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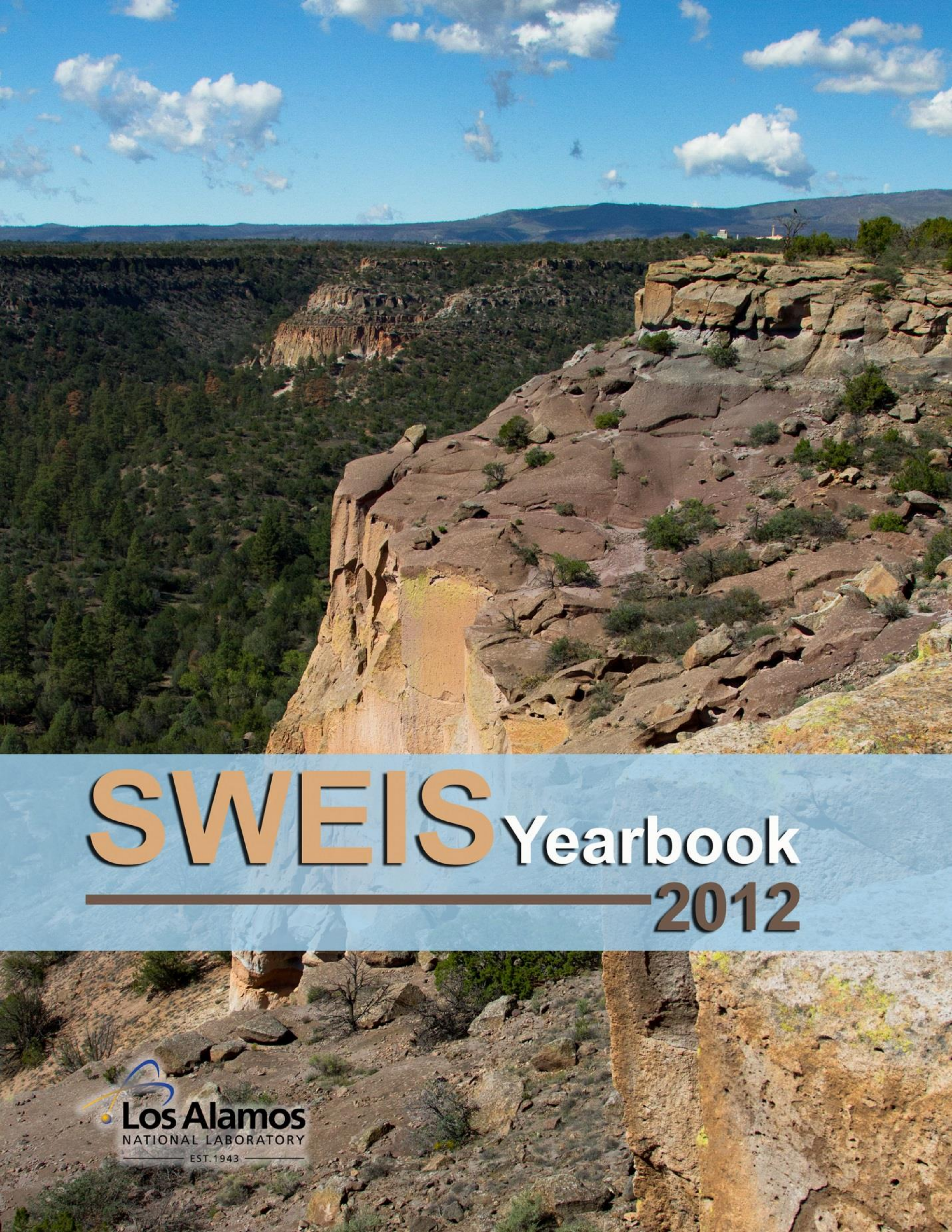

SWEIS Yearbook 2012

Los Alamos
NATIONAL LABORATORY
EST. 1943

Front Cover photo: View to the west up Los Alamos Canyon from the Anniversary Trail.
(Photo credit: Phillip Noll)

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SWEIS Yearbook–2012

Comparison of 2012 Data to Projections of the 2008 Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory

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Prepared by the Environmental Stewardship Services Group,
Environmental Protection Division

CONTENTS

Figures

Tables

Appendixes

PREFACE

The Site-Wide Environmental Impact Statement (SWEIS) for Continued Operation of Los Alamos National Laboratory (LANL) was issued in May 2008 (DOE 2008a). In September 2008, the United States Department of Energy (DOE)/National Nuclear Security Administration (NNSA) issued the first Record of Decision (ROD) for the 2008 SWEIS (DOE 2008b). DOE/NNSA issued the second ROD for the 2008 SWEIS in July 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 contained in the 2008 SWEIS for the level of operations selected by the SWEIS. Yearbook publications to date are available online in LANL's Electronic Public Reading Room.

The 2012 SWEIS Yearbook is the fifth compilation of annual data since the first ROD for the 2008 LANL SWEIS was issued and the third compilation of annual data since the second ROD was issued. The SWEIS Yearbook is an essential component in DOE's five-year evaluation of the SWEIS.

The SWEIS Yearbooks contain data that can be used for trend analyses to identify potential problem areas and enable 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 2012.

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EXECUTIVE SUMMARY

Los Alamos National Laboratory (LANL or the Laboratory) operations data for Calendar Year (CY) 2012 mostly fell within the 2008 Site-Wide Environmental Impact Statement (SWEIS) projections. Operation levels for one LANL facility exceeded the 2008 SWEIS capability projections—Radiochemistry Facility; however, none of the capability increases caused exceedances in radioactive air emissions, waste generation, or National Pollutant Discharge Elimination System (NPDES) discharge. Several facilities exceeded the 2008 SWEIS levels for waste generation quantities; however, all were one-time, non-routine events that do not reflect the day-to-day operations of the Laboratory. In addition, total site-wide waste generation quantities were below SWEIS projections for all waste types, reflecting the overall levels of operations at both the Key and Non-Key Facilities. Although gas and electricity consumption have remained within the 2008 SWEIS limits for utilities, water consumption exceeded the 2008 SWEIS projections by 27 million gallons in CY 2012.

Background

In 1999, the 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. 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.

In 1999, DOE and LANL implemented a program, the Annual SWEIS Yearbook, to make annual comparisons between SWEIS projections and actual operations data. The Yearbook provides DOE/National Nuclear Security Administration (NNSA) with a tool to assist decision-makers in determining the continued adequacy of the SWEIS in characterizing existing operations. The Yearbook focuses on operations during one CY and specifically addresses the following:

- Facility and/or process modifications or additions.
- Types and levels of operations.
- Environmental effects of operations.
- Site-wide effects of operations.

In August 2005, a memo was issued to LANL from DOE/NNSA to prepare a new SWEIS (NNSA 2005). The new SWEIS was issued in May 2008 (DOE 2008a). The 2008 SWEIS analyzed the potential environmental impacts of future operations at LANL. In September 2008, DOE/NNSA issued the first ROD for the 2008 SWEIS (DOE 2008b). DOE/NNSA chose to implement the No Action Alternative with the addition of some elements of the Expanded Operations Alternative in the September ROD. In July 2009, DOE/NNSA issued the second ROD for the 2008 SWEIS (DOE 2009a); again DOE/NNSA chose to implement the No Action Alternative with some additional elements of the Expanded Operations Alternative.

Current Results

This Yearbook represents data collected for CY 2012. The selected levels of operation from the RODs and the SWEIS provided projections for these operations. This Yearbook compares data from CY 2012 to the 2008 SWEIS projections where appropriate.

The 2012 Yearbook addresses capabilities and operations using the concept of "Key Facilities" as presented in the 2008 SWEIS. It also discusses the "Non-Key Facilities," which include all buildings and structures not part of a Key Facility, (i.e., the balance of LANL).

Operations Levels and Operations Data Levels

The 2008 SWEIS defined capabilities and activity levels for Key and Non-Key Facilities. These operations levels for CY 2012 were compared to 2008 projections. Facilities that exceeded the operations levels as defined by the 2008 SWEIS are listed below. The 2008 SWEIS also defined operation data levels for Key and Non-Key Facilities. These include amount of waste generated, air emission limits and outfall discharge limits for each facility. Facilities that exceeded the 2008 SWEIS operations data levels are listed below.

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 CY 2012, seven construction/modification projects were undertaken:

- Electrical and mechanical systems were expanded to meet new computer requirements at the Nicholas C. Metropolis Center (Metropolis Center);
- Construction of the Radiological Laboratory/Utility/Office Building at Technical Area (TA) 55 was completed;
- The Nuclear Materials Safeguards and Security Upgrades Project continued at TA-55;
- The TA-55 Reinvestment Project construction continued;
- Construction of solar evaporation tanks at TA-52 for the Radioactive Liquid Waste Treatment Facility (RLWTF) was completed;
- Construction of the Los Alamos Neutron Science Center (LANSCE) Weapons Neutron Research National Security Nuclear Science Facility was completed; however, the design for the new substation continued; and
- The Materials Science Laboratory (MSL) Infill Project began.

Within the Non-Key Facilities, four major construction projects were undertaken:

- Construction of the Photovoltaic Array Reuse of Los Alamos County Landfill continued;
- Construction of the Sanitary Effluent Reclamation Facility Expansion (SERF-E) continued;
- Construction of the Indoor Firing Range continued; and
- Construction of the Interagency Wildfire Center began.

During CY 2012, 80 capabilities were active and 10 capabilities were inactive at LANL's Key and Non-Key Facilities. At the Chemistry and Metallurgy Research (CMR) Building Key Facility, destructive and nondestructive analysis, nonproliferation training, and large vessel handling capabilities were not active. No high-pressure gas fills and processing, gas boost system, development, diffusion and membrane purification, hydrogen isotopic separation, or radioactive liquid waste treatment took place at the Tritium Facilities. Materials Test Station equipment was not installed at LANSCE. No waste retrieval, waste treatment, or decontamination operations took place at Solid Radioactive and Chemical Waste (SRCW) Facilities.

During CY 2012, operation levels for one LANL facility exceeded the 2008 SWEIS capability projections—Radiochemistry Facility.

The Radiochemistry Facility conducted radionuclide transport studies at levels twice the number projected in the 2008 SWEIS and increased isotope offsite shipments by 77 percent compared with levels projected in the 2008 SWEIS. Although chemical waste generation exceeded 2008 SWEIS projections for this facility, this was due to a one-time, non-routine maintenance activity that was not associated with the increase in operations levels noted here.

In CY 2012, several Key Facilities exceeded waste projections in the 2008 SWEIS. All exceedances were due to one-time, non-routine events. Total LANL site-wide waste generation for all waste types for CY 2012 fell below 2008 SWEIS projections. The following facilities exceeded 2008 SWEIS projections for waste generation.

Chemical Waste:

- MSL – due to disposal of material produced from the roofing project at TA-03-1698;
- Sigma Complex – due to disposal of beryllium contaminated waste generated from the replacement of the ventilation system in the Beryllium Technology Facility, which is within the Sigma Complex. In addition, some waste from CY 2011 was shipped offsite and;
- SRCW Facilities – due to three reasons: (1) disposal of contaminated soil from diesel fuel and pump oil leaks, (2) disposal of solid waste debris from a roof tear-off and replacement project, and (3) disposal of drum liners that no longer met SRCW specifications due to long-term storage.

Low-level Radioactive Waste:

- SRCW Facilities - due to the construction debris from the construction of Permacon for processing low-level radioactive waste crate boxes stored in Area G.
- RLWTF – due to a campaign to treat and dispose of evaporator bottoms.

Mixed low-level Radioactive Waste:

- SRCW Facilities – due to debris, that was of contact in nature, from the repackaging and over-packing of transuranic waste containers and waste related to consolidating and packaging of mixed low-level radioactive waste.

Transuranic and Mixed Transuranic Waste:

- CMR Building – exceeded projections by 1 cubic meter due to additional chemistry and metallurgy research and development activities.

In CY 2012, the Nicholas C. Metropolis Center (Metropolis Center, formerly the Strategic Computing Complex) exceeded 2008 SWEIS projections for outfall discharge. Operation of the SERF-E is expected to greatly reduce discharge amounts from the Metropolis Center. The Metropolis Center did not exceed 2008 SWEIS projections for waste, utility use, or radioactive air emissions.

Site-wide Operations Data and Affected Resources

This Yearbook evaluates the effects of LANL operations in CY 2012 in three general areas: effluents to the environment, workforce and regional consequences, and changes to environmental areas for which 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) totaled approximately 227 curies, less than 1 percent of the annual projected radiological air emissions of 34,000 curies[1] projected in the 2008 SWEIS.

Emissions of criteria pollutants were well below 2008 SWEIS projections and below the New Mexico Administrative Code, Title 20, Chapter 2, Part 73 limits.

In response to DOE Executive Order 13514, Los Alamos National Security, LLC reported its greenhouse gas emissions from stationary combustion sources to the United States Environmental Protection Agency for the third time. These stationary combustion sources emitted 59,726 metric tons of carbon dioxide equivalents.

Since 1999, the total number of permitted outfalls was reduced from 55 identified to 11 permits regulated under the NPDES permit No. NM0028355. In CY 2012, nine outfalls flowed. Calculated NPDES discharges totaled 153.8 million gallons, approximately 10.3 million gallons less than the CY 2011 total. This is well under the 2008 SWEIS projected volume of 279.5 million gallons per year.

LANL performed significant groundwater compliance work in CY 2012 pursuant to the New Mexico Environment Department Compliance Order on Consent. These activities included groundwater monitoring, groundwater investigations, and installation of monitoring wells in support of various groundwater investigations and corrective measures evaluations. However, no new monitoring wells were installed. Measured parameters for groundwater were similar to 2008 SWEIS projections.

Total waste quantities from LANL operations were below 2008 SWEIS projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities. Waste quantities at Key and Non-Key Facilities that exceeded the 2008 SWEIS levels were one-time, non-routine events. The 2008 SWEIS combined transuranic and mixed transuranic waste into one waste category since they are both managed for disposal at the Waste Isolation Pilot Plant.

DOE/NNSA removed 42 structures at LANL. Of these structures, 34 were demolished, 6 were salvaged, and 2 were transferred to Santa Clara Pueblo. This eliminated a total of 46,407 square feet of the Laboratory's footprint.

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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.

In the 2008 SWEIS No Action Alternative, the total utility consumption projections were reduced from 1999 SWEIS projections to a number closer to the average utility consumption for the six previous years. Water consumption for CY 2012 was 444.9 million gallons. This 27-million gallon water consumption exceedance represents the second time LANL has exceeded utility projections from either the 1999 or the 2008 SWEIS. Electricity consumption was 449 gigawatt-hours compared with the 2008 SWEIS projection of 582 gigawatt-hours. Gas consumption for CY 2012 was 1.10 million decatherms compared with the 2008 SWEIS projection of 1.20 million decatherms.

Radiological exposures to LANL workers were well within the levels projected in the 2008 SWEIS. The total effective dose equivalent for the LANL workforce was 140.1 person-rem, which is much lower than the 280 person-rem workforce dose projected in the 2008 SWEIS. There were approximately 138 recordable cases of occupation injury and illness; this represents a 27 percent decrease from CY 2011. Also, approximately 33 cases resulted in days away, restricted or transferred duties, representing a 39 percent reduction in cases from CY 2011. Both of these rates were well below 2008 SWEIS projections.

In the 2008 SWEIS No Action Alternative, the 2005 levels of employment were projected to remain steady at 13,504. The 10,366 employees at the end of CY 2012 represent a 13 percent reduction compared with the 11,672 total employees reported in the 2011 Yearbook. The total number of employees is 30 percent below 2008 SWEIS projections.

Measured parameters for ecological resources were similar to 2008 SWEIS projections, and measured parameters for cultural resources and land resources were below 2008 SWEIS projections. Ecological resources include biological resources such as protected sensitive species, ecological processes, and biodiversity. No excavation occurred of sites at TA-54 or anywhere else on LANL. Seven historic buildings were demolished in Fiscal Year 2012. Ecological and cultural resources remained protected in CY 2012. For land use, the 2008 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 CY 2012, this expansion had not become necessary. From 2001 to 2012, approximately 2,450 acres of land were transferred to the Bureau of Indian Affairs to be held in trust for the Pueblo of San Ildefonso or conveyed to Los Alamos County. Three tracts were conveyed or transferred in CY 2012.

Conclusion

In conclusion, LANL operations during CY 2012 mostly fell within 2008 SWEIS projections. Although operation levels for one LANL facility exceeded the 2008 SWEIS capability, none of the capability increases caused exceedances in radioactive air emissions, waste, or NPDES discharge. Several facilities exceeded the 2008 SWEIS levels for waste generation quantities; however, all were one-time, non-routine events that do not reflect the day-to-day operations of the Laboratory. In addition, total site-wide waste generation quantities were below 2008 SWEIS projections for all waste types, reflecting the overall levels of operations at both the Key and Non-Key Facilities. Although gas and electricity consumption have remained within the 2008 SWEIS limits for utilities, water consumption exceeded the 2008 SWEIS projections by 27 million gallons.

DOE/NNSA is committed to reducing energy and water consumption and will continue to make improvements towards that goal in the future. Energy reduction initiatives like night setbacks; lighting retrofits; heating, ventilation, and air conditioning upgrades; and High Performance Sustainable Buildings continue to be implemented. In addition, improvements to the SERF-E in CY 2012 are expected to lead to increased use of recycled effluent in the cooling towers in CY 2013, thereby significantly reducing the amount of potable water consumed. Details can be found in LANL's FY 2013 Site Sustainability Plan. Overall, LANL operations data from CY 2012 indicate that LANL has been operating within the 2008 SWEIS projections and regulatory limits.

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

Area of Contribution	Contributor
Air Emissions	David Fuehne
Air Emissions	Sonja Salzman
Air Emissions	Walt Whetham
Bioscience	Steve Cossey
Bioscience	Milan Gadd
Chemistry and Metallurgy Research Building	Steve Cossey
Cultural Resources	Kari Garcia
Decontamination, Decommissioning, and Demolition	Ian Albright
Decontamination, Decommissioning, and Demolition	Kelly Gee
Ecological Resources	Charles Hathcock
Environmental Cleanup	Joe English
Environmental Cleanup	Katie Higgins
Environmental Cleanup	Rich Mirenda
Environmental Cleanup	Linda Nelson
Footprint Elimination	Janet Harry
Groundwater	David Rogers
High Explosives Processing Facilities	David Schrock
High Explosives Testing Facilities	David Schrock
Land Resources	Jennifer Payne
Liquid Effluents	Marc Bailey
Liquid Effluents	Holly Wheeler
Liquid Effluents	Jeff Walterscheid
Los Alamos Neutron Science Center	Patricia Vardaro-Charles
Machine Shops	Darrik Stafford
Materials Science Laboratory	Marc Gallegos
Materials Science Laboratory	Dee Hoisington
Nicholas C. Metropolis Center	Harold Armstrong

Area of Contribution	Contributor
National Pollutant Discharge Elimination System Data	Marc Bailey
Non-Key Facilities: Photovoltaic Array	Michael Bodelson
Non-Key Facilities: Sanitary Effluent Recycling Facility	Terry J. Singell
Non-Key Facilities: Tactical Training Facility	Jeff Tucker
Non-Key Facilities: Indoor Firing Range	Jeff Tucker
Non-Key Facilities: Interagency Wildfire Center	Paul Stevenson
Plutonium Facility Complex	Randy Johnson
Pollution Prevention Program	Sonja Salzman
Radioactive Liquid Waste Treatment Facility	Chris Del Signore
Radiochemistry Facility	Patricia Vardaro-Charles
Sanitary Waste/Recycling	Sonja Salzman
Sigma Complex	Marc Gallegos
Sigma Complex	Mark Paffet
Socioeconomics	Joe Sibley
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Solid Radioactive and Chemical Waste Data	Tim Sloan
Solid Radioactive and Chemical Waste Data	Justin Tozer
Target Fabrication Facility	Ross Muenchausen
Tritium Facilities	David Schrock
Utilities	Maura Miller
Utilities	Monica Witt
Worker Safety/Doses	Paul Hoover
Worker Safety/Doses	Bethany Rich
Worker Safety/Doses	Jim Stein

ACRONYMS AND ABBREVIATIONS

AIRNET	Radiological Air Sampling Network
ALARA	as low as reasonably achievable
AOC	area of concern
ARTIC	Actinide Research and Technology Instruction Center
BA	biological assessment
bgs	below ground surface
BMP	best management practice
BSL	Biosafety Level
BTF	Beryllium Technology Facility
CD	Critical Decision
C&D	construction and demolition
CFR	Code of Federal Regulations
CGP	Construction General Permit
CGTG	Combustion Gas Turbine Generator
CLEAR	Chloride Extraction and Actinide Recovery (Line)
CME	corrective measure evaluation
CMI	corrective measure implementation
CMR	Chemical and Metallurgy Research (Building)
CMRR NF	CMR Replacement Nuclear Facility
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
Consent Order	NMED Compliance Order on Consent
COPEC	chemical of potential ecological concern
CRMP	Cultural Resources Management Plan
CVD	Containment Vessel Disposition
CY	calendar year
DART	Days Away, Restricted or Transferred
DARHT	Dual-Axis Radiographic Hydrodynamic Test (Facility)
DD&D	decontamination, decommissioning, and demolition
DNA	Deoxyribonucleic acid
DOE	US Department of Energy
DVRS	Decontamination and Volume Reduction System
EGEE	2-Ethoxyethanol
EGME	2-Methoxyethanol
EIS	Environmental Impact Statement
ENV-ES	Environmental Stewardship Group
EP	Environmental Programs
EPA	US Environmental Protection Agency

ER	Environmental Restoration (Project)
Ex-ID	excavation permit review
FEL	Free Electron Laser
FONSI	Finding of No Significant Impact
FTE	full-time equivalent
FY	fiscal year
HAP	hazardous air pollutant
HazCat	Hazard Category
HEP	High Explosives Processing
HEPA	high-efficiency particulate air (filter)
HET	High Explosives Testing
HEWTF	High Explosive Wastewater Treatment Facility
HVAC	heating, ventilation, and air conditioning
IP	Individual Permit
IPF	Isotope Production Facility
IRT	Integrated Review Tool
ITSR	Interim Technical Safety Requirement
IVML	*In Vivo* Measurements Laboratory
IWSST	Institutional Worker Safety and Security Team
kg	kilograms
kg/yr	kilogram per year
klb	thousands of pounds
KSL	KBR/Shaw/LATA
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LANSCE	Los Alamos Neutron Science Center
linac	linear accelerator
LLW	low-level radioactive waste
m^3	cubic meter
m^3/yr	cubic meters per year
MDA	Material Disposal Area
MEK	Methyl Ethyl Ketone
Metropolis Center	Nicholas C. Metropolis Center
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

MVA	megavolt ampere
MW	megawatt
MWh	megawatt-hour
NEPA	National Environmental Policy Act
NFA	no further action
NHC	Nuclear Hazard Classification
NISC	Nonproliferation and International Security Center
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSA	New Mexico Solid Waste Act
NMSSUP	Nuclear Materials Safeguards and Security Upgrades Project
NNSA	National Nuclear Security Administration
NOI	notice of intent
NOx	nitrous oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NS2	National Security Nuclear Science
NSSB	National Security Sciences Building
OSRP	Offsite Source Recovery Project
P2	Pollution Prevention
PCB	polychlorinated biphenyl
PETN	Pentaerythritol tetranitrate
PHERMEX	pulsed high-energy radiographic machine emitting x-rays (Facility)
PM	particular matter
PNM	Public Service Company of New Mexico
PRB	permeable reactive barrier
PRID	permit and requirements identification
PV	photovoltaic
RCRA	Resource Conservation and Recovery Act
RLUOB	Radiological Laboratory/Utility/ Office Building
RLWTF	Radioactive Liquid Waste Treatment Facility
RNA	Ribonucleic acid
ROD	Record of Decision
SA	Supplement Analysis
SAD	Safety Assessment Document
SAL	screening action level
SCC	Strategic Computing Complex
SEIS	Supplemental Environmental Impact Statement
SERF	Sanitary Effluent Reclamation Facility
SERF-E	Sanitary Effluent Reclamation Facility Expansion

SHPO	State Historic Preservation Office
SMA	site monitoring area
SNM	special nuclear material
SOC	Securing Our Country (LANL Protective Force)
SOx	sulfur oxides
SPEIS	Supplemental Programmatic Environmental Impact Statement
SRCW	Solid Radioactive and Chemical Waste
SSL	soil screening level
SWEIS	Site-Wide Environmental Impact Statement
SWMU	solid waste management unit
SWPPP	Storm Water Pollution Prevention Plan
SWWS	Sanitary Wastewater Systems
TA	Technical Area
TCE	trichloroethene
TED	total effective dose
TFF	Target Fabrication Facility
TRC	Total Recordable Case (rate)
TRP	TA-55 Reinvestment Project
TRU	transuranic
TSFF	Tritium Science and Fabrication Facility
TSTA	Tritium Systems Test Assembly (Facility)
UC	University of California
UCN	Ultracold Neutron (Facility)
US	United States
USGS	US Geological Survey
UV	ultraviolet
W	Weapons Systems Engineering (Division)
WETF	Weapons Engineering Tritium Facility
WIPP	Waste Isolation Pilot Plant
WMRM	Waste Mitigation and Risk Management (Facility)
WNR	Weapons Neutron Research (Facility)
WSST	Worker Safety and Security Team
WX	Weapons Experiments (Division)
WX-7	High Explosive Science and Technology group
yd^3	cubic yards

1.0 INTRODUCTION

1.1 Site-Wide Environmental Impact Statement

In 1999, the United States (US) Department of Energy (DOE)[2] published a Site-Wide Environmental Impact Statement (SWEIS) for Continued Operation of the Los Alamos National Laboratory (LANL or the Laboratory) (DOE 1999a). DOE issued its Record of Decision (ROD) on this SWEIS in September 1999 (DOE 1999b). The ROD identified the decisions DOE made on levels of operation for the Laboratory for the foreseeable future.

As per DOE regulations, DOE/National Nuclear Security Administration (NNSA) in 2004 initiated preparation of a Supplement Analysis (SA) for the 1999 SWEIS (NNSA 2004). The purpose of the SA was to determine if the existing SWEIS remained adequate. In August 2005, DOE/NNSA issued a memo directing LANL to prepare a new SWEIS (NNSA 2005). A new SWEIS was determined to be the appropriate level of analysis for compliance with the National Environmental Policy Act (NEPA) as a result of 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.

The new SWEIS was issued in May 2008 (DOE 2008a). In September 2008, DOE/NNSA issued the first ROD for the 2008 SWEIS (DOE 2008b). Concurrently, DOE/NNSA was analyzing actions described in the Complex Transformation Supplemental Programmatic Environmental Impact Statement (Complex Transformation SPEIS or SPEIS) (DOE 2008c). 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. Again, DOE/NNSA chose the No Action Alternative with the addition of some elements of the Expanded Operations Alternative in this ROD.

The first SA to the 2008 SWEIS was issued in October 2009 (DOE 2009b). This analysis was prepared to determine if the 2008 SWEIS adequately bounded offsite 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.

The second SA was issued by DOE/NNSA in April 2011 (DOE/EIS-0380-SA-02, DOE 2011a). It was prepared to assess DOE/NNSA activities of the Offsite Source Recovery Project (OSRP) to recover and manage high-activity beta/gamma sealed sources from Uruguay and other locations. DOE/NNSA published an amended SWEIS ROD in the Federal Register on July 20, 2011 (DOE 2011b), in response to the SA on the OSRP.

2 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 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.

1.2 Annual Yearbook

To enhance the usefulness of the SWEIS, DOE/NNSA and LANL implemented a program in which annual comparisons would be made 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 addresses capabilities and operations using the concept of "Key Facilities" 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). The Yearbook also discusses the "Non-Key Facilities," which include all buildings and structures not part of a Key Facility (i.e., the balance of LANL).

The Yearbook focuses on the following information:

- *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 [EISs]) that were prepared.
- *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 measurements of site-wide effects 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 DOE has long-term stewardship responsibilities as an administrator of federal lands.
- *Summary and conclusion.* Chapter 4 summarizes CY data 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[3] (HazCat) at the time the SWEIS was developed through CY 2012.
- *Pollution Prevention (P2) Awards (Appendix D)*. This appendix provides a summary of the DOE 2012 P2 Awards for LANL.

Data for comparison come from a variety of sources, including facility records, operations reports, facility personnel, and the annual Environmental Report (previously the 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 Yearbook provides DOE/NNSA with information needed to evaluate the adequacy of the SWEIS and enable them to make decisions on when and if a new SWEIS is needed. The Yearbook also provides Los Alamos National Security, LLC (LANS) managers with a guide to determine whether activities are within the SWEIS operating envelope. The Yearbook serves as a summary of environmental information collected and reported by the various groups at LANL.

1.3 CY 2012 Yearbook

The 2012 Yearbook represents the sixth full year of operations data reported since LANL management transitioned from the University of California (UC) to LANS. LANS consists of UC, Bechtel, BWX Technologies, and Washington Group International, and currently operates LANL for 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 2012. It compares data from CY 2012 to 2008 SWEIS projections. The collection of data on facility operations is a unique effort. The type of information developed for the 2008 SWEIS is not routinely collected at LANL. Nevertheless, this information is the heart of the 2008 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 this effort.

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

- Category 2 Nuclear Hazard – has the potential for significant onsite consequences. DOE-STD-1027-92 (DOE 1992b) provides the resulting threshold quantities for radioactive materials that define Category 2 facilities.
- Category 3 Nuclear Hazard – has the potential for only significant localized consequences. Category 3 is designed to capture those facilities such as laboratory operations, 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.

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2.0 FACILITIES AND OPERATIONS

LANL occupies 1,013 structures containing 8.2 million square feet under roof, spread over an area of 36 square miles of land owned by the U S government and administered by DOE/NNSA. Much of the undeveloped area at LANL provides a buffer for security, safety, and possible future expansion. Approximately 40 percent 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 809 permanent buildings and 204 temporary structures (trailers and transportable buildings). In CY 2012, LANS leased approximately 49 buildings within the Los Alamos town site and Carlsbad, New Mexico.

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 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 the potential to cause significant environmental impacts,
- 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/NNSA programmatic decisions.

In 2008, Pajarito Site (TA-18) was placed into Surveillance and Maintenance mode. All operations ceased and the facility was downgraded to a Less-than-HazCat 3 Nuclear Facility (DOE 2011c). For the purpose of the 2008–2012 SWEIS Yearbooks, Pajarito Site has been removed as a Key Facility. In addition, the 2008 SWEIS recognized the Nicholas C. Metropolis Center for Modeling and Simulation (Metropolis Center), formerly known as the Strategic Computing Complex (SCC), as a new Key Facility because of the amounts of electricity and water it uses. The remainder of LANL capabilities was called "Non-Key," not to imply that these facilities were any less important to the accomplishment of critical research and development, but because they did not fit the above criteria for "Key" Facilities.

The Key Facilities comprise 42 of the 48 HazCat 2 and HazCat 3 Nuclear Structures at LANL. Since the issuance of the 2008 SWEIS, DOE/NNSA and LANS have published 12 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 Chapter 2 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. Beginning in CY 2010, the Safety Basis Division at LANL was no longer required to publish a list of facilities identified as Less-than-HazCat 3 Nuclear Facilities (radiological facilities); therefore, that information will no longer be included in the SWEIS Yearbooks.

