depleted Uranium	ESA-WOI-OP-41.0, R.1
28.	TA-08-0065	WFO	ADEES	Sealed Sources	Depleted Uranium	ESA-WOI-OP-41.0, R.1
29.	TA-08-0070	WFO	ADEES	Non Destructive Testing	Depleted Uranium	ESA-WOI-OP-41.0, R.1
30.	TA-08-0120	WFO	ADEES	Radiography	DU	ESA-WOI-OP-41.0, R.1
31.	TA-11-0002	WFO	ADWP	Vibration Test	Depleted Uranium	ESA-WOI-OP-41.0, R.1
32.	TA-11-0025	WFO	ADWP		Depleted Uranium	ESA-WOI-OP-41.0, R.1
33.	TA-11-0030	WFO	ADWP	Vibration Test Bldg	Depleted Uranium	ESA-WOI-OP-41.0, R.1
34.	TA-11-0036	WFO	ADWP	HE Magazine		
35.	TA-11-0065	WFO	ADWP	Burn Pit	Depleted Uranium	ESA-WOI-OP-41.0, R.1
36.	TA-15 DART Firing Site	WFO		Firing Site (R307)	DU contamination	
37.	TA-15-R183	WFO		Vault	Depleted Uranium	
38.	TA-16-0202	WFO	ADEES	Laboratory	DU,	ESA-WOI-OP-42.0, R.1

	TA-Bldg	FOD	RAD	Facility	Description	Inventory Document Either delete or change to Haz Cat Document
39.	TA-16-0207	WFO	ADWP	Component Testing	DU	ESA-WOI-OP-41.0, R.1
40.	TA-16-0260	WFO	ADWP		Depleted Uranium	ESA-WOI-OP-41.0, R.1
41.	TA-16-0261	WFO	ADWP		DU	ESA-WOI-OP-41.0, R.1
42.	TA-16-0263	WFO	ADWP		DU	ESA-WOI-OP-41.0, R.1
43.	TA-16-0267	WFO	ADWP		DU, legacy cont.	ESA-WOI-OP-41.0, R.1
44.	TA-16-0280	WFO	ADWP	Inspection Building	DU	ESA-WOI-OP-41.0, R.1
45.	TA-16-0281	WFO	ADWP	Rest House	DU	ESA-WOI-OP-41.0, R.1
46.	TA-16-0283	WFO	ADWP	Component Storage	DU	ESA-WOI-OP-41.0, R.1
47.	TA-16-0285	WFO	ADWP	Component Storage	DU	ESA-WOI-OP-41.0, R.1
48.	TA-16-0300	WFO	ADWP	Component Storage	DU/Th-232	ESA-WOI-OP-41.0, R.1
49.	TA-16-0301	WFO	ADWP	Component Storage	Depleted Uranium	ESA-WOI-OP-41.0, R.1
50.	TA-16-0302	WFO	ADWP	Component Storage Training	DU	ESA-WOI-OP-41.0, R.1
51.	TA-16-0332	WFO	ADWP	Component Storage	Depleted Uranium	ESA-WOI-OP-41.0, R.1
52.	TA-16-0410	WFO	ADWP	Assembly Building	Depleted Uranium	ESA-WOI-OP-41.0, R.1
53.	TA-16-0411	WFO	ADWP	Assembly Building	Depleted Uranium	ESA-WOI-OP-41.0, R.1
54.	TA-16-0413	WFO	ADWP	Component Storage	Depleted Uranium	ESA-WOI-OP-41.0, R.1
55.	TA-16-0414	WFO	ADWP	Storage Building	Depleted Uranium	ESA-WOI-OP-41.0, R.1
56.	TA-16-0415	WFO	ADWP	Component Storage	DU	ESA-WOI-OP-41.0, R.1
57.	TA-16-0955	WFO	ADWP			
58.	TA-18 ALL	IFCS		60 facilities		
59.	TA-21-0005	IFCS		Laboratory Bldg	Radiological contamination	
60.	TA-21-0089	IFCS				
61.	TA-21-0150	IFCS		Molecular chemistry	Radiological contamination	
62.	TA-21-0152	IFCS		Laboratory	Legacy Contamination	ESA-WOI-OP-41.0, R.1
63.	TA-21-0155	IFCS		TSTA Facility	Radioactive-mixed contamination	
64.	TA-21-0209	IFCS		Labs. & Offices, TSFF	Tritium, DU, Pu	ESA-WOI-FSP-TSFR, Rev 0

