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SWEIS Yearbook 2013

Los Alamos
NATIONAL LABORATORY
EST. 1943

Front Cover photos: Mixed-conifer forest (top), habitat for the Jemez Mountains salamander (*Plethodon neomexicanus*) (bottom). (Photo credit: Michael T. Hill)

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SWEIS Yearbook–2013

Comparison of 2013 Data to Projections of the 2008 Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory

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NATIONAL LABORATORY
EST. 1943

Prepared by the Environmental Stewardship Services Group,
Environmental Protection Division

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EXECUTIVE SUMMARY

Los Alamos National Laboratory (LANL or the Laboratory) operations data for calendar year (CY) 2013 mostly fell within the 2008 Site-Wide Environmental Impact Statement (SWEIS) projections. Operation levels for the Radiochemistry Facility exceeded the 2008 SWEIS capability projections. This increase in operations did not cause an increase in waste generation, or National Pollutant Discharge Elimination System (NPDES) discharges, there was a slight exceedance in radioactive air emissions above the projections from the 2008 SWEIS. Although individual nuclide categories may slightly exceed projections, overall emissions and offsite dose remain bounded by the 2008 SWEIS projections for the Radiochemistry Facility. Several facilities exceeded the 2008 SWEIS levels for waste generation quantities, however all were one-time, non-routine events that do not reflect day-to-day LANL operations. 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. Gas, electricity and water consumption remained within the 2008 SWEIS levels for utilities in CY 2013.

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 the 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, DOE/NNSA issued a memo requesting LANL 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 2013. The selected levels of operation from the RODs and the SWEIS provided projections for these operations. This Yearbook compares data from CY 2013 to the 2008 SWEIS projections approved in a ROD.

The 2013 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.

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 2013 were compared to 2008 SWEIS 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 the 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 15 facility construction and modification projects within the Key Facilities. During CY 2013, 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).
- The Nuclear Materials Safeguards and Security Upgrades Project continued at Technical Area (TA) 55.
- The TA-55 Reinvestment Project construction continued.
- 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.
- The Materials Science Laboratory (MSL) Infill Project was completed.

Within the Non-Key Facilities, two major construction projects were undertaken.

- Construction of the Indoor Firing Range was completed.
- Construction of the Interagency Wildfire Center was completed.

During CY 2013, 75 capabilities were active and 15 capabilities were inactive at LANL's Key and Non-Key Facilities.

At the Chemistry and Metallurgy Research (CMR) Building Key Facility, the following capabilities were inactive:

- destructive and nondestructive analysis,
- nonproliferation training,
- actinide research and development, and
- large vessel handling.

At the Tritium Facilities, the following capabilities were inactive:

- high-pressure gas fills and processing,
- gas boost system testing and development,

- diffusion and membrane purification,
- metallurgical and material research,
- hydrogen isotopic separation, or
- radioactive liquid waste treatment.

At LANSCE, Materials Test Station equipment was not installed.

At Solid Radioactive and Chemical Waste (SRCW) Facilities, the following capabilities were inactive:

- waste retrieval,
- waste treatment, and
- decontamination operations.

At the Plutonium Facility Complex, no fabrication of ceramic-based reactor fuels took place.

During CY 2013, operation levels for one LANL facility exceeded the 2008 SWEIS capability projections—Radiochemistry Facility. The Radiochemistry Facility increased isotope offsite shipments by 103 percent compared with levels projected in the 2008 SWEIS. Although chemical waste generation exceeded 2008 SWEIS projections for this facility, the exceedance was due to a one-time, non-routine maintenance activity not associated with an increase in operations levels.

In CY 2013, several Key Facilities exceeded 2008 SWEIS waste projections. All exceedances were due to one-time, non-routine events. Total LANL site-wide waste generation for all waste types for CY 2013 fell below 2008 SWEIS projections. The following facilities exceeded 2008 SWEIS projections for waste generation.

Chemical Waste:

- High Explosives Processing – due to disposal of chemical waste produced from steel tank refurbishment project at TA-16-0171;
- High Explosives Testing – due to disposal of sediment and water from the cleanout of a cooling tower and disposal of cooling tower media and water overflow tank;
- MSL – due to disposal of unused/unspent corrosive liquid;
- Radiochemistry Facility – due to the disposal of water from the cleanout of a cooling tower and disposal of cooling tower media;
- Radioactive Liquid Waste Treatment Facility (RLWTF) – due to the disposal of unused/unspent chemicals;
- Sigma Complex – due to (1) disposal of beryllium contaminated laboratory waste generated since 2011 and (2) water from the cleanout of a cooling tower and disposal of cooling tower media;
- SRCW Facilities – due to (1) disposal of asphalt from a parking lot upgrade project, (2) disposal of asbestos from an asbestos abatement project, and (3) disposal of unused/unspent enamel paint; and

- Plutonium Facility – due to disposal of soil, personal protective equipment, and plastics associated with the cleanup of spilled diesel fuel.

Low-Level Radioactive Waste:

- SRCW Facilities - due to debris from the construction of Perma-Con® (modular containment structure) for processing low-level radioactive waste crate boxes stored in Area G. and
- RLWTF – due to a campaign to treat and dispose of evaporator bottoms.

Mixed Low-Level Radioactive Waste:

- Machine Shops – due to the decommissioning of a circuit board and cathode ray tube part for final disposition; and
- SRCW Facilities – due to waste related to consolidating and packaging of mixed low-level radioactive waste.

Site-Wide Operations Data and Affected Resources

This Yearbook evaluates the effects of LANL operations during CY 2013 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 air 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 220 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 (DOE 2009a), Los Alamos National Security, LLC (LANS) 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 53,687 metric tons of carbon dioxide equivalents.

Since 1999, the total number of permitted outfalls was reduced from 55 to 11 and regulated under the NPDES permit No. NM0028355. In CY 2013, eight outfalls flowed. Calculated NPDES discharges totaled 123.1 million gallons, approximately 30.7 million gallons less than the CY 2012 total. This is well under the 2008 SWEIS projected volume of 279.5 million gallons per year.

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 resulted in significantly decreased emissions.

LANS performed significant groundwater compliance work in CY 2013 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.

In CY 2013, DOE/NNSA removed 29 structures at LANL eliminating 49,032 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 2013 was 369 million gallons; this is 75 million gallons less water consumption than in 2012. Improvements to the Sanitary Effluent Reclamation Facility (SERF) operations in CY 2012 led to increased use of recycled effluent in cooling towers in CY 2013. Electricity consumption was 434 gigawatt-hours compared with the 2008 SWEIS projection of 651 gigawatt-hours. Gas consumption for CY 2013 was 1.0 million decatherms compared with the 2008 SWEIS projection of 1.20 million decatherms. DOE/NNSA and the Laboratory are committed to increasing energy efficiency and will continue to make improvements towards that goal.

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 138.7 person-rem, much lower than the 280 person-rem workforce dose projected in the 2008 SWEIS. There were approximately 121 recordable cases of occupation injury and illness, which represents a 13 percent decrease from CY 2012. In addition, approximately 44 cases resulted in days away, restricted or transferred duties, representing a 12 percent increase in cases from CY 2012. 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 10,279 employees at the end of CY 2013 represent a less than 1 percent reduction compared with the 10,366 total employees reported in the 2012 Yearbook. The total number of employees is 24 percent below 2008 SWEIS projections.