The definition of each Key Facility hinges upon operations,[4] 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 (e.g., the Target Fabrication Facility [TFF]) to more than 400 structures comprising the Los Alamos Neutron Science Center (LANSCE) Key Facility. Key Facilities can also exist in more than a single TA, as is the case with the High Explosives Testing (HET) and High Explosives Processing (HEP) Key Facilities, which exist in all or part 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 CY 2012. Each of these three aspects is given perspective by comparing them to projections made by the 2008 SWEIS. This comparison provides an evaluation of whether or not data resulting from LANL operations continue to fall within the environmental envelope established in the 2008 SWEIS. It should be noted that modifications and construction activities that were completed prior to CY 2012 are summarized in previous Yearbooks. Routine maintenance, support activities, safety and environmental improvements, and footprint reduction are on-going at LANL. These activities are described in Appendix L of the 2008 SWEIS.

This chapter also discusses Non-Key Facilities, which include buildings and structures not part of a Key Facility, or the balance of LANL facilities. The Non-Key Facilities represent a significant fraction of LANL and comprise all or the majority of 30 of 49 TAs, including TA-00, which comprises leased space within the Los Alamos town site and TA-57 at Fenton Hill, and approximately half of LANL's total acres. The Non-Key Facilities include such important buildings and operations as the Nonproliferation and International Security Center (NISC); the National Security Sciences Building (NSSB), the main administration building; and the TA-46 Sanitary Wastewater System (SWWS). Table 2-1 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 locations of the TAs and the Key Facilities.

4 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 2-1. Key and Non-Key Facilities

Key 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 (HEP) Facilities	TAs 08, 09, 11, 16, 22, 37	1,115
High Explosives Testing (HET) Facilities	TAs 15, 36, 39, 40	8,691
Tritium Facility	TA-16	18
Target Fabrication Facility (TFF)	TA-35	3
Bioscience Facilities	TAs 43, 03, 16, 35, 46	4
Radiochemistry Facility	TA-48	116
Radioactive Liquid Waste Treatment Facility (RLWTF)	TA-50	62
Los Alamos Neutron Science Center (LANSCE)	TA-53	751
Solid Radioactive and Chemical Waste (SRCW) Facilities	TA-50 & TA-54	943
Plutonium Facility Complex	TA-55	93
Subtotal, Key Facilities	19 of 49 TAs	11,834
All Non-Key Facilities	30 of 49 TAs	14,224
Total: LANL		**26,058**

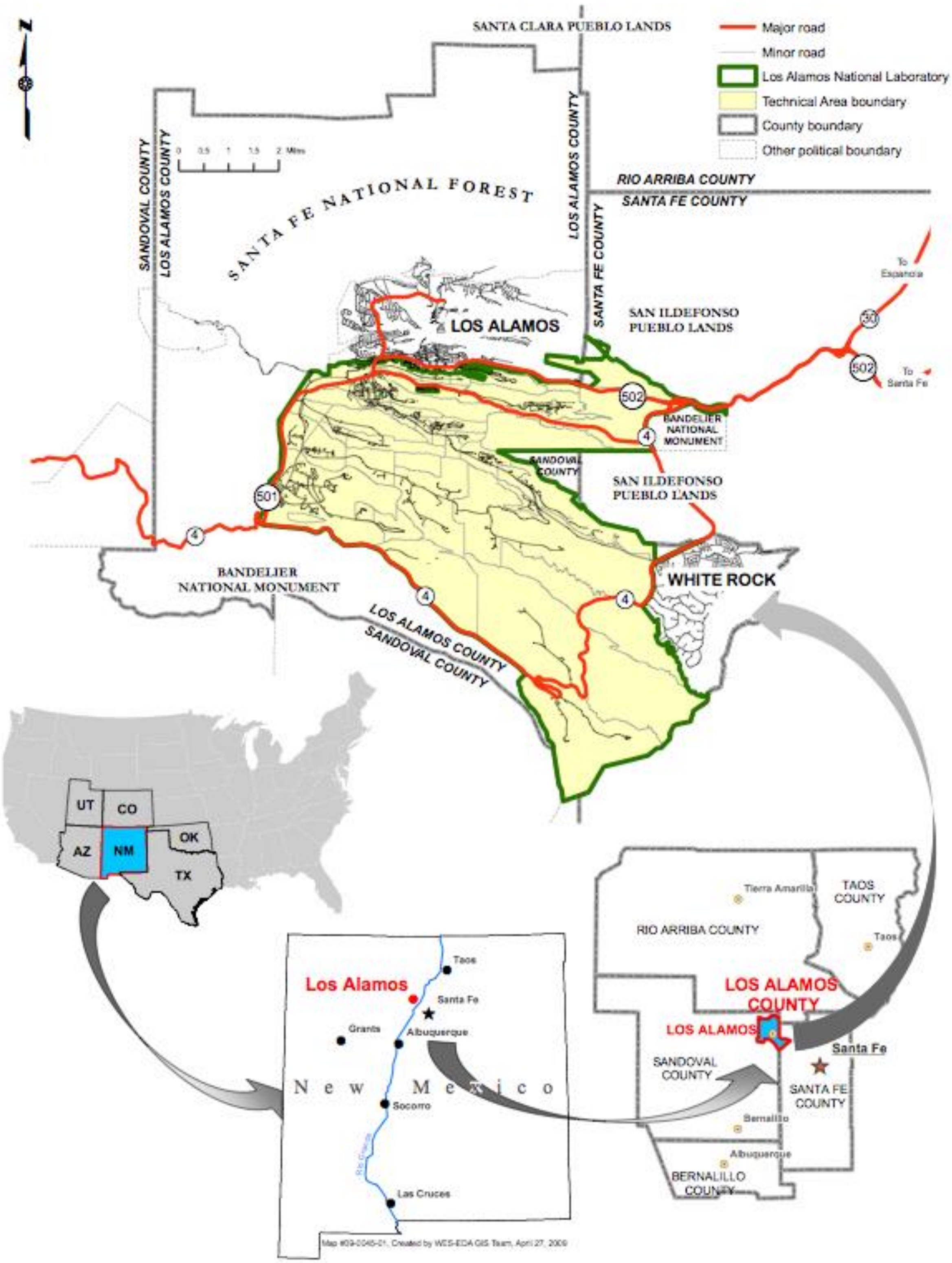

Figure 2-1. Location of LANL

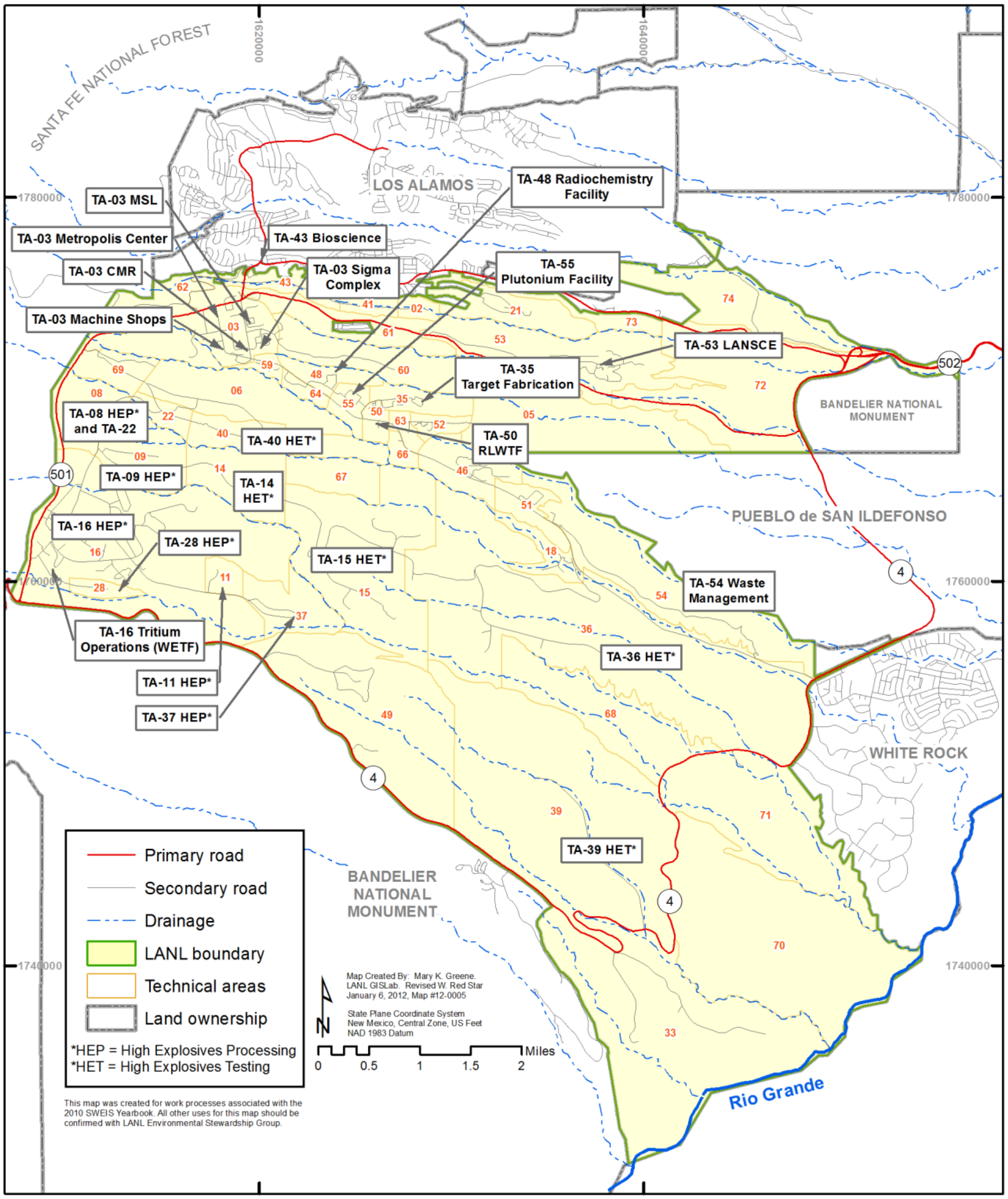

Figure 2-2. Location of Technical Areas and Key Facilities

2.1 CMR Building (TA-03)

The CMR Building was designed and constructed to the 1949 Uniform Building Code and occupied in 1952 to house analytical chemistry, plutonium metallurgy, uranium chemistry, and engineering design and drafting activity. At the time the 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 Building consists of three floors: basement, first floor, and attic. It has seven independent wings connected by a common corridor.

As shown in Table 2-2, the CMR Building was designated a HazCat 2 Nuclear Facility. The CMR Building is also designated a Security Category 3 Nuclear Facility.

Table 2-2 and the Nuclear Hazard Classification (NHC) tables in the other sections of this Yearbook reflect the data in the published DOE listings of LANL Nuclear Facilities applied during the CY under review, in this case 2012. Changes in the listings that have occurred during the year will not be reflected in Table 2-2 or other NHC tables if they are not yet published in the DOE listings. The most recent DOE list of LANL nuclear facilities was published in CY 2011.

Table 2-2. CMR Buildings with Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2012*
TA-03-0029	CMR	2	2

* DOE list of LANL nuclear facilities (DOE 2011c).

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 Replacement Nuclear Facility (CMRR NF) at TA-55 and
- Conduct decontamination, decommissioning, and demolition (DD&D) of the CMR Building.

In November 2003, DOE/NNSA issued an EIS 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, DOE/NNSA decided to replace the CMR Building with a new CMRR 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 SA (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. DOE/NNSA determined that the proposed actions were adequately bounded by the analyses of impacts projected by the 2003 CMRR EIS, and at the time no Supplemental CMRR EIS was required. The CMRR NF would replace the CMR Building as the Key Facility.

On September 28, 2010, DOE/NNSA published a notice of intent (NOI) to prepare a Supplemental Environmental Impact Statement (SEIS) for the CMRR NF in the Federal Register. Since the issuance of the CMRR EIS ROD in 2004, new geologic information regarding seismic conditions caused DOE/NNSA to change some design aspects of the CMRR NF. The SEIS assessed potential environmental impacts of these proposed changes and of the construction and operation of the nuclear facility portion of the CMRR. The NOI was followed by a 30-day scoping/public comment period.

An amended ROD was issued on October 12, 2011 (DOE 2011b). On February 13, 2012, DOE/NNSA deferred the CMRR NF for at least five years.

Construction of the Radiological Laboratory/Utility/Office Building (RLUOB) was completed in CY 2012 and operational readiness began.

During CY 2003, modifications to Wing 9 were started in support of the Containment Vessel Disposition (CVD) 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 an SA 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 (DOE 2003b). The project was placed on hold in 2004 based on a decision by DOE/NNSA that the project was a major modification. This decision was later rescinded and the project moved forward in 2009. In 2010, installation of the CVD enclosure and glovebox began. In 2011, the work to complete the CVD enclosure continued. Startup activities began in CY 2012.

CMR Building Safety Basis. The CMR Building Safety Basis documentation currently consists of the 1998 Basis for Interim Operations and associated Interim Technical Safety Requirements (ITSRs), which expired in 2010. The ITSR update, which represents improvements in the Safety Basis through changes to existing or additional controls, was approved by NNSA in CY 2008. On December 10, 2010, the CMR Building Documented Safety Analysis was approved and became the documented Safety Basis for the facility.

While the CMR Building continued to maintain normal operations in CY 2012 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 Building 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 on the Risk Reduction Project was suspended in CY 2012 due to a lack of funding.

2.1.2 Operations at the CMR Building

The 2008 SWEIS identified seven capabilities for this Key Facility. Four of the seven capabilities were active in CY 2012, and all were below operational levels projected in the 2008 SWEIS (Table A-1).

2.1.3 Operations Data for the CMR Building

Operations data levels at the CMR Building remained below levels projected in the SWEIS, with one exception. Transuranic (TRU) and Mixed TRU waste generation at CMR exceeded 2008

SWEIS projections by approximately 1 cubic meter due to additional chemistry and metallurgy research and development activities at the CMR Building. Table A-2 provides operations data 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), as well as several support and storage facilities. Building TA-03-2519, an ion exchange building, was added to the Sigma Complex in 2010 to reduce copper concentrations in order to meet new effluent discharge limits established in the new National Pollutant Discharge Elimination System (NPDES) permit. Primary activities at the Sigma Complex are the fabrication of metallic and ceramic items, characterization of materials, and process research and development.

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. All three of the capabilities were active in CY 2012, and all were below operational levels projected in the 2008 SWEIS (Table A-3).

2.2.3 Operations Data for the Sigma Complex

Operations data levels at the Sigma Complex remained below levels projected in the 2008 SWEIS, with one exception. Chemical waste generation exceeded 2008 SWEIS projections due to disposition of beryllium contaminated waste from the BTF. During CY 2012, the BTF replaced the variable air volume ventilation system which generated additional beryllium contaminated waste. In addition, some beryllium contaminated waste from CY 2011 was shipped offsite. Table A-4 provides operations data details.

2.3 Machine Shops (TA-03)

The Machine Shops Key Facility consists of two buildings, the Nonhazardous Materials Machine Shop (TA-03-0039) and the Radiological Hazardous Materials Machine Shop (TA-03-0102). Both buildings are located within the same exclusion area. Activities consist primarily of machining, welding, fabrication, inspection, and assembly of various materials in support of many LANL programs and projects.

2.3.1 Construction and Modifications at the Machine Shops

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

2.3.2 Operations at the Machine Shops

The 2008 SWEIS identified three capabilities at the Machine Shops. All three of the capabilities were active in CY 2012, and all were below operational levels projected in the 2008 SWEIS (Table A-3). The workload at the Machine Shops is directly linked to research and development and production requirements.

2.3.3 Operations Data for the Machine Shops

Operations data levels at the Machine Shops remained below levels projected in the 2008 SWEIS, with one exception. Mixed low-level radioactive waste (MLLW) generation at the Machine Shops exceeded 2008 SWEIS projections by 0.02 cubic meters due to non-routine, intermittent, and programmatic housekeeping associated with minor machining modifications to a small part. Table A-6 provides operations data details.

2.4 Materials Science Laboratory (TA-03)

The Materials Science Laboratory (MSL) Key Facility consists of two buildings: a laboratory building (TA-03-1698) containing 27 labs, 60 offices, 21 materials research areas, and support rooms and the Material Science and Technology Office Building (TA-03-1415).

2.4.1 Construction and Modifications at the MSL

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

In October 2012, the MSL Infill project began. The project anticipates 7,978 square feet of new laboratory space. The completion of this project was included in the environmental assessment for the construction of the MSL (DOE 1992c).

2.4.2 Operations at the MSL

The 2008 SWEIS identified four capabilities at the MSL. All four of the capabilities were active in CY 2012, and all were below operational levels projected in the 2008 SWEIS, with one exception (Table A-3). The materials processing capability was expanded in CY 2012.

2.4.3 Operations Data for the MSL

Operations data levels at the MSL remained below levels projected in the 2008 SWEIS. Table A-8 provides operations data details.

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

The Metropolis Center became a Key Facility in the 2008 SWEIS. The Metropolis Center, which began operating in 2002, is housed in a three-story, 303,000-square-foot structure in TA-03 (TA-03-2327). It is the home of the Cielo Supercomputer (one of the world's fastest and most advanced computers), which 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. The Metropolis Center, together with the Laboratory Data Communication Center, the Central Computing Facility, and the Advanced Computing Laboratory, forms the center for high-performance computing at LANL.

The impacts associated with operating the Metropolis Center 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 1998) and its associated Finding of No Significant Impact (FONSI). The 2008 SWEIS analyzed the proposed increase in the operating platform beyond 50 teraflops to support approximately 1,000 teraflops (1 petaflop). 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. The computing level that can be supported by about 15 megawatts (MW) of electrical usage and 51 million gallons per year (193 million liters) of potable 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, Hurricane, Roadrunner, and Cielo. In preparation for these machines, the electrical and mechanical systems in the Key Facility were expanded to meet the new computers' requirements. During 2010, both Lightning and Bolt were decommissioned, and Roadrunner became the primary computer resource for LANL's weapons workload. A new computer, Cielo, arrived in the beginning of CY 2011. It was integrated into the stable of computers at the Metropolis Center and began production work in October 2011. Cielo alone consumes approximately 3 MW of power. During CY 2012, the Redtail and Hurricane systems were decommissioned.

To prepare the Metropolis Center for the arrival of the next computer, Trinity, in 2015, an upgrade to the power and cooling systems at the site will be required. Five 1,200-ton open cell cooling towers, four large heat exchangers, primary and secondary process pumps, and a large amount of carbon steel piping material will be required. In addition, two 3,000-amp electrical substations will need to be installed, and power distribution will be reconfigured to maximize power efficiency. This reconfiguration will maintain power redundancy and reliability to vital components of computing systems on the computer floor. In CY 2012, the SCC Infrastructure Upgrade Project design was 60 percent complete. Construction is expected to begin in October 2013. Although the SCC Infrastructure Project may exceed water and electrical use limits analyzed in the 2008 SWEIS for the Metropolis Center, DOE/NNSA determined that increases requiring more than 15 MW of electricity or 51 million gallons (193 million liters) of water per year would be covered by 2008 SWEIS site-wide utility limits, not specific facility limits.

2.5.2 Operations at the Metropolis Center

The 2008 SWEIS identified one capability at the Metropolis Center. This capability was active in CY 2012 and was performed at operational levels projected in the 2008 SWEIS (Table A-9).

As described in the 2008 SWEIS, the Metropolis Center computing platform would expand the capabilities and operations levels to increase functional capability. Computer operations are performed 24 hours a day, with personnel occupying the control room around the clock to support computer operation activities. 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.

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 utilizes. The 2008 SWEIS analyzed the operating levels to be supported by approximately 15 MW of electrical usage and 51 million gallons (193 million liters) per year of groundwater. The Metropolis Center water consumption is currently metered. Water usage is monitored daily and reported monthly.

Operations data levels at the Metropolis Center remained below levels projected in the 2008 SWEIS, with one exception. Outfall discharge amounts exceeded 2008 SWEIS projections. The Sanitary Effluent Recycling Facility Expansion (SERF-E) facility is expected to greatly reduce water discharge and consumption amounts at the Metropolis Center by allowing the use of recycled water instead of potable water in cooling towers. In August 2012, a ribbon cutting ceremony marked the official start of operations at the SERF-E facility. Table A-10 provides operations data details.

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

HEP Facilities are located in all or parts of six TAs. Building types include production and assembly facilities, analytical and synthesis laboratories, test facilities, explosives storage magazines, units for treating hazardous explosive waste by open burning, and a facility for treatment of explosive-contaminated wastewaters. Activities consist primarily of manufacture and assembly of detonators for nuclear weapons, and high explosives components for Science-Based Stockpile Stewardship Program tests and experiments, and work conducted under the global security/threat reduction missions. Environmental and safety tests are performed at TA-11 and TA-09, while TA-08 houses radioactive testing (includes radiography and ultrasonic activities).

Operations are performed by personnel in multiple directorates, divisions, and groups. These operations include high explosives manufacturing and assembly work; chemical synthesis of new explosives; explosives analytical and testing services; research and development of new initiation systems; production of stockpile detonators and initiation devices; and nondestructive testing and evaluation. All explosives at LANL are managed through this Key Facility where they are stored as raw materials, pressed into solid shapes, and machined to customers' specifications. The completed shapes are shipped to customers onsite and offsite for use in experiments and open detonations. Personnel at TA-09 produce a small quantity of high explosives during the year from basic chemistry and lab-scale synthesis operations. Other groups use small quantities of explosives for manufacturing and testing of detonators and initiating devices. Detonable explosives waste 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 offsite facilities for treatment and disposal.

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

2.6.1 Construction and Modifications at the HEP Facilities

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

- Complete construction of TA-16 Engineering Complex. The construction of this complex was never initiated, and the project has been cancelled.
- Removal or demolition of vacated structures that are no longer needed.

In CY 2012, the High Explosive Packaging and Transportation group conducted operations in TA-16-0305. Plastics development is no longer conducted at TA-16. The historic restoration of the TA-08 Gun Site was initiated in CY 2008 with Phase 1 completed in 2009 (DOE 1996a). Planning for Phase II started in CY 2010. Field work for Phase II (i.e., structural repairs) was completed CY 2012.

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

Structural modifications to TA-16-0200 to incorporate an exterior fire egress stairway began in 2010 and were completed 2012.

2.6.2 Operations at the HEP Facilities

The 2008 SWEIS identified six capabilities at this Key Facility. All of the six capabilities were active in CY 2012, and all were below operational levels projected in the 2008 SWEIS (Table A-11). The plastics research and development capability 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 2012, less than 2,400 pounds of high explosives and less than 600 pounds of mock explosives material were used in the fabrication of test components for internal and external customers. The LANL High Explosive Science and Technology group (WX-7) synthesized and/or formulated less than 100 pounds of explosives. Materials testing at TA-09 expended less than 10 pounds of these explosives. Materials testing at TA-22 expended less than 1 pound of Pentaerythritol tetranitrate (PETN)-based detonators.

Approximately 2,180 pounds of water-saturated explosive scrap were generated from machining operations at TA-16 and treated by open burning at the TA-16 Burn Ground. All high explosives burning operations are conducted at TA-16-0388. High explosives processing and high explosives laboratory operations generated approximately 19,000 gallons of explosive-contaminated water, which was treated at the High Explosives 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 included 2,180 pounds of water-saturated scrap, less than 370 pounds of detonable explosives-contaminated filters, and approximately 600 pounds of excess solid high explosives. No explosives-contaminated sand or solvents were treated. Approximately 1,400 gallons of propane and 3 gallons of kerosene 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 2012 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 the HEP Facilities

In CY 2012, operations data levels at HEP were below levels projected in the 2008 SWEIS. One outfall remains on the NPDES permit: outfall 05A-055 (HEWTF). However, there have been no discharges through the 05A-055 outfall since 2010. Table A-12 provides operations data details.

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

HET Facilities, which are located in all or parts of five TAs, comprise more than one half (22 square miles) of the land area occupied by LANL, and have 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 (TA-15-0312) and the Vessel Preparation 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.

2.7.1 Construction and Modifications at the HET Facilities

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, and the construction of new facilities within the Two-Mile Mesa Complex was not pursued in CY 2012. A modification was made at the DARHT Facility in 2010 by the connection of the cooling tower outfall and septic system into the LANL sanitary sewer. This eliminated the discharge of cooling tower water to one of LANL's NPDES outfalls and removed the septic system for the DARHT Facility. In 2011, phase one of an upgrade to the aboveground mineral oil storage tanks at TA-15-0313 Radiographic Support Laboratory was initiated with the decommissioning of one existing tank, structure 15-436, in preparation for phase two installation of a double-walled replacement tank, which is expected to be completed in 2014. In 2012, four above-ground mineral oil tanks were removed. Two tanks were removed from TA-15 (R306) site and the other two were removed from TA-36 (PIXY) site. Additionally, the design of a new weather enclosure is anticipated to be completed in 2013.

Cleanup efforts at the Pulsed High-Energy Radiographic Machine Emitting X-rays (PHERMEX) Facility were initiated in 2010. The cleanup effort continued in 2012; eight shipments of surface contaminated objects (e.g., concrete blocks, vehicles, and equipment) were shipped to the Nevada National Security Site for disposal. Additional cleanup is anticipated to continue in 2013.

2.7.2 Operations at the HET Facilities

The 2008 SWEIS identified seven capabilities at this Key Facility. All seven of the capabilities were active in CY 2012, and all were below operational levels projected in the 2008 SWEIS (Table A-13). HET Facilities operations continued to scale back with operations primarily within TA-14, 15, and 36, and with TA-39 being utilized on an occasional basis. Levels of research in CY 2012 were below those projected in 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 (kg) of depleted uranium was expended, compared with approximately 3,900 kg projected in the 2008 SWEIS. The quantity of expended depleted uranium includes the quantity of depleted uranium expended during material sanitization.

Four hydrotests were performed at the DARHT Facility. 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 the HET Facilities

Operations data levels at HET Facilities remained below levels projected in the 2008 SWEIS. Table A-14 provides operations data details.

2.8 Tritium Facilities (TA-16)

The Weapons Engineering Tritium Facility (WETF) in TA-16 is the principal building in this Key Facility. In 2008, tritium operations at TA-21, the Tritium Science and Fabrication Facility (TSFF; TA-21-0209) and the Tritium Systems Test Assembly (TSTA; TA-21-0155), were put in surveillance and maintenance mode. In 2009, tritium operations were consolidated in WETF. DD&D of these facilities and remediation of the TA-21 site began in CY 2009 with demolition of both TSTA and TSFF completed in CY 2010.

WETF structures include TA-16-0205, -0329, -0450, -0824, and limited areas of TA-16-0202. The majority of tritium operations are conducted in TA-16-0205, with some assembly operations performed in TA-16-0202. TA-16-0450 is physically connected to TA-16-0205 but radiologically separated and is not currently operational with tritium. TA-16-0329 and TA-16-0824 are office buildings. Limited operations involving the removal of tritium from actinide materials are conducted at LANL's Plutonium Facility Complex; however, these operations are small in scale and were not included as part of Tritium Facilities in the 2008 SWEIS. The tritium emissions from TA-55, however, are included as part of the Plutonium Complex Facility.

WETF is listed as a HazCat 2 Nuclear Facility (Table 2-3). In CY 2012, the tritium inventory at WETF was greater than 30 grams.

Table 2-3. WETF Buildings with Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2012[a]
TA-16-0205[b]	WETF	2	2
TA-16-0205A[b]	WETF	2	2
TA-16-0450[b]	WETF	2	2

[a] DOE list of LANL nuclear facilities (DOE 2011c).

[b] In 2003, TA-16-205 and TA-16-0205A were nuclear facilities while TA-16-0450 was not operational with tritium. The three buildings are physically connected, but 16-0450 is radiologically separated from 16-0205/205A.

2.8.1 Construction and Modifications at the Tritium Facilities

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

- DD&D of TA-21 tritium facilities. This was completed in CY 2010.

2.8.2 Operations at the Tritium Facilities

The 2008 SWEIS identified nine capabilities for this Key Facility. Five of the nine capabilities were active in CY 2012, and all were below operational levels projected in the 2008 SWEIS (Table A-15), with WETF performing fewer than the projected 65 gas processing operations. 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

Operations data levels at Tritium Facilities remained below levels projected in the 2008 SWEIS. Outfall 02A-129 is not active. Table A-16 provides operations data details.

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.

2.9.1 Construction and Modifications at the TFF

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

2.9.2 Operations at the TFF

The 2008 SWEIS identified three capabilities at the TFF. All three of the capabilities were active in CY 2012, and all were below operational levels projected in the 2008 SWEIS (Table A-17). 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 in CY 2012 was less than the 12,400 targets per year projected in the 2008 SWEIS.

2.9.3 Operations Data for the TFF

Operations data levels at the TFF remained below levels projected in the 2008 SWEIS. Table A-18 provides operations data details.

2.10 Bioscience Facilities (TA-43, TA-03, TA-35, TA-16)

Bioscience Facilities include the main Health Research Laboratory facility (TA-43-0001, and -0037) plus additional offices and labs located at TA-35-0085 and -0254 and at TA-03-0562, -1076, and -4200. Operations at TA-43 and TA-35-0085 include chemical and laser activities that maintain hazardous materials inventories 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 [BSL-1 and -2]), cellular components (e.g., Ribonucleic acid [RNA], Deoxyribonucleic acid [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 Key Facility activities at Bioscience Facilities are categorized as low hazard non-nuclear.

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 was proposed to be constructed at TA-62 on approximately 15 acres. However, DOE/NNSA cancelled the project in CY 2010.

During CY 2004, construction was finalized on the BSL-3 facility. The BSL-3 facility is a windowless single-story 3,202-square-foot, stand-alone, biocontainment facility located in TA-03 (TA-03-1076). The building includes two BSL-3 laboratories and one BSL-2 laboratory, plus associated administrative space, designed to safely handle and store biohazardous materials. Due to the BSL-3 facility'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 in 2002 by the Environmental Assessment for the Proposed Construction and Operation of a Bio-Safety Level 3 Facility at Los Alamos National Laboratory and a FONSI (DOE 2002a). However, the FONSI for operations was withdrawn by DOE/NNSA on January 22, 2004, due to the need to re-evaluate the environmental consequences of operating the facility with regard to its location on fill material and related seismic concerns. On November 29, 2005, DOE/NNSA issued a NOI to prepare an environmental impact statement (EIS) for the proposed operation of the BSL-3 facility. A draft EIS is currently in final review prior to release for public comment. The facility remains unused at this time, pending public review of the EIS and issuance of a ROD. If it is decided that the building will not be used for BSL-3 work, or if there are significant delays in the NEPA process related to BSL-3 work, LANS will relocate activities from older, existing buildings into BSL-3 and conduct other work there that is already covered within the 2008 SWEIS.

2.10.2 Operations at the Bioscience Facilities

The 2008 SWEIS identified 12 capabilities for this Key Facility. All of the 12 capabilities were active in CY 2012 and were at or below levels projected in the 2008 SWEIS (Table A-19).

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

This Key Facility has BSL-1 and BSL-2 work, which includes limited work with potentially infectious microbes. All activities involving infectious microorganisms are regulated by the Centers for Disease Control and Prevention, 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.

The *In Vivo* Measurements Laboratory (IVML) continues to be located in TA-43-0001 and is, therefore, a capability within this Key Facility and is included here. This capability is operated by the Health Physics Measurements Group of the Radiation Protection Division and is not part of the Bioscience Division. The IVML is used for direct monitoring of personnel for intakes of radioactive materials as part of the overall Radiation Protection and Internal Dosimetry Programs at LANL. Measurements are performed in two 2-centimeters thick, pre-World War II steel counting chambers located in the subbasement of TA-43-0001. In CY 2012, the IVML was re-accredited by the DOE Accreditation Program for Radiobioassay for the measurement of transuranic radionuclides, uranium, and thorium in the chest; fission and activation products in the chest and whole body; and radioiodine in the thyroid. IVML also maintains capabilities for measurement of radionuclides in other organs. The monitoring an individual receives is determined from the work they perform (routine monitoring) and if there has been any involvement in radiological incidents (special bioassay).