	TA-Bldg	FOD	RAD	Facility	Description	Inventory Document Either delete or change to Haz Cat Document
65.	TA-21-0213	IFCS		Lab Supply Warehouse	Radiological contamination	
66.	TA-21-0257	EWMO		RLWT	Treatment of radioactive liquid waste, Analysis of volume measurement	Development stage
67.	TA-21 MDA B NES	EWMO		MDA B NES	An inactive Material Disposal Area consisting of four major pits, a small trench, and miscellaneous small disposal sites.	
68.	TA-35-0002	STO	ADTR	Nuclear Safeguards Research Bld.	Sealed Sources, various other	TRPFOD-OPS-SORD-011.0
69.	TA-35-0027	STO	ADTR	Nuclear Safeguards Lab.	Sealed Sources, various other	TRPFOD-OPS-SORD-011.0
70.	TA-35-0034	STO	ADTR	Nuclear Safeguards Research Bld.	Sealed Sources, various other	TRPFOD-OPS-SORD-011.0
71.	TA-35-0087	STO	ADTR		Sealed Sources, various other	TRPFOD-OPS-SORD-011.0
72.	TA-35-0124	STO	ADEPS	Antares Target Hall	Pu-239	MST-AB-FOM-ALL-04-0002, rev.0
73.	TA-35-0125	STO	ADEPS	Atlas Bldg	NHMFL, Pu-239, Am-241	MST-AB-FOM-ALL-04-0002, rev.0
74.	TA-35-0126	STO	ADEPS	Mechanical Bldg	Pu-239, Np-237	MST-AB-FOM-ALL-04-0002, rev.0
75.	TA-35-0189	STO		Trident Laser Lab	Used Pu-239 sealed source	TRPFOD-OPS-SORD-011.0
76.	TA-35-0213	STO	ADEPS	Target Fabrication Facility	Various	MST-AB-FOM-ALL-04-0002, rev.0
77.	TA-35-0374	STO	ADTR		Contaminated Hoods	TRPFOD-OPS-SORD-011.0
78.	TA-36-0001	IFCS		Lab and Offices	Radiological contamination	
79.	TA-36-0214	IFCS		Central HP Calibration Facility	Calibrate Rad Prot. Inst.	ESH4-RIC-SOP-06,RI
80.	TA-37-0010	WFO	ADWP	Storage Magazine	Depleted Uranium	ESA-WOI-OP-41.0, R.1
81.	TA-37-0016	WFO		Storage Magazine	Depleted Uranium, Fixed Cont.	ESA-WOI-OP-41.0, R.1