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. On October 10, 2013, the Jemez Mountains salamander (*Plethodon neomexicanus*) was federally listed as an endangered species under the Endangered Species Act. A site plan was prepared for the salamander and consultations with the United States Fish and Wildlife Service began for its inclusion into LANL's Habitat Management Plan. No archaeological excavations occurred at TA-54 or anywhere else on LANL property. 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. No historic buildings were demolished in fiscal year (FY) 2013. Ecological and cultural resources remained protected in CY 2013. 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. As of CY 2013, this expansion had not become necessary. From 2001 to 2013, approximately 2,500 acres of land were transferred to the Bureau of Indian Affairs to be held in trust for the Pueblo de San Ildefonso or conveyed to Los Alamos County. No tracts were conveyed or transferred in CY 2013.

Conclusion

LANL operations during CY 2013 mostly fell within 2008 SWEIS projections. Operation levels for the Radiochemistry Facility exceeded the 2008 SWEIS capability projections. This increase in operations did not cause an increase in waste generation or NPDES discharges; there was a slight exceedance in radioactive air emissions above the projections from the 2008 SWEIS. Although individual nuclide categories may slightly exceed projections, overall emissions and offsite dose remain bounded by the 2008 SWEIS projections for the Radiochemistry Facility. 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. Gas, electricity, and water consumption have remained within the 2008 SWEIS projections for utilities.

DOE/NNSA is committed to reducing energy and water consumption and will continue to make improvements towards that goal. 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 Expansion in CY 2012 increased use of recycled effluent in the cooling towers in CY 2013, reducing the amount of water consumed by 75 million gallons. Details can be found in LANL's FY 2013 Site Sustainability Plan. Overall, LANL operations data from CY 2013 indicate that LANL has been operating within the 2008 SWEIS projections and regulatory limits.

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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 performed a formal analysis of the adequacy of the SWEIS to characterize the environmental envelope for continuing operations at LANL. The annual SWEIS Yearbook was designed to assist DOE in this analysis by comparing operational data with projections of the SWEIS for the level of operations selected by the SWEIS RODs. Yearbook publications are available online in LANL's Electronic Public Reading Room (http://www.lanl.gov/library/about/environmental.php).

The 2013 SWEIS Yearbook is the sixth compilation of annual data since the first ROD for the 2008 LANL SWEIS was issued and the fourth 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 SWEIS Yearbook summarizes the data for calendar year 2013.

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ACKNOWLEDGMENTS

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The authors would like to give a special thanks to Jennifer Payne, SWEIS Program Manager and Resources Management Team Leader, for her support and assistance.

Many individuals assisted in the collection of information and review of drafts. Data and information came from 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.

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Decontamination, Decommissioning, and Demolition	Ian Albright
Decontamination, Decommissioning, and Demolition	Kelly Gee
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High Explosives Processing Facilities	Bob Lechel
High Explosives Testing Facilities	Bob Lechel
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Liquid Effluents	Holly Wheeler
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Machine Shops	Darrik Stafford
Materials Science Laboratory	Marc Gallegos
Materials Science Laboratory	Dee Hoisington
Nicholas C. Metropolis Center	Harold Armstrong

Area of Contribution	Contributor
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Non-Key Facilities: Tactical Training Facility	Jeff Tucker
Non-Key Facilities: Indoor Firing Range	Jeff Tucker
Non-Key Facilities: Interagency Wildfire Center	Paul Stevenson
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Radioactive Liquid Waste Treatment Facility	Chris Del Signore
Radiochemistry Facility	Patricia Vardaro-Charles
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Sigma Complex	Marc Gallegos
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Utilities	Andrew Erickson
Worker Safety/Doses	Paul Hoover
Worker Safety/Doses	Jim Stein

ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
AOC	area of concern
BA	biological assessment
BMP	best management practice
BSL	Biosafety Level
BTF	Beryllium Technology Facility
C&D	construction and demolition
CFR	Code of Federal Regulations
CGP	Construction General Permit
CGTG	Combustion Gas Turbine Generator
Ci	curies
CLEAR	Chloride Extraction and Actinide Recovery (Line)
cm	centimeters
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
COPC	chemical of potential 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
EIS	Environmental Impact Statement
ENV	Environmental Protection Division
ENV-ES	Environmental Stewardship Services 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
GTRI	Global Radiological Threat Reduction
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
Laboratory	Los Alamos National Laboratory
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
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
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
NMSSUP	Nuclear Materials Safeguards and Security Upgrades Project
NNSA	National Nuclear Security Administration
NOI	notice of intent
NO_x	nitrous oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NS2	National Security Nuclear Science
NSSB	National Security Sciences Building
ORPS	occurrence reporting and processing system
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	particulate matter
PNM	Public Service Company of New Mexico
PPE	personal protective equipment
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

SCC	Strategic Computing Complex
SEIS	Supplemental Environmental Impact Statement
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	(Complex Transformation) Supplemental Programmatic Environmental Impact Statement
SRCW	Solid Radioactive and Chemical Waste
SWEIS	Site-Wide Environmental Impact Statement
SWMU	solid waste management unit
SWPPP	Storm Water Pollution Prevention Plan
SWWS	Sanitary Wastewater Systems
TA	Technical Area
TAL	target action level
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)
UCN	Ultracold Neutron (Facility)
US	United States
USFWS	US Fish and Wildlife Service
VOC	volatile organic compound
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)
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) for this SWEIS in September 1999 (DOE 1999b). The ROD identified the decisions DOE made on future levels of operation at the Laboratory.

As per DOE regulations, in 2004 DOE/National Nuclear Security Administration (NNSA) 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 requesting 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 involving 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 for the 2008 SWEIS 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 for the 2008 SWEIS 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.

A second SA to the 2008 SWEIS was issued by DOE/NNSA in April 2011 (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

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2 Congress established the National Nuclear Security Administration (NNSA) within the DOE to manage the nuclear weapons program for the US. 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.

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.

1.2 Annual Yearbook

To enhance the usefulness of the SWEIS, DOE/NNSA and Los Alamos National Security, LLC (LANS) 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.

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 National Pollutant Discharge Elimination System (NPDES) outfall discharge data (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 ecological resources, and other resources for which DOE/NNSA has long-term stewardship responsibilities as an administrator of federal lands.
- *Summary and conclusion.* Chapter 4 summarizes CY 2013 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 2013.
- *Pollution Prevention (P2) Awards (Appendix D)*. This appendix provides a summary of the DOE 2013 P2 Awards for LANL.

Data for comparison come from a variety of sources, including facility records, operations reports, facility personnel, and the Annual Site 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 SWEIS Yearbook provides DOE/NNSA with information needed to evaluate the adequacy of the SWEIS and enable decision making on when and if a new SWEIS is needed. The Yearbook also provides 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 2013 Yearbook

This Yearbook represents data collected for CY 2013. It compares CY 2013 data with 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 compiled 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.

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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.

2.0 FACILITIES AND OPERATIONS

LANS manages 976 buildings, trailers, and transportable buildings containing 8.2 million square feet under roof, spread over an area of approximately 40 square miles of land owned by the US government and administered by DOE/NNSA and the DOE Office of Science. Much of the undeveloped area at LANL provides a buffer for security, safety, and possible future expansion. Approximately 41 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 approximately 803 permanent buildings and 173 temporary structures (trailers and transportable buildings). In CY 2013, LANS leased approximately 39 buildings and DOE leased 1 building 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 are critical to meeting mission assignments and

- house operations that have the potential to cause significant environmental impacts,
- are of most interest or concern to the public (based on comments in the 1999 and 2008 SWEIS public hearings), or
- might 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 (radiological facility) (DOE 2011c). For the purpose of the 2008–2013 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 are called “Non-Key,” not to imply that these facilities are any less important to the accomplishment of critical research and development, but because they do not fit the above criteria for “Key” Facilities.