2.10.3 Operations Data for the Bioscience Facilities

In CY 2012, operations data levels at Bioscience Facilities remained below levels projected in the 2008 SWEIS. Table A-20 provides operations data details.

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

The Radiochemistry Facility includes all of TA-48 (116 acres) and part of 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 and Checkout Building (TA-48-0017), the Advanced Analytical Development Building (TA-48-0028), the Clean Chemistry/Mass Spectrometry Building (TA-48-0045), the Weapons Analytical Chemistry Facility (48-0107), and the Isotope Separator Building (TA-48-0008).

2.11.1 Construction and Modifications at the Radiochemistry Facility

The 2008 SWEIS projected no major facility modifications to the Radiochemistry Facility.

The following activities were reviewed internally through the Integrated Review Tool (IRT) and have NEPA coverage under Appendix L of the 2008 SWEIS. Under this category, in CY 2012, there were two changes to the main radiochemistry laboratory (TA-48-0001):

- An upgrade to the boiler system that provides heat to the central portion of the building (LANL 2012a) and

- An upgrade of room 302 from a radiological laboratory to a clean room laboratory.

2.11.2 Operations at the Radiochemistry Facility

The 2008 SWEIS identified 11 capabilities at the Radiochemistry Facility. All of the 11 capabilities were active in CY 2012. Two capabilities, isotope production and radionuclide transport studies, continue to expand beyond levels projected in the SWEIS (Table A-21). The remaining nine capabilities were performed at operational levels projected in the SWEIS. The Hydro-test sample analysis capability is now being performed at TA-15 and will no longer be reported as a TA-48 capability.

2.11.3 Operations Data for the Radiochemistry Facility

Operations data levels at the Radiochemistry Facility remained below levels projected in the SWEIS, with one exception. Chemical waste generation at the Radiochemistry Facility exceeded 2008 SWEIS projections due to the removal of asphalt and concrete to build a new concrete pad and the disposal of friable asbestos-contaminated material or equipment from throughout LANL. Table A-22 provides operations data details.

2.12 Radioactive Liquid Waste Treatment Facility (TA-50)

The RLWTF is located in TA-50 and consists of six primary structures: the RLWTF Building (TA-50-0001), the Pump House and Influent Storage Building for low-level radioactive liquid wastes (TA-50-0002), the TRU storage facility (TA-50-0066), a 100,000-gallon (380,000-liter) influent holding tank for low-level radioactive liquid waste (TA-50-0090), a facility for the storage of secondary liquid wastes (TA-50-0248), and the Waste Mitigation and Risk Management (WMRM) Facility (TA-50-0250), which has the capacity to store 300,000 gallons of low-level influent in an emergency such as a wildfire. Five of the six structures are listed as HazCat-3 Nuclear Facilities (Table 2-4). The RLWTF treats radioactive liquid waste generated by other LANL facilities and houses analytical laboratories to support waste treatment operations. The RLWTF Building is the largest structure in TA-50, with 40,000 square feet (3,720 square meters) under roof.

Table 2-4. Radioactive Liquid Waste Treatment Facility Buildings with Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2012*
TA-50-0001	RLWTF Building	3	3
TA-50-0002	Pump House and Influent Storage	3	3
TA-50-0066	TRU Storage Facility	3	3
TA-50-0090	Holding Tank	3	3
TA-50-0248	Evaporator Storage Tanks	3	3

* DOE list of LANL nuclear facilities (DOE 2011c).

2.12.1 Construction and Modifications at the RLWTF

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 following actions took place during CY 2012:

- Design of a replacement RLWTF was suspended by DOE/NNSA. A replacement facility for the treatment of low-level radioactive liquid waste was planned to be constructed within the next five years and be placed into operation sometime after 2018. Status of the facility is uncertain at this time.
- Solar evaporation tanks were installed at TA-52. They will likely be placed into operation during 2013.
- A secondary reverse osmosis unit was installed. Operations began in August 2012.
- A decision was reached to stop using seven vessels that are not equipped with leak detection capability. (Six of the seven vessels were installed in 1963, before the Environmental Protection Agency [EPA] even existed.) This decision will lead to two significant process changes: the use of two WMRM tanks for influent storage and the use of a microfilter in lieu of the clarifiers and gravity filter. A high-priority project, with daily progress meetings, was launched in March 2012 to design and construct facility and process changes. Most physical changes were completed by the end of CY 2012; startup and use of the altered process is expected to occur in 2013.

2.12.2 Operations at the RLWTF

The 2008 SWEIS identified two capabilities at this Key Facility. Both capabilities were active and were below levels projected in the 2008 SWEIS (Table A-23).

The primary measurement of activity for this Key Facility is the volume of radioactive liquid waste processed through the main treatment plant. In CY 2012, the RLWTF received 2.9 million liters of influent; 3 percent of this was delivered by truck (16 tankers). A total of 2.5 million liters of treated water were discharged to the environment via the effluent evaporator that was installed in January 2011. No treated water was discharged to Mortandad Canyon.

There was no TRU radioactive liquid waste activity during CY 2012. Three waste transfers (897 liters) were received from TA-55, an average of one transfer every four months. One drum of sludge was produced in August 2012.

2.12.3 Operations Data for the RLWTF

Operations data levels at RLWTF remained below levels projected in the 2008 SWEIS, with one exception. LLW generation at RLWTF exceeded 2008 SWEIS projections due to a campaign to treat and dispose of evaporator bottoms. Table A-24 provides operations data details.

2.13 Los Alamos Neutron Science Center (TA-53)

LANSCE lies entirely within TA-53. The Key Facility has more than 400 structures, including one of the largest buildings at LANL. Building TA-53-0003, which houses the linear accelerator (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 LANSCE (the User Facility) is composed of the 800-million-electron-volt linac, a Proton Storage Ring, and five major experimental areas: the Manuel Lujan Neutron Scattering Center, the Weapons Neutron Research (WNR) Facility, the Isotope Production Facility (IPF) and Experimental Areas B and C.

Experimental Area C is the location of proton radiography experiments for the Science-Based Stockpile Stewardship Program. A new experimental facility, for the production of ultra-cold neutrons, the Ultracold Neutron (UCN) Facility, was commissioned in 2005 in Area B and completed its eight full-run cycles in 2012 (DOE 2002b). Experimental Area A, formerly used for pi meson and cancer therapy research and isotope production, is currently inactive and was emptied of all beam and experimental equipment in 2009. Future programmatic use of Experimental Area A is slated for installation of the Materials Test Station (MTS). A second accelerator facility located at TA-53-0365, the Low-Energy Demonstration Accelerator, was decommissioned and dismantled in 2006. TA-53-0365 is currently being used for the Free Electron Laser (FEL) prototype.

LANSCE is classified as an Accelerator Facility regulated under DOE Order 420.2C 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—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.

2.13.1 Construction and Modifications at LANSCE

The 2008 SWEIS projected two modifications to LANSCE:

- Installation of MTS equipment in Experimental Area A.
- Construction of Neutron Spectroscopy Facility within existing buildings (under high-powered microwaves and advanced accelerators capability).

In addition to the projected facility modifications reflected in the 2008 SWEIS, additional construction and modification projects were initiated and/or completed in CY 2012 as follows:

The LANSCE WNR National Security Nuclear Science (NS2) Facility is a 3,650-square-foot building that doubles the WNR facility's capacity for experimental testing. The final design was completed in 2010, and construction began during the three-month accelerator maintenance outage in 2011 (LANL 2010a). The building was formally commissioned in fall of 2012. A power pole to support the facility was installed in 2012. The NS2 building is a user facility and would support civilian and national security research. Several projects at LANSCE were planned and/or executed to support the NS2 building and include the WNR experimental area substation switchgear project. This project would provide a feed of secondary electrical loads for several experimental buildings in the southeastern portion of the accelerator facility to include the NS2 building (LANL 2010b). The subcontract for fabrication of the substation switchgear was cancelled based on issues related to subcontract requirements. A new subcontract is in the process of being re-awarded.

The planning, design, and procurement of long lead components for a multiyear project entitled "LANSCE Risk Mitigation" was approved in 2010. The scope of this project encompasses the restoration of the LANSCE 800-million electron volt (MeV) linear accelerator to historic performance levels (DOE 2010a). The LANSCE Risk Mitigation Project continues to make progress and is scheduled to be completed in 2018. Progress made in 2012 includes an electrical power upgrade for Building 3, Sector A, ordering of replacement systems for 2013 outage and order of long lead equipment, installation of Sector A industrial controls, and other planned projects along the linac.

The following activities that took place at LANSCE during CY 2012 were reviewed internally through the IRT and have NEPA coverage under Appendix L of the 2008 SWEIS:

- Building 3, Building 30, and portions of Building 4 received new roofing as part of the Roof Asset Management Program (LANL 2011a; LANL 2011b).
- Replacement of the Sector A heating, ventilation, and air conditioning (HVAC) system (LANL 2011c).
- Upgrade of the Building 31 HVAC system (LANL 2011d).
- Refurbishment of the Experimental Area A Crane.
- Replacement of the Building 2 Cooling Tower (LANL 2012b).
- Replacement of the Building 30 HVAC system (LANL 2010c).
- Removal/salvage of structure TA-53-1138 (LANL 2012c).

2.13.2 Operations at LANSCE

The 2008 SWEIS identified eight capabilities at this Key Facility. Seven of the eight capabilities were active in CY 2012 and all fell below operational levels projected in the 2008 SWEIS (Table A-25).

During CY 2012, LANSCE operated the accelerator and the five experimental areas identified above (section 2.13). Area A has been idle for more than 10 years. The primary indicator of activity for LANSCE is production of the 800-MeV LANSCE proton beam as shown in Table A-25. These production figures are all less than the 6,400 hours at 1,250 microamps (µA) projected in the 2008 SWEIS. There were no experiments conducted for transmutation of wastes.

The most significant accomplishment in CY 2012 for LANSCE was the completion of the WNR NS2 new-user facility and the successful completion of the run cycle for the five experimental facilities: the WNR, the Proton Radiography area, IPF, UCN, and the Manuel Lujan Center. During the construction of the NS2 facility in 2011, some flight paths available to the user community were not fully available. It is anticipated that in 2013, WNR will be able to significantly increase the number of industry experiments it can complete during a run cycle. LANSCE hosted more than 126 user visits during the seven-month 2012–2013 run cycle. The facility operated at an average of 88.1 percent availability for the Lujan Center and 84.8 percent for WNR, allowing the completion of 313 experiments for internal and external neutron scattering and neutron nuclear physics users. The numbers of experiments were down considerably from the previous year due to a contamination event that occurred in the user facility in August 2012. The contamination event shut down the Lujan Center operations during the production period scheduled from August through December. The Lujan Center operations are planned to resume in January 2013. Other significant accomplishments at LANSCE include the observance of the sixth production run for the ultra-cold neutron experimental area. Progress was made towards plans to scale-up research on the FEL system by collaborating with the Office of Naval Research, industry, other national laboratories, and industrial and academic partners, in development of a potentially effective countermeasure against anti-ship cruise missiles. The normal-conducting radio frequency injector successfully operated and transported dark current up to 100 µA.

2.13.3 Operations Data for LANSCE

Operations data levels at LANSCE remained below levels projected in the SWEIS. Radioactive air emissions are a key environmental parameter since LANSCE emissions have historically accounted for more than 95 percent of the total LANL's offsite dose. The total point source emissions were approximately 136 curies. Table A-26 provides operations data details.

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

The Solid Radioactive and Chemical Waste (SRCW) Facilities are located at TA-50 and TA-54. Activities at this Key Facility are 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 SRCW 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.

As shown in Table 2-5, the 2008 SWEIS recognized 24 structures at the SRCW Facility as having HazCat 2 nuclear classification. (Area G was recognized as a whole, and then individual buildings and structures were also recognized.)

2.14.1 Construction and Modifications at the SRCW Facilities

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 New Mexico Environment Department (NMED) Compliance Order on Consent (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.

Table 2-5. Solid Waste Buildings with Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2012[a]
TA-50-0069	Waste Characterization, Reduction, and Repackaging Facility	2	2
TA-50-0069 Outside	Nondestructive Analysis Mobile Activities	N/A	2
TA-50-0069 Outside[b]	Drum Storage	2	2
TA-54-Area G[c]	LLW Storage/Disposal	2	2
TA-54-0002	TRU Storage Building	N/A	2
TA-54-0008	Storage Building	2	2
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	N/A	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	3
TA-54-0412	TRU Waste Management Dome	N/A	2
TA-54-1027	Hazardous, Chemical, Mixed, and Tritiated Waste Storage Dome	N/A	2
TA-54-1028	Hazardous, Chemical, Mixed, and Tritiated Waste Storage Dome	N/A	2
TA-54-1030	Hazardous, Chemical, Mixed, and Tritiated Waste Storage Dome	N/A	2
TA-54-1041	Hazardous, Chemical, Mixed, and Tritiated Waste Storage Dome	N/A	2
TA-54-Pad1[d]	Storage Pad	2	2
TA-54-Pad10[e]	Storage Pad	2	2
TA-54-Pad281	LLW Storage	N/A	2

[a] DOE list of LANL nuclear facilities (DOE 2011c).

[b] "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 1 was formerly the TA-54-0226 TRU Waste Storage Dome.

[e] Pad 10 was originally designated as Pads 2 and 4 in the SWEIS.

The OSRP recovers and manages unwanted radioactive sealed sources and other radioactive material that

- Present a risk to national security, 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[5] (42 USC); or
- Are DOE-owned.

The OSRP, International Threat Reduction Group, and the Nuclear Engineering and Nonproliferation Division at LANL are tasked by NNSA's Office of Global Radiological Threat Reduction to recover and manage sealed radioactive sources from domestic and international locations.

NEPA coverage for the OSRP has been analyzed and approved in various NEPA documents with the most recent analysis in the 2008 SWEIS. In April 2011, the Supplement Analysis for the Transport and Storage of High-Activity Sealed Sources from Uruguay and Other Locations (DOE/EIS-0380-02; DOE 2011a) was prepared for the OSRP project. This SA analyzed transportation of sealed sources recovered from foreign countries to the US through the global commons via commercial cargo aircraft and also examined the role of a commercial facility in managing these sealed sources (an aspect of the OSRP that was not addressed in the 2008 SWEIS). DOE/NNSA issued an amended ROD in the Federal Register on July 20, 2011.

On September 28, 2011, DOE submitted NEPA regulation revisions to the Federal Register. The final regulations became effective October 13, 2011. In the revised rule, DOE established 20 new categorical exclusions, including recovery of radioactive sealed sources and sealed source-containing devices from domestic or foreign locations provided that (1) the recovered items are transported and stored in compliant containers and (2) the receiving site has sufficient existing storage capacity and all required licenses, permits, and approvals.

As of December 2011, approximately 19,000 sources had been brought to LANL. Of these, about 16,500 were shipped to the Waste Isolation Plant (WIPP) for final disposition. Approximately 18,500 were collected for storage at TA-54 and about 500 were brought to TA-55.

2.14.2 Operations at the SRCW Facilities

The 2008 SWEIS identified seven capabilities at this Key Facility. Six of the seven capabilities were active in CY 2012 and all fell below operational levels projected in the 2008 SWEIS (Table A-27). The primary measurements of activity for this facility are volumes of newly-generated chemical, LLW, and TRU wastes to be managed, and volumes of legacy TRU waste and MLLW in storage.

5 Public Law 99-240 is an act to amend the Low-Level Radioactive Waste Policy Amendments Act of 1985. The act was 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.

2.14.3 Operations Data for the SRCW Facilities

The 2008 SWEIS waste projections were exceeded for chemical waste, LLW, and MLLW at the SRCW Facilities. Chemical waste generation at the SRCW Facilities exceeded 2008 SWEIS projections due to three reasons: (1) disposal of contaminated soil from diesel fuel and pump oil leaks, (2) disposal of solid waste debris from a roof tear-off and replacement project, and (3) disposal of drum liners that no longer met SRCW specifications due to long-term storage. LLW generation at the SRCW Facilities exceeded 2008 SWEIS projections due to construction debris from the construction of Permacon for processing LLW crate boxes stored in Area G. MLLW generation at the SRCW Facilities exceeded 2008 SWEIS projections due to debris, which was of contact in nature, from the repackaging and over-packing of TRU waste containers and waste related to consolidating and packaging of MLLW. TRU waste that was reclassified as MLLW is not counted as newly generated, but tracked in Table A-27 as part of the waste characterization, packaging, and labeling capability. Table A-28 provides operations data details.

2.15 Plutonium Facility 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, TA-55-0004, is categorized as a HazCat 2 Nuclear Facility, but was built to comply with the seismic standards for HazCat 1 Nuclear Facility. In addition, TA-55 includes two low hazard chemical facilities (TA-55-0003 and -0005) and one low hazard energy source facility (TA-55-0007). The DOE/NNSA listing of LANL nuclear facilities for 2011 (DOE 2011c) retained Building TA-55-0004 as a HazCat 2 Nuclear Facility (Table 2-6).

Table 2-6. Plutonium Facility Complex Buildings with Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2012*
Plutonium Facility (TA-55-0004)	Plutonium Processing	2	2

* DOE list of LANL nuclear facilities (DOE 2011c).

2.15.1 Construction and Modifications at the Plutonium Facility Complex

The 2008 SWEIS projected two facility modifications:

- TA-55 Reinvestment Project (TRP) (formerly the Plutonium Facility Complex Refurbishment Project)
- TA-55 Radiography Facility 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 DOE/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 completed in CY 2010. During CY 2012, TRP II construction activities were conducted and TRP III was in the planning stage.

The TA-55 Radiography Facility Project was cancelled. In 2006, DOE established an interim radiography capability in an existing area at the Plutonium Facility Complex until a stand-alone facility could be built. Interim work continued in CY 2012.

In addition, the following construction/modification projects continued in CY 2012:

- As part of the CMRR Project, construction of the RLUOB was completed in 2012[6]. On February 13, 2012, NNSA deferred the CMRR-NF for at least five years.
- DD&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 2012.
- The Nuclear Materials Safeguards and Security Upgrades Project (NMSSUP) Phase II provides physical security upgrades at the Plutonium Facility Complex. NMSSUP Phase II construction activities continued through 2012.
- The Seismic Analysis of Facilities and Evaluation of Risk Project at TA-55-0004 addresses deficiencies identified through structural analysis conducted to evaluate the ability of the TA-55 Plutonium Facility safety structures, systems, and components to meet their credited safety functions as defended in the Documented Safety Analysis. Project planning and construction activities continued through 2012.

2.15.2 Operations at the Plutonium Facility Complex

TA-55, located just southeast of TA-03, includes the Plutonium Facility Complex and is the chosen location for the CMRR NF. This facility would replace the current CMR Building and would provide chemical and metallurgical processes for recovering, purifying, and converting plutonium and other actinides into many compounds and forms; however, as stated in section 2.1.1, the CMRR NF was deferred in 2012 for five years. Additional capabilities would include the means to ship, receive, handle, and store nuclear materials, as well as manage the wastes and residues produced by TA-55 operations. In 2012, relocated chemistry and metallurgy research, actinide chemistry, and materials characterization capabilities that may be provided at the site through the project were in the pre-conceptual phase of construction.

In May 2011, DOE/NNSA issued a categorical exclusion to operate the Chloride Extraction and Actinide Recovery (CLEAR) Line at TA-55-0004 (formerly referred to as the Chloride Extraction and Acid Recovery Line) (DOE 2011d). The CLEAR Line would remove actinides from existing waste streams and provide actinides for reuse at TA-55. Operation of the CLEAR Line would reduce both TRU waste that would be shipped to WIPP and the amount of actinides going to RLWTF. Internal glovebox modifications at TA-55-0004 are needed to provide flexibility for the recovery of specific isotopes or specific types of waste minimization activities.

The 2008 SWEIS identified seven capabilities at this Key Facility. All of the seven capabilities were active in CY 2012 and all fell below operational levels projected in the 2008 SWEIS (Table A-29).

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6 The CMRR Project was covered by an EIS (DOE 2003a).

2.15.3 Operations Data for the Plutonium Facility Complex

Operations data levels at the Plutonium Facility Complex remained below levels projected in the 2008 SWEIS. Table A-30 provides operations data details.

2.16 Non-Key Facilities

The balance, and majority, of LANL buildings are referred to in the 2008 SWEIS as Non-Key Facilities. Non-Key Facilities house operations that do not have the 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. Table 2-7 shows the LANL Nuclear Hazard Classification List for the Non-Key Facilities.

Table 2-7. Non-Key Facilities with Nuclear Hazard Classification

Building	Description	2008 SWEIS	NHC LANL 2012*
TA-10 potential release site 10-002(a)-00	Former Liquid Disposal Complex	3	3

* DOE list of LANL nuclear facilities (DOE 2011c).

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. Major projects that have been completed since 2008 are listed in Table 2-8. A complete description of these projects can be found in previous Yearbooks.

Table 2-8. Non-Key Facilities Completed Construction Projects

Description	Year Completed
Los Alamos Site Office Building	2008
Protective Force Running Track	2010

New projects that were still under construction or were completed in CY 2012 are discussed in the following paragraphs:

2.16.1.1 The Tactical Training Facility

Description. The Tactical Training Facility is a mock facility commonly referred to as a Military Operations in Urban Terrain Facility at TA-16. The facility is designed to allow for interior and exterior feature reconfiguration to simulate both indoor and outdoor physical configurations of certain LANL facilities where tactical training is needed. In addition to modular configurable spaces, the facility will also house a supervisor viewing area, stairwells to accommodate move and shoot training based on local facilities of concern, a simulated Central Alarm Station, a simulated Technical Area Isolation Zone monitored by the Central Alarm Station that is inside the building, a briefing room, and a firearms storage area (vault type room). This building is planned to be a pre-manufactured steel building with a slab on grade foundation, modeled after the Oak Ridge Y-12 Dye Marking Cartridge Facility currently in use. It is sited on approximately 13.44 acres.

Status. The project received NEPA coverage through the 2008 SWEIS. Construction began in August 2010, was ongoing in 2011, and is expected to be completed in March 2013.

2.16.1.2 Photovoltaic Array Reuse of Los Alamos County Landfill Location

Description. In an effort to beneficially reuse the LANL TA-61 "brownfield" landfill site, Los Alamos County is leasing approximately 15 of the 46 acres of land it operated as a landfill for the installation of up to 2.5 MW of photovoltaics (PV) to generate electric power. The system, including an 8-megawatt-hour (MWh) battery storage system, will be connected to the Los Alamos Power Pool infrastructure.

Status. In February 2010, DOE/NNSA categorically excluded the project (DOE 2010b). The first MW of the PV system and the entire battery system are being installed by Los Alamos County. Construction started in December 2011 and was completed the end of summer 2012. The other 1 to 1.5 MW will be installed through a Los Alamos County-issued power purchase agreement. The entire system is expected to be in place and operating no later than the summer of 2013.

2.16.1.3 Expansion of the Sanitary Effluent Reclamation Facility

Description. Early in 2010, NNSA proposed an action that would expand the size and operational capacity of the Sanitary Effluent Reclamation Facility (SERF), located on the south rim of Sandia Canyon. The purpose of this expansion is to improve wastewater treatment to meet effluent limitations for polychlorinated biphenyls (PCBs) imposed in NPDES Permit NM0028355. The permit requires compliance with these limitations by July 31, 2012. SERF-E includes the installation of associated storage tanks, pumps, piping, and equipment necessary to distribute the treated water for reuse at LANL facilities. Depending on the amount of treated water ultimately reused, this action could reduce or eliminate the amount of wastewater currently discharged into the upper portion of Sandia Canyon.

Status. SERF-E received NEPA coverage through a FONSI on August 24, 2010 (DOE 2010c). The project achieved Critical Decision (CD) 1 in early 2010 and achieved CD-2, Approve Performance Baseline, CD-3, and start of construction in May 2011. Operations were restarted at the facility in September 2011, and the facility with the expanded capability was operational prior to July 31, 2012, consistent with the permit requirements. The project achieved CD-4, Start of Operations, on July 30, 2012 and completed all remaining punch list items by September 27, 2012.

2.16.1.4 The Indoor Firing Range

Description. The Indoor Firing Range is an approximately 15,000-square-foot indoor range facility with a 50-meter, 20-position firing range, a 20-position-wide bullet trap, automated target turning systems, prefabricated shooting positions, and an integrated control booth. The facility includes a weapons and ammunition storage area, a classroom, range storage rooms, and restroom facilities. This facility is modeled after an existing facility at Y-12.

Status. Construction began in September 2011, continued in 2012, and is expected to be completed in January 2013.

2.16.1.5 The Interagency Wildfire Center at TA-49

Description. DOE/NNSA proposed the construction of a new, single-story multipurpose interagency fire center at TA-49. The National Park Service currently holds a DOE/NNSA permit for use and construction on a parcel of land adjacent to State Road 4 at the entrance to TA-49. The building would contain about 6,400 square feet of offices, training and conference rooms and about 200 square feet of storage for fire protection and suppression equipment. The

National Park Service designed the facility to qualify for designated Leadership in Energy and Environmental Design certification.

Construction will include removal of temporary office trailers and structures currently on the site, realignment of a short segment of the existing access road to the existing temporary buildings, paving and gravelling, and installation of utilities. Utility installation would use existing corridors wherever possible. Operation of this facility would have a negligible increase in utility usage for the site. DOE/NNSA would supply water, gas, and electricity to the facility from either existing mains along State Road 4 or via short distribution lines from existing utilities along the TA-49 entrance road.

Status. In January 2012, DOE/NNSA categorically excluded the project (DOE 2012). Construction started in July 2012 and is expected to be complete in April 2013.

2.16.2 Operations at the Non-Key Facilities

Non-Key Facilities are host to seven of the eight categories of activities at LANL as shown in Table A-31. The eighth category, environmental cleanup, is discussed in Section 2.17. During CY 2012, 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 CY 2012, the Non-Key Facilities generated about 28 percent of the total LANL chemical waste volume; about one percent of the total LLW volume; less than one half percent of the total MLLW volume; and about six percent of the total TRU waste volume. Operations data levels at the Non-Key Facilities remained below levels projected in the 2008 SWEIS. Table A-32 presents operations data details.

The combined flows of the TA-46 SWWS and the TA-03 Power Plant account for about 86 percent of the total discharge from Non-Key Facilities and about 64 percent of all water discharged by LANL. Section 3.2 provides more details.

2.17 Environmental Cleanup

The Laboratory, through the Environmental Programs (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 waste at the Laboratory. For further details on waste generation amounts, see Section 3.3.

2.17.1 History of Corrective Action Sites at LANL

DOE established the EP Directorate, formerly the ER Project, in 1989 to characterize and, if necessary, remediate solid waste management units (SWMUs) and areas of concern (AOCs); areas 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 (NMSA 1978, §74-9-36[D]), and by DOE/NNSA for radionuclides under the Atomic Energy Act implemented through DOE Order 458.1, "Radiation Protection of the Public and the Environment," and DOE Order 435.1, "Radioactive Waste Management."

On March 1, 2005, NMED, DOE, and the University of California entered into the Consent Order, which superseded Module VIII. Under the agreement of the Consent Order, all 2,123 original corrective action sites, 6 newly identified sites, an additional site resulting from the split of SWMU 00-033, and the 24 sites split during a consolidation effort were subject to the new Consent Order requirements with the exception of 166 sites removed from Module VIII by NMED, 25 AOCs previously approved by NMED, and 541 sites approved for no further action (NFA) by EPA. Therefore, 1,422 sites were originally regulated under the Consent Order. The Consent Order provides that the status of all 1,422 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 2012, NMED issued 139 Certificates of Completion without Controls and 54 Certificates of Completion with Controls. Of the 193 Certificates of Completion issued, 2 overlap former EPA or NMED approvals for NFA and 2 overlap NMED removals from Module VIII of LANL's Hazardous Waste Facility Permit; thus, only 189 are subtracted. This administrative action reduced the total number of corrective action sites remaining in the investigation process at LANL to 1,233.

In 2010, two previously unknown corrective action sites were identified and reported to the administrative authority, and the Laboratory received its new Hazardous Waste Facility Permit, which removed 20 Resource Conservation and Recovery Act (RCRA) sites as corrective action sites. Combined, these administrative actions reduced the total number of corrective action sites remaining in the investigation process at LANL to 1,215.

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 DOE determines that it is not reasonably likely to be reactivated. The NMED has also approved delayed investigation at 80 sites that are currently active units or where investigation is not feasible until future DD&D of associated operational facilities. 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 prior to the end date of the Consent Order (currently 2015).

2.17.2 Environmental Cleanup Operations

In January 2012, the NMED and DOE/NNSA announced a framework agreement between the two agencies to address prioritization of environmental work at the Laboratory. This non-binding agreement in principle calls for the Laboratory to accelerate the shipment of TRU wastes from TA-54 to WIPP in Carlsbad, New Mexico. DOE/NNSA agreed to ship 3,706 cubic meters of TRU waste from TA-54 to WIPP by June 30, 2014. In order to achieve the accelerated waste shipments within existing and anticipated budgets, the NMED agreed that some work that would have been performed under the Consent Order during this timeframe be delayed so that funding originally assigned to the Consent Order work could be transferred to the TRU waste disposition activities. As a result, fewer activities than originally scheduled under the Consent Order were performed in 2012.

The EP Directorate developed and/or revised one investigation work plan (along with the associated historical investigation report), one monitoring plan, one corrective measures evaluation report, one supplemental remedy completion report, two progress reports, five investigation reports, and four miscellaneous reports, which were submitted to the NMED during 2012. A work plan proposes investigation activities designed to characterize SWMUs, AOCs, consolidated units, aggregate areas, and/or canyons. The data are presented in an investigation report, which presents and assesses the sampling results, and recommends additional sampling, remediation, monitoring, or NFA, as appropriate. In addition to the work plans and reports, numerous other documents related to groundwater, surface water, storm water, and well installations were written and submitted to the NMED. These included periodic monitoring reports, drilling work plans, and well completion reports as well as the annual update to the Interim Facility-Wide Groundwater Monitoring Plan. The NMED granted Certificates of Completion for 19 SWMUs and AOCs in 2012. The certificates indicated that corrective actions were complete without controls for 17 sites, meaning no additional corrective actions or conditions are necessary. The remaining two sites have land-use controls requiring land use to remain industrial.

Table 2-9 provides summaries of the investigations for which activities were started, continued, and/or completed and for which reports were submitted in 2012. In addition, the corrective measure implementation (CMI) status for the 260 Outfall, the corrective measure evaluation (CME) and vapor monitoring for Material Disposal Area (MDA) C, and MDA B waste management and DD&D activities are described below.