	TA-Bldg	FOD	RAD	Facility	Description	Inventory Document Either delete or change to Haz Cat Document
82.	TA-39-0002	STO	ADTR	Lab/Office Building	Contamination	MST-AB-FOM-ALL-04-0002, rev.0
83.	TA-41-0001	STO	ADTR	Underground Vault	Depleted Uranium	TRPFOD-OPS-SORD-011.0
84.	TA-41-0006	STO	ADTR	Laboratory	Tritium contamination	TRPFOD-OPS-SORD-011.0
85.	TA-43-0001	STO	ADTR	Health Research Lab	Various	TRPFOD-OPS-SORD-011.0
86.	TA-43-0028	STO	ADTR		Various	TRPFOD-OPS-SORD-011.0
87.	TA-43-0047	STO	ADTR		Various	TRPFOD-OPS-SORD-011.0
88.	TA-43-0049	STO	ADTR		Various	TRPFOD-OPS-SORD-011.0
89.	TA-43-0061	STO	ADTR		Various	TRPFOD-OPS-SORD-011.0
90.	TA-46-0001	STO	ADCLES	Laboratory/Office	Various	MST-AB-FOM-ALL-04-0002, rev.0
91.	TA-46-0024	STO	ADCLES	Laboratory/Office	Various	MST-AB-FOM-ALL-04-0002, rev.0
92.	TA-46-0025	STO	ADCLES	Engineering Lab	Various	MST-AB-FOM-ALL-04-0002, rev.0
93.	TA-46-0030	STO	ADCLES	Electronics Lab	Various	MST-AB-FOM-ALL-04-0002, rev.0
94.	TA-46-0031	STO	ADCLES	Test Building #2	Various	MST-AB-FOM-ALL-04-0002, rev.0
95.	TA-46-0041	STO	ADCLES	Laser Isotope Support Facility	Various	MST-AB-FOM-ALL-04-0002, rev.0
96.	TA-46-0154	STO	ADCLES	Physical Chemistry Lab	Various	MST-AB-FOM-ALL-04-0002, rev.0
97.	TA-46-0158	STO	ADCLES	Laser Induced Chemistry Lab	Various	MST-AB-FOM-ALL-04-0002, rev.0
98.	TA-46-0208	STO	ADCLES	FEL Lab Building	Various	MST-AB-FOM-ALL-04-0002, rev.0
99.	TA-46-0416	STO	ADCLES	Morgan Shed	Various	MST-AB-FOM-ALL-04-0002, rev.0
100.	TA-48-0001	STO	ADCLES	RC-1	Radiochemistry	PRO-C-DO-007.5
101.	TA-48-0008	STO	ADCLES	Isotope Separator BLDG	Various	PRO-C-DO-007.5

	TA-Bldg	FOD	RAD	Facility	Description	Inventory Document Either delete or change to Haz Cat Document
102.	TA-48-0017	STO	ADCLES	Assembly & Checkout BLDG	Various	PRO-C-DO-007.5
103.	TA-48-0026	STO	ADCLES	Office BLDG	Various	PRO-C-DO-007.5
104.	TA-48-0027	STO	ADCLES	Transportable	Various	PRO-C-DO-007.5
105.	TA-48-0028	STO	ADCLES	Adv Analytical Devel BLDG	Various	
106.	TA-48-0033	STO	ADCLES	Transportable	Various	PRO-C-DO-007.5
107.	TA-48-0038	STO	ADCLES	Metal BLDG	Various	PRO-C-DO-007.5
108.	TA-48-0039	STO	ADCLES	Metal BLDG	Various	PRO-C-DO-007.5
109.	TA-48-0045	STO	ADCLES	Clean Chemistry/Mass Spec	Various	
110.	TA-48-0063	STO	ADCLES	Transportainer	Various	
111.	TA-48-0107	STO	ADCLES	Weapons Analytical Chemistry	Various	
112.	TA-48-0111	STO	ADCLES	Transportainer	Various	PRO-C-DO-007.5
113.	TA-48-0168	STO	ADCLES	Chem-Stor BLDG	Various	PRO-C-DO-007.5
114.	TA-48-0180	STO	ADCLES	Chem-Stor BLDG	Various	PRO-C-DO-007.5
115.	TA-48-0181	STO	ADCLES	Chem-Stor BLDG	Various	
116.	TA-48-0215	STO	ADCLES	Transportainer	Various	PRO-C-DO-007.5
117.	TA-48-0236	STO	ADCLES	Walk-in Cooler	Various	PRO-C-DO-007.5
118.	TA-50-0037	EMWO		Arctic	No SNM except for holdup in ventilation system duct work, Pu-239	None
119.	TA-53-0945	LANSCE		Liq. Waste Treatment Facility	Rad Liq. Treatment Facility	SOP-RLW-002.R.3
120.	TA-53-0954	LANSCE		Rad Liq. Waste basins	Evaporation Basins	SOP-RLW-002.R.3
121.	TA-54, Area L	EWMO		Liquid hazardous waste treatment & storage	Liquid hazardous waste treatment & storage	AP-SWO-002, Data Management of CWDRs and WPFs
122.	TA-54-0412	EWMO		DVRS	Decontamination & volume reduction system	Development stage