The Key Facilities comprise 42 of the 48 HazCat 2 and HazCat 3 Nuclear Facilities 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; 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 composing 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 2013. Each of these three aspects is given perspective by comparing them to projections made in 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 2013 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 and make up the balance of LANL facilities. The Non-Key Facilities represent a significant fraction of LANL and comprise all, or the majority of, 30 of the 49 TAs, including TA-00, which consists of leased space within the Los Alamos town site and White Rock, TA-57 at Fenton Hill. Non-Key Facilities comprise 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, 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, and 37	1,115
High Explosives Testing (HET) Facilities	TAs 15, 36, 39, and 40	8,691
Tritium Facility	TA-16	18
Target Fabrication Facility (TFF)	TA-35	3
Bioscience Facilities	TAs 43, 03, 16, 35, and 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	TAs 50 and 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**

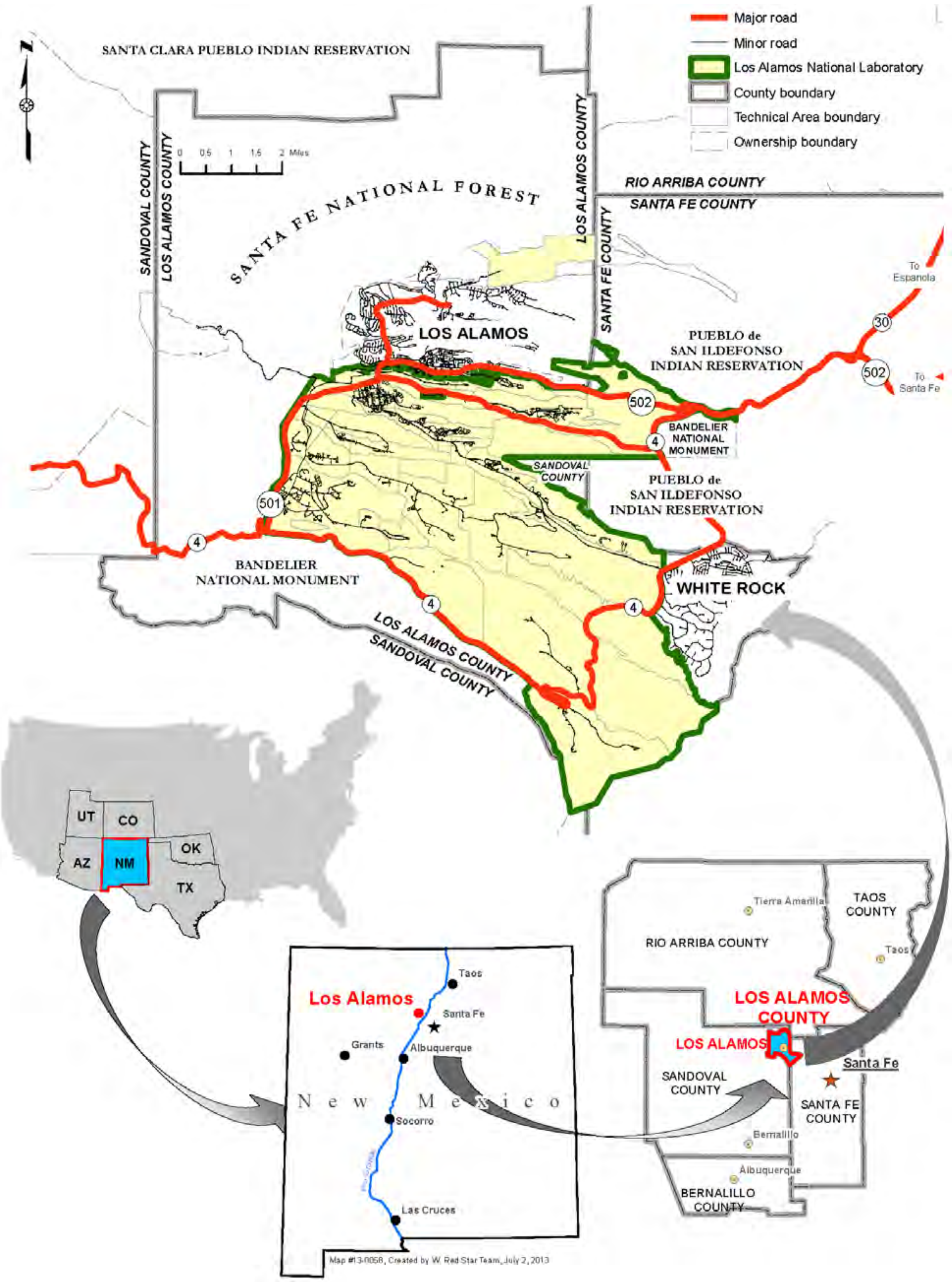

Figure 2-1. Location of LANL

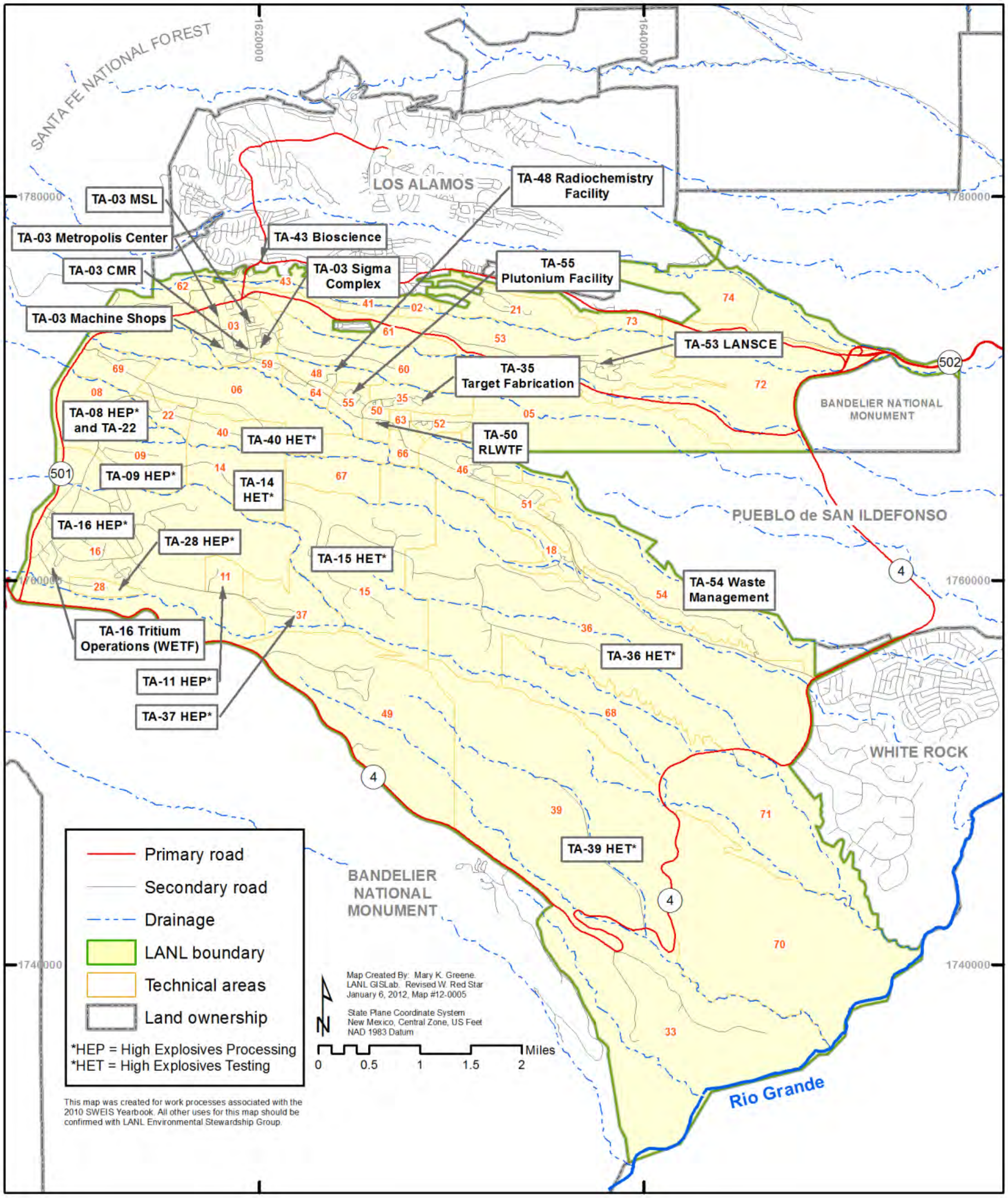

Figure 2-2. Location of Technical Areas and Key Facilities

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.

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 2013. 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 NHC

Building	Description	2008 SWEIS	NHC LANL 2013*
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, an 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). NNSA selected the Modified CMRR-NF Alternative described in the SEIS to proceed forward with the design and construction of the nuclear facility at LANL. 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 in the CMR 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 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. In CY 2013, startup activities were still in progress.

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 2013 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 2013, and all four were below operational levels projected in the 2008 SWEIS (Table A-1). The CVD project is expected to start in CY 2014 and is expected to last two to three years, ending no later than CY 2017 (bounding completion date). As needed, the CMR facility will be decommissioned by CY 2018 once the CVD project is completed. CMR is planning for termination of operations in CY 2019.

2.1.3 Operations Data for the CMR Building

Operations data levels at the CMR Building remained below levels projected in the 2008 SWEIS. 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 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 2013, 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 cooling tower media and water from the cooling tower at SM-2238 and beryllium contaminated laboratory waste from the BTF. During CY 2013, 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 also 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 fenced 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 2013 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 due to the decommissioning of a small part for final disposition. This accounts for all MLLW generated at Machine Shops. 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 laboratories, 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 developed laboratory space in an area currently unfinished on the second floor of TA-3-1698. Four lab environments were developed and outfitted with appropriate enclosures and lab benches. The project is expected to be completed by 2014. The 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 2013, and all were below operational levels projected in the 2008 SWEIS (Table A-7).

2.4.3 Operations Data for the MSL

Operations data levels at the MSL remained below levels projected in the 2008 SWEIS, with one exception. Chemical waste generation at the MSL exceeded 2008 SWEIS projections due to disposition of unused/unspent corrosive products, which consisted of approximately 80 percent (560 kilograms) of the chemical waste generated. 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[5] 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 the 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 at the Metropolis Center 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 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 at 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 per year. 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 2013, the SCC Infrastructure Upgrade Project design was completed. Construction began 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

5 A teraflop is a measure of a computer's speed and can be expressed as: A trillion floating point operations per second. 10 to the 12th power floating-point operations per second. 2 to the 40th power flops.

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 2013 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. 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 both 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 laboratory-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 2013, the High Explosives Science and Technology group conducted operations in TA-16-0305.