Table 2-9. Summary of Site, Aggregate Area, and Canyon Investigations Conducted and/or Reported on in 2012 under the Corrective Actions Program

Document	TAs	Number of Sites Investigated	Number of Samples Collected	Number of Sites where Cleanup Conducted	Number of Sites where Extent Defined/ Not Defined	Risk/Dose Assessments	Conclusions/ Recommendations
Investigation Report for Cañon de Valle Aggregate Area, TA-14[a]	TA-14	27	Approx. 260 samples	0	Five sites extent defined and two sites further sampling for extent not warranted; 10 sites extent not defined.	Seven sites do not pose potential unacceptable human health and ecological risks/doses.	Seven sites recommended for complete without controls [AOCs 14-001(a, b, c, d, e), C-14-001, SWMU 14-003]. Ten sites require further sampling for extent; two of these sites also recommended for remediation. Nine sites recommended for deferred/delayed characterization and investigation.
Supplemental Remedy Completion Report for Upper Los Alamos Canyon Former Technical Area 32[a]	Former TA-32	2	6	0	Two sites extent defined.	Two sites do not pose potential unacceptable human health (industrial) and ecological risks/doses.	Two sites recommended and granted complete with controls [SWMUs 32-002(a) and 32-002(b1)]. Further evaluation of the SWMUs and AOCs within former TA-32 may be performed in the future with the objective of supporting a determination of corrective action complete without controls.
Investigation Report for Lower Mortandad/ Cedro canyons Aggregate Area, Revision 1[b]	TA-05	4	Approx. 170 samples	SWMU 05-006(c) approx. 2.1 yd^3 of soil, debris, and lead shielding excavated.	Four sites extent defined.	Four sites do not pose potential human health and ecological risks/doses.	Four sites recommended for complete without controls [SWMUs 05-003, 05-004, 05-005(b), and 05-006(c)]. Investigation complete.

Document	TAs	Number of Sites Investigated	Number of Samples Collected	Number of Sites where Cleanup Conducted	Number of Sites where Extent Defined/ Not Defined	Risk/Dose Assessments	Conclusions/ Recommendations
Nest Box Monitoring Report for the Upper Pajarito Canyon Watershed[a]	n/a[c]	3 reaches	9 insect samples	n/a	n/a	No difference in risk from chemicals of potential ecological concern (COPEC)s between the Pajarito reaches and reference locations. Reproductive measures (eggshell thickness, clutch size, hatch date, hatching success, and fledgling success) not affected by contaminants.	Weight of evidence indicates COPECs in the Pajarito reaches do not pose a potential risk to population abundance or persistence and species diversity of avian ground invertevore feeding guild species. Further characterization of cavity-nesting birds and their food for metals and PCBs in the Pajarito watershed reaches is not warranted.
Results of 2011 Sediment Monitoring in the Pajarito Canyon Watershed[a]	3, 6, 22, 40, 8, 9, 69, 12, 15, 18, 48, 54, 55, 59, 64, 66	13	26 samples	n/a	n/a	n/a	Analytical results from sediment samples collected in the watershed and in baseline areas downstream from the Las Conchas burn area in 2011, combined with results from previous sediment samples, indicate that concentrations of most COPECs released from Laboratory sites decrease downstream from the sources and also decrease over time. These data also indicate that many COPECs detected in the 2011 sediment samples have a primary source in the Las Conchas burn area, associated with the transport of ash. Other COPECs detected in the 2011 sediment samples have a source in runoff from developed areas, consistent with results downstream from urban areas, such as the Los Alamos town site.

Document	TAs	Number of Sites Investigated	Number of Samples Collected	Number of Sites where Cleanup Conducted	Number of Sites where Extent Defined/ Not Defined	Risk/Dose Assessments	Conclusions/ Recommendations
Investigation Report for DP Site Aggregate Area Delayed Sites [Consolidated Unit 21-004(b)-99 and Solid Waste Management Unit 21-0011 (b)] and DP East Building Footprints, at TA-21, Revision 1[a]	TA-21	8 (5 SWMUs/ AOCs and 3 building footprints)	Approx. 368 samples	Structures, waste lines, debris, and/or asphalt (approximately 30 yd^3) were removed. Some structures could not be fully excavated because of the depth below the ground surface or nearby active utilities.	Extent of contamination is not defined at any of the sites.	0	Additional sampling for extent may be required at all sites. Limited additional soil removal and associated confirmation sampling may also be warranted for areas with contamination above soil screening levels (SSLs) and screening action levels (SALs). A Phase II investigation work plan has been proposed to address the additional sampling and remediation required at the sites.
Phase II Investigation Report for Sandia Canyon	TA-03	1 reach (S-5EC); 5 stream gage stations; 1 spring; 41 wells	15 sediment; 88 surface water; 857 groundwater	0	Contaminants in sediment originally released from TA-03 extend for approximately 10 km to 12 km (6 mi to 7 mi) down canyon from the sources. Concentrations in supplemental reach S-5EC are generally much less than the maximum concentrations measured during Phase I.	The conclusions of the ecological and human health risk assessments are not changed from those presented in the Phase I report based on the additional Phase II sediment and surface water sampling results.	Surface water/storm water will continue to be monitored. Groundwater will also continue to be monitored for potential changes in concentrations or distribution of contaminants within wells in the Chromium Investigation monitoring group.

Document	TAs	Number of Sites Investigated	Number of Samples Collected	Number of Sites where Cleanup Conducted	Number of Sites where Extent Defined/ Not Defined	Risk/Dose Assessments	Conclusions/ Recommendations
Investigation/ Remediation Report for MDA B, Solid Waste Management Unit 21-015, Revision 1[b]	TA-21	1	187 confirmation samples, 7 borehole samples, 4 pore gas samples, 3 geotechnical samples. In 2012, 10 confirmation samples of repackaging area collected.	All waste removed and contaminated soil/tuff from 0-10 ft below ground surface (bgs) excavated. A total of 47,350 yd^3 of waste from the trenches at MDA B was shipped from the site.	Defined by results from previous investigations including the 1998 angled boreholes, Direct Push Technology sampling, confirmation sample data, soil-vapor data, and the results from the three post-remediation vertical boreholes drilled beneath the trenches at MDA B.	No inorganic or organic COPEC concentrations from samples collected in the depth range of 0 to 10 ft bgs exceeded residential SSLs. Concentrations for all radionuclides, except plutonium 239/240 on one sample, were below the residential SALs from 0–10 ft bgs The overall 95% upper confidence limit (9.85 pCi/g) for plutonium 239/240 from 0–10 ft bgs was below the residential SAL. Pore gas screening evaluation indicates that volatile organic compounds (VOCs) and tritium in subsurface pore gas below MDA B pose an extremely low risk of groundwater contamination.	Investigation/Remediation Work Plan objectives have been met and the nature and extent of residual contamination from historical waste disposal activities have been defined. Further sampling and/or remediation at MDA B are not necessary pending a risk/dose assessment for the site.

Document	TAs	Number of Sites Investigated	Number of Samples Collected	Number of Sites where Cleanup Conducted	Number of Sites where Extent Defined/ Not Defined	Risk/Dose Assessments	Conclusions/ Recommendations
Reconnaissance Survey Report for Post-Las Conchas Fire Flooding in Water Canyon/ Cañon de Valle	TA-16	14 reaches, 3 springs, 4 alluvial wells, 4 gage stations	Approx. 180 sediment, 84 storm water, 620 alluvial groundwater and springs	n/a	n/a	n/a	Little evidence of perturbations to key contaminant concentrations in springs, alluvial wells, and surface water. The sole observed effect was an increase in barium concentration in one alluvial well in samples collected in September 2011. Storm water samples showed increased concentrations in both filtered and unfiltered barium upgradient and downgradient of the Laboratory. The resultant deposits also show very low concentrations consistent with or less than pre-fire concentrations. There is no need for mitigation actions to reduce sediment transport in future floods.

[a] Report was submitted in 2012 but the investigation was conducted and completed in 2011 or earlier.
[b] Revision 1 did not involve additional sampling or remediation so the original investigation results and conclusions remain unchanged.
[c] n/a = Not applicable.

Consolidated Unit 16-021(c)-99 (260 Outfall) CMI. The subsurface CME and surface CMI for Consolidated Unit 16-021(c)-99 proceeded at a reduced pace during Fiscal Year (FY) 2012 compared with previous years, primarily because of the ongoing effects of the 2011 Las Conchas fire. The primary activities relevant for the surface CMI included (1) an evaluation of post-fire flooding effects in Cañon de Valle, which revealed moderate levels of geomorphic damage and minimal impacts to contaminant concentrations in alluvial wells and springs in the canyon; and (2) inspection of a monitoring well and bentonite pond cap downgradient of the 260 Outfall ponds, which indicated the injection grouting and bentonite pond cap in that area were working effectively. For the subsurface CME, the principal relevant activity was an evaluation of the well network for TA-16, which identified data gaps in the groundwater monitoring network for the 260 Outfall CME. This network evaluation recommended the installation of new wells north of Cañon de Valle, installation of a new regional well in the central portion of TA-16, rehabilitation of wells to the east of TA-16, and conversion of the CdV-16-4ip well to a single-screen well. Each well will require four quarters of sampling.

The Cañon de Valle pilot permeable reactive barrier (PRB) remains nonoperational because of post–Las Conchas fire flooding, which destroyed the capture wall for the PRB. Continued risks of flooding preclude reinstalling the PRB at this time. The current location of the PRB is not feasible for barrier reinstallation because of the deep scouring of the alluvial sediment in that area.

Sediment sampling of key reaches within Cañon de Valle and Water Canyon was completed during June/July 2012. This sampling was designed to evaluate the effects of post–Las Conchas fire flooding on the alluvial systems in Cañon de Valle and Water Canyons. The results are summarized in the "Reconnaissance Survey Report for Post–Las Conchas Fire Flooding in Water Canyon and Cañon de Valle" (LANL 2012d). In summary, sediment reaches are variably disturbed, with the highest impacts in the western reaches. In most reaches, sediment packages with the highest contaminant levels were not disturbed by the post-fire flooding.

MDA C. A CME was conducted for MDA C to assess alternatives for preventing future exposure. The purpose of the CME is to identify and evaluate potential remedial alternatives for MDA C. The CME focuses on realistic remedies, is tailored to this site, and is consistent with expected future land uses. Consent Order–specified evaluation criteria were used to select the recommended corrective measures alternative for the MDA C subsurface units based on evaluation of specific site conditions, including the contaminant inventory, the design of the disposal units, the environmental setting, and the nature and extent of contamination.

Treatment technologies were identified and screened for applicability to the sources of contamination present at MDA C. Applicable technologies were then combined into corrective measures alternatives to address the remedial action objectives for MDA C. The corrective measures alternatives were screened against the threshold criteria per Section VII.D.4.a of the Consent Order. Alternatives that satisfy the threshold criteria were then evaluated and ranked against the Remedial Alternative Evaluation Criteria (i.e., balancing criteria) identified in Section VII.D.4.b of the Consent Order. The highest-ranking alternative was selected as the recommended corrective measures alternative.

As a result of this evaluation, the recommended corrective measures alternative includes constructing an evapotranspiration cover over the pits and shafts to provide a barrier against human and ecological exposure to waste and contaminated soil. The cover also restricts the infiltration of water by providing a soil medium to hold infiltrated water until it is removed by evaporation from the surface and by transpiration through vegetation. The alternative includes constructing and operating a soil-vapor extraction system to remove volatile organic compound (VOCs) from the subsurface to prevent the downward migration of these VOCs to the groundwater. Performance monitoring and institutional controls will be included to ensure the remedial action objectives have been satisfied. Long-term monitoring at MDA C that couples vapor monitoring in the vadose zone near the disposal units with regional aquifer monitoring will provide a defense-in-depth approach to demonstrate the effectiveness of the final remedy.

MDA C Subsurface Vapor Monitoring. Subsurface vapor (pore-gas) monitoring was conducted during 2012 at 80 sampling ports within 18 vapor monitoring wells beneath and surrounding MDA C. The first sampling event was conducted during March and April, and the second sampling event was conducted during October and November. Subsurface vapor monitoring samples have been collected at the site since 2004, and vapor monitoring data indicate VOCs and tritium are present in the subsurface. The data collected from vapor monitoring wells are used to evaluate whether VOCs and tritium may be a potential threat to groundwater and whether corrective actions may be required.

A total of 28 VOCs and tritium was detected in pore gas at MDA C during the first 2012 sampling event and 16 VOCs and tritium were detected in pore gas during the second 2012 sampling event. The screening evaluation of the 2012 data identified three VOCs with vapor concentrations above their respective Tier I screening values: 2-hexanone, methylene chloride, and trichloroethene (TCE). TCE is the only VOC detected at concentrations above the Tier II screening values in two to three monitoring wells at the eastern end of MDA C at over 800 feet above the regional aquifer. The locations with the highest TCE concentrations are consistent with vapor monitoring data from 2010 and 2011. At most locations, the tritium activity decreased with depth, and most values were below the Tier I and Tier II screening values. Tritium exceeded either the Tier I or the Tier II screening value in monitoring wells at the eastern end and along the northern boundary of MDA C for the two sampling events. The tritium results are consistent with previous sampling data.

Vapor monitoring at MDA C will continue on a biannual basis to support remedy selection.

MDA B. Activities performed during 2012 at MDA B included management of onsite remediation waste, preparation for DD&D of the enclosure structures used during remediation, and initiation of DD&D. Wastes removed from MDA B during 2011 remediation activities included old naval munitions consisting of fifty 5-inch and 6-inch projectiles. These munitions were contaminated with radionuclides and had to be decontaminated by abrasive blasting so that they could be transported to another Laboratory TA for evaluation to confirm they contained no high explosives. A temporary decontamination facility was established onsite and used to decontaminate all the munitions. The decontaminated munitions were then packaged and transported offsite for evaluation.

Five temporary enclosure buildings were constructed at MDA B to contain the waste excavation activities that were completed in 2011. These structures were constructed of steel and ranged in size from 140 feet x 75 feet to 280 feet x 75 feet. During 2012, LANL prepared for and initiated DD&D of the enclosures. Preparation activities included radiological characterization of the interior surfaces of the enclosures and concrete foundations, utility deactivation and disconnection, removal of universal waste and ancillary equipment, and site preparation. Demolition of the aboveground portion of three of the enclosures was completed during 2012 and the steel demolition debris was size-reduced and packaged for offsite transport and disposal. Demolition of the below-grade concrete foundations for these three enclosures began during 2012 but was not completed.

DD&D wastes generated during 2012 were 391 cubic yards of nonradioactive industrial waste and 980 cubic yards of LLW. An additional 312 cubic yards of concrete debris was generated and segregated for recycle.

Interim Facility-Wide Groundwater Monitoring Plan. During 2012, the 2011 Interim Facility-Wide Groundwater Monitoring Plan, Revision 1, which addresses monitoring to be conducted from January 2012 through September 2012, was approved with modification, and the 2013 Interim Facility-Wide Groundwater Monitoring Plan, which addresses monitoring to be conducted from October 2012 through September 2013, was submitted. The 2013 Plan covers interim groundwater monitoring activities during FY 2013. Water monitoring in 2012 included base flow, alluvial groundwater, intermediate-perched groundwater, and regional aquifer groundwater. Monitoring was performed and reported for area-specific monitoring groups related to project areas that may be located in more than one watershed. Area-specific monitoring groups are defined for TA-54 in Pajarito and Mortandad Canyons; TA-21, primarily in Los Alamos Canyon; MDA AB, primarily in Ancho Canyon; MDA C, primarily in Mortandad Canyon; the chromium investigation area in Sandia and Mortandad Canyons; and the TA-16 260 Outfall in Water Canyon/Cañon de Valle. Locations that are not included within one of these six area-specific monitoring groups are assigned to the general surveillance monitoring group. Monitoring beyond LANL boundaries was conducted in areas affected in the past by LANL operations as well as in areas unaffected by LANL for the purpose of providing baseline data.

2.17.3 Site/Facility Categorization

No new nuclear environmental sites were added to or removed from the DOE/LANL Nuclear Facilities List during 2012 (Table 2-10).

Table 2-10. Environmental Sites with Nuclear Hazard Classification

Site	Description	2008 SWEIS	NHC LANL 2012*
TA-21; SWMU 21-014	MDA A (General's Tanks)	2	2
TA-21; Consolidated Unit 21-016(a)-99	MDA T	2	2
TA-35; AOC 35-001	MDA W	3	3
TA-49; SWMUs 49-001(a), 49-001(b), 49-001(c), and 49-001(d)	MDA AB	2	2
TA-54; SWMU 54-004	MDA H	3	3
TA-54; Consolidated Unit 54-013(b)-99	MDA G, as an element of TA-54 Waste Storage and Disposal Facility, Area G	2	2

* DOE list of LANL nuclear facilities (DOE 2011c).

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3.0 SITE-WIDE 2012 OPERATIONS DATA AND AFFECTED RESOURCES

Chapter 3 summarizes operational data at the site-wide level. It compares actual operating data to projected environmental effects for the parameters discussed in the 2008 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 CY 2012 totaled approximately 227 curies, less than 1 percent of the annual projected radiological air emissions of 34,000 curies[7] projected in the 2008 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 Facilities Key Facility totaled approximately 75 curies.

The total point source emissions from LANSCE totaled approximately 136 curies.

Non-point sources of radioactive air emissions are present at LANSCE, TA-54 Area G, and other locations around LANL. In most years, non-point emissions are generally small compared with stack emissions. For example, in CY 2012, non-point air emissions from LANSCE totaled approximately 10 curies. However, the highest single contributor to offsite dose was wind-blown resuspension of a legacy contamination site in Los Alamos Canyon. Measured air concentrations at the Radiological Air Sampling Network (AIRNET) Station 257 resulted in a dose of 0.49 millirem for CY 2012. Additional detail about radioactive air emissions is provided in LANL's 2012 annual compliance report to the EPA (LANL 2013a), submitted in June 2013, and in the 2012 Environmental Report (LANL 2013b).

For CY 2012, maximum offsite dose to the maximally exposed individual was 0.58 millirem. The dose was primarily due to non-point emissions sources as described above; measured stack emissions and potential emissions from minor sources contributed to the difference. The maximum offsite dose to the maximally exposed individual projected in the 2008 SWEIS is 7.8 millirem per year. The EPA radioactive air emissions limit for DOE facilities is 10 millirem per year. This dose is calculated to the theoretical maximum exposed individual who lives at the nearest offsite receptor location 24 hours per day, eating food grown at that same site. No actual person received a dose of this magnitude. In CY 2012, the population dose (collective dose to the general public within 50 miles of the site) for airborne releases was 0.27 person-rem.

7 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.

3.1.2 Non-Radiological Air Emissions

Emissions of Criteria Pollutants. The 2008 SWEIS projected that 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 during construction and DD&D activities, as well as during implementation of the Consent Order.

Criteria pollutants include nitrogen oxides (NOx), sulfur oxides (SOx), carbon monoxide (CO), and particulate matter (PM). Compared with industrial sources and power plants, LANL 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 shows, CY 2012 emissions of criteria pollutants were far below the estimated emissions projected in the 2008 SWEIS.

Table 3-1. Emissions of Criteria Pollutants as Reported on LANL's Annual Emissions Inventory*

Pollutants	Units	2008 SWEIS	2012 Operations
CO	Tons/year	58	12.5
NO_x	Tons/year	201	19.4
PM	Tons/year	11	2.5
SO_x	Tons/year	0.98	0.8

* Emissions included on the annual Emissions Inventory Report do not include insignificant sources (e.g., small, exempt boilers and heaters and exempt standby emergency generators).

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 (NMAC), Title 20, Chapter 2, Part 73 (20.2.73 NMAC). The report provides emission estimates for non-exempt boilers, the TA-03 Power Plant and Combustion Gas Turbine Generator (CGTG), and the TA-60 Asphalt Batch Plant. In addition, emissions from the data disintegrator, degreasers, and permitted beryllium machining operations are reported. For more information, refer to LANL's Emissions Inventory Report for 2012 (LANL 2013c. In CY 2012, more than half of the significant criteria pollutants (NOx and CO) originated from the TA-03 Power Plant.

In June 2012, LANL received a new Title V Operating Permit from the NMED. This permit included facility-wide emission limits and additional recordkeeping and reporting requirements. Table 3-2 summarizes the facility-wide emission limits in the Title V Operating Permit, the 2008 SWEIS emission projections, and the CY 2012 actual 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. In CY 2012, all emissions were below the levels projected in the 2008 SWEIS.

Table 3-2. 2012 Emissions for Criteria Pollutants as Reported on LANL's Title V Operating Permit Emissions Reports*

Pollutants	Units	2008 SWEIS	Title V Facility-Wide Emission Limits	2012 Emissions
CO	Tons/year	58	225	32.7
NO_x	Tons/year	201	245	49.3
PM	Tons/year	11	120	4.6
SO_x	Tons/year	0.98	150	0.8

* The Title V Operating Permit Emissions Report includes two categories of sources not required in the annual Emission Inventory Report: small, exempt boilers and heaters and exempt standby emergency generators.

Chemical Usage and Emissions. Chemical usage and calculated emissions for Key Facilities are reported using ChemLog, LANL's chemical management database. The quantities presented here represent all chemicals procured or brought onsite in CY 2012. This methodology is identical to that used by LANL for reporting under Section 3.1.2.3 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 2013c).

Air emissions presented in Appendix B are listed as emissions by Key Facility. Emission estimates (expressed as kilograms per year [kg/yr]) were performed in the same manner as those reported in previous SWEIS Yearbooks. First, usage of listed chemicals was calculated per Key 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 1 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 were reported.

Table 3-3 gives information on total VOCs and hazardous air pollutants (HAPs) estimated from research and development operations. Projections in the 2008 SWEIS for VOCs and HAPs were expressed as concentrations rather than emissions; therefore, direct comparisons cannot be made, and projections from the 2008 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. In CY 2012, the HAP and VOC emissions were well below Title V Operating Permit limits.

Table 3-3. Emissions of VOCs and HAPs from Chemical Use in Research and Development Activities

Pollutant	Emissions (Tons/year)		
	Title V Operating Permit Limits	CY 2011	CY 2012
HAPs	24	2.6	6.2
VOCs	200	6.4	8.8

Greenhouse Gas Emissions. In CY 2012, LANL reported to the EPA its greenhouse gas emissions from stationary combustion sources for the third time. The stationary combustion sources at LANL include permitted generators, emergency backup generators, the asphalt plant, the TA-03 Power Plant, the CGTG, and all boilers. In CY 2012, these stationary combustion sources emitted 59,726.1 metric tons of carbon dioxide equivalents (CO_2e). Methane has approximately 21 times the global warming potential of carbon dioxide (CO_2), and NOx has approximately 310 times the global warming potential of carbon dioxide. Methane and NOx are weighted respectively when calculating the mass of CO_2e emitted.

Table 3-4 shows the breakdown of emissions from LANL's stationary sources by gas type in metric tons per year (not CO_2e).

Table 3-4. Emissions from LANL's Stationary Sources

Gas Name	Units	2008 SWEIS	2012 Emissions
Methane	Metric Tons/year	*	1.12
NO_x	Metric Tons/year	*	0.11
CO_2	Metric Tons/year	*	59,667.9
Total Emissions	**Metric Tons CO_2e/year**	*****	**59,726.1**

* The 2008 SWEIS did not project greenhouse gas emissions.

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.

Outfall Reduction Program. LANL implements the Outfall Reduction Program to reduce the total number of outfalls discharging to the environment. From January 1, 2012, through December 31, 2012, LANL had 11 wastewater outfalls (10 industrial outfalls and one sanitary outfall) that were regulated under NPDES Permit No. NM0028355. Based on discharge monitoring reports prepared by LANL's Water Quality and RCRA Group, nine permitted outfalls had recorded flows in CY 2012, totaling an estimated 153.8 million gallons. This is approximately 10.3 million gallons less than the CY 2011 total of 164.1 million gallons. The CY 2012 total volume of discharge is well below the maximum flow of 279.5 million gallons projected in the 2008 SWEIS. Treated wastewater released from LANL's NPDES outfalls rarely leaves the site. Details on NPDES compliance and noncompliance during CY 2012 are provided in the 2012 Environmental Report (LANL 2013b).

CY 2012 discharges are summarized by watershed and compared with watershed totals projected in the 2008 SWEIS in Table 3-5.

Table 3-6 compares NPDES discharges by Key and Non-Key Facilities. In CY 2012, the bulk of the discharges came from Non-Key Facilities. Key Facilities accounted for approximately 40.6 million gallons of the total. LANSCE discharged approximately 17.6 million gallons in CY 2012, about 6.1 million gallons less than CY 2011, accounting for about 43.3 percent of the total discharge from all Key Facilities.

Table 3-5. NPDES Discharges by Watershed (million gallons)

Watershed	No. of Outfalls 2008 SWEIS	No. of Permitted Outfalls CY 2012	Discharge 2008 SWEIS	Discharge CY 2012
Guaje	0	0	0	0
Los Alamos	5	1	45.6	16.9
Mortandad	5	4	44.3	1.7
Pajarito	0	0	0	0
Pueblo	0	0	0	0
Sandia	6[a]	5	187.3	135.2
Water[b]	5	1	2.26	0
Totals	21	11	279.5	153.8

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 05A055 discharge to Cañon de Valle, a tributary to Water Canyon.

Table 3-6. NPDES Discharges by Facility (million gallons)

Key Facility	No. of Outfalls 2008 SWEIS	No. of Permitted Outfalls CY 2012	Discharge 2008 SWEIS	Discharge CY 2012
Plutonium Complex	1	1	4.1	1.34
Tritium Facility	2	None	17.4	0
CMR Building	1	None	1.9	0
Sigma Complex	2	1	5.8	0.036
High Explosives Processing	3	1	0.06	0
High Explosives Testing	2	None	2.2	0
LANSCE	4	2	28.2[a]	17.55
Metropolis Center	1	1	13.6	21.63
Biosciences	None	None	0	0
Radiochemistry Facility	None	None	0	0
RLWTF	1	1	4.0	0
Pajarito Site	None	None	0	0
MSL	None	None	0	0
TFF	None	None	0	0
Machine Shops	None	None	0	0
Waste Management Operations	None	None	0	0
Subtotal, Key Facilities	17	7	78.6	40.56
Non-Key Facilities	4	4	200.9	113.24[b]
Totals	**21[c]**	**11**	**279.5**	**153.8**

a In previous Yearbooks, this number was reported inaccurately as 28.2. The total discharge projected for all LANSCE outfalls into both Los Alamos and Sandia Canyons is 29.5 million gallons, which is the combined total of 28.2 and 1.3 million gallons, respectively.

b Mainly due to discharge from SWWS and the TA-03 Power Plant.

c In previous Yearbooks, the number 15 was reported due to the fact that as of August 1, 2007, there were only 15 permitted outfalls. However, the 2008 SWEIS projected 21 outfalls under the No Action Alternative. Therefore, this number has been updated to accurately reflect that projection.

LANL has three principal wastewater treatment facilities: the SWWS Plant at TA-46 (a Non-Key Facility), the RLWTF at TA-50, and the HEWTF at TA-16 (both Key Facilities). The RLWTF (Outfall 051) discharges into Mortandad Canyon. The HEWTF and RLWTF did not discharge any wastewater in CY 2012.

As previously stated, discharges from the Non-Key Facilities made up the majority of the total CY 2012 discharge from LANL. This total, 113.2 million gallons, was about 87.7 million gallons less than the 200.9 million gallons total discharge from Non-Key Facilities projected in the 2008 SWEIS. Two Non-Key Facilities, the TA-46 SWWS and the TA-03 Power Plant (both of which discharge through Outfall 001), account for about 86 percent of the total discharge from Non-Key Facilities and about 64 percent of all water discharged by LANL in CY 2012.

Construction General Permit. The NPDES Construction General Permit (CGP) Program regulates storm water discharges from construction activities disturbing one or more acres, including those construction activities that are part of a larger common plan of development collectively disturbing one or more acres. Parties subject to the CGP include both LANL and the general contractor performing the construction work.

LANL and the general contractor apply individually for NPDES CGP coverage and are co-permittees at most construction sites. Compliance with the NPDES CGP includes developing and implementing a Storm Water Pollution Prevention Plan (SWPPP) before soil disturbance can begin and conducting site inspections once soil disturbance has commenced. A SWPPP describes the project activities, site conditions, best management practices (BMPs; erosion control measures), and permanent control measures required for reducing pollution in storm water discharges and protecting cultural and biological resources, including threatened and endangered species and critical habitat. Compliance with the NPDES CGP is demonstrated through periodic inspections that document the condition of the site and also identify corrective actions required to keep pollutants from moving off the construction site. Data collected from these inspections are tabulated weekly and monthly in the form of Site Inspection Compliance Reports.

During CY 2012, the Laboratory implemented and maintained 42 construction site SWPPPs and addendums to SWPPPs and performed 749 storm water inspections associated with construction sites. The Laboratory uses a geographic information system to manage project information and generate status reports that facilitate reporting under the Director’s Portfolio Reviews. The overall NPDES CGP inspection compliance record in CY 2012 was 94.9 percent (711 of the 749 inspections).

The 2012 CGP became effective on February 16, 2012. Existing projects under the previous 2008 CGP were required to have SWPPPs prepared to meet 2012 permit requirements and submit NOIs to discharge under the new 2012 CGP by May 16, 2012. Some of the new requirements in this permit include the following:

- Increased waiting time to begin construction after the NOI to discharge is submitted (from 7 to 14 days),
- Increase in inspection frequency (from 14 to 7 days),
- Inspections required after a rain event of 0.25 inches or greater,
- Shorter time to complete corrective actions, and
- More stringent inspection, corrective action, and follow-up reporting.

Multi-Sector General Permit. The NPDES Multi-Sector General Permit (MSGP) Program regulates storm water discharges from identified industrial activities and their associated facilities. These activities include metal fabrication; primary metals; 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 the EPA on September 29, 2008. In December 2008, LANS submitted to the EPA an NOI to discharge for coverage under the MSGP. Authorization to discharge under the current MSGP expires on September 29, 2013. At that time, EPA will either publish a new permit or administratively continue the existing permit. The intent of the 2008 MSGP is to authorize storm water discharges from permitted industrial facilities and minimize the discharge of potential pollutants.

The 2008 MSGP requires the development and implementation of site-specific SWPPPs, which must include identification of potential pollutants and the implementation of BMPs. The permit also requires monitoring of storm water discharges from permitted sites for specified constituents, personnel training, site inspections, and implementation of corrective actions.

Compliance with the 2008 MSGP for LANL permitted facilities in CY 2012 was achieved primarily by implementing the following:

- Identifying potential pollutants and activities that may impact surface water quality and identifying and providing structural and non-structural controls (BMPs) to limit the impact of those pollutants.
- Developing and implementing facility-specific SWPPPs.
- Performing routine facility inspections and conducting required corrective actions.
- Performing required benchmark, impaired waters, and effluent limitations storm water monitoring of specific analytical parameters for the industrial activities listed under the permit.

LANL implemented and maintained 11 SWPPPs covering 13 facilities in CY 2012.Detailed results of CY 2012 MSGP monitoring are summarized in the 2012 Environmental Report (LANL 2013b). LANL has completed four of the five years of required storm water monitoring in accordance with the 2008 MSGP. Since LANS started monitoring under the 2008 MSGP in April 2009, the analytical monitoring requirements have been completed for most of the permitted facilities. The permit allows discontinuation of monitoring under the following circumstances:

- Constituents are found not to be present,
- Constituents/parameters are found to be present below permit defined levels, or
- Changes to impaired water constituents (i.e., no longer requiring specific constituent monitoring for impaired water).

The Individual Permit. The NPDES Individual Permit (IP) Program regulates storm water discharges from 405 specified SWMUs and AOCs, referred to in the permit as “Sites.” The Sites listed in the IP are associated with historical LANL operations dating back to the Manhattan Project Era of the 1940s. Potential contaminants of concern within these sites include metals, organics, high explosives, and radionuclides from historic industrial activities. The IP also establishes a schedule for implementation of control measures, monitoring, specified corrective actions, and reporting for the regulated sites. Storm water discharges are sampled at 250 site monitoring areas (SMAs) for potential pollutant concentrations above applicable target action levels.