	TA-Bldg	FOD	RAD	Facility	Description	Inventory Document Either delete or change to Haz Cat Document
123.	TA-54-1009	EMWO		Decontamination Facility	Decontamination Facility	PS-Policy-001, project support acceptance criteria
124.	TA-59-0001	IFCS		Occupational Health Lab	Analytical-Environmental	FSP-C-OPS-71-03.2

Appendix E: DOE 2009 Pollution Prevention Awards for LANL

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DOE Headquarters, in conjunction with the NNSA, sponsor annual pollution prevention awards programs. The programs provide recognition to personnel who implement pollution prevention projects. LANS submits nominations for the DOE/NNSA awards each year and received eight awards for pollution prevention projects during FY09, including three Best-in-Class awards. The winning projects are described below.

- The Fleet Management and Process Improvement Project - The team investigated the underlying causes of increased fleet costs and created a strategy for down-sizing and right-sizing the onsite fleet. The work of the team saved approximately $156,000.

- A Green Synthesis Path to the Explosive DAAF - High explosive synthesis is often unable to benefit from a greener synthesis path due to constraints on purity, yield, and the types of impurities. However, this team replaced the original synthesis path to diaminoazoxyfurazan (DAAF), with an environmentally-friendly alternative. This method decreased the process time by 90 percent and improved purity of the final product. It also maintains a high product yield and generates no hazardous waste.

- LED Replacement Lights for Glove Boxes - This team replaces about 90 fluorescent light fixtures in glove boxes with LED lights each year. LED lights consume less electricity and have a life span up to ten times longer than fluorescent fixtures. Additionally, LED lights contain no hazardous components and can be disposed of at a lower cost than fluorescent fixtures. The annual savings is over $32,600, which includes energy costs, procurement, and waste disposal.

- Using a Mature EMS for Meaningful Institutional Improvements (Best in Class) LANS uses its EMS to systematically improve institutional environmental performance. The EMS is moving beyond traditional sustainability programs and merging with worker safety, regulatory compliance, and institutional infrastructure programs. Such improvements are critical to the credibility of the EMS and the continued willingness of employees to participate in the improvement process.

- MRAD Pollution Prevention Plan (Best in Class) - The Muon Radiography Project (MRAD) project uses thousands of sensitive drift tubes that require careful cleaning. The initial plan was to clean the tubes using an acid waste tank system. An alternative cleaning system was implemented, and this change avoids 5,500 gallons of hazardous waste annually. This effort saved over $900,000 in disposal, facility, and regulatory costs. Worker safety was greatly enhanced with the reduction in hazardous chemical exposure.

- Extending Reuse Period of Anti-C Lab Coats at CMR - It was determined that the CMR lab coat change frequency could be extended from one day to one week. Employees now spend less time surveying and handling laundry, which also

provides an estimated times savings of 1800 hours per year. Spending on the laundry contract is reduced by about half.

- Server Virtualization Results in Continual Cost and Energy Savings (Best in Class) - This team reduced the overall server computer footprint by leveraging a technology that virtualizes multiple computers on a consolidated platform that reduces hardware procurement, maintenance, disposal, and energy use. The technology allows for multiple operating systems to be run on a single computer. This team reduced the number of computer servers from 200 to 12. The estimated energy savings are over 873,000 kilowatt-hours and $1.4 million per year.

- Remediation Project Minimizes Waste - Approximately 2,400 cubic yards of clean overburden soil was segregated and reused as backfill material. Reuse of the overburden soil eliminated the need for this material to be processed as waste and avoided approximately $2 million in storage, transportation, and disposal costs. To control dust and minimize runoff, the overburden stockpiles were covered with non-hazardous magnesium chloride, and this resulted in 40 cubic yards of plastic sheeting waste avoidance. Additionally, a clean metal tank was sent to a metal recycler.

To obtain a copy of the SWEIS Yearbook – 2009, contact Marjorie Wright
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The 2009 Yearbook is available on the web through the
Los Alamos National Laboratory Public Reading Room:
http://eprr.lanl.gov

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