2.6.2 Operations at the HEP Facilities

The 2008 SWEIS identified six capabilities at this Key Facility. All six capabilities were active in CY 2013 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 2013, less than 3,000 pounds of high explosives and less than 1,000 pounds of mock explosives material were used in the fabrication of test components for internal and external customers. The LANL High Explosives Science and Technology group synthesized and/or formulated less than 100 pounds of explosives. Materials testing at TA-09 expended less than 30 pounds of these explosives. Materials testing at TA-22 expended less than 1 pound of Pentaerythritol tetranitrate (PETN)-based detonators.

High explosives processing and high explosives laboratory operations generated approximately 12,000 gallons of explosive-contaminated water, which was treated at the High Explosives Wastewater Treatment Facility (HEWTF) using an evaporator system resulting in zero liquid discharge. All high explosives burning operations are conducted at TA-16-0388. Explosive waste treated there included 2,400 pounds of water-saturated high explosive machining scrap and 1,100 pounds of high explosive contaminated scrap metal. No explosives-contaminated sand or solvents were treated. Approximately 2,000 gallons of propane were expended to treat these materials. Non-detonable explosive-contaminated equipment was steam cleaned in the building (TA-16-0260) and salvaged or sent for recycling.

Efforts continued in CY 2013 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

Operations data levels at HEP were below levels projected in the 2008 SWEIS with one exception. Chemical waste generation exceeded 2008 SWEIS projections due to the disposition of waste generated during the refurbishment of TA-16-0171, a steel water tank. Approximately 48 percent (10,000 kilograms) of chemical waste was generated during this activity. Clean out activities included cleaning out the tank, stripping and repainting all surfaces, lead abatement, and installing cathodic protection. 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, 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 (sites specifically designed to conduct experiments with explosives) 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 (TA-22) 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 2013. 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 15-0436. In 2013, the second tank 15-0435 was decommissioned in preparation for phase two installation of a double-walled replacement tank expected to be completed in CY 2014. A revitalization effort of firing site R-306 was completed in 2013 to support upcoming HET activities. This included infrastructure repairs/upgrades and firing point reconfiguration.

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

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 2013, 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 TAs 14, 15, 36, 39, and 40. Levels of research in CY 2013 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 90 kilograms of depleted uranium was expended, compared with approximately 3,900 kilograms projected in the 2008 SWEIS. The quantity of expended depleted uranium includes the quantity of depleted uranium expended during material sanitization.

Five hydrotests were performed at the DARHT Facility. Intermediate-scale dynamic experiments containing beryllium using single-walled steel containment vessels continued at the Eenie Firing Point (TA-36-0003), along with other programmatic experiments. A steel vessel is used to mitigate 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 with one exception. Chemical waste generation exceeded 2008 SWEIS projections due to sediment and water mixtures from clean-out of cooling towers and water overflow tanks which consisted of approximately 94 percent (51,000 kilograms) of waste of the chemical waste generated. 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) at TA-21-0209, and the Tritium Systems Test Assembly (TSTA) at 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 are included as part of the Plutonium Complex Facility.

In CY 2013, the tritium inventory at WETF was greater than 30 grams and, thus is listed as a HazCat 2 Nuclear Facility (Table 2-3).

Table 2-3. WETF Buildings with NHC

Building	Description	2008 SWEIS	NHC LANL 2013[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. Three of the nine capabilities were active in CY 2013, and all three were below operational levels projected in the 2008 SWEIS (Table A-15). In addition to the capabilities listed in the SWEIS, other activities included packaging of legacy items for waste disposition.

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 2013, 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 2013 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 laboratories 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. Because of 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, chemical wastes, or 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 Biosafety Level 3 Facility at Los Alamos National Laboratory" and a FONSI (DOE 2002a). However, on January 22, 2004, DOE/NNSA withdrew the FONSI to re-evaluate the environmental consequences of operating the facility based on 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.

In CY 2013 TA-43-0020 was decontaminated and decommissioned (see section 3.11.2 for details).