On February 13, 2009, EPA Region 6 issued NPDES IP No. NM0030759 to co-permittees, LANS and DOE. Immediately following issuance of the IP by the EPA, the IP was publicly appealed. Following permit modification negotiations in 2009, the EPA issued a Final Permit Modification Decision in September 2010. The effective date for this new modified IP was November 1, 2010. Authorization to discharge under the current IP expires on March 31, 2014.

The IP requires that the permittees implement erosion and sediment control, manage run-on and runoff from sites, conduct employee training, eliminate unauthorized discharges, and establish other specified controls, in coordination with a comprehensive, coordinated monitoring program, and corrective actions if necessary to minimize pollutants in the permittees' storm water discharges.

During CY 2012, Laboratory compliance with the IP at permitted sites was achieved by implementing the following activities and controls:

- Completing Site Discharge Pollution Prevention Plan updates
    - ❖ Volume 1 – Los Alamos/Pueblo Watershed, Revision 1
    - ❖ Volume 2 – Sandia/Mortandad Watershed, Revision 1
    - ❖ Volume 3 – Pajarito Watershed, Revision 1
    - ❖ Volume 4 – Water/Cañon de Valle Watershed, Revision 1
    - ❖ Volume 5 – Ancho/Chaquehui Watershed, Revision 1
- Performing website updates and public notifications
- Holding three public and two technical meetings
- Conducting 1,017 permit-required inspections and 1,963 sampling equipment inspections
- Collecting baseline confirmation monitoring samples at 15 SMAs and corrective action enhanced control confirmation monitoring samples at five SMAs
- No further monitoring at three SMAs, based on no exceedance of target action levels from baseline monitoring sample results
- Replacing 89 retired control measures
- Installing 50 additional control measures at 21 SMAs
- Installing 151 enhanced control measures at 42 SMAs associated with 67 Sites
- Completing corrective actions at 12 sites
- Initiating corrective action based on target action level exceedances at 63 SMAs associated with 105 sites

3.3 Solid Radioactive and Chemical Wastes

Due to 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 LANL'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 operations capture and track data for waste streams, regardless of their points of generation or disposal. These data include information on waste generating processes, waste quantities, 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 under the Consent Order 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, the EP Directorate performs cleanup operations of sites and facilities formerly involved in weapons research and development. The EP Directorate includes the operations and responsibilities of the previous ER Project. Table 3-7 summarizes waste types and generation for LANL in CY 2012.

Table 3-7. LANL Waste Types and Generation

Waste Type	Units	2008 SWEIS[a]	CY 2012
Chemical	10^3 kg/yr	3,516.4	1,487.48
LLW	m^3/yr	105,647	3,723.46
MLLW	m^3/yr	14,106	40.87
TRU	m^3/yr	1,736	85.09
Mixed TRU	m^3/yr	[b]	41.89

a Waste projections for Key and Non-Key Facilities were based on the 2008 SWEIS, Chapter 5 (page 5-139), Table 5-39, Radioactive and Chemical Waste from routine operations, No Action Alternative. EP waste projections were based on 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 wastes into one waste category since they are both managed for disposal at WIPP.

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 potential release sites and MDAs from FY 2007 through FY 2016. Waste volumes associated with the 2008 SWEIS

Removal Option are presented in the 2008 SWEIS, Appendix I, Table I-70. The FY waste volume projection from Table I-70 is used as the projection for EP waste types for the SWEIS Yearbooks.

Waste quantities from CY 2012 LANL operations were significantly below the 2008 SWEIS projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities (Table 3-7).

3.3.1 Chemical Wastes

The 2008 SWEIS projected chemical waste to decline for normal operations at LANL; however, significant quantities of chemical waste are expected due to environmental remediation activities. Chemical waste includes not only construction and demolition debris, but also all other non-radioactive wastes passing through the SRCW Key Facility. In addition, construction and demolition debris is a component of those chemical wastes that in most cases are sent directly to offsite disposal facilities. Construction and demolition debris consists primarily of asbestos and construction debris from 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 for CY 2012 are tracked in Section 3.11.2 of this Yearbook.

In CY 2012, chemical waste volumes were well below volumes projected in the 2008 SWEIS (Table 3-8). Chemical waste generation for LANL in CY 2012 was about 42 percent of the chemical waste volume projected in the 2008 SWEIS. EP chemical waste generation accounted for about 64 percent of the total volume of chemical waste generated. Table 3-8 summarizes chemical waste generation during CY 2012.

Table 3-8. Chemical Waste Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2012
Key Facilities	10^3 kg/yr	596	111.65
Non-Key Facilities	10^3 kg/yr	650	419.15
EP	10^3 kg/yr	2,270.4[a,b]	956.68
LANL	10^3 kg/yr	3,516.4	1,487.48

a Used conversion 1,100 kg/1 m^3. 1,100 kg was derived from adding all of EP waste for CY 2008.

b Projected annual waste generation for FY 2012 from Implementation of the Consent Order, Removal Option, 2008 SWEIS (Table I-70).

3.3.2 Low-Level Radioactive Wastes

The 2008 SWEIS projected that LLW generation would increase from waste generated from the removal of MDAs, and LLW would exceed the TA-54 Area G capacity, which would require offsite disposal. In CY 2012, LLW volumes were well below volumes projected in the 2008 SWEIS (Table 3-9). LLW generation in CY 2012 for LANL was about 4 percent of volumes projected in the 2008 SWEIS. EP LLW accounted for about 47 percent of the total LLW volumes generated. Table 3-9 summarizes LLW generation during CY 2012.

Table 3-9. LLW Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2012
Key Facilities	m^3/yr	7,646	1,493.60
Non-Key Facilities	m^3/yr	1,529	37.27
EP	m^3/yr	96,472[a,b]	1,745.14
LANL	m^3/yr	105,647	3,723.46

a Includes low-level, alpha low-level, and remote-handled LLW.

b Projected annual waste generation for FY 2012 from Implementation of the Consent Order, Removal Option, 2008 SWEIS (Table I-70).

3.3.3 Mixed Low-Level Radioactive Wastes

The 2008 SWEIS projected MLLW generation to increase yet remain less than 2 percent of the projected quantity of LLW generation. MLLW generation in CY 2012 for LANL was less than 1 percent of volumes projected in the 2008 SWEIS. EP MLLW accounted for about one percent of the total MLLW volumes generated. Table 3-10 summarizes MLLW generation during CY 2012.

Table 3-10. MLLW Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2012
Key Facilities	m^3/yr	68	40.24[a]
Non-Key Facilities	m^3/yr	31	0.02
EP	m^3/yr	10,336[b,c]	0.61
LANL	m^3/yr	10,435	40.87

a Note: TRU waste that was reclassified as MLLW at SRCW is not counted here as newly generated but is tracked in Appendix A, Table A-27, under the capability of Waste Characterization, Packaging, and Labeling.

b Includes mixed low-level, mixed alpha low-level, and mixed remote-handled low-level radioactive waste.

c Projected annual waste generation for FY 2012 from Implementation of the Consent Order, Removal Option, 2008 SWEIS (Table I-70).

3.3.4 Transuranic and Mixed Transuranic Waste

The 2008 SWEIS combines TRU and mixed TRU waste into one waste category since they are both managed for disposal at WIPP. Therefore, in this Yearbook, TRU and mixed TRU waste generation are analyzed together.

In CY 2011, the Las Conchas Fire came within 3.5 miles of TA-54, Area G, the Laboratory's storage facility for TRU waste. Following the fire, the NMED and DOE/NNSA formed a framework agreement that realigned environmental priorities at the Laboratory based on risk. As a result of the framework agreement, LANL agreed to ship 3,706 cubic meters of combustible and dispersible TRU waste stored aboveground at Area G to WIPP for permanent disposal by June 30, 2014.

In January 2012, workers at TA-54 began organizing waste containers differently in an effort to help expedite waste processing and shipment. Waste containers with similar waste types are staged together to facilitate efficient remediation, characterization, and disposition. In the past, waste with similar characteristics often was stored in different locations, so it took extra time to retrieve it for processing.

In June 2012, LANL celebrated the 1,000th TRU waste shipment to WIPP. To commemorate this occasion, an event at TA-54 was attended by the New Mexico Governor Susana Martinez, San Ildefonso Governor Terry Aguilar, and other federal, state, and county officials.

In CY 2012, TRU waste was generated almost exclusively in three Key Facilities (the Plutonium Facility Complex, the CMR Building, and the SRCW Facilities), as well as the Non-Key Facilities. Mixed TRU wastes were generated at two Key Facilities: the Plutonium Facility Complex and the CMR Building. TRU and Mixed TRU waste generation in CY 2012 for LANL was about eleven percent of volumes projected in the 2008 SWEIS. No EP TRU or Mixed TRU waste was generated. Table 3-11 summarizes TRU and Mixed TRU waste generation during CY 2012.

Table 3-11. TRU and Mixed TRU Waste Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2012 TRU and Mixed TRU	CY 2012 TRU	CY 2012 Mixed TRU
Key Facilities	m^3/yr	413[a]	119.44	77.55	41.89
Non-Key Facilities	m^3/yr	23[a]	7.54	7.54	0
EP	m^3/yr	704[,ab]	0	0	0
LANL	m^3/yr	1,140[a]	126.98	85.09	41.89

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 2012 from Implementation of the Consent Order, Removal Option, 2008 SWEIS (Table I-70).

3.3.5 Sanitary Waste

The 2008 SWEIS projected that the Los Alamos County landfill would not reach capacity until 2014; however, during CY 2012 the landfill stopped accepting waste for burial and became a transfer station. During CY 2012, LANL continued to implement pollution prevention, waste minimization, and recycling programs which helped reduce the amount of waste disposed of in sanitary landfills.

LANL's total sanitary waste generation can be classified as either from construction and demolition (C&D) activities or from more routine office and laboratory activities (Non-C&D). LANL sanitary waste can also be categorized as recyclable and non-recyclable. Table 3-12 shows LANL sanitary waste generation for CY 2012. The recycle rate of total sanitary waste at LANL for CY 2012 was 81 percent.

Table 3-12. LANL Sanitary Waste Generation in CY 2012 (metric tons)

	Non-C&D	C&D	Total
Recycled	1,294	6,950	8,244
Landfill disposal	1,400	481	1,881
Total	**2,694**	**7,431**	**10,125**

Non-C &D sanitary waste consists mostly of food, food-contaminated waste, plastic, glass, Styrofoam packing material, and similar items. Paper, cardboard, metals, plastic bottles, and toner cartridges can all be recycled from the routine waste stream. Construction of new facilities and demolition of old facilities are expected to continue to produce substantial quantities of C&D waste including metal, wood, concrete, and asphalt. Recycling programs for concrete, asphalt, and brush have been established, and as a result, LANL is recycling more C&D waste and decreasing landfill disposal. A clean fill database at LANL, implemented in CY 2012, allows excess clean fill to be requested and reused as needed. This innovation has avoided and will continue to avoid the disposal and purchase of thousands of cubic yards of clean fill.

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, a partnership agreement with Los Alamos County and LANL established in 1985. DOE/NNSA owns and distributes most utility services to LANL facilities, and Los Alamos County provides these services to the communities of White Rock and Los Alamos.

Utility infrastructure demands for electricity, natural gas, and water are projected to increase for LANL through 2021, 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, New Mexico, to Los Alamos. At the end of 2009, the CGTG was installed and operational. The CGTG serves as one of LANL’s onsite energy sources by producing electricity from the combustion of fuel. The CGTG is capable of producing 27 MW 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.

Table 3-13 presents LANL’s CY 2012 gas usage. Approximately 85 percent of the gas used by LANL in 2012 was for heat production. 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 TA-03 Power Plant operators in turbine operation.

Total gas consumption for CY 2012 was less than projected in the 2008 SWEIS.

Table 3-13. Gas Consumption (decatherms[a]) at LANL in CY 2012

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	Not projected	Not projected	Not projected
CY 2012	1,097,479	164,490	932,989	303,458[c]

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

b klb: Thousands of pounds.

c TA-03 steam production has two components: that used for electricity production (3,215 klb in CY 2012) and that used for heat (263,790 klb in CY 2012).

3.4.2 Electrical

LANL is supplied with electricity through the Los Alamos Power Pool. 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 the import capability of Power Pool resources. Import capacity is now limited only by the physical capability (thermal rating) of the transmission lines, which is 115 MW from a number of hydroelectric, coal, and natural gas power generators throughout the western US.

Onsite electricity generation capability for the Power Pool is limited by the existing TA-03 Power Plant (the power plant generates both steam and power), which is capable of producing up to 10 MW of electricity with the steam-driven turbine generators #1 and #2 and 27 MW from the CGTG for a total of 37 MW shared by the Power Pool under contractual arrangement. The #3 steam turbine at the Co-generation Complex is a 10-MW unit, but it is out of service due to a condenser failure, and costs to repair it are prohibitive at this time. Currently, there are no plans to upgrade the existing equipment.

In an effort to beneficially use the LANL TA-61 “brownfield” landfill site, Los Alamos County is proposing to lease and use approximately 15 of the 46 acres of land it operated as a landfill for the installation of up to 2 MW of PV to generate electric power. The system will be connected to a 7-MWh battery storage system, which in turn will be connected to the Los Alamos Power Pool infrastructure. Construction started in December 2011 and was completed at the end of summer 2012. The other 1.0 to 1.5 MW will be installed through a Los Alamos County-issued power purchase agreement. The entire system is expected to be in place and operating by the summer of 2013.

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.

The current transmission line configuration is not vulnerable to a single failure taking out both incoming transmission lines due to re-configuration of the lines when the Southern Technical Area Station was installed. However, the transmission import capacity of 115 megavolt ampere (MVA) is expected to be exceeded in CY 2018. Re-conductoring of the Norton Line is planned prior to this date and will increase the import capacity to 131 MVA, allowing loads to be fully served by offsite generation until CY 2021. Forecasts show LANL will need to work with PNM to re-conductor the Reeves Line in order to increase import capacity above 131 MVA as necessary. Onsite generation and seasonal transmission line rating increases can be used to supplement import capacity to meet LANL power needs if necessary while LANL pursues increases in transmission import capability.

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 April 2011, the new 3-MW turbine at Los Alamos County's Abiquiu hydropower facility came online. A low-flow turbine allows the facility to keep generating power even when flow levels from Abiquiu dam are below the capacity of the two existing turbines. This low-flow turbine would increase renewable energy generation capacity by 22 percent at the hydropower facility—from 13.8 MW to 16.8 MW. The new turbine will produce enough energy to power 1,100 homes annually.

In the 2008 SWEIS No Action Alternative, LANL's 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 MW-hours. In addition, the electricity peak load under the No Action Alternative is 91,200 kilowatts.

Some 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 additional processors and increase functional capability 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 3-14 under the 2008 SWEIS represents 91,200 kilowatts for LANL plus 18,000 kilowatts operating requirements for the Metropolis Center.

Table 3-15 shows annual use of electricity for CY 2012. LANL's electricity use remains below projections in the 2008 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 3-14. Electricity Peak Coincidental Demand in CY 2012[a]

Category	LANL Base	LANSCE	Metropolis Center	LANL Total	County Total	Pool Total
2008 SWEIS	57,200	34,000	18,000[b]	103,200[c]	19,800	111,000
CY 2012	42,967	17,820	9,830	70,617	16,296	86,913

a All figures in kilowatts.

b Expanded Operations Alternative limit for the Metropolis Center.

c 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.

Table 3-15. Electricity Consumption in CY 2012[a]

Category	LANL Base	LANSCE	Metropolis Center	LANL Total	County Total	Pool Total
2008 SWEIS	356,000	139,000	131,400[b]	582,400[c]	150,000	645,000
CY 2012	267,166	96,228	86,540	449,933	130,094	580,027

a All figures in MW-hours.

b Expanded Operations Alternative limit for the Metropolis Center.

c This number represents 495,000 MW-hours for LANL under the No Action Alternative plus 87,400 MW-hours (131,400 MW-hours Expanded Operations limit – 44,000 MW-hours No Action Alternative) to expand the capabilities and operational levels of the Metropolis Center as stated in the SWEIS ROD dated September 2008.

Energy Efficiency. Preliminary results of an energy efficiency project at the Laboratory were collected in CY 2012, which showed a big reduction in energy use and associated cost.

In CY 2011, the Laboratory implemented an energy savings performance contract to upgrade and automate heating and air conditioning and replace energy-inefficient light bulbs in more than 20 buildings. In CY 2012, the effort had resulted in an average energy reduction of 10 to 20 percent each month. Energy conservation measures, including building automation system upgrades and night setbacks, were implemented in select buildings across LANL.

Based on NNSA/DOE Sustainability Goals, LANL is working toward an energy-reduction goal of 30 percent by 2015 from a 2003 baseline. In CY 2012, the Laboratory had reduced energy use by 8 percent.

3.4.3 Water

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 continues 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 Trans-mountain Diversion water as a means of maintaining those water rights. Los Alamos County completed a preliminary engineering study and was negotiating a contract during 2012, which would provide more stability, before further investment.

The Los Alamos County bills LANL for water and all water use records maintained by LANL are based on those billings. The distribution system used to supply water to LANL facilities 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.

LANL has installed water meters on high-usage facilities and has a Supervisory Control and Data Acquisition/Equipment Surveillance System on the water 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 more than 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 additional processors and MDA remediation were two of the few elements of the Expanded Operations Alternative that were approved to go forward. Expansion of the Metropolis Center to support projected future supercomputing would impact water usage at LANL. The 2008 SWEIS projected that expanding to a 15-MW maximum operating platform would potentially increase water usage at the Metropolis Center 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 SERF in CY 2012 are expected to lead to increased use of recycled effluent in the cooling towers in CY 2013, leading to a decrease in Metropolis Center water use. Water consumption at the Metropolis Center was 43.8 million gallons in CY 2012.

Table 3-16 shows water consumption in million gallons for CY 2012. Under the 2008 RODs, water use at LANL is projected to be 380 million gallons from the No Action Alternative plus elements of the Expanded Operations Alternative. In CY 2012, LANL consumed approximately 445 million gallons of water. Total use by LANL in 2012 was about 27 million gallons more than the 2008 SWEIS projection of 418 million gallons. The calculated NPDES discharge of 153.8 million gallons (see Table 3-6) in CY 2012 was about 35 percent of the total LANL usage of 445 million gallons.

Table 3-16. Water Consumption (million gallons) in CY 2012

Category	LANL Total	Metropolis Center	LANSCE	Los Alamos County	Total
2008 SWEIS ROD	417.8[a]	51[b]	[c]	1,241	1,621
CY 2012	444.9	43.8[d]	39.9	Not Available[e]	Not Available[e]

a This number represents 380 million gallons for LANL under the No Action Alternative plus 32 million gallons (51 million gallons Expanded Operations limit – 19 million gallons 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.

b Cooling water needed in support of Metropolis Center expansion to support supercomputing. Improvements to the SERF will lead to increased use of recycled effluent in the cooling towers.

c Water consumption at LANSCE was not projected in the 2008 SWEIS.

d Metropolis Center water consumption was metered for the first time in CY 2011.

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

3.5 Worker Safety

The LANL Safety Policy is as follows:

> *We conduct our work safely and responsibly to achieve our mission. We ensure a safe and healthful work environment for workers, contractors, visitors, and other on-site personnel. We protect the health, safety, and welfare of the general public. We do not compromise safety for personal, programmatic, or operational reasons.*

An Institutional Worker Safety and Security Team (IWSST) has been established at LANL with the mission to improve safety and security through direct involvement of all people performing work. The IWSST represents all workers and reports directly to the Laboratory Director. Membership on the IWSST includes a representative and alternate from each Directorate within the Laboratory and from each of the primary contractors. Specific objectives of the IWSST include the following:

- Advocate safety and security as core values at the Laboratory.
- Promote communication of safety and security concerns and actions across organizations.
- Engage all people conducting business on behalf of the Laboratory in personal and corporate safety and security.
- Encourage ideas and actions that reduce risk and occurrence of incidents and accidents.
- Serve as points of contact for any worker at the Laboratory with a safety or security concern or idea.
- Track and address individual safety and security concerns raised by the worker, institutional safety, or security data.
- Evaluate and recommend improvements for the effectiveness of safety and security activities.

- Achieve a cooperative attitude for a safe and secure environment.
- Celebrate successes in demonstrating safe and secure behavior among workers at the Laboratory.
- Review concerns of workers over implementation of proposed policies concerning safety and security.
- Assist in the development of institutional goals, objectives, and measures with regard to safety and security.

Worker Safety and Security Teams (WSSTs) reside within the line organizations and act as conduits for sharing information and communicating decisions. There are approximately 100 directorate, division, and group-level WSSTs. The purpose of the WSSTs is to achieve employee ownership of personal and institutional safety. To achieve this goal, the WSST provides input and receives feedback on safety and health issues. Employee involvement helps drive behaviors that support the Integrated Safety Management System and the development of a world-class safety program that moves toward zero accidents and injuries.

In 2010, LANL was accepted into the DOE Voluntary Protection Program at “Merit Status.” LANL has maintained Merit Status by demonstrating continued improvements during a subsequent DOE assessment in 2011. LANL received 10 “Opportunities for Improvements” as a result of the 2011 assessment. Many improvements have been made in work control, expansion of behavior-based safety, and the completion of Human Performance Improvement training by all LANL managers and approximately 1,500 employees. The next DOE Voluntary Protection Program assessment is scheduled for 2013.

3.5.1 Injuries and Illnesses

Analysis of LANL’s injury and illness performance shows an improvement of 39 percent in CY 2012 compared with CY 2011 with respect to the Days Away, Restricted or Transferred (DART) rate and a reduction of 27 percent in the Total Recordable Case (TRC) rate.

For CY 2012, there were 138 recordable injury cases with 33 cases that resulted in DART duties. Table 3-17 summarizes CY 2012 occupational injury and illness rates.

Table 3-17. TRC and DART Rates at LANL

LANL	Total 2012 Cases	CY 2011	CY 2012	Percent Change
TRC Rate	138	1.92	1.40	27% Reduction
DART Rate	33	0.56	0.34	39% Reduction

3.5.2 Ionizing Radiation and Worker Exposures

Occupational radiation exposures for workers at LANL during CY 2012 are summarized in Table 3-18. The collective total effective dose (TED) for the LANL workforce during CY 2012 was 140.1 person-rem, an increase of 10 percent from CY 2011 to CY 2012. Data in Table 3-19 show 25 fewer radiation workers received a measurable dose in CY 2012 compared with CY 2011. With fewer workers and increased collective dose, the average non-zero dose per worker was higher by 11 mrem. Of the 140.1 person-rem collective TED reported for CY 2012, 0.259 person-rem was from internal exposures to radioactive materials, consisting of small intakes from routine tritium operations, uranium, and americium. 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.

Table 3-18. Radiological Exposure to LANL Workers*

Parameter	Units	2008 SWEIS	CY 2012
Collective TED (external + internal)	person-rem	280	140.1
Number of workers with measurable dose	number	2,018	1,435
Average non-zero dose: • external + internal radiation exposure	millirem	139	98

* Data in this table are current as of March 18, 2013.

The highest individual doses in CY 2012 indicate an overall decrease of typical doses received since CY 2000. Senior management and the Institutional Radiation Safety Committee have set expectations and put in place mechanisms to drive individual and collective doses as low as reasonably achievable (ALARA) through performance goals and other ALARA measures. For whole body doses, no worker exceeded DOE's 5-rem/year dose limit, and no worker exceeded the 2-rem/year LANL administrative control level established for external exposures. Table 3-19 summarizes the highest individual dose data for CYs 2008–2012.

Table 3-19. Highest Individual Annual Doses (TED) to LANL Workers (rem)

CY 2008	CY 2009	CY 2010	CY 2011	CY 2012
2.106	1.142	1.198	1.039	1.401
1.198	0.933	0.940	1.004	1.234
1.132	0.932	0.859	0.993	1.195
1.096	0.885	0.856	0.983	1.181
0.952	0.877	0.833	0.910	1.123

Comparison with the 2008 SWEIS Baseline. The collective TED for CY 2012 was 50 percent of the 280 person-rem per year projection in the 2008 SWEIS.

Work and Workload: Changes in workload and types of work at nuclear facilities, particularly the TA-55 Plutonium Facility Complex, 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 was projected to increase because of the dose associated with achieving a production level of 20 pits per year at TA-55. In addition, collective worker dose and annual average worker dose were projected to increase due to the implementation of the actions related to the Consent Order, but the long-term effect of MDA cleanup and closure of waste management facilities at TA-54 would result in a reduced worker dose.

TA-55 operations accounted for about half of the occupational dose at LANL in CY 2012. Doses in this Key Facility were higher in CY 2012 than CY 2011 as radiological work increased. Besides occupational exposure from both weapons manufacturing and plutonium-238 work, 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 CY 2012.

In addition to TA-55 operations, significant portions of the LANL collective dose were accrued by workers performing maintenance 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 and unanticipated low-level intakes of uranium and americium. The highest reported internal dose (100 mrem committed effective dose) resulted from a uranium airborne radioactivity exposure.

ALARA Program: LANL occupational exposure continues to be deliberately managed under an aggressive ALARA Program within the LANL Radiation Protection Program, with an emphasis on dose optimization, ALARA goals, performance measurement, line management engagement, and oversight by the Institutional Radiation Safety Committee and LANL senior management. Based on established ALARA goals, dose accrued to date, and expected workload, CY 2013 collective doses are again expected to be on the order of 150 rem. Improvements in maintaining radiation exposures ALARA, such as improved dose tracking during work activities, additional shielding, better radiological safety designs, worker involvement, and innovative solutions should result in continually lower LANL radiological worker doses relative to the work conducted.

Collective TEDs for Key Facilities. In general, extracting collective TEDs by Key Facility or TA is difficult because 1) these data are collected at the group level, 2) groups are often tenants in multiple facilities, and 3) 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 2012 was approximately half of the LANL collective TED. As discussed previously, maintenance activities at TA-53 and solid waste operations at TA-50 and TA-54 also contributed substantially 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.

In February 2012, LANL announced it would seek a voluntary reduction of between 400 and 800 employees from its regular permanent workforce. The program was aimed at reducing the possibility of involuntary layoffs and to better position LANL to execute its missions with a lower federal budget. In March 2012, LANL announced that 557 employees would leave as part of the voluntary separation program.

The LANL-affiliated workforce continues to include LANS employees and subcontractors. Under the 2008 SWEIS No Action Alternative, the 2005 levels of employment were assumed to remain steady at 13,504 employees. As shown in Table 3-20, the total number of employees in CY 2012 was 30 percent lower than 2008 SWEIS projections. The 10,366 total employees at the end of CY 2012 show a 13 percent reduction from the 11,672 employees reported in the 2011 SWEIS Yearbook.

Table 3-20. LANL-Affiliated Workforce

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 2012	9,553	382	46	0	385	10,366

a Securing Our Country (SOC) (formerly Protection Technology-Los Alamos)

b Total number of employees was presented in the 2008 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 KBR/Shaw/LATA (KSL) employees converted to LANS under “CRAFT” Type of Appointment effective 12/2008.

LANL has 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). No updated data for 2012 has been published.

The residential distribution of the LANL-affiliated workforce reflects the housing market dynamics of three counties. As seen in Table 3-21, 87 percent of LANS employees reside in Los Alamos, Rio Arriba, and Santa Fe counties.

Table 3-21. County of Residence for LANL-Affiliated Workforce[a]

Category	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 2012	4,474	1,695	2,103	962	9,234	319	9,553

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. From 1999 through 2012, the land resources (i.e., undeveloped and developed lands) available for use at LANL have been reduced. Three tracts of land were conveyed or transferred in CY 2012. These tracts were A-8b, A-10, and B-3. Table 3-22 provides location and size information. Since CY 2001, the following acres of land were transferred under Public Law 105-119[8] (42 USC 2391), which

8 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 to be held in trust for the Pueblo de 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 Public Law is now set to expire in September 2022.

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.

were analyzed in the Land Conveyance and Transfer EIS (DOE 1999c) and managed by LANL's Environmental Protection Division's Land Conveyance and Transfer Project Office:

- ~2,100 acres of land have been transferred to the Bureau of Indian Affairs to be held in trust for the Pueblo of San Ildefonso and
- ~350 acres of land have been conveyed to Los Alamos County and the Los Alamos Public School Board.

In January 2011, Public Law 105-119 was extended to September 30, 2022, when President Obama signed the National Defense Authorization Act. Table 3-22 provides a summary of the land parcels remaining to potentially be transferred or conveyed. It also includes the land parcels that were transferred in CY 2012, marked with an asterisk.

Table 3-22. Potential Land Transfer/Conveyance Tracts Analyzed in the Land Conveyance and Transfer Environmental Impact Statement

Land Tract	Acreage	Location
TA-21/A-16	250	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.
Rendija Canyon/A-14a, c, d	890	North of and below Los Alamos town site's Barranca Mesa residential subdivision.
TA-74 South/A-18a	520	Southern reach of Pueblo Canyon between the White Rock Y and Airport.
B-3*	3	Pueblo Canyon, situated within a preservation easement
DP Road South/A-8b*	3	DP Road Site, situated west of MDA B on south side of DP Road
Airport-3 South 2/A-5-2	44	The Airport Site, situated north of TA-21 and south of NM 501
Airport Road South 2/A-5-3	15	Part of the Airport-3 (South) tract, situated east of A-5-2, north of TA-21 and south of NM 501
TA-21 West 2/A-15-2	1	DP Road
C-2, C-3 and C-4	150	Highway near White Rock "Y"

* Tracts A-10, B-3, and A-8b were transferred in CY 2012.

LANL's 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. In CY 2011, remediation of MDA B was completed; this area will be made available for conveyance to Los Alamos County in the future. Through these efforts, LANL may make several large tracts of land available for use (DOE 1999c).

MDA remediation, canyon cleanup, and other actions related to the implementation of the Consent Order should result in several tracts of remediated land available for conveyance or transfer.

3.8 Groundwater

Under the No Action Alternative in the 2008 SWEIS, LANL operational levels would remain similar to current levels; therefore, there would be little change in the flow of contaminants to the alluvial or regional aquifers. 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.

LANL performed substantial groundwater compliance work in CY 2012 pursuant to the Consent Order. These activities included groundwater monitoring and groundwater investigations in support of various groundwater reports and CMEs. However, no new monitoring wells were installed in CY 2012.

Plugging and abandonment was completed in early CY 2012 for Seismic Hazard Borehole 4, Test Hole 6 in Pajarito Canyon, Borehole H-19, Beta Hole in Water Canyon, TA-21 Distillation Hole, and Test Well 3 (LANL 2012e).

In CY 2012, LANL sampled 186 groundwater wells, well ports, and springs in 326 separate sampling events. Many alluvial wells were dry due to drought conditions and ongoing reductions in liquid effluent.

3.9 Cultural Resources

LANL has a large and diverse number of historic and prehistoric properties. Approximately 88 percent of DOE-administered land in Los Alamos County has been surveyed for prehistoric and historic cultural resources. Prior to 2007, more than 1,800 prehistoric sites had been recorded at LANL (Table 3-23). However, during 2007, sites excavated since the 1950s were removed from the site count numbers, lowering LANL's number of recorded sites. In 2011, sites that were removed from the overall site count numbers included those destroyed by early construction activities, those that were pre-1966 National Historic Preservation Act, and those removed per consultations with the New Mexico State Historic Preservation Office (SHPO). Seventy-two percent of the total archaeological sites at LANL date from the 13th, 14th, and 15th centuries. Most of the sites are situated in the piñon-juniper vegetation zone, with more than 78 percent lying between 5,800 and 7,100 feet in elevation. Nearly 58 percent 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[9] communities as traditional cultural properties.