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 2013 and all were at or below levels projected in the 2008 SWEIS (Table A-19).

There is no work with radioactive materials 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 laboratories that include 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 Radiation Protection Services 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 20-centimeter-thick, pre-World War II steel counting chambers (SB-14 and SB-16) 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 by the work they perform (routine monitoring) and if there has been any involvement in radiological incidents (special bioassay). During CY 2013 the SB-14 counting system was operational and used for client counts. SB-16 was in stand-by status for most of the year but expected to be brought to production status in early CY 2014.

2.10.3 Operations Data for the Bioscience Facilities

In CY 2013, 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 2013 there were 10 changes to the Radiochemistry Facility:

- Upgrades to the TA-48-0001 boiler system that began in CY 2012 continued (LANL 2011a).
- Replacement of the Hot Cell #13 control panel in TA-48-0001 was completed (LANL 2012a).
- Moving the Materials Synthesis and Integrated Devices team out of TA-48-0107 began.
- A new Perchlorate system was installed in TA-48-0001, room 426.
- Refurbishment of TA-48-0001, room 305 continued.
- Removal/replacement of the cooling tower media and cleanout in TA-48-0001 was completed.
- New chillers were installed in TA-48-0045.
- A new P10 gas cylinder system was installed in TA-48-0001.

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 2013. One capability exceeded the levels projected in the 2008 SWEIS. The Radiochemistry Facility increased isotope offsite shipments by 103 percent compared with levels projected in the 2008 SWEIS. Isotope production continues to expand beyond levels projected in the SWEIS because of the demand from the nuclear medicine, research, and industrial isotope user communities (Table A-21). The remaining ten 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 2008 SWEIS, with two exceptions. Chemical waste generation at the Radiochemistry Facility exceeded 2008 SWEIS projections due to the removal and replacement of cooling tower media and cleanout. Radiological air emissions exceeded the 2008 SWEIS projections for bromine isotopes. Although individual nuclide categories, such as bromine isotopes, may slightly exceed projections, overall emissions and offsite dose remain bounded by the 2008 SWEIS projections for the Radiochemistry Facility. 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 tank for LLW (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 under roof.

Table 2-4. RLWTF Buildings with NHC

Building	Description	2008 SWEIS	NHC LANL 2013*
TA-50-0001	RLWTF Building	3	3
TA-50-0002	Pump House and Influent Storage	3	3
TA-50-0066	Transuranic (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 2013.

- Design of a replacement RLWTF was suspended by DOE/NNSA until mid-December 2013, when the project was re-activated. A replacement facility for the treatment of LLW is planned to be constructed by 2016, and be placed into operation in 2018.
- Solar evaporation tanks were installed at TA-52 during 2012, but were not used in 2013. Startup awaits New Mexico Environment Department (NMED) approval of a permit application submitted in August 2012.
- A decision was reached in March 2012 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] 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. Most piping and equipment changes were completed by the end of CY 2012; startup and use of some of the altered processes began during 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 2013, the RLWTF received 2.7 million liters of influent; 5 percent of this was delivered by truck (20 tankers). A total of 2.5 million liters of treated water were discharged to the environment via the effluent evaporator. No treated water was discharged to Mortandad Canyon.

There was little transuranic (TRU) radioactive liquid waste activity during CY 2013. Only one waste transfer (648 liters) was received from TA-55; one drum of sludge was produced in July 2013.

2.12.3 Operations Data for the RLWTF

Operations data levels at RLWTF remained below levels projected in the 2008 SWEIS, with two exceptions. Chemical waste generation at the RLWTF exceeded 2008 SWEIS projections due to the disposal of unused/unspent chemicals. LLW generation at RLWTF exceeded 2008 SWEIS projections due to a campaign to treat and dispose of evaporator bottoms, which accounted for approximately 74 percent (476 cubic meters) of LLW generated at RLWTF. 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 (MeV) 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), Experimental Area B known as the Ultracold Neutron Facility (UCN) and Experimental Area C (the Proton Radiography Facility).

Experimental Area A, formerly used for pi meson[6] and cancer therapy research and isotope production, is currently inactive and was emptied of most beam and experimental equipment in 2009. 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 eight 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, Volume VIII—Balance of Plant. The second safety basis document is the LANSCE Accelerator Safety Envelope, which provides the operating bounds for the eight areas discussed in SAD Volumes I-VIII.

6 Pi meson is any of three subatomic particles: $\pi 0$, $\pi +$, and $\pi -$.

2.13.1 Construction and Modifications at LANSCE

The 2008 SWEIS projected two modifications to LANSCE:

Installation of Materials Test Station equipment in Experimental Area A.

- Construction of the 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 2013 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. The NS2 building is a user facility and would support civilian and national security research. An additional upgrade at WNR is 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. Installation work began in CY 2013 and is expected to be completed in CY 2014.

The planning, design, and procurement of long-lead-time 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-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 CY 2018. Progress made in CY 2013 includes procurement and testing of replacement systems intended to be installed during the 2014 outage and order of long-lead-time equipment, installation of Sector A industrial controls, and other planned projects along the linac.

The following activities that took place at LANSCE during CY 2013 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 2011b; LANL 2011c).
- The Sector A heating, ventilation, and air conditioning (HVAC) system was replaced (LANL 2011d).
- The Building 31 HVAC system was upgraded (LANL 2011e).
- The Experimental Area A Crane was refurbished.
- The Building 2 Cooling Tower was replaced (LANL 2012b).
- The Building 30 HVAC system was replaced (LANL 2010b).
- Structure TA-53-1138 was removed and salvaged (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 2013 and all seven fell below operational levels projected in the 2008 SWEIS (Table A-25).

During CY 2013, LANSCE operated the linac 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 projected in the 2008 SWEIS. There were no experiments conducted for transmutation of wastes.

The most significant accomplishment in CY 2013 for LANSCE was the successful completion of the run cycle for the five experimental facilities: WNR, the Proton Radiography area, IPF, UCN, and the Manuel Lujan Center. After the construction of the NS2 facility in 2011–12, some flight paths that had been unavailable to the user community were fully available in 2013, allowing WNR to significantly increase the number of industry experiments it can complete during a run cycle. The number of experiments at the Lujan Center increased as the center recovered from a contamination event that occurred in the user facility in August 2012, shutting down the Lujan Center operations during the production period scheduled from August through December. The Lujan Center operations resumed in January 2013. Other significant accomplishments at LANSCE include the observance of the seventh 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 generated and transported electron beam current of a few milliamps.

2.13.3 Operations Data for LANSCE

Operations data levels at LANSCE remained below levels projected in the 2008 SWEIS. Radioactive air emissions are a key environmental parameter since LANSCE emissions have historically accounted for more than 95 percent of the total offsite dose from LANL. The total point source emissions were approximately 164 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.)

Table 2-5. Solid Waste Buildings with NHC

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[b]	2
TA-50-0069 Outside[c]	Drum Storage	2	2
TA-54-Area G[d]	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[e]	Storage Pad	2	2
TA-54-Pad10[f]	Storage Pad	2	2
TA-54-Pad281	LLW Storage	N/A	2

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

[b] N/A – not available.

[c] "Drum Storage" includes drum staging/storage pad and waste container temperature equilibration activities outside TA-50-69.

[d] This includes LLW (including mixed waste) storage and disposal in domes, pits, shafts, and trenches; TRU waste storage in domes and shafts (does not include TRU Waste Inspection and Storage Program); TRU legacy waste in pits and shafts; low-level disposal of asbestos in pits and shafts. Operations building: TRU waste storage.

[e] Pad 1 was formerly the TA-54-0226 TRU Waste Storage Dome.

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

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 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.

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[7] (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 (GTRI) 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 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 8, 2011 (DOE 2011b) which stated, NNSA will continue implementing the GTRI OSRP program, including the recovery, storage and disposition of high-activity beta/gamma sealed sources. This program includes the recovery of sealed sources from foreign countries, and NNSA has decided that transport of high-activity sealed sources through the global commons via commercial cargo aircraft may be utilized as part of the ongoing GTRI OSRP program.

Of the planned countries slated for source repatriation in fiscal years (FYs) 2012–2014, OSRP recovered sources from India, Bolivia, and Canada. For the remainder of FY 2014, it is anticipated that OSRP will potentially recover sources from Mexico and Japan.

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

7 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.

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.

Approximately 22,813 sources were brought to LANL. Of these, about 21,485 were shipped to the Waste Isolation Plant (WIPP) for final disposition. Approximately 22,030 sources were collected for storage at TA-54; about 593 sources were brought to TA-55, and 190 sources to the Nevada National Security Site.

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 six 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.

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 for three reasons: (1) disposal of asphalt and concrete from a parking lot upgrade at TA-50-0069 (the Waste Characterization, Reduction, and Repackaging Facility) which accounted for approximately 37 percent (636 kilograms) of chemical waste generated at SRCW; (2) disposal of non-friable asbestos from abatement projects throughout LANL, which accounted for approximately 31 percent (544 kilograms) of chemical waste generated at SRCW; and (3) disposal of unused/unspent flammable enamel paint, which accounted for approximately 13 percent (225 kilograms) of chemical waste generated at SRCW. LLW generation at SRCW exceeded 2008 SWEIS projections due to the disposal of fiberglass-reinforced plywood boxes and crates that were repackaged waste under the 3706 TRU Waste Campaign, which accounted for approximately 25 percent (147 cubic meters) of LLW generated at SRCW. MLLW generation at SRCW exceeded 2008 SWEIS projections because of waste related to consolidating and packaging of MLLW, which accounted for 39 percent (326 cubic meters) of MLLW generated at SRCW. 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 NHC

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 2013, TRP II activities were conducted which included the replacement of confinement doors and structural upgrades of gloveboxes. TRP III was in the planning stage which will include the replacement of the ventilation system in TA-55-0041.

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 2013.

In addition, the following construction/modification projects continued in CY 2013.

- As part of the CMRR Project, construction of the RLUOB was completed in 2012[8]. 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 2013.
- 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 2013.
- 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 2013.

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 location for the proposed 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 2013, this work remained in a deferred status.

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

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. This work continued in 2013.

The 2008 SWEIS identified seven capabilities at this Key Facility. Six of the seven capabilities listed in Table A-29 were active in 2013. For all six active capabilities, activity levels were below those projected by the SWEIS.

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 with one exception. Chemical waste generation exceeded 2008 SWEIS projections due an equipment failure and the associated cleanup of spilled diesel fuel. Associated wastes included soil, personal protective equipment (PPE), and plastics and consisted of approximately 149,500 kilograms of waste or approximately 97 percent of the total chemical waste generated. Table A-29 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 NHC List for the Non-Key Facilities.

Table 2-7. Non-Key Facilities with NHC

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
Expansion of the Sanitary Effluent Reclamation Facility	2012
Photovoltaic Array Reuse of Los Alamos County Landfill Location	2012

New projects that were still under construction or were completed in CY 2013 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 is complete and received occupancy in May 2013.

2.16.1.2 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. The project is complete and received occupancy 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 contains 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 was expected to be complete in April 2013. In 2013, the Interagency Fire Center was complete and turned over to the National Park Service for full operations.

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's 26,058 acres. 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, with one exception. Chemical waste generation at Non-Key Facilities exceeded 2008 SWEIS projections due to disposal of filter press cakes produced from treating effluent from SWWS that is blended with additional water sources and used at the Sanitary Effluent Reclamation Facility Expansion (SERF-E) facility. The filter cakes composed approximately 63 percent (785,800 kilograms) of the total chemical waste generated. 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 water discharges 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 and other Laboratory operations.

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. Section 3.3 provides more details on waste generation amounts.

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 hazardous constituents under the New Mexico Hazardous Waste Act (NMSA 1978, § 74-4-10) and 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 of the Laboratory's 1994 Hazardous Waste Facility Permit. Under 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. Of these, 166 sites were removed from Module VIII by NMED. In addition, 25 AOCs previously approved for no further action (NFA) by NMED and 541 sites approved for NFA by EPA were excluded from regulation by the Consent Order. 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 2013, NMED issued 148 Certificates of Completion without Controls and 60 Certificates of Completion with Controls. Of the 208 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 204 are subtracted. This administrative action reduced the total number of corrective action sites remaining in the investigation process at LANL to 1,218.

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) hazardous waste management units as corrective action sites. Combined, these administrative actions reduced the total number of corrective action sites remaining in the investigation process at LANL to 1,200.

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 LANL. 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 2013.

The EP Directorate developed and/or revised one monitoring plan, two interim measures work plans, two progress reports, one status report, three monitoring reports, one investigation/ remediation report, one supplemental investigation report, and two survey/inspection reports, which were submitted to NMED during 2013 or early 2014. A plan proposes investigation or remediation activities designed to characterize or clean-up sites, aggregate areas, and/or canyons or canyon segments. The data are presented in a report that 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 reconfiguration reports as well as the annual update to the Interim Facility-Wide Groundwater Monitoring Plan. The NMED granted Certificates of Completion for 15 SWMUs and AOCs in 2013. The certificates indicated that corrective actions were complete without controls for nine sites, meaning no additional corrective actions or conditions are necessary. The remaining six sites have land-use controls requiring land use to remain non-residential, or controls requiring storm water monitoring.

Table 2-9 provides summaries of the site, aggregate area, and canyon investigations conducted and/or reported in 2013. In addition, the supplemental investigation report for the Upper Sandia Canyon Aggregate Area is summarized and the 2013 vapor monitoring at MDA C is presented.

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
Storm Water Performance Monitoring in the Los Alamos/ Pueblo Canyons Watershed during 2012[a]	n/a[b]	9 sediment transport mitigation sites and 13 gage stations	30 sampling events (a sampling event is defined as the collection of one or more samples from a specific gaging station during a specific run-off event) resulting in 483 samples collected	n/a	n/a	n/a	Net sediment deposition occurred in most surveyed areas that experienced monsoonal flood events in 2012, which is consistent with the goal of the sediment transport mitigation work plans. The surveys document that the sediment transport mitigation sites are currently operating as designed and are not undergoing net erosion over the period of this monitoring program. Analytical data collected from storm water samples indicate that for the 9 analytes exceeding New Mexico water-quality standards, only total polychlorinated biphenyls (PCBs) has a recognized source at LANL sites and offsite transport. Offsite transport of PCBs in 2012 occurred only in Los Alamos Canyon, and the weir and associated sediment retention basins were effective at substantially reducing this transport. Concentrations of PCBs measured in lower Los Alamos Canyon are similar to those measured in upper Los Alamos Canyon above LANL sites and are consistent with the transport of PCBs from the Las Conchas burn area down Guaje Canyon. PCBs in the burn area have a global source in atmospheric fallout and have accumulated in the watershed over time. The transport of radionuclides in storm water that have a LANL source was also substantially reduced by the settling of sediment above the weir.