To date, LANS cultural resource subject matter experts have identified no sites associated with the Spanish Colonial or Mexican periods. In 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 2008 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 DOE/NNSA Los Alamos Site Office, the SHPO, and the Advisory Council on Historic Preservation. Additionally, LANS Cultural Resource Specialists have evaluated many Manhattan Project and Early Cold War properties (1943–1963) and those properties built after 1963 that potentially have historical significance, reducing the total number of potential historic cultural resource sites. In FY 2011, historic buildings that had been evaluated and demolished were also removed from the count of potential historic properties. Only those buildings still standing are now included in the total count of 563 (Table 3-24). Most buildings constructed after 1963 are being evaluated on a case-by-case basis as projects arise

9 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.

that have the potential to impact the properties. Therefore, additional buildings may be added to the list of historic properties in the future.

Table 3-23. Acreage Surveyed, Prehistoric Cultural Resource Sites Recorded, and Cultural Resource Sites Eligible for the NRHP at LANL FY 2008, 2009, 2010, 2011, and 2012[a]

FY	Total acreage surveyed by FY	Total acreage systematically surveyed to date	Total prehistoric cultural resource sites recorded to date (cumulative)	Total number of eligible and potentially eligible NRHP sites	Percentage of total site eligibility	Number of notifications to Indian Tribes[b]
2008	0	23,130	1,727[c]	1,625[c]	94	2
2009	52	23,046	1,745[c]	1,642[c]	94	3
2010	17.8	23,090[d]	1,748[c]	1,655[c]	94.6	6
2011	19.29	23,094.5[d]	1,748[c]	1,647[c]	94.2	0
2012	0	23,094.5[d]	1,748[c]	1,649[c]	94.3	0

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 As part of the 2008 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.

c 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.

d No tracts of land were conveyed to Los Alamos County during FY 2012. Three tracts were conveyed in December 2012. This will be reflected as a change in FY 2013. Therefore, the total acres surveyed remains 23,094.50.

Table 3-24. 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[e]
2008	758	623	346	277	55	144
2009	759	631	352	279	56	150
2010	751	646	364	282	56	170
2011	571	468	263	205	56	184
2012	563	461	358[d]	205	77.6	191

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. During FY 2011 evaluated and demolished historic buildings are no longer included in the total number of historic “potential properties” and any other column in this table.

c This represents both eligible and non-eligible sites.

d The fiscal year 2011 number inadvertently omitted the historic buildings that have not been evaluated and that are therefore, considered potentially NRHP eligible. They are re-included in the FY 2012 number.

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

LANS Cultural Resource subject matter experts continue to evaluate buildings and structures from the Manhattan Project and the Early Cold War period (1943–1963) for eligibility in the National Register of Historic Places (NRHP).

One hundred and forty-five historic sites have been recorded at LANL. All have been assigned unique New Mexico Laboratory of Anthropology site numbers. Some of the 145 sites are experimental areas and artifact scatters that date to the Manhattan Project and Early Cold War periods. The majority, 119 sites, are structures or artifact scatters associated with the Early Historic Pajarito Plateau or Homestead periods. Of these 145 sites, 98 are eligible for the NRHP. There are 418 Manhattan Project and Early Cold War period buildings.

Demolished Buildings. Table 3-25 indicates the extent of historic building documentation and demolition to date. Not all buildings that have been documented as part of the DD&D Program have been demolished yet.

Table 3-25. Historic Building Documentation and Demolition Numbers

Fiscal Year	Number of Buildings for which Documentation was Completed	Number of Buildings Actually Demolished in Fiscal Year
2008	4	6
2009	4	6
2010	0	20
2011	0	13
2012	1	7

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 2012,[10] LANS evaluated 656 proposed actions but conducted no new field surveys to identify archaeological sites. However, one new survey to identify historic buildings was conducted. DOE/NNSA sent 10 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. During FY 2012 no reports were sent to the Governors of San Ildefonso, Santa Clara, Cochiti, Jemez, and Acoma Pueblos and the President of the Mescalero Apache Tribe to identify any traditional cultural properties that a proposed action could affect.

10 All updates for the Cultural Resources section are reported on a FY basis, instead of CY. This is due to the fact that similar data is reported to Congress on a FY basis.

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 2011 from a Los Alamos County undertaking to install a new water tank on federal land. The project was stopped while archaeological excavation of the human remains took place. These remains, as of the end of FY 2012, were still pending repatriation, which will occur as soon as agreements between the Pueblo de San Ildefonso and DOE are finalized.

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 2012.

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 DARHT Facility Mitigation Action Plan (DOE 1996e). 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 have most recently visited Nake'muu on September 26, 2008 (FY 2008); October 23, 2009 (FY 2010); and November 10, 2010 (FY 2011). No visits were conducted during fiscal year 2012 due to scheduling issues.

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 2005, with more than 200,000 artifacts and 2,000 samples being recovered (LANL 2008). During FY 2012, the Resources Management Team continued to conduct the annual inspection of curation facility (Museum of Indian Arts and Cultural in Santa Fe, New Mexico) where the artifacts and records from the 39 excavated sites along with collections from other earlier projects conducted at LANL are housed. No tracts of land were transferred or conveyed by DOE/NNSA to Los Alamos Country or the Pueblo de San Ildefonso during FY 2012. However, three tracts of land were conveyed in December 2012 (see section 3.7 for details). These will be included in the FY 2013 update.

Cerro Grande Fire Recovery*.* During FY 2012, LANL continued to monitor five of the original 34 Ancestral Pueblo and Archaic period archaeological sites rehabilitated by the Pueblo of San Ildefonso in 2004. The monitoring was in support of the Mitigation Action Plan for the Special Environmental Analysis for the Cerro Grande Rehabilitation Project (LANL 2010d). 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 2012 field season, no sites were removed from the monitoring plan. All five sites monitored were recommended for one additional year of monitoring to determine if the erosion controls installed during FY 2012 remedied the identified issues or if additional erosion controls are needed. Thus, five sites and two traditional cultural property fences will continue to be monitored in FY 2013.

3.9.3 Cultural Resources Management Plan

The Cultural Resources Management Plan (CRMP; LANL 2006) 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' 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.

The CRMP was finalized and approved by LANL and DOE/NNSA in 2005 and was implemented through a Programmatic Agreement signed in June 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 2012, an updated CRMP was drafted and reviewed by DOE/NNSA. The Draft Final CRMP was sent to the New Mexico SHPO for review.

During FY 2012, implementing activities included:

- Development of the draft landmark nomination package for the National Park Service for the proposed Project Y Manhattan Project National Historic Landmark. The degree of implementation of the plan in future years is contingent on funding.
- The historic restoration of the TA-08 Gun Site, a significant Cold War era building, continued. Restoration was initiated in CY 2008 with Phase I completed in 2009 (DOE 1996a). Planning for Phase II started in CY 2010. Field work for Phase II (i.e., structural repairs) was completed CY 2012.
- At least 10 tours of V-Site and other LANL historic properties and several public presentations related to LANL history and historic properties dating from the Homestead, Manhattan Project, and Cold War Eras were conducted.
- Additionally, public tours of Tsirege were conducted in May 2012 for Pojoaque Pueblo's Poeh Cultural Center and Museum and as part of New Mexico Heritage Preservation Month.

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 2008 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 2012 support this projection. These data are reported in the 2012 Environmental Report (LANL 2013b).

The SWEIS biological assessment (BA), 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 in this BA included remediation of several MDAs, DD&D of TA-21, and elimination or reduction of outfall releases in Mortandad Canyon and its tributaries. Other BAs are completed as needed.

LANL management approved a LANL Biological Resources Management Plan in September 2007 (LANL 2007). LANS biologists updated a source document for migratory bird protection BMPs (LANL 2011e) and a source document for sensitive species protection in 2011 (LANL 2011f). These source documents are updated annually, when new information is available. Neither of these documents were updated during CY 2012.

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 Cerro Grande fire in 2000 that will have an impact on forest health for decades to come. The Cerro Grande and Las Conchas fires greatly reduced tree densities in the area, particularly on US Forest Service land west of LANL. Subsequent wildfire risk reduction thinning activities have also reduced tree density and cover on much of the LANL forest and woodland. Additionally, a bark beetle infestation after the Cerro Grande fire killed many of the remaining mature conifer trees throughout the Pajarito Plateau. LANL forests and woodlands are now more open and will continue to be dominated by understory species for many years.

In CY 2012, the annual Wildland Fire Management Plan was 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; and

(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. Fuels management are completed in compliance with the Wildfire Hazard Reduction and Forest Health Environmental Assessment (DOE-EA-1329; DOE 2000).

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.

3.10.2 Threatened and Endangered Species Habitat Management Plan

Under the Threatened and Endangered Species Habitat Management Plan (LANL 2011g) in CY 2012, LANL continued annual surveys for Mexican Spotted Owls and Southwestern Willow Flycatchers. Surveys were also conducted for one state-listed species, the Jemez Mountains salamander. LANS biologists provided guidance for minimizing disturbance and habitat alteration impacts on federally-listed species to projects and operations through excavation permit reviews (Ex-ID) and the permits and requirements identification (PRID) process.

3.10.3 BAs and Compliance Packages

DOE submits BAs to the US Fish and Wildlife Service to review proposed activities and projects for potential impacts to federally-listed threatened or endangered species. These assessments are necessary when a project is not able to follow the existing guidelines in the Threatened and Endangered Species Habitat Management Plan. These assessments evaluate and document the amount of development or disturbance at proposed construction sites and the amount of disturbance within designated core and buffer habitat. DOE prepares floodplain assessments in accordance with 10 CFR 1022.

During CY 2012, no BAs were prepared. The following floodplain assessments were completed:

- Floodplain Assessment for the Proposed Engineered Erosion Controls at TA-72 in Lower Sandia Canyon, Los Alamos National Laboratory (LANL 2012f)
- Floodplain Assessment for the Proposed Outdoor Fire Range Upgrades at TA-72 in Lower Sandia Canyon, Los Alamos National Laboratory (LANL 2012g)

3.11 Footprint Elimination and DD&D

3.11.1 Footprint Elimination

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

The institutionally-funded Footprint Reduction Project is dedicated to moving specific facilities toward their ultimate elimination. Project activities include the following:

- Funding the moves of functions and 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 2012, DOE/NNSA removed 42 structures. Of these structures, 34 were demolished, 6 were salvaged, and 2 were sold publicly, eliminating a total of 46,407 square feet of the Laboratory’s footprint.

3.11.2 DD&D

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. DD&D activities at LANL are covered under the 2008 SWEIS, and all waste volumes generated from these activities are tracked in the SWEIS Yearbooks. The 2008 SWEIS projected DD&D actions would produce large quantities of demolition debris, bulk LLW, and smaller quantities of TRU, MLLW, sanitary, asbestos, and hazardous wastes. Most waste would be disposed of offsite.

In CY 2012, DOE/NNSA demolished 34 structures. Table 3-26 summarizes the waste volumes for all buildings that went through the DD&D process in CY 2012.

Table 3-26. CY 2012 DD&D Facilities Construction and Demolition Debris[a]

Building Number[b]	DD&D Completed	Waste Volumes (m^3)						
		Construction/ Demolition Debris	Asbestos[c]	Universal Waste	Recyclable Metal[d]	Recyclable Asphalt/ Concrete	Recyclable Wood	Equipment Salvaged[d]
03-0097	07/21/12	5	0.4	0.1	1.32	5	0	0
03-0373	07/21/12	0.4	.03	0.1	0.1	0.4	0	0
03-0462	06/29/12	40	3	0.1	10	38	0	0
03-0545	06/19/12	8	0.6	0.1	2	7.5	0	0
03-0546	06/21/12	8	0.6	0.1	2	7.5	0	0
03-1533	06/18/12	9	0.75	0.1	2.5	9	0	0
03-1664	07/21/12	5	0	0.1	0.15	0.5	0	0
03-2018	07/02/12	3.5	0.3	0.1	1	3.5	0	0
03-2260	08/27/12	0	0	0.1	0.5	1	0	0
15-0326	08/17/12	0.1	0	0.1	0.2	0.5	0	0
18-0037	04/26/12	1.5	0.5	.03	1	25	0	0
18-0127	08/17/12	73	24	2	68	1243	0	0
18-0129	05/31/12	50	16	1.2	47	858	0	0
18-0141	05/18/12	7.4	2.4	.2	6	126	0	0
18-0187	07/27/12	1.1	.36	.02	10	19	0	0
18-0188	06/19/12	1.1	.36	.02	10	19	0	0
18-0190	06/18/12	4	1.3	.01	4	68	0	0
18-0227	06/02/12	22	7	0.5	22	370	0	0
18-0270	05/30/12	0.3	0.1	.01	0.3	5	0	0
18-0297	05/30/12	6.7	2	0.2	6.7	114	0	0
35-0046	09/20/12	314	20	2	55	200	0	0
35-0224	09/19/12	20	1	0	3.5	0	0	0
35-0226	09/20/12	20	1	0	3.5	0	0	0
35-0227	09/21/12	20	1	0	3.5	0	0	0

	Building Number[b]	DD&D Completed	Waste Volumes (m³) Construction/ Demolition Debris	Asbestos[c]	Universal Waste	Recyclable Metal[d]	Recyclable Asphalt/ Concrete	Recyclable Wood	Equipment Salvaged[d]
	35-0261	06/27/12	9	0.75	0.1	2.5	8.8	0	0
	35-0262	06/27/12	9	0.75	0.1	2.5	8.8	0	0
	35-0263	06/27/12	9	0.75	0.1	2.5	8.8	0	0
	53-1138	08/16/12	15.7	0	0	0.01	0	0	0
	57-0041	10/02/12	12.54	0	0.1	0.5	0	0	4.3
	57-0074	10/03/12	28.5	0	0.1	1.25	0	0	4.3
	57-0077	10/03/12	34.2	0	0.1	1.5	0	0	4.3
	57-0115	10/04/12	35.34	1	0.1	1.5	0	0	4.3
	57-0122	11/07/12	1	0	0.1	0	0	0	4.3
	57-0123	11/07/12	1	0	1	0	0	0	4.3
Total			**775.38**	**85.95**	**8.99**	**272.53 T**	**3,146.3**	**0**	**25.8 T**
2008 SWEIS			**246,409 m^3 [a]**						

a Construction/demolition debris includes uncontaminated wastes such as steel, brick, concrete, pipe, and vegetative matter from land clearance. This number represents 151,382 m^3 from the No Action Alternative, 2,293 m^3 from the RLWTF upgrade, 2,133 m^3 from the Plutonium Refurbishment, 35,934 m^3 from the TA-21 DD&D Option, 12,998 m^3 from the TA-18 DD&D Option, and 41,669 m^3 from the Waste Management Facilities Transition.

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.

d Recyclable Metal and Equipment Salvaged volumes are only tracked in tons (not in cubic meters). This is designated with a T after the number in the total. All other waste volumes were tracked in cubic meters.

4.0 SUMMARY AND CONCLUSION

This Yearbook reviews CY 2012 operations for the 15 Key Facilities (as defined by the 2008 SWEIS) and the Non-Key Facilities at LANL and compares those operations to levels projected by the 2008 SWEIS. The Yearbook also reviews the environmental effects associated with operations at the Key Facilities and the Non-Key Facilities and compares these data with 2008 SWEIS projections. In addition, the Yearbook presents a number of site-wide effects of those operations and environmental parameters.

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 CY 2012, seven construction/modification projects were undertaken:

- Electrical and mechanical systems were expanded to meet new computer requirements at the Metropolis Center;
- Construction of the RLUOB at TA-55 was completed;
- The NMSSUP continued at TA-55;
- The TRP construction continued;
- Construction of solar evaporation tanks at TA-52 for the RLWTF was completed;
- Construction of the LANSCE WNR NS2 Facility was completed; however, the design for the new substation continued; and
- The MSL Infill Project began.

Within the Non-Key Facilities, four major construction projects were undertaken:

- Construction of the Photovoltaic Array Reuse of Los Alamos County Landfill continued;
- Construction of the SERF-E continued;
- Construction of the Indoor Firing Range continued; and
- Construction of the Interagency Wildfire Center began.

During CY 2012, 80 capabilities were active and 10 capabilities were inactive at LANL's Key and Non-Key Facilities. At the CMR Building, destructive and nondestructive analysis, nonproliferation training, and large vessel handling capabilities were not active. No high-pressure gas fills and processing, gas boost system, development, diffusion and membrane purification, hydrogen isotopic separation, or radioactive liquid waste treatment took place at the Tritium Facilities. Materials Test Station equipment was not installed at LANSCE. No waste retrieval, waste treatment, or decontamination operations took place at SRCW Facilities.

During CY 2012, operation levels for one LANL Key Facility exceeded the 2008 SWEIS capability projections—Radiochemistry Facility.

The Radiochemistry Facility conducted radionuclide transport studies at levels twice the number projected in the 2008 SWEIS and increased isotope offsite shipments by 77 percent compared with levels projected in the 2008 SWEIS. Although chemical waste generation exceeded 2008 SWEIS projections for this facility, this was due to a one-time, non-routine maintenance activity that was not associated with the increase in operations levels noted here.

In CY 2012, several Key Facilities exceeded waste projections in the 2008 SWEIS. All exceedances were due to one-time, non-routine events. Total LANL site-wide waste generation for all waste types for CY 2012 fell below 2008 SWEIS projections. The following facilities exceeded 2008 SWEIS projections for waste generation.

Chemical Waste:

- MSL – due to disposal of material produced from the roofing project at TA-03-1698;
- Sigma Complex – due to disposal of beryllium contaminated waste generated from the replacement of the ventilation system in the BTF, which is within the Sigma Complex. In addition, some waste from CY 2011 was shipped offsite and;
- SRCW Facilities – due to three reasons: (1) disposal of contaminated soil from diesel fuel and pump oil leaks, (2) disposal of solid waste debris from a roof tear-off and replacement project, and (3) disposal of drum liners that no longer met SRCW specifications due to long-term storage.

Low-Level Radioactive Waste:

- SRCW Facilities - due to the construction debris from the construction of Permacon for processing LLW crate boxes stored in Area G.
- RLWTF – due to a campaign to treat and dispose of evaporator bottoms.

Mixed Low-Level Radioactive Waste:

- SRCW Facilities – due to debris, which was of contact in nature, from the repackaging and over-packing of TRU waste containers and waste related to consolidating and packaging of MLLW.

Transuranic and Mixed Transuranic Waste:

- CMR Building – exceeded projections by 1 cubic meter due to additional chemistry and metallurgy research and development activities.

In CY 2012, the Metropolis Center exceeded 2008 SWEIS projections for outfall discharge. Operation of the SERF-E is expected to greatly reduce discharge amounts from the Metropolis Center. The Metropolis Center did not exceed 2008 SWEIS projections for waste, utility use, or radioactive air emissions.

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) totaled approximately 227 curies, less than 1 percent of the annual projected radiological air emissions projected in the 2008 SWEIS. Emissions of criteria pollutants were well below 2008 SWEIS projections and below the NMAC, Title 20, Chapter 2, Part 73 limits.

In response to DOE Executive Order 13514, LANS reported its greenhouse gas emissions from stationary combustion sources to the US EPA for the third time. These stationary combustion sources emitted 59,726 metric tons of CO_2e.

Since 1999, the total number of permitted outfalls was reduced from 55 identified to 11 permits regulated under the NPDES permit No. NM0028355. In CY 2012, nine outfalls flowed. Calculated NPDES discharges totaled 153.8 million gallons, approximately 10.3 million gallons less than the CY 2011 total. This is well under the 2008 SWEIS projected volume of 279.5 million gallons per year.

LANL performed significant groundwater compliance work in CY 2012 pursuant to the Consent Order. These activities included groundwater monitoring, groundwater investigations, and installation of monitoring wells in support of various groundwater investigations and corrective measures evaluations. However, no new monitoring wells were installed. Measured parameters for groundwater were similar to 2008 SWEIS projections.

Total waste quantities from LANL operations were below 2008 SWEIS projections for all waste types, reflecting the levels of operations at both the Key and Non-Key Facilities. Waste quantities at Key and Non-Key Facilities that exceeded the 2008 SWEIS levels were one-time, non-routine events. The 2008 SWEIS combined TRU and mixed TRU waste into one waste category since they are both managed for disposal at the WIPP.

DOE/NNSA removed 42 structures at LANL. Of these structures, 34 were demolished, 6 were salvaged, and 2 were transferred to Santa Clara Pueblo. This eliminated a total of 46,407 square feet of the Laboratory's footprint.

In the 2008 SWEIS No Action Alternative, the total utility consumption projections were reduced from 1999 SWEIS projections to a number closer to the average utility consumption for the six previous years. Water consumption for CY 2012 was 444.9 million gallons. This 27-million gallon water consumption exceedance represents the second time LANL has exceeded utility projections from either the 1999 or the 2008 SWEIS. Electricity consumption was 449 gigawatt-hours compared with the 2008 SWEIS projection of 582 gigawatt-hours. Gas consumption for CY 2012 was 1.10 million decatherms compared with the 2008 SWEIS projection of 1.20 million decatherms. 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 were well within the levels projected in the 2008 SWEIS. The TED equivalent for the LANL workforce was 140.1 person-rem, which is much lower than the 280 person-rem workforce dose projected in the 2008 SWEIS. There were approximately 138 recordable cases of occupation injury and illness; this represents a 27 percent decrease from CY 2011. Also, approximately 33 cases resulted in DART duties, representing a 39 percent reduction in cases from CY 2011. Both of these rates were well below 2008 SWEIS projections.

In the 2008 SWEIS No Action Alternative, the 2005 levels of employment were projected to remain steady at 13,504. The 10,366 employees at the end of CY 2012 represent a 13 percent reduction compared with the 11,672 total employees reported in the 2011 Yearbook. The total number of employees is 30 percent below 2008 SWEIS projections.

Measured parameters for ecological resources were similar to 2008 SWEIS projections, and measured parameters for cultural resources and land resources were below 2008 SWEIS projections. No excavation occurred of sites at TA-54 or anywhere else on LANL. Seven historic buildings were demolished in FY 2012. Ecological and cultural resources remained protected in CY 2012. For land use, the 2008 SWEIS projected the disturbance of 41 acres of new land at TA-54 because of the need for additional disposal cells for LLW. (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 2012, this expansion had not become necessary. From 2001 to 2012, approximately 2,450 acres of land were transferred to the Bureau of Indian Affairs to be held in trust for the Pueblo of San Ildefonso or conveyed to Los Alamos County. Three tracts were conveyed or transferred in CY 2012.

In conclusion, LANL operations during CY 2012 mostly fell within 2008 SWEIS projections. Although operation levels for one LANL facility exceeded the 2008 SWEIS capability, none of the capability increases caused exceedances in radioactive air emissions, waste, or NPDES discharge. Several facilities exceeded the 2008 SWEIS levels for waste generation quantities; however, all were one-time, non-routine events that do not reflect the day-to-day operations of the Laboratory. In addition, total site-wide waste generation quantities were below 2008 SWEIS projections for all waste types, reflecting the overall levels of operations at both the Key and Non-Key Facilities. Although gas and electricity consumption have remained within the 2008 SWEIS limits for utilities, water consumption exceeded the 2008 SWEIS projections by 27 million gallons. DOE/NNSA is committed to reducing energy and water consumption and will continue to make improvements towards that goal in the future. Energy reduction initiatives like night setbacks, lighting retrofits, HVAC upgrades, and High Performance Sustainable Buildings continue to be implemented. In addition, improvements to the SERF-E in CY 2012 are expected to lead to increased use of recycled effluent in the cooling towers in CY 2013, thereby significantly reducing the amount of potable water consumed. Details can be found in LANL's FY 2013 SSP (LANL 2012h). Overall, LANL operations data from CY 2012 indicate that LANL has been operating within the 2008 SWEIS projections and regulatory limits.

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Appendix A of the SWEIS Yearbook–2012

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	2012 Operations
Analytical Chemistry	Support actinide research and processing activities by processing approximately 7,000 samples/year.	Analytical Chemistry received approximately 1,500 samples and conducted more than 6,000 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. Some storage and inventory activities took place. Activity performed as projected.
Destructive and Nondestructive Analysis (Design Evaluation Project)	Evaluate up to 10 secondary assemblies/year through destructive/non-destructive analyses and disassembly.	No activity. Project has not been active since 1999.
Nonproliferation Training	Conduct nonproliferation training using special nuclear material (SNM).	No activity. This activity has been suspended indefinitely at the CMR.
Actinide Research and Development[a]	Characterize approximately 100 samples/year using microstructural and chemical metallurgical analyses.	No activity. Process activity was moved to TA-55 in 2007.
	Perform compatibility testing of actinides and other metals to study long-term aging and other material effects.	Activity performed as projected.
	Analyze TRU waste disposal related to validation of WIPP performance assessment models.	No activity. Project was completed in 2001.
	Perform TRU waste characterization.	No activity.
	Analyze gas generation as could occur in TRU waste during transportation to WIPP.	No activity.
	Demonstrate actinide decontamination technology for soils and materials.	No activity.
	Develop actinide precipitation method to reduce mixed wastes in LANL effluents.	No activity.
	Process up to 400 kg of actinides/year between TA-55 and the CMR building.	No activity.
Fabrication and Processing	Process up to 5,000 curies of neutron sources/year (both plutonium-238 and beryllium and americium-241 and beryllium sources).	No activity. Project was terminated in CY 1999.
	Process neutron sources other than sealed sources.	No activity.
	Stage a total of up to 1,000 plutonium-238 and beryllium and americium-241 and beryllium neutron sources in Wing 9 floor holes.	Operations continued as projected in an effort to reduce the number of sources in Wing 9 floor holes. (Note: Exact numbers are classified.)

Capability	2008 SWEIS Projections	2012 Operations
	Produce 1,320 targets/year for isotope production.	No activity.
	Separate fission products from irradiated targets.	No activity.
	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 kg).	No activity. Casting furnace capability was removed in CY 1999.
Large Vessel Handling[b]	Process up to two large vessels from the Dynamic Experiments Program annually.	Installation of enclosure and glovebox restarted in preparation for CVD Project startup in CY 2013.

a. The actinide activities at the CMR Building and at TA-55 are expected to total 400 kg/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 kg/yr.

b. Currently referred to as the CVD Project.

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

Parameter	Units[a]	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions			
Total Actinides[b]	Ci/yr	7.60E-4	8.95E-06
Krypton-85	Ci/yr	1.00E+2	Not measured[c]
Xenon-131m	Ci/yr	4.50E+1	Not measured[c]
Xenon-133	Ci/yr	1.50E+3	Not measured[c]
NPDES Discharge			
03A021[d]	MGY	1.9	No outfalls
Wastes			
Chemical	kg/yr	10,886	1,052.95
LLW	m^3/yr	1,835	85.49
MLLW	m^3/yr	19	0.04
TRU	m^3/yr	42[e]	39.79[f]
Mixed TRU	m^3/yr	[e]	3.36[f]

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; radioactive progeny (daughter products) are not included.

c. These radionuclides are not considered to be significant to offsite dose from this stack and do not require measurement under EPA regulations.

d. Outfall 03A021 was removed from the NPDES Permit (NM0028355) in October 2011.

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

f. TRU and Mixed TRU waste generation at CMR exceeded 2008 SWEIS projections by 1.15 m^3 additional chemistry and metallurgy research and development activities at the CMR Building.

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

Capability	2008 SWEIS Projections	2012 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.	Activity performed as projected. Uranium component work was curtailed due to material control and accountability reconciliation.
Characterization of Materials	Perform research and development on properties of ceramics, oxides, silicides, composites, and high-temperature materials.	Totals of 150 assignments and < 500 specimens were characterized.
	Analyze up to 36 tritium reservoirs/year.	No activity.
	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.	No activity.
Fabrication of Metallic and Ceramic Items	Fabricate stainless steel and beryllium components for up to 80 pits/year.	Fabricated approximately 24 stainless steel and specialty alloy pit components.
	Fabricate up to 200 reservoirs for tritium/year.	No activity.
	Fabricate components for up to 50 secondary assemblies/year (of depleted uranium, depleted uranium alloy, enriched uranium, deuterium, and lithium).	Fabricated components for fewer than 10 secondary assemblies.
	Fabricate non-nuclear components for research and development: about 100 major hydrotests and 50 joint test assemblies/year.	Fabricated components for fewer than 20 major hydrotests and for less than 10 joint test assemblies.
	Fabricate beryllium targets.	Provided material for the production of inertial confinement fusion targets and fabricated fewer than two targets.
	Fabricate targets and other components for accelerator production of tritium research.	No activity.
	Fabricate test storage containers for nuclear materials stabilization.	No activity.

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

Parameter	Units	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions[a]			
Uranium-234	Ci/yr	6.60E-5	Not measured[a]
Uranium-238	Ci/yr	1.80E-3	Not measured[a]
NPDES Discharge			
03A022	MGY	5.8	0.036
Wastes			
Chemical	kg/yr	9,979	17,203.47[b]
LLW	m^3/yr	994	17.55
MLLW	m^3/yr	4	0.21
TRU	m^3/yr	0[c]	0
Mixed TRU	m^3/yr	0[c]	0

a. Emissions levels from this site are below EPA levels that require monitoring.

b. Chemical waste generation exceeded 2008 SWEIS projections due to disposition of beryllium contaminated waste from the Beryllium Technology Facility (BTF), which is within the Sigma Complex. During CY 2012, the BTF replaced the variable air volume ventilation system which generated additional beryllium contaminated waste. In addition, some beryllium contaminated waste from CY 2011 was shipped offsite. BTF waste accounted for approximately 77% (13,303.87 kg) of all chemical waste generated at Sigma Complex.

c. 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	2012 Operations
Fabrication of Specialty Components	Provide fabrication support for the dynamic experiments program and explosives research studies.	Specialty components were fabricated at levels below those projected.
	Support up to 100 hydrodynamic tests/year.	Fewer than 20 hydrodynamic tests were supported.
	Manufacture up to 50 joint test assembly sets/year.	Fewer than 10 joint test assembly sets were manufactured.
	Provide general laboratory fabrication support as requested.	Activity performed as projected.
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.
Dimensional Inspection of Fabricated Components	Perform dimensional inspection of finished components.	Activity performed as projected.
	Perform other types of measurements and inspections.	No activity.

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

Parameter	Units	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions			
Uranium isotopes[a]	Ci/yr	1.50E-04	Not measured[b]
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	474,002	123.67
LLW	m^3/yr	604	8.22
MLLW	m^3/yr	0	0.02[c]
TRU	m^3/yr	0[d]	0
Mixed TRU	m^3/yr	0[d]	0

a. No U-238 was measured at Machine Shops. However, uranium isotopes U-234 andU-235 were measured. This may reflect an operations focus on low-enriched uranium fuel instead of depleted uranium.

b. The main stack at TA-03-0122 was shut down in CY 2011. Remaining radiological operations are not vented to the environment, but exhausted locally back into the room.

c. MLLW generation at the Machine Shops exceeded 2008 SWEIS projections due to non-routine, intermittent, and programmatic housekeeping associated with minor machining modifications to a small part. This accounts for all MLLW generated at Machine Shops.

d. 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	2012 Operations
Materials Processing	Support development and improvement of technologies for materials formulation.	Activity was performed as projected.
	Support development of chemical processing technologies, including recycling and reprocessing techniques to solve environmental problems.	Activity was performed as projected.
Mechanical Behavior in Extreme Environments	Study fundamental properties of materials and characterize their performance, including research on the aging of weapons.	Activity was performed as projected. Cold mock-up of weapons assembly and processing as well as other technologies continued to be expanded. Fabrication, assembly, and prototype experiments were expanded.
	Develop and improve techniques for these and other types of studies.	Activity was performed as projected. 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.	Activity was performed as projected. Single crystal growth, amorphous alloy research, powder processing, and materials characterization were expanded.
	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.	Activity was performed as projected. Capability for ion beam modification of materials was increased.
	Provide facilities for synthesis and mechanical characterization of materials systems for bulk conductor applications. Develop and improve techniques for development of advanced materials.	Activity was performed as projected. 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.	Activity was performed as projected. 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	2012 Operations
Radioactive Air Emissions	Ci/yr	Negligible	Not measured[a]
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	590	146.69
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. Emissions levels from this site are below EPA levels that require monitoring.

b. 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	2012 Operations
Computer Simulations	Perform complex three-dimensional computer simulations to estimate nuclear yield and aging effects to demonstrate nuclear stockpile safety. Apply computing capability to solve other large-scale, complex problems.	Activity performed as projected.