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
Results of 2012 Sediment Monitoring in the Pajarito Canyon Watershed[a]	n/a	8 reaches, drainages, or areas	18 samples	n/a	n/a	n/a	Analytical results from sediment samples collected in the Pajarito Canyon watershed and in baseline areas downstream from the Las Conchas burn area in 2012, combined with results from previous sediment investigations, indicate concentrations of most chemicals of potential concern (COPCs) released from LANL sites decrease downstream from the sources and also decrease over time. This finding is consistent with the conceptual model. Dissipation of flood energy and deposition of entrained sediment in the wetland areas between TA-18 and State Road 4 contributed greatly to reducing the downstream transport of contaminants derived from SWMUs or AOCs farther west in the watershed. These data also indicate many COPCs detected in the 2012 sediment samples have a primary source in the Las Conchas burn area and are associated with the transport of ash. One exception to this trend is silver, which had not been identified as a COPC in reach PA-3E before 2011 sampling and was also detected above sediment background value in 2012, indicating post–Las Conchas floods likely transported some silver contamination down canyon from source areas.

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
Results of 2012 Sediment Monitoring in Water Canyon and Cañon de Valle Watersheds[a]	n/a	8 reaches and 6 gage stations	16 sediment samples, 31 storm water flow readings	n/a	n/a	n/a	The maximum 2012 flood discharge was approximately an order of magnitude lower than the maximum 2011 discharge but was more than an order of magnitude higher than the maximum discharge observed in non-fire-affected years (during or within 3 yr of major fires). Floods during the 2012 monsoon season resulted in preferential erosion of pre-1943 alluvium and post-1942 deposits next to the active stream channel. This condition results in downstream transport of sediment from geomorphic units with typically low concentrations of key COPCs, while units with typically higher concentrations are generally intact. This pattern was also observed in the post-2011 monsoon season investigation. Barium, high explosives, and PCB concentrations in fine-grained post–Las Conchas sediment deposits show decreasing concentrations downstream from LANL source areas and are well within the concentration distribution documented in the Water Canyon/Cañon de Valle investigation report. Sediment and storm water data from Cañon de Valle and Water Canyon yield a conceptual site model in which COPCs, such as barium and PCBs, are mobilized from non-LANL-affected burn areas above LANL property and locally from affected areas within LANL property. COPCs from these two source areas likely mix, and for most key constituents, LANL contributions are indistinguishable from contributions derived from fire-affected areas.

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
Semiannual Progress Reports for Corrective Measures Evaluation/ Corrective Measures Implementation for Consolidated Unit 16-021(c)-99[c]	16	1	Best management practices (BMPs) inspected (8 separate significant rain events were recorded between March and September 2013); 45 groundwater samples (split over 2 periodic monitoring events) as part of TA-16-260 monitoring group	n/a	n/a	n/a	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. A continued risk of flooding precludes 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. The bentonite cap in the former 260 Outfall pond was inspected following the September 12 to 13, 2013, storm event and was found to be in good condition. Three wells (CdV-16-4ip, CdV-R-15-3, and CdV-R-37-2) were reconfigured into single-screen wells between June and August 2013. Four drilling work plans and an interim measure work plan for source removal at one well were approved. The storms on September 12 and 13, 2013, produced 5.39 inches of precipitation at the TA-06 weather station. Precipitation was higher in the headwaters area than on LANL property. This flood caused geomorphic changes to Cañon de Valle and Water Canyon. Damage was reported at three wells: 16-25280, CdV-16-1(i), and MSC-16-06295.
Phase II Investigation Sampling of Upper Los Alamos Canyon Aggregate Area	00, 01, former 32, 43, 61	16	663 soil/fill, tuff, sediment samples	n/a	7 sites extent defined/9 sites extent not defined	n/a	14 sites will undergo remediation for one or more contaminants. Additional sampling is needed at 9 sites to delineate the area and/or depth to excavate as part of the remediation.

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
2013 Biennial Asphalt Monitoring and Removal Report for Area of Concern C-00-041, Guaje, Barrancas, Rendija Canyons Aggregate Area	00	1	1/2 55-gallon drum of asphalt and tar was removed	1	n/a	n/a	Exposed asphalt and tar fragments were found and removed during the site inspection. Asphalt or tar was removed only if it was visible at the surface and involved no excavation or significant soil disturbance. The asphalt and tar pieces ranged in size from less than an inch to up to 12 inches in length and width. A total of 660 pounds of asphalt and tar was removed and transferred to and recycled at the Los Alamos County Eco-Station.
2013 Biennial Ordnance Survey Report, Solid Waste Management Units 00-011(a, d, and e), Guaje, Barrancas, Rendija Canyons Aggregate Area	00	3	No unexploded ordnance or munitions and explosives of concern were found. Several pieces of munitions debris were found at the three SWMUs.	3	n/a	n/a	Activities conducted in 2013 included visual inspections of the sites using lines of personnel trained to recognize unexploded ordnance. The trained personnel conducted site walkovers to identify any suspect material. No unexploded ordnance was found at the three sites. Several pieces of munitions debris were identified and removed and photographed by LANS Emergency Response personnel. Approximately the same amount of munitions debris has been found each year the sites have been surveyed.

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
2013 Excavation of the Los Alamos Canyon Low-Head Weir	n/a	3 basins behind the Los Alamos Canyon low-head weir	6 Sediment samples collected to characterize the material to be excavated	3 basins	n/a	Maximum concentrations were not greater than residential soil screening levels or screening action levels and were less than respective minimum ecological screening levels, except for 7 metals and one organic chemical. Maximum concentrations of these analytes were less than or equivalent to the minimum lowest effect level ecological screening levels.	An estimated 6,000 cubic yards (including post-excavation expansion) of sediment was removed from the three basins to maximize the sediment-retention capacity. No potential unacceptable human health and ecological risks were present.
Status Report for Pumping Test at Well R-42	05	Regional aquifer	166 groundwater samples collected during pump test	Regional aquifer	n/a	n/a	A pump test was conducted at regional aquifer well R-42 from June 17, 2013, to August 21, 2013, to collect water level and water chemistry data needed to evaluate potential corrective actions for the chromium plume in the regional aquifer beneath Mortandad and Sandia Canyons. A total of 629,000 gallons of water was extracted during the pump test, treated, and land applied. The R-42 pump test was the first of several tests being performed under the Interim Measures Work Plan for Evaluation of Chromium Mass Removal. Results of all tests will be presented in a 2014 report.

[a] Report was submitted in 2013 but the investigation was conducted and completed in 2012.

[b] n/a = Not applicable.

[c] Both progress reports summarized together.

Upper Sandia Canyon Aggregate Area Supplemental Investigation. The Upper Sandia Canyon Aggregate Area is located in TA-03, TA-60, and TA-61 at LANL. In 2009, 89 SWMUs or AOCs were investigated and the results documented in the approved investigation report. The approved investigation report concluded that additional sampling to define the nature and extent of contamination was needed for 41 SWMUs and AOCs.

In January 2012, after the investigation report and Phase II investigation work plan had been approved, the NMED and DOE entered into a framework agreement for the realignment of environmental priorities at LANL. Under the framework agreement, the NMED and DOE agreed to review characterization efforts undertaken to date pursuant to the Consent Oder to identify those sites where the nature and extent of contamination have been adequately characterized. The framework agreement also stipulated the use of EPA guidance in this process, except in cases where EPA guidance was not supported by sound science. Pursuant to the framework agreement, the Laboratory reviewed its data evaluation process with respect to EPA guidance and the framework agreement principles and concluded that this process could be revised to complete site characterization more efficiently, while providing full protection of human health and the environment. Specifically, the process for evaluating data to define extent of contamination was revised to provide a greater emphasis on risk/dose reduction, consistent with EPA guidance.