Table A-10. Metropolis Center (TA-03) Operations Data

Parameter	Units	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions	Ci/yr	Not projected[a]	Not measured[a]
NPDES Discharge			
03A027	MGY	13.6	21.6[b]
Wastes			
Chemical	kg/yr	0	0
LLW	m^3/yr	0	0
MLLW	m^3/yr	0	0
TRU	m^3/yr	0[c]	0
Mixed TRU	m^3/yr	0[c]	0

a. No radiological operations occur at this site.

b. Outfall discharge amounts exceeded 2008 SWEIS projections. The SERF-E is expected to greatly reduce discharge amounts at the Metropolis Center.

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

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

Capability	2008 SWEIS Projections	2012 Operations
Volume of Explosives Required*	High explosives processing activities would use approximately 82,700 pounds (37,500 kg) of explosives and 2,910 pounds (1,320 kg) of mock explosives annually.	Less than 3,200 pounds (1,451 kg) of high explosives and less than 1,900 pounds (862 kg) of mock explosives material were used in the fabrication of test components for internal and external customers
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 projected limits.
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. 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, 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/year.	Weapons Systems Engineering (W)/ Weapons Experiments (WX) Divisions provided fewer than 100 major assemblies for National Nuclear Security Site subcritical experiments and joint and local 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/year.	W/WX Divisions performed fewer than 15 stockpile-related safety and mechanical tests.

Capability	2008 SWEIS Projections	2012 Operations
Research, Development, and Fabrication of High-Power Detonators	Continue to support stockpile stewardship and management activities. Manufacture up to 40 major product lines/year. Support DOE-wide packaging and transport of electro-explosive devices.	High-power detonator activities by Nuclear Component Operations Division resulted in the manufacture of fewer than 40 product lines.

* This is not a capability. The total amount of explosives and mock explosives used across all activities is an indicator of overall activity levels for this Key Facility.

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

Parameter	Units	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions			
Uranium-238	Ci/yr	9.96E-7	Not measured[a]
Uranium-235	Ci/yr	1.89E-8	Not measured[a]
Uranium-234	Ci/yr	3.71E-7	Not measured[a]
NPDES Discharge			
Total Discharges	MGY	0.06	0
03A-130 (TA-11)[b]	MGY	[c]	No discharges
05A-055 (TA-16)	MGY	[c]	0
Wastes			
Chemical	kg/yr	13,154	11,876.67
LLW	m^3/yr	15	0
MLLW	m^3/yr	<1	0.11
TRU	m^3/yr	0[d]	0
Mixed TRU	m^3/yr	0[d]	0

a. LANS does not measure these non-point (diffuse) emissions at their source; rather, LANS uses ambient air measurements at public receptor locations to evaluate compliance from diffuse emissions.

b. Outfall 03A-130 was removed from the NPDES Permit (NM0028355) in October 2011.

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

Capability	SWEIS Projections	2012 Operations
Volume of Materials Required*	Conduct about 1,800 experiments per year.	HET operations conducted were primarily within TA-14, 15, and 36 at levels below SWEIS projections.
	Use up to 6,900 pounds (3,130 kg) of depleted uranium in experiments annually.	Less than 10 kg of depleted uranium were expended.
Hydrodynamic Tests	Develop containment technology. Conduct baseline and code development tests of weapons configuration. Conduct 100 major hydrodynamic test/year.	4 hydrodynamic tests were conducted.
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.	Activity performed as projected.
Explosives Research and Testing	Conduct tests to characterize explosive materials.	Activity performed as projected.
Munitions Experiments	Support the US Department of Defense with research and development of conventional munitions. Conduct experiments to study external-stimuli effects on munitions.	Activity performed as projected.
High-Explosives Pulsed-Power Experiments	Conduct experiments using explosively driven electromagnetic power systems.	Activity performed as projected.
Calibration, Development, and Maintenance Testing	Perform experiments to develop and improve techniques to prepare for more involved tests.	Activity performed as projected.
Other Explosives Testing	Conduct advanced high explosives or weapons evaluation studies.	Activity performed as projected.

* This is not a capability. The total volume of materials required across all activities is an indicator of overall activity levels for this Key Facility.

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

Parameter	Units	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions			
Depleted Uranium[a]	Ci/yr	1.5E-1	Not measured[b]
Uranium-234	Ci/yr	3.4E-2	Not measured[b]
Uranium-235	Ci/yr	1.5E-3	Not measured[b]
Uranium-238	Ci/yr	1.4E-1	Not measured[b]
Chemical Usage[c]			
Aluminum[c]	kg/yr	45,720	< 1,000
Beryllium	kg/yr	90	< 1
Copper[c]	kg/yr	45,630	< 10
Depleted Uranium	kg/yr	3,931.4	< 30
Iron[c]	kg/yr	30,210	< 1
Lead	kg/yr	241.4	< 1
Tantalum	kg/yr	450	< 1
Tungsten	kg/yr	390	< 2
NPDES Discharge			
03A–185 (TA-15)[d]	MGY	2.2	No outfalls
Wastes			
Chemical	kg/yr	35,380	17,801.98
LLW	m^3/yr	918	287.14
MLLW	m^3/yr	8	0.05
TRU[f]	m^3/yr	< 1[e]	0
Mixed TRU	m^3/yr	[e]	0

a. The isotopic composition of depleted uranium is approximately 72% uranium-238, approximately 1% uranium-235, and approximately 27% 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. LANS does not measure these non-point (diffuse) emissions at their source; rather, LANS uses ambient air measurements at public receptor locations to evaluate compliance from diffuse emissions.

c. The quantities of copper, iron, 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. Outfall 03A-185 was removed from the NPDES Permit (NM0028355) in October 2011.

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

Table A-15. Tritium Facilities (TA-16) Comparison of Operations

Capability	2008 SWEIS Projections	2012 Operations
High-Pressure Gas Fills and Processing	Handle and process tritium gas in quantities of about 100 grams approximately 65 times/year.	No activity.
Gas Boost System Testing and Development	Conduct gas boost system research and development and testing and gas processing operations approximately 35 times/year using quantities of about 100 grams of tritium.	No activity.
Diffusion and Membrane Purification	Conduct research on gaseous tritium movement and penetration through materials—perform up to 100 major experiments/year. Use this capability for effluent treatment.	No activity.
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.	Activity performed as projected.
Gas Analysis	Measure the composition and quantities of gases (in support of tritium operations).	Activity performed as projected.
Calorimetry	Perform calorimetry measurements in support of tritium operations.	Activity performed as projected.
Solid Material and Container Storage	Store about 1,000 grams of tritium inventory in process systems and samples, inventory for use, and waste.	Activity performed as projected.
Hydrogen Isotopic Separation	Perform research and development of tritium gas purification and processing in quantities of about 200 grams of tritium per test.	No activity.
Radioactive Liquid Waste Treatment: TA-21	Pre-treat liquid LLW at TA-21 prior to transport for treatment. Activity ends with decommissioning of TA-21 tritium buildings.	No activity.

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

Parameter	Units	2008 SWEIS	2012 Operations
Radioactive Air Emissions			
TA-16/WETF, Elemental tritium	Ci/yr	3.00E+2	8.56E+00
TA-16/WETF, Tritium in water vapor	Ci/yr	5.00E+2	6.65+01
NPDES Discharge			
02A-129 (TA-21)[a]	MGY	17.4	No outfalls
Wastes			
Chemical	kg/yr	1,724	270.79
LLW	m^3/yr	482	8.81
MLLW	m^3/yr	3	0.04
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a. Outfall 02A-129 was removed from the NPDES Permit (NM0028355) in October 2011.
b. 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	2012 Operations
Precision Machining and Target Fabrication	Provide targets and specialized components for approximately 12,400 laser and physics tests/year.	Provided targets and specialized components for about 25 tests.
	Perform approximately 100 high-energy-density physics tests/year.	Provided components to WX and Physics Divisions for less than 12 high-energy-density physics tests.
	Analyze up to 36 tritium reservoirs/year.	No activity.
Polymer Synthesis	Produce polymers for targets and specialized components for approximately 12,400 laser and physics tests/year.	Produced polymers for targets and specialized components for about 10 laser and physics tests. Produced polymeric components for weapons aging studies and hydro testing
	Perform approximately 100 high-energy-density physics tests/year.	No activity.
Chemical and Physical Vapor Deposition	Coat targets and specialized components for about 12,400 laser and physics tests/year.	Coated targets and specialized components for about 25 tests
	Support approximately 100 high-energy-density physics tests/year. Support plutonium pit rebuild operations.	No Activity.

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

Parameter	Units	2008 SWEIS	2012 Operations
Radioactive Air Emissions	Ci/yr	Negligible	Not measured[a]
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	3,810	126.30
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. Emissions levels from this site are below EPA levels that require monitoring.

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

Table A-19. Bioscience Facilities (TA-03, TA-16, TA-35, TA-43, and TA-46) Comparison of Operations

Capabilities	2008 SWEIS Projection	2012 Operations (FTEs)[a]
Biologically Inspired Materials and Chemistry	Determine formation and structure of biomaterials for bioenergy.	Activities performed as projected. (7 FTEs)
	Synthesize biomaterials.	
	Characterize biomaterials.	
Cell Biology	Study stress-induced effects and responses on cells.	Activities performed as projected. (5 FTEs)
	Study host-pathogen interactions.	
	Determine effects of beryllium exposure.	
Computational Biology	Collect, organize, and manage information on biological systems.	Activities performed as projected. (20 FTEs)
	Develop computational theory to analyze and model biological systems.	
Environmental Microbiology	Study microbial diversity in the environment; collect and analyze environmental samples.	Activities performed as projected. (14 FTEs)
	Study biomechanical and genetic processes in microbial systems.	
Genomic Studies	Analyze genes of living organisms such as humans, animals, microbes, viruses, plants, and fungi.	Decrease in DOE support, growth in work for others. (28 FTEs)
Genomic and Proteomic Science	Develop and implement high-throughput tools. Perform genomic and proteomic analysis.	Activities performed as projected. (14 FTEs)
	Study pathogenic and nonpathogenic systems.	
Measurement Science and Diagnostics	Develop and use spectroscopic tools to study molecules and molecular systems.	Activities performed as projected. (12 FTEs)
	Perform genomic, proteomic, and metabolomic studies.	
Molecular Synthesis and Isotope Applications	Synthesize molecules and materials.	Activities performed as projected. (11 FTEs)
	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.	

Capabilities	2008 SWEIS Projection	2012 Operations (FTEs)[a]
Structural Biology	Research three-dimensional structure and dynamics of macromolecules and complexes. Use various spectroscopy techniques.	Activities performed as projected. (10 FTEs)
	Perform neutron scattering.	
	Perform x-ray scattering and diffraction.	
Pathogenesis	Perform genome-scale, focused, and computationally enhanced experimental studies on pathogenic organisms.	Activities performed as projected. (4 FTEs)
Biothreat Reduction and Bioforensics	Analyze samples for biodefense and national security purposes. Identify pathogen strain signatures using DNA sequencing and other molecular approaches.	Activities performed as projected. (17 FTEs)
InVivo Monitoring[b]	Performs whole-body scans as a service to the LANL personnel monitoring program, which supports operations with radioactive materials conducted elsewhere at LANL.	Conducted 649 lung and whole body client counts and 1,357 other counts (detector studies, quality assurance, etc.). (3 FTEs)

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

b. This is not a Bioscience Division capability; however, it is located at TA-43-0001. Therefore, it is a capability within this Key Facility and is included here.

Table A-20. Bioscience Facilities (TA-03, TA-16, TA-35, TA-43, and TA-46) Operations Data

Parameter	Units	2008 SWEIS	2012 Operations
Radioactive Air Emissions	Ci/yr	Not estimated	Not measured[a]
NPDES Discharge		No outfalls	No outfalls
Wastes			
Chemical	kg/yr	13,154	7.3
LLW	m^3/yr	34	0
MLLW	m^3/yr	3	0
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a. No radiological operations occur at this site.

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	2012 Operations
Radionuclide Transport Studies	Conduct 80 to 160 actinide transport, sorption, and bacterial interaction studies/year.	This capability continues to perform at two times the level projected in the 2008 SWEIS.*
	Develop models for evaluation of groundwater.	
	Assess performance of risk of release for radionuclide sources at proposed waste disposal sites.	
Environmental Remediation Support	Conduct background contamination characterization pilot studies.	Activity performed as projected.
	Conduct performance assessments, soil remediation research and development, and field support.	
	Support environmental remediation activities.	
Ultra-Low-Level Measurements	Perform chemical isotope separation and mass spectrometry at current levels.	Activity performed as projected.
Nuclear and Radiochemistry Separations	Conduct radiochemical operations involving quantities of alpha-, beta-, and gamma-emitting radionuclides at current levels for non-weapons and weapons work.	Activity performed as projected.
Isotope Production	Conduct target preparation, irradiation, and processing to recover medical and industrial application isotopes to support approximately 150 offsite shipments/year.	Approximately 265 offsite shipments; production reflecting an approximate 77% increase over levels identified in the SWEIS.*
Actinide and TRU Chemistry	Perform radiochemical operations involving alpha-emitting radionuclides.	Radiochemical operations remain at SWEIS levels for alpha-emitting radionulides. RC-1, rooms 411 and 415 have begun to perform radiochemical operations with beta and gamma emitting fission products.
Data Analysis	Re-examine archive data and measure nuclear process parameters of interest to weapons radiochemists.	Activity performed as projected.
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.	Activity performed as projected.

Capability	2008 SWEIS Projections	2012 Operations
Structural Analysis	Perform synthesis and structural analysis of actinide complexes at current levels.	Activity performed as projected.
	Conduct x-ray diffraction analysis of powders and single crystals.	
Sample Counting	Measure the quantity of radioactivity in samples using alpha-, beta-, and gamma-ray counting systems.	Activity performed as projected.
Hydro-test Sample Analysis	Measure beryllium contamination from simulated nuclear weapons hydro-testing.	No Activity. This capability is now being performed at TA-15.

* These capability levels exceeded 2008 SWEIS projections.

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

Parameter	Units	2008 SWEIS Projections	2012 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 isotopes	Ci/yr	4.8E-7	1.48E-08
Arsenic-72	Ci/yr	1.2E-4	None detected[b]
Arsenic-73	Ci/yr	2.5E-3	None detected[b]
Arsenic-74	Ci/yr	1.3E-3	3.58E-06
Beryllium-7	Ci/yr	1.6E-5	None detected[b]
Bromine isotopes[c]	Ci/yr	9.3E-4	1.00E-05
Germanium-68[d]	Ci/yr	8.9E-3	1.06E-02
Rubidium-86	Ci/yr	3.0E-7	None detected[b]
Selenium-75	Ci/yr	3.8E-4	1.06E-04
Other Activation Products[e]	Ci/yr	5.5E-6	None detected[b]
NPDES Discharge		No outfalls	No outfalls
Wastes			
Chemical	kg/yr	3,311	12,057.73[f]
LLW	m^3/yr	268	58.31
MLLW	m^3/yr	4	0.20
TRU	m^3/yr	0[g]	0
Mixed TRU	m^3/yr	0[g]	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. Bromine isotopes that were measured are Br-76 and Br-77.

d. Germanium-68 was assumed to be in equilibrium with gallium-68.

e. Other Activation Products are a mixed group of activation products represented by strontium-90 and yttrium-90 in equilibrium.

f. Chemical waste generation at the Radiochemistry Facility exceeded 2008 SWEIS projections due to the removal of asphalt and concrete to build a new concrete pad, which accounted for approximately 67% (8,116.13 kg) of chemical waste generated at Radiochemistry Facility, and the disposal of friable asbestos-contaminated material or equipment from throughout LANL, which accounted for approximately 25% (3,084.43 kg) of chemical waste generated at the Radiochemistry Facility.

g. 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*	2012 Operations
Waste Transport, Receipt, and Acceptance	Collect radioactive liquid waste from generators and transport it to the RLWTF at TA-50.	Activity performed as projected.
	Support, certify, and audit generator characterization programs.	Activity performed as projected.
	Maintain the waste acceptance criteria for the RLWTF.	Activity performed as projected.
	Send approximately 300,000 liters of evaporator bottoms to an offsite commercial facility for solidification/year. (Approximately 23 m^3 of solidified evaporator bottoms would be returned/year for disposal as LLW at TA-54, Area G.)	277,000 liters of radioactive liquid waste bottoms were shipped. No solidified bottoms were returned for disposal at Area G
	Transport annually to TA-54 for storage or disposal: -300 m^3 of LLW -2 m^3 of mixed LLW -14 m^3 of TRU waste -500 kg of hazardous waste	Transported to Area G for storage or disposal: -24 m^3 of LLW were shipped to Area G. -61 m^3 were shipped to Nevada Test Site. -0 m^3 of mixed LLW -0 m^3 TRU waste -0 kg of hazardous waste
Radioactive Liquid Waste Treatment	Pretreat 190,000 liters/year of liquid TRU waste.	No activity.
	Solidify, characterize, and package 17 m^3/year of TRU waste sludge.	0.2 m^3 (1 drum) of cemented sludge was created.
	Treat 20 million liters/year of liquid LLW.	Processed 2.9 million liters of liquid LLW.
	Dewater, characterize, and package 60 m^3/year of LLW sludge.	2.2 m^3 LLW sludge (11 drums) was packaged.
	Process 1,200,000 million liters/year of secondary liquid waste generated by the RLWTF treatment processes through the RLWTF evaporator.	Re-treated 553,000 liters through reverse osmosis units.
	Discharge treated liquids through an NPDES outfall.	No water was discharged through the NPDES outfall. 2.5 million liters of treated water were evaporated.

* 2008 SWEIS Projection updated to the Expanded Operations Alternative.

Table A-24. Radioactive Liquid Waste Treatment Facility (TA-50) Operations Data

Parameter	Units	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions			
Americium-241	Ci/yr	Negligible	None detected[a]
Plutonium-238	Ci/yr	Negligible	6.34E-09
Plutonium-239	Ci/yr	Negligible	None detected[a]
Thorium-228	Ci/yr	Negligible	None detected[a]
Thorium-230	Ci/yr	Negligible	None detected[a]
Thorium-232	Ci/yr	Negligible	None detected[a]
Uranium-238	Ci/yr	Negligible	1.79E-07
NPDES Discharge			
051	MGY	4.0	0
Wastes			
Chemical	kg/yr	499	255.00
LLW	m^3/yr	298	476.58[b]
MLLW	m^3/yr	2.2	0
TRU	m^3/yr	13.7[c]	0
Mixed TRU	m^3/yr	[c]	0

a. 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.

b. LLW generation at RLWTF exceeded 2008 SWEIS projections due to a campaign to treat and dispose of evaporator bottoms. This accounted for approximately 70% (329.19 m^3) of LLW generation at RLWTF.

c. 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	2012 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/year (6,400 hours). The H+ beam current would be 1,250 microamperes; the H- beam current would be 200 microamperes.	Activity performed as projected. H+ beam was delivered to the Isotope Production Facility for 2,996.8 of 3,237.5 scheduled hours at an average current of 223.0 microamperes with 92.6% reliability. H- beam was delivered as follows: (a) to the Lujan Center for 877.8 of 996.0 scheduled hours at an average current of 102.0 microamperes with 88.1% total availability; (b) to WNR Target 2 for 186.8 of 237.1 scheduled hours in a “pulse on-demand” mode of operation with 78.8% total availability; (c) to WNR Target 4 for 2658.0 of 2928.1 scheduled hours at an average current of 1.44 microamperes with 90.8% total availability; (d) through Line X to Line B (ultracold neutron) for 1,838.0 of 1,965.6 scheduled hours in a “pulse on demand” mode of operation with 93.5% total availability; (e) through Line X to Line C (proton radiography [pRad]) for 555.9 of 625.4 scheduled hours in a “pulse on Accelerator Beam Delivery, Maintenance, and Development demand” mode of operation with 88.9% total availability.
	Reconfigure beam delivery and support equipment to support new facilities, upgrades, and experiments.	Activity performed as projected. The WNR Facility was upgraded with a new user building, the NS2 Facility. With the construction of the new facility, the Target 4 flight paths, shielding, and access control systems were reconfigured to allow for a second 30-degree flight path for Irradiation of Chips and Electronics, several reconfigured flight paths (Chi-nu) to replace and enhance the capability of the Fast Neutron-Induced Gamma-Ray Observer (FIGARO), and a general use flight path.

Capability	2008 SWEIS Projections	2012 Operations
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.	Activity performed as projected.
	Perform remote handling and packaging of radioactive material, as needed.	Remote handling and packaging was performed at the Isotope Production Facility. Revitalization of the A-6 remote handling capabilities is ongoing to restore this capability for future missions.
Neutron Research and Technology*	Conduct 1,000 to 2,000 experiments/year using neutrons from the Lujan Center and WNR Facility.	50 experiments were conducted at the Lujan Center and 76 experiments were conducted at WNR Facility.
	Support contained weapons-related experiments using small to moderate quantities of high explosives, including: -Approximately 200 experiments/year using nonhazardous materials and small quantities of high explosives. -Approximately 60 experiments/year using up to 4.5 kg of high explosives and depleted uranium. -Approximately 80 experiments/year using small quantities of actinides, high explosives, and sources. -Shock wave experiments involving small amounts, up to nominally 50 grams of plutonium. -Support for static stockpile surveillance technology research and development.	No activity.
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/year at Manuel Lujan Center and WNR Facility.	No activity.
	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 kg of high explosives and 45 kg of depleted uranium. -Dynamic experiments in powder launcher with up to 300 grams of gunpowder. -Contained experiments using small to moderate quantities of high explosives similar to those discussed under Neutron Research and Technology.*	34 high explosive experiments were conducted.
	Conduct research using ultracold neutrons; operate up to 10 microamperes/year of negative beam current.	Ultracold neutrons collected data for the UCNa, UCNA, UCNb, and EDMn experiments.

Capability	2008 SWEIS Projections	2012 Operations
Medical Isotope Production	Irradiate up to 120 targets/year for medical isotope production at the Isotope Production Facility.	A total of 53 targets were irradiated in 2012 (34 rubidium chloride targets for Sr-82; 17 gallium targets for Ge-68 production; 1 aluminum target for Na-22 production and 1 WO_3 target for exploratory production of Re-186).
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.	Activity performed as projected.
Radioactive Liquid Waste Treatment (Solar Evaporation at TA-53)	Treat about 520,000 liters/year of radioactive liquid waste.	LANSCE received 286,400 liters of radioactive liquid waste into its holding tanks; 6,850 liters of this was from other sites. A total of 325,620 liters of treated water were discharged to the evaporation tanks.

* High explosives quantities used under the Neutron Research and Technology capability include up to 10 pounds of high explosives and/or depleted uranium, small quantities of actinides and sources, and up to 50 grams of plutonium.

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

Parameter	Units	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions			
Argon-41	Ci/yr	8.87E+2	7.91E+00
Particulate & Vapor Activation Products	Ci/yr	Not projected[a]	1.55E-03
Carbon-10	Ci/yr	2.65E+0	1.32E-01
Carbon-11	Ci/yr	2.25E+4	9.00E+01
Nitrogen-13	Ci/yr	3.10E+3	1.21E+01
Oxygen-15	Ci/yr	3.88E+3	1.81E+01
Tritium as Water	Ci/yr	Not projected[a]	1.69E+01
NPDES Discharge			
Total Discharges	MGY	28.2	17.5
03A048	MGY	Not projected [b]	16.9
03A113	MGY	Not projected [b]	0.6
Wastes			
Chemical	kg/yr	16,783	8,814.85
LLW	m^3/yr	1,070	2.55
MLLW	m^3/yr	1	0
TRU	m^3/yr	0[c]	0
Mixed TRU	m^3/yr	0[c]	0

a. The radionuclide was not projected in the 2008 SWEIS because it was either dosimetrically insignificant or not isotopically identified.

b. The 2008 SWEIS did not calculate individual flow per outfall.

c. 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[a]	2012 Operations
Waste Characterization, Packaging, and Labeling	Characterize 640 cubic meters of newly-generated TRU waste.	Characterized approximately 442 cubic meters.
	Characterize 8,400 cubic meters of legacy TRU waste.	Characterized approximately 1,488 cubic meters of TRU waste.
	Characterize LLW, MLLW, and chemical waste, including waste from DD&D and remediation activities. Characterize additional LLW, MLLW, and chemical waste, including waste from DD&D and remediation activities	Re-characterized and shipped approximately 92 cubic meters of 10-100nCi/g waste in 2012. This is formerly TRU waste that was reclassified as MLLW when rad assays showed it to be less than 100nCi/g.[b]
	Ventilate TRU waste retrieved from below-ground storage.	No activity.
	Perform coring and visual inspection of a percentage of TRU waste packages.	Performed visual examinations on the following TRU waste packages: 36 pipe overpack containers and 40 drums. No drums were cored.
	Overpack and bulk small waste, as required.	119 chemical waste drums were overpacked for Department of Transportation compliance.
	Support, certify, and audit generator characterization programs.	Activity performed as projected.
	Maintain waste acceptance criteria for LANL waste management facilities.	Activity performed as projected.
	Maintain waste acceptance criteria for offsite treatment, storage, and disposal facilities.	Activity performed as projected.
	Maintain WIPP waste acceptance criteria compliance and liaison with WIPP operations.	Activity performed as projected.
	Characterize approximately 2,400 cubic meters of contact-handled and 100 cubic meters of remote-handled legacy TRU waste retrieved from below-ground storage.	No activity.
Waste Transport, Receipt, and Acceptance	Ship 540 cubic meters/year of newly generated TRU waste to WIPP.	Shipped 388 cubic meters of newly generated TRU waste to WIPP.
	Ship 8,400 cubic meters/year of legacy TRU waste to WIPP.	Shipped 734 cubic meters of legacy TRU waste to WIPP.
	Ship LLW to offsite disposal facilities.	Shipped approximately 5,855 cubic meters LLW offsite for disposal.
	Ship 55 cubic meters of MLLW for offsite treatment and disposal in accordance with EPA land disposal restrictions.	Approximately 22 cubic meters of MLLW were shipped offsite for treatment and disposal.
	Ship 6,400 metric tons of chemical wastes for offsite treatment and disposal in accordance with EPA land disposal restrictions.	Approximately 73 metric tons of chemical waste was shipped for offsite treatment and disposal.

Capability	2008 SWEIS Projections[a]	2012 Operations
	Ship LLW, MLLW, and chemical waste from DD&D and remediation activities. Ship additional LLW, MLLW, and chemical waste from DD&D and remediation activities.	Shipped approximately 3,409 cubic meters LLW from MDA B remediation activities offsite for disposal.
	Collect chemical and mixed wastes from LANL generators and transport to Consolidated Remote Storage Sites and TA-54.	Activity performed as projected.
	Receive, on average, 5 to 10 shipments/year of LLW and TRU waste from offsite locations.	No activity.
	Ship approximately 2,340 cubic meters of contact-handled and 100 cubic meters of remote-handled legacy TRU waste to WIPP.	No activity.
Waste Storage	Stage chemical and mixed wastes before shipment for offsite treatment, storage, and disposal.	Activity performed as projected.
	Store TRU waste until it is shipped to WIPP.	Activity performed as projected.
	Store MLLW pending shipment to a treatment facility.	Activity performed as projected.
	Store LLW uranium chips until sufficient quantities are accumulated for stabilization campaigns.	Stored and shipped 1.7 cubic meters of LLW uranium chips.
	Store TRU waste generated by DD&D and remediation activities.	No activity.
	Manage and store sealed sources for the OSRP at increased types and quantities.	Activity performed as projected.
Waste Retrieval	Retrieve remaining legacy TRU waste 2,400 cubic meters of contact-handled and 100 cubic meters of remote-handled from below-ground 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 activity.
Waste Treatment	Compact up to 2,300 cubic meters/year of LLW.	No activity.
	Process 2,300 cubic meters of TRU waste through size reduction at the Decontamination and Volume Reduction System (DVRS).	Processed approximately 48 cubic meters of TRU waste through size reduction at the DVRS.
	Demonstrate treatment (e.g., electrochemical) of liquid MLLW.	No activity.
	Stabilize 870 cubic meters of uranium chips.	No activity.
	Process newly generated TRU waste through new TRU Waste Facility.	No activity.

Capability	2008 SWEIS Projections[a]	2012 Operations
Waste Disposal	Dispose 84 cubic meters of LLW in shafts, 23,000 cubic meters of LLW in pits, and small quantities of radioactively contaminated polychlorinated biphenyls in shafts in Area G/year.	Approximately 5,445 cubic meters LLW were disposed of onsite in pits.
	Dispose additional LLW generated by DD&D and remediation activities.	Approximately 5,212 cubic meters LLW from MDA B remediation were disposed of onsite in pits.
	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.	No activity.
	Decontaminate vehicles and portable instruments for reuse (as required).	No activity
	Decontaminate precious metals for resale using an acid bath.	No activity.
	Decontaminate scrap metals for resale by sandblasting the metals.	No activity.
	Decontaminate 200 cubic meters of lead for reuse by grit blasting.	No activity.

a. 2008 SWEIS Projection updated to the Expanded Operations Alternative

b. TRU waste that was reclassified as MLLW is not counted as newly generated, but tracked here.

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

Parameter	Units	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions[a]			
Tritium	Ci/yr	6.09E+1	1.5
Americium-241	Ci/yr	2.87E-6	None detected[a]
Plutonium-238	Ci/yr	2.24E-5	1.95E-10[a]
Plutonium-239	Ci/yr	8.46E-6	2.23E-10[a]
Uranium-234	Ci/yr	8.00E-6	8.02E-09[a]
Uranium-235	Ci/yr	4.10E-7	None detected[a]
Uranium-238	Ci/yr	4.00E-6	5.28E-09[a]
Other Radionuclides	Ci/yr	Negligible	4.83E-09
NPDES Discharge	MGY	No outfalls	No outfalls
Wastes[b]			
Chemical	kg/yr	907	34,555.95[c]
LLW	m^3/yr	229	278.53[d]
MLLW	m^3/yr	8	37.35[e]
TRU	m^3/yr	27[f]	0.53
Mixed TRU	m^3/yr	[f]	0.83

a. Data shown are measured emissions from Waste Characterization, Reduction, and Repackaging Facility and the Actinide Research and Technology Instruction Center Facility at TA-50, and Building 412 and Dome 231 at TA-54. The two TA-54 stacks were monitored starting in 2010. No other stacks require monitoring at TA-54. All non-point sources at TA-50 and TA-54 are measured using ambient monitoring.

b. Secondary wastes are generated during the treatment, storage, and disposal of chemical and radioactive wastes. Examples include repackaging wastes from the visual inspection of TRU waste, high-efficiency particulate air (HEPA) filters, personnel protective clothing and equipment, and process wastes from size reduction and compaction.

c. Chemical waste generation at SRCW exceeded 2008 SWEIS projections due to three reasons: (1) disposal of drum liners that no longer meet SRCW specifications due to long-term storage, which accounted for approximately 89% (30,655.11 kg) of chemical waste generated at SRCW; (2) disposal of solid waste debris from a roof tear-off and replacement project, which accounted for approximately 8% (2,721.55 kg) of chemical waste generated at SRCW; and (3) disposal of contaminated soil from diesel fuel and pump oil leaks, which accounted for approximately 1% (482.62 kg) of chemical waste generated at SRCW.

d. LLW generation at SRCW exceeded 2008 SWEIS projections due to construction debris from the construction of Permacon for processing low-level waste crate boxes stored in Area G. This accounted for approximately 38% (107.04 m^3) of LLW generation at SRCW.

e. MLLW generation at SRCW exceeded 2008 SWEIS projections due to two reasons: (1) debris, which is of contact in nature, from the repackaging and over-packing of TRU waste containers, which accounted for 41% (15.3 cubic meters) of MLLW generated at SRCW, and (2) waste related to consolidating and packaging of MLLW, which accounted for 43% (16 cubic meters) of MLLW generated at SRCW. Note: TRU waste that was reclassified as MLLW (47.49 m^3) is not counted here as newly generated, but tracked in Table A-27as part of Waste Characterization, Packaging, and Labeling capability.

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

Table A-29. Plutonium Facility Complex (TA-55) Comparison of Operations

Capability	2008 SWEIS Projection	2012 Operations
Plutonium Stabilization	Recover, process, and store existing plutonium inventory.	Activity performed as projected. Highest priority items have been stabilized.
Manufacturing Plutonium Components	Produce nominally 20 plutonium pits/year.	Fewer than 20 qualified pits were produced.
	Fabricate parts and samples for research and development activities, including parts for dynamic and subcritical experiments.	Activity performed as projected.
Surveillance and Disassembly of Weapons Components	Disassemble, survey, and examine up to 65 plutonium pits/year.	Fewer than 65 pits were disassembled. Fewer than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance).
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.	Activity performed as projected.
	Operate the 40-millimeter Impact Test Facility and other test apparatus.	Activity performed as projected.
	Develop expanded disassembly capacity and disassemble up to 200 pits/year.	Fewer than 200 pits were disassembled/converted. Fewer than 12 pits were processed through tritium separation.
	Process up to 5,000 curies of neutron sources (including plutonium and beryllium and americium-241 and beryllium).	No activity.
	Process neutron sources other than sealed sources.	Activity performed as projected.
	Process up to 400 kg/yr of actinides between TA-55 and the CMR Building.*	Fewer than 400 kg of actinides were processed.
	Process pits through the Special Recovery Line (tritium separation).	Activity performed as projected.
	Perform oralloy decontamination of 28 to 48 uranium components per month.	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.	Activity performed as projected.
	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.

Capability	2008 SWEIS Projection	2012 Operations
	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.
	Develop safeguards instrumentation for plutonium assay.	Activity performed as projected.
	Analyze samples.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.
Fabrication of Ceramic-Based Reactor Fuels	Make prototype mixed oxide (MOX) fuel.	Activity performed as projected.
	Build test reactor fuel assemblies.	No activity.
	Continue research and development on other fuels.	Activity performed as projected.
Plutonium-238 Research, Development, and Applications	Process, evaluate, and test up to 25 kg/yr plutonium-238 in production of materials and parts to support space and terrestrial uses.	Less than 25 kg of plutonium-238 was processed, evaluated, and/or tested.
	Recover, recycle and blend up to 18 kg/yr plutonium-238.	Less than 18 kg of plutonium-238 was recovered, recycled and blended.
Storage, Shipping, and Receiving	Provide interim storage of up to 6.6 metric tons of the LANL SNM inventory, mainly plutonium.	Activity performed as projected.
	Store working inventory in the vault in Building 55-4; ship and receive SNM as needed to support LANL activities.	Activity performed as projected.
	Provide temporary storage of Security Category I and II materials removed in support of TA-18 closure, pending shipment to the Nevada National Security Site and other DOE Complex locations.	Activity performed as projected.
	Store sealed sources collected under DOE's OSRP.	Activity performed as projected.
	Store MOX fuel rods and fuel rods containing archive and scrap metals from MOX fuel lead assembly fabrication.	Activity performed as projected.

* The actinide activities at the CMR Building and at TA-55 are expected to total 400 kg/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 kg/yr.

Table A-30. Plutonium Facility Complex (TA-55) Operations Data

Parameter	Units	2008 SWEIS Projections	2012 Operations
Radioactive Air Emissions			
Plutonium-239[a]	Ci/yr	1.95E-5	1.44E-09
Tritium in Water Vapor	Ci/yr	7.50E+2	3.51E+00
Tritium as a Gas	Ci/yr	2.50E+2	1.19E+00
NPDES Discharge			
03A181	MGY	4.1	1.3
Wastes			
Chemical	kg/yr	8,618	7,360.67
LLW	m^3/yr	757	267.87
MLLW	m^3/yr	15	2.21
TRU	m^3/yr	336[b]	37.23
Mixed TRU	m^3/yr	[b]	37.70

a. Projections for the SWEIS were reported as plutonium or plutonium-239, the primary material at TA-55.
b. 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
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.
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).
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.
Waste Management	Management of municipal solid wastes. Sewage treatment. Recycling programs.
Infrastructure and Central Services	Human resources activities. Management of utilities (natural gas, water, electricity). Public interface.
Maintenance and Refurbishment	Painting and repair of buildings. Maintenance of roads and parking lots. Erecting and demolishing support structures.
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	2012 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	113.2
001	MGY	[b]	97.88[c]
13S	MGY	[b]	[c]
03A-160	MGY	28.5	0.29
03A-199	MGY	[b]	15.07
Wastes			
Chemical	kg/yr	651,000	419,151.59
LLW	m^3/yr	1,529	37.27
MLLW	m^3/yr	31	0.02
TRU	m^3/yr	23[d]	7.54
Mixed TRU	m^3/yr	[d]	0

a. Stack emissions from previously active facilities (TA-33 and TA-41); these stacks have been shut down. 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 13S have been combined. Outfall 001 includes discharge from the TA-46 SWWS and TA-03 Power Plant.

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

Appendix B
Chemical Usage and Estimated Emission Data

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Key Facility	Toxic Air Pollutants	CAS Number	Units	2012 Usage	2012 Estimated Air Emissions
CMR Building	Acetone	67-64-1	kg/yr	9.48	3.32
CMR Building	Ammonium Chloride (Fume)	12125-02-9	kg/yr	1.50	0.53
CMR Building	Beryllium	7440-41-7	kg/yr	0.23	0.08
CMR Building	Cadmium, el.&compounds, as Cd	7440-43-9	kg/yr	1.08	0.38
CMR Building	Chromium, Metal &Cr III Compounds, as Cr	7440-47-3	kg/yr	0.90	0.32
CMR Building	Ethanol	64-17-5	kg/yr	6.31	2.21
CMR Building	Hafnium	7440-58-6	kg/yr	1.66	0.58
CMR Building	Hydrogen Bromide	10035-10-6	kg/yr	1.50	0.53
CMR Building	Hydrogen Chloride	7647-01-0	kg/yr	23.74	8.31
CMR Building	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.25	0.09
CMR Building	Nitric Acid	7697-37-2	kg/yr	24.42	8.55
CMR Building	Propane	74-98-6	kg/yr	0.42	0.00
CMR Building	Propylene Dichloride	78-87-5	kg/yr	1.16	0.40
CMR Building	Sulfuric Acid	7664-93-9	kg/yr	7.36	2.58
CMR Building	Tantalum Metal	7440-25-7	kg/yr	2.09	0.73
CMR Building	Toluene	108-88-3	kg/yr	0.87	0.30
High Explosives Processing Facilities	Acetone	67-64-1	kg/yr	1.32	0.46
High Explosives Processing Facilities	Acetylene	74-86-2	kg/yr	7.89	0.00
High Explosives Processing Facilities	Dichlorodifluoromethane	75-71-8	kg/yr	0.96	0.34
High Explosives Processing Facilities	Diethylene Triamine	111-40-0	kg/yr	14.86	5.20
High Explosives Processing Facilities	Ethanol	64-17-5	kg/yr	3.16	1.11
High Explosives Processing Facilities	Ethyl Acetate	141-78-6	kg/yr	180.06	63.02
High Explosives Processing Facilities	Isopropyl Alcohol	67-63-0	kg/yr	2.97	1.04
High Explosives Processing Facilities	Kerosene	8008-20-6	kg/yr	6.06	2.12
High Explosives Processing Facilities	Methyl Ethyl Ketone (MEK)	78-93-3	kg/yr	402.71	140.95
High Explosives Processing Facilities	Propane	74-98-6	kg/yr	136.08	0.00
High Explosives Testing Facilities	Beryllium	7440-41-7	kg/yr	0.23	0.08
High Explosives Testing Facilities	Ethanol	64-17-5	kg/yr	31.97	11.19

Key Facility	Toxic Air Pollutants	CAS Number	Units	2012 Usage	2012 Estimated Air Emissions
High Explosives Testing Facilities	Isopropyl Alcohol	67-63-0	kg/yr	6.28	2.20
High Explosives Testing Facilities	Nitric Acid	7697-37-2	kg/yr	0.76	0.27
High Explosives Testing Facilities	Sulfur Hexafluoride	2551-62-4	kg/yr	121.79	42.63
Bioscience Facilities	Acetic Acid	64-19-7	kg/yr	7.87	2.75
Bioscience Facilities	Acetic Anhydride	108-24-7	kg/yr	1.08	0.38
Bioscience Facilities	Acetone	67-64-1	kg/yr	53.32	18.66
Bioscience Facilities	Acetonitrile	75-05-8	kg/yr	4.71	1.65
Bioscience Facilities	Allyl Alcohol	107-18-6	kg/yr	0.43	0.15
Bioscience Facilities	Chloroform	67-66-3	kg/yr	1.40	0.49
Bioscience Facilities	Cyclohexanol	108-93-0	kg/yr	0.96	0.34
Bioscience Facilities	Ethanol	64-17-5	kg/yr	83.16	29.11
Bioscience Facilities	Ethyl Acetate	141-78-6	kg/yr	72.03	25.21
Bioscience Facilities	Ethyl Ether	60-29-7	kg/yr	23.10	8.09
Bioscience Facilities	Formamide	75-12-7	kg/yr	0.57	0.20
Bioscience Facilities	Glutaraldehyde	111-30-8	kg/yr	1.06	0.37
Bioscience Facilities	Hexane (other isomers)* or n-Hexane	110-54-3	kg/yr	79.24	27.73
Bioscience Facilities	Hydrogen Chloride	7647-01-0	kg/yr	1.90	0.66
Bioscience Facilities	Hydrogen Peroxide	7722-84-1	kg/yr	36.57	12.80
Bioscience Facilities	Isopropyl Alcohol	67-63-0	kg/yr	33.78	11.82
Bioscience Facilities	Methyl Alcohol	67-56-1	kg/yr	30.47	10.66
Bioscience Facilities	Methylene Chloride	75-09-2	kg/yr	72.70	25.44
Bioscience Facilities	Phenol	108-95-2	kg/yr	1.16	0.41
Bioscience Facilities	Phosphoric Acid	7664-38-2	kg/yr	1.83	0.64
Bioscience Facilities	Potassium Hydroxide	1310-58-3	kg/yr	0.50	0.18
Bioscience Facilities	Sulfuric Acid	7664-93-9	kg/yr	11.04	3.86
Bioscience Facilities	Tetrahydrofuran	109-99-9	kg/yr	4.62	1.62
Bioscience Facilities	Triethylamine	121-44-8	kg/yr	1.09	0.38
Bioscience Facilities	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.50	0.01
LANSCE	Acetone	67-64-1	kg/yr	59.80	20.93
LANSCE	Acetylene	74-86-2	kg/yr	19.13	0.00
LANSCE	Ethanol	64-17-5	kg/yr	41.89	14.66
LANSCE	Isopropyl Alcohol	67-63-0	kg/yr	32.21	11.27
LANSCE	Methyl Alcohol	67-56-1	kg/yr	3.17	1.11
LANSCE	Propane	74-98-6	kg/yr	114.50	0.00
LANSCE	Sulfur Hexafluoride	2551-62-4	kg/yr	81.19	28.42

Key Facility	Toxic Air Pollutants	CAS Number	Units	2012 Usage	2012 Estimated Air Emissions
LANSCE	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	4.00	0.04
LANSCE	VM & P Naphtha	8032-32-4	kg/yr	0.75	0.26
Machine Shops	Acetone	67-64-1	kg/yr	15.80	5.53
Machine Shops	Acetylene	74-86-2	kg/yr	12.82	0.00
Machine Shops	Ethanol	64-17-5	kg/yr	24.58	8.60
Machine Shops	Isopropyl Alcohol	67-63-0	kg/yr	12.57	4.40
Machine Shops	Propane	74-98-6	kg/yr	0.44	0.00
Materials Science Laboratory	2-Ethoxyethanol (EGEE)	110-80-5	kg/yr	0.93	0.33
Materials Science Laboratory	Acetone	67-64-1	kg/yr	35.55	12.44
Materials Science Laboratory	Acetonitrile	75-05-8	kg/yr	1.57	0.55
Materials Science Laboratory	Chloroform	67-66-3	kg/yr	1.48	0.52
Materials Science Laboratory	Ethanol	64-17-5	kg/yr	12.63	4.42
Materials Science Laboratory	Hydrogen Chloride	7647-01-0	kg/yr	0.59	0.21
Materials Science Laboratory	Hydrogen Peroxide	7722-84-1	kg/yr	0.70	0.25
Materials Science Laboratory	Isopropyl Alcohol	67-63-0	kg/yr	37.60	13.16
Materials Science Laboratory	Methyl Alcohol	67-56-1	kg/yr	9.50	3.32
Materials Science Laboratory	Phosphoric Acid	7664-38-2	kg/yr	1.83	0.64
Materials Science Laboratory	Potassium Hydroxide	1310-58-3	kg/yr	1.00	0.35
Materials Science Laboratory	Toluene	108-88-3	kg/yr	3.47	1.21
Plutonium Facility Complex	Acetone	67-64-1	kg/yr	34.76	12.16
Plutonium Facility Complex	Acetylene	74-86-2	kg/yr	590.40	0.00
Plutonium Facility Complex	Diethylene Triamine	111-40-0	kg/yr	0.96	0.34
Plutonium Facility Complex	Ethanol	64-17-5	kg/yr	25.26	8.84
Plutonium Facility Complex	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.99	0.35
Plutonium Facility Complex	Hydrogen Peroxide	7722-84-1	kg/yr	1.41	0.49
Plutonium Facility Complex	Methyl 2-Cyanoacrylate	137-05-3	kg/yr	0.52	0.18
Plutonium Facility Complex	n,n-Dimethylformamide	68-12-2	kg/yr	4.74	1.66
Plutonium Facility Complex	Nitric Acid	7697-37-2	kg/yr	86.68	30.34
Plutonium Facility Complex	Propane	74-98-6	kg/yr	0.37	0.00
Plutonium Facility Complex	Trichloroethylene	79-01-6	kg/yr	58.57	20.50
Radiochemistry Facility	Chloroform	67-66-3	kg/yr	0.89	0.31
Radiochemistry Facility	Cobalt, elemental & inorg.comp., as Co	7440-48-4	kg/yr	2.27	0.02
Radiochemistry Facility	Ethanol	64-17-5	kg/yr	7.18	2.51
Radiochemistry Facility	Ethyl Acetate	141-78-6	kg/yr	21.16	7.41
Radiochemistry Facility	Ethyl Ether	60-29-7	kg/yr	16.59	5.81
Radiochemistry Facility	Ethylamine	75-04-7	kg/yr	0.35	0.12

Key Facility	Toxic Air Pollutants	CAS Number	Units	2012 Usage	2012 Estimated Air Emissions
Radiochemistry Facility	Hexane (other isomers) or n-Hexane	110-54-3	kg/yr	48.86	17.10
Radiochemistry Facility	Hydrogen Bromide	10035-10-6	kg/yr	9.75	3.41
Radiochemistry Facility	Hydrogen Chloride	7647-01-0	kg/yr	309.81	108.43
Radiochemistry Facility	Hydrogen Fluoride, as F	7664-39-3	kg/yr	3.45	1.21
Radiochemistry Facility	Hydrogen Peroxide	7722-84-1	kg/yr	79.78	27.92
Radiochemistry Facility	Indium & compounds, as In	7440-74-6	kg/yr	0.26	0.09
Radiochemistry Facility	Isopropyl Alcohol	67-63-0	kg/yr	26.71	9.35
Radiochemistry Facility	Methyl Alcohol	67-56-1	kg/yr	18.83	6.59
Radiochemistry Facility	Methylene Chloride	75-09-2	kg/yr	50.54	17.69
Radiochemistry Facility	n,n-Dimethylformamide	68-12-2	kg/yr	1.90	0.66
Radiochemistry Facility	Nitric Acid	7697-37-2	kg/yr	1534.72	537.15
Radiochemistry Facility	Phosphoric Acid	7664-38-2	kg/yr	11.00	3.85
Radiochemistry Facility	Potassium Hydroxide	1310-58-3	kg/yr	3.02	1.06
Radiochemistry Facility	Propane	74-98-6	kg/yr	50.14	0.00
Radiochemistry Facility	Propylene Dichloride	78-87-5	kg/yr	2.31	0.81
Radiochemistry Facility	sec-Butyl Alcohol	78-92-2	kg/yr	3.20	1.12
Radiochemistry Facility	Silver (metal dust & soluble comp., as Ag)	7440-22-4	kg/yr	2.65	0.93
Radiochemistry Facility	Sulfuric Acid	7664-93-9	kg/yr	5.52	1.93
Radiochemistry Facility	Tetrahydrofuran	109-99-9	kg/yr	7.57	2.65
Radiochemistry Facility	Tetrasodium Pyrophosphate	7722-88-5	kg/yr	0.25	0.09
Radiochemistry Facility	Toluene	108-88-3	kg/yr	1.21	0.42
Radiochemistry Facility	Triethylamine	121-44-8	kg/yr	0.36	0.13
Radiochemistry Facility	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.97	0.01
Radiochemistry Facility	VM & P Naphtha	8032-32-4	kg/yr	3.00	1.05
Radiochemistry Facility	Yttrium	7440-65-5	kg/yr	2.27	0.79
Radiochemistry Facility	2-Methoxyethanol (EGME)	109-86-4	kg/yr	0.48	0.17
Radiochemistry Facility	Acetic Acid	64-19-7	kg/yr	1.05	0.37
Radiochemistry Facility	Acetone	67-64-1	kg/yr	144.16	50.46
Radiochemistry Facility	Acetonitrile	75-05-8	kg/yr	6.60	2.31
Radiochemistry Facility	Benzene	71-43-2	kg/yr	0.88	0.31
Radiochemistry Facility	Beryllium	7440-41-7	kg/yr	0.23	0.08
Radiochemistry Facility	Cadmium, el.&compounds, as Cd	7440-43-9	kg/yr	2.16	0.76
Radiochemistry Facility	Carbon Tetrachloride	56-23-5	kg/yr	6.38	2.23
Radioactive Liquid Waste Treatment Facility	Sulfuric Acid	7664-93-9	kg/yr	843.70	295.29

Key Facility	Toxic Air Pollutants	CAS Number	Units	2012 Usage	2012 Estimated Air Emissions
Sigma Complex	Acetone	67-64-1	kg/yr	7.90	2.76
Sigma Complex	Acetylene	74-86-2	kg/yr	18.14	0.00
Sigma Complex	Aluminum numerous forms	7429-90-5	kg/yr	2.77	0.03
Sigma Complex	Chromium, Metal &Cr III Compounds, as Cr	7440-47-3	kg/yr	0.80	0.28
Sigma Complex	Copper	7440-50-8	kg/yr	2.36	0.02
Sigma Complex	Diethylene Triamine	111-40-0	kg/yr	0.48	0.17
Sigma Complex	Ethanol	64-17-5	kg/yr	12.32	4.31
Sigma Complex	Furfuryl Alcohol	98-00-0	kg/yr	2.26	0.79
Sigma Complex	Indium & compounds, as In	7440-74-6	kg/yr	0.91	0.32
Sigma Complex	Isopropyl Alcohol	67-63-0	kg/yr	40.85	14.30
Sigma Complex	Magnesium Oxide Fume	1309-48-4	kg/yr	0.45	0.16
Sigma Complex	Methyl Alcohol	67-56-1	kg/yr	0.79	0.28
Sigma Complex	Molybdenum	7439-98-7	kg/yr	291.32	101.96
Sigma Complex	Propane	74-98-6	kg/yr	0.97	0.00
Sigma Complex	Tantalum Metal	7440-25-7	kg/yr	9.94	3.48
Sigma Complex	Tin numerous forms	7440-31-5	kg/yr	2.27	0.02
Sigma Complex	Toluene	108-88-3	kg/yr	1.73	0.61
Sigma Complex	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	22.21	0.22
Sigma Complex	Zirconium Compounds, as Zr	7440-67-7	kg/yr	2.00	0.02
Solid Radioactive and Chemical Waste Facilities	Ethanol	64-17-5	kg/yr	98.66	34.53
Solid Radioactive and Chemical Waste Facilities	Propane	74-98-6	kg/yr	1007.19	0.00
Target Fabrication Facility	Acetone	67-64-1	kg/yr	31.60	11.06
Target Fabrication Facility	Divinyl Benzene	1321-74-0	kg/yr	0.92	0.32
Target Fabrication Facility	Ethanol	64-17-5	kg/yr	21.08	7.38
Target Fabrication Facility	Ethyl Acetate	141-78-6	kg/yr	3.60	1.26
Target Fabrication Facility	Methyl Alcohol	67-56-1	kg/yr	34.03	11.91
Target Fabrication Facility	Methyl Silicate	681-84-5	kg/yr	1.50	0.53
Target Fabrication Facility	Methylene Chloride	75-09-2	kg/yr	10.61	3.71
Target Fabrication Facility	n-Heptane	142-82-5	kg/yr	2.73	0.96
Target Fabrication Facility	Styrene	100-42-5	kg/yr	2.72	0.95
Target Fabrication Facility	Tetrahydrofuran	109-99-9	kg/yr	21.34	7.47
Target Fabrication Facility	Trichloroethylene	79-01-6	kg/yr	29.28	10.25
Target Fabrication Facility	Vinyl Toluene	25013-15-4	kg/yr	0.90	0.32
Tritium Facilities	Acetone	67-64-1	kg/yr	12.71	4.45
Tritium Facilities	Ethanol	64-17-5	kg/yr	12.63	4.42

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Appendix C of the SWEIS Yearbook–2012

Nuclear Facilities List

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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	
R. M. Mobley LANL Safety Basis Division	2/18/11 Date
Thomas L. Forbes LASO Safety Basis Team Leader	03/01/2011 Date
[signature] LASO Manager	3/7/11 Date

Record of Document Revisions

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

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 WCRRF due to ABD-WFM-005, R. 0; updated NES to be referenced to NES-ABD-0101, R.1.0
10	January 2008	Re-categorized RLWTF per memo SBT:CMK-002, Removed SST Pad per 5485.3/SBT:JF-39193
11	September 2009	Removed MDA B per SBT:2SBLJ-56803; Removed WWTP per 2009 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-40 1 since the old EWMO-document numbering system is no longer utilized by the Safety Basis Division).
12	January 2011	Removed MDA-C per COR-SO-6.30.2010-264748; Removed TA-53 Resin Tank per COR-SO-2.8.2010-232928; Removed EF Site per COR-SO-9.15.2010-282846; added TA-50-0248 to Table 5-2 per AD-NHHO:11-041 Response to question about adding Building TA-50-248 to the DOE/LANL List of LANL Nuclear Facilities. Removed "and three disposal pits" from MDA-A per COR-SO-1.4.2010-223375

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.

Changes in Nuclear Facility Status

Date	Description
10/01	TA-53 LANSCE IL JCO in relation to changes in operational parameters of the coolant system with an expiration date of 1/31/02.
10/01	TA-53 LANSCE Actinide BIO approved as hazard category 3 nuclear activity.
3/02	TA-33-86, High Pressure Tritium Facility (HPTF) removed from nuclear facilities list.
4/02	TA-53 LANSCE, DOE NNSA approves BIO for Storing Activated Components (A6, etc.) in Bldg 53-3 Sector M "Area A East" and added as hazard category 3 nuclear activity.
7/02	TA-53 LANSCE, WNR Facility Target 4 downgraded to below hazard category 3 and removed 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

Changes in Nuclear Facility Status

Date	Description
3/04	TA-54-38, Radioassay and Nondestructive Testing (RANT) Facility, is re-categorized as a Hazard Category 2 nuclear facility from Hazard Category 3.
6/04	TA-54-412 Decontamination and Volume Reduction Glovebox (DVRS) added to Nuclear Facility List. The facility will operate as a Hazard Category 2 not exceeding 5 months from the date LASO formally releases the facility for operations following readiness verification.
6/04	DOE Safety Evaluation Report for the TSFF BIO establishes that TSFF is re-categorized as a Hazard Category 3 from Hazard Category 2.
7/04	TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) was re-categorized as a Hazard Category 2 Nuclear Facility based on a DOE Memo dated March 20, 2002.
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 WCRRF 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-I004 Removed WWTP per SBT:25BLJ-49261 which approved final hazard categorization NES-ABD-0501 RI Removed Pratt Canyon per SBT:25BLJ-49261 which approves final hazard, categorization NES-ABD-0401 RI Added EF Firing Site per AD-NHHO:09-093
1/11	Removed MDA-C per COR-SO-6.30.2010-264748 Removed TA-53 Resin Tank per COR-SO-2.8.2010-232928 Removed EF Site per COR-SO-9.15.2010-282846 Added TA-50-0248 per AD-NHHO:11-041 Response to question about adding Building TA-50-248 to the DOE/LANL List of LANL Nuclear Facilities Removed "and three disposal pits" from MDA-A per COR-SO-1.4.2010-223375

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
BIO	Basis for Interim Operations
BUS	Business Operations (Division)
CFR	Code of Federal Regulations
CMR	Chemistry and Metallurgy Research (Facility)
CSO	cognizant secretarial officer
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
DVRS	decontamination and volume reduction glovebox
EWM	Environmental Waste Management
FMU	facility management unit
HC	hazard category
HPTF	High Pressure Tritium Facility
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
MDA	material disposal area
MLNSC	Manuel Lujan Neutron Scattering Center
NDA	non-destructive assay
NES	Nuclear Environmental Site
NNSA	National Nuclear Security Administration
OSD	Operations Support Division
OSRP	Offsite Source Recovery Project
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
SER	safety evaluation report
SM	South Mesa
STD	standard
SST	Safe-Secure Trailer
TA	technical area
TRU	transuranic
TSD	transportation safety document

Term	Meaning
TSR	technical safety requirement
WCRRF	Waste Characterization, Reduction and Repackaging Facility
WETF	Weapons Engineering Tritium Facility
WFO	Weapons Facilities Operations

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 document 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, 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 420.2B, Change 1, *Safety of Accelerator Facilities*, USDOE, 7/23/04.

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 (RLWTF)
2	TA-50 Waste Characterization Reduction and Repackaging Facility (WCRRF)
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 (General's Tanks)
2	TA-21 MDA T NES
3	TA-35 MDA W NES
2	TA-49 MDA AB NES
3	TA-54 MDA H NES

6 LANL NUCLEAR FACILITIES SUMMARY TABLES

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 (RLWTF)	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		
	0248	3		4 Waste water holding tanks	AD-NHHO:11-041 Response to question about adding Building TA-50-248 to the DOE/LANL List of LANL Nuclear Facilities	
50	0069	2	TA-50 Waste Characterization Reduction and	Waste characterization, reduction, and repackaging facility	*Basis for Interim Operation for Waste Characterization, Reduction, and Repackaging Facility (WCRRF),*	EWM
	External	2		Drum staging activities outside TA-50-69		

TABLE 5-2. Nuclear Facility Categorization Information

TA	Bldg	Haz Cat	Facility Name	Description	Categorization Basis	FOD
50	0069	2	Repackaging Facility (WCRRF)	Waste characterization, reduction, and repackaging facility	ABD-WFM-005, R.0, April 23, 2007	EWM
	External	2		Drum staging activities outside TA-50-69		

TABLE 5-2. Nuclear Facility Categorization Information (cont.)

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.	EWM
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	EWM
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")	"Documented Safety Analysis for Surveillance and Maintenance of Nuclear Environmental Sites at Los Alamos National Laboratory", NES-ABD-0101, R.1.0, June, 2007	TA21
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	TA21
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	TA21

TABLE 5-2. Nuclear Facility Categorization Information (cont.)

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	TA21
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	TA21

Appendix D of the SWEIS Yearbook–2012
Department of Energy
2012 Pollution Prevention Awards for
Los Alamos National Laboratory

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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 six awards for pollution prevention projects during FY 2012. The winning projects are described below. The first three projects received Best-in-Class awards.

- ***Ronnie Garcia: Master of Minimization***
  LANS nominated Ronnie Garcia as an agent of positive environmental change. For over a decade, the employee has been at the forefront of waste minimization activities both at his site and institutionally. Ronnie led dozens of recognized pollution prevention projects, and his work has gone far above and beyond his job requirements. His efforts have saved the Laboratory millions of dollars in avoided procurement and waste disposal, and literally millions of pounds of material have been recycled thanks to his work. This project also received a DOE Sustainability Award.

- ***The Outfall Reduction Program at Los Alamos National Laboratory***
  The Outfall Reduction Program was established to reduce environmental impacts of discharges, conserve potable water, and improve regulatory compliance. The full realization of the Outfall Reduction Program strategy anticipates the reclamation, reuse, and recycling of approximately 163 million gallons of potable groundwater annually.

- ***Reducing Szulfur Hexafluoride Use in Ion Sources***
  A LANS researcher developed a strategy to use much less sulfur hexafluoride in his equipment. The strategy has resulted in fewer electronics failures, less lost time to maintenance work, and no contamination of the system by toxic trace gases. The strategy avoids the use of approximately 240lb/year of sulfur hexafluoride and potentially over one million dollars per year in lost productive time for the accelerator at Los Alamos Neutron Science Center (LANSCE).

- ***Biodiesel Waste Improves LANL Sewage Plant Performance***
  Crude glycerol, a waste produced in the production of biodiesel, is being used to improve the effluent water quality of the Laboratory's sewage treatment facility and increase opportunities for the reclamation and reuse of cooling tower discharges. The crude glycerol provides supplementary "food" to the microorganisms responsible for sewage breakdown and increases the microorganisms' activity while subsequently improving the removal of pharmaceuticals and metabolites, endocrine disruptors, heavy metals, and nitrates. The improved plant performance has allowed the diversion of about 14.7 million gallons water/year of cooling tower discharges from the environment to the Laboratory's sewage plant. This water is now available for reclamation and reuse.

- ***Thorium is Now Green***
  A new and versatile thorium chloride reagent has been developed using legacy thorium nitrate waste. This process is cost-effective, safe, and green. In addition, it has applications in thorium chemistry, materials science, and nuclear reactors. This project won an R&D 100 Award in 2011.

- ***Insensitive High Explosive (TATB) Synthesis Using Environmentally-Friendly Processes***
  The US does not currently have the domestic capability to produce precursor chemicals to manufacture the high explosive 1,3,5-triamino-2,4,6-trinitrobenzene (TATB) used in some weapons systems. Some of the chemical processes to make the precursor chemicals are no longer allowed domestically due to environmental concerns over hazardous processes and solvents that contribute to global warming. LANS researchers have overcome these concerns by developing an environmentally-friendly method to produce TATB.

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