Based on the revised evaluation of the data, the nature and extent of contamination have been defined, and/or no further sampling for extent is warranted for 31 sites. The nature and extent of contamination have not been defined and further sampling is warranted for 10 sites.

The human health risk-screening assessments found no potential unacceptable risks for any of the sites evaluated under the industrial and construction worker scenarios. For the residential scenario, 12 sites had potential unacceptable risks, while 28 sites had no potential unacceptable risks. The total doses at 12 sites where radionuclides COPCs were present were below the target dose limit of 25 millirem per year as authorized by DOE Order 458.1 for all three scenarios.

No potential ecological risks were found for any receptor following ecological risk-screening of the sites.

Based on the results of the data evaluations presented in the supplemental investigation report, the following recommendations were made.

- Corrective action complete without controls is recommended for 21 sites for which extent is defined and which pose no potential unacceptable human health risk under the residential scenario and no unacceptable ecological risk.
- Corrective action complete with controls is recommended for 10 sites for which extent is defined and which pose no potential unacceptable human health risk under the industrial and construction worker scenarios and no unacceptable ecological risk.

Material Disposal Area (MDA) C Subsurface Vapor Monitoring. Subsurface vapor (pore-gas) monitoring was conducted during 2013 at 80 sampling ports within 18 vapor monitoring wells beneath and surrounding MDA C. The first sampling event was conducted during March and April 2013, and the second sampling event was conducted from November 2013 to January 2014. Subsurface vapor monitoring samples have been collected at the site since 2004, and vapor monitoring data indicate volatile organic compounds (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 26 VOCs and tritium were detected in pore gas at MDA C during the first sampling event and 20 VOCs and tritium were detected in pore gas during the second sampling event. The screening evaluation of the 2013 data identified three VOCs with vapor concentrations above their respective Tier I screening values based on protection of groundwater: 2-hexanone, methylene chloride, and trichloroethene (TCE). The Tier I screening levels are very conservative screening levels intended to identify whether vapor-phase chemicals could result in contamination of groundwater in excess of cleanup levels. TCE is the only VOC detected at concentrations above the less conservative Tier II groundwater protection screening values in three monitoring wells at the eastern end of MDA C. Samples with TCE above the Tier II screening levels were all collected at over 800 feet above the regional aquifer indicating a very low potential for groundwater contamination. The locations with the highest TCE concentrations are consistent with vapor monitoring data from 2010, 2011, and 2012. 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.

2.17.3 Site/Facility Categorization

No new nuclear environmental sites were added to or removed from the DOE/LANL Nuclear Facilities List during 2013 (Table 2-10).

Table 2-10. Environmental Sites with NHC

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).

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.

On September 13, 2013, a major storm impacted Los Alamos County, which delivered over 7 inches of rainfall surpassing storm specification for one hundred-year flood events. Los Alamos County Administrator Harry Burgess issued a disaster emergency declaration. The floods severely eroded stream banks within Pueblo Canyon and other sites within the DOE boundary. Recovery efforts to stabilize stream banks have begun.

3.1 Air Emissions

3.1.1 Radiological Air Emissions

Radiological airborne emissions from point sources (i.e., stacks) during 2013 totaled approximately 220 curies, less than one percent of the annual projected radiological air emissions of 34,000 curies[9] projected in the SWEIS.

The two largest contributors to radioactive air emissions were tritium from the Tritium Facilities (both Key and Non-Key) and activation products from LANSCE. Stack emissions from the Tritium Key Facilities were about 52 curies.

The total point source emissions from LANSCE were approximately 164 curies.

Non-point sources of radioactive air emissions are present at LANSCE, Area G, and other locations around LANL. In most years, non-point emissions are generally small compared to stack emissions. For example, in CY 2013, non-point air emissions from LANSCE were approximately 12 curies. However, in 2012, 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 Airnet Station 324 resulted in a dose of 0.08 millirem for CY 2013. Additional detail about radioactive air emissions is provided in LANL's 2013 annual compliance report to the EPA (LANL 2014a), submitted in June 2014, and in the 2013 Annual Site Environmental Report (formerly the Environmental Surveillance Report) (LANL 2014b).

For 2013, maximum offsite dose to the maximally exposed individual was 0.21 millirem. The EPA radioactive air emissions limit for DOE facilities is 10 millirem per year. This dose is calculated to the theoretical maximum exposed individual who lives at the nearest offsite receptor location 24 hours per day, eating food grown at that same site. No actual person received a dose of this magnitude.

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.

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9 The projected radiological air emissions changed from the 10-year annual average of 21,700 curies in the 1999 SWEIS to 34,000 curies in the 2008 SWEIS. Annual radiological air emissions from 1999–2005 were used to project 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 2013 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	2013 Operations
CO	Tons/year	58	12.3
NO_x	Tons/year	201	20.7
PM	Tons/year	11	2.4
SO_x	Tons/year	0.98	0.4

* 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 2013 (LANL 2014c). In CY 2013, 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 2013 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 2013, all emissions were below the levels projected in the 2008 SWEIS.

Table 3-2. 2013 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	30.4
NO_x	Tons/year	201	245	44.2
PM	Tons/year	11	120	4.2
SO_x	Tons/year	0.98	150	0.7

* 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 2013. 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 2014c).

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 2013, 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 2012	CY 2013
HAPs	24	6.2	3.5
VOCs	200	8.8	9.6

Greenhouse Gas Emissions. In CY 2013, LANL reported to the EPA its greenhouse gas emissions from stationary combustion sources for the fourth time. The stationary combustion sources at LANL include permitted generators, emergency backup generators, the asphalt plant, the TA-3 power plant, the combustion turbine, and all boilers. In CY 2013, these stationary combustion sources emitted 53,687.1 metric tons of carbon dioxide equivalents (CO_2e). Methane has approximately 25 times the global warming potential of carbon dioxide (CO_2), and NO_x has approximately 298 times the global warming potential of CO_2. Methane and NO_x 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	2013 Emissions
Methane	Metric Tons/year	*	1.02
NO_x	Metric Tons/year	*	0.10
CO_2	Metric Tons/year	*	53,630.9
Total Emissions	**Metric Tons CO_2e/year**	*****	**53,687.1**

* 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 has implemented portions of the Outfall Reduction Program to reduce the total number of outfalls discharging to the environment from 15 in August 2007 to 11 in November 2011. From January 1, 2013, through December 31, 2013, 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 Environmental Compliance Programs Group, eight permitted outfalls had recorded flows in CY 2013, totaling an estimated 123.1 million gallons. This is approximately 30.7 million gallons less than the CY 2012 total of 153.8 million gallons. The CY 2013 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 2013 are provided in the 2013 Annual Site Environmental Report (LANL 2013a).

CY 2013 discharges are summarized by watershed and compared with watershed totals projected in the 2008 SWEIS in Table 3-5.

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 2013
Guaje	0	0	0	0
Los Alamos	5	1	45.6	19.4
Mortandad	5	4	44.3	2.7
Pajarito	0	0	0	0
Pueblo	0	0	0	0
Sandia	6[a]	5	187.3	101.0
Water[b]	5	1	2.26	0
Totals	21	11	279.5	123.1

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 or Outfall 03A027.

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

Table 3-6 compares NPDES discharges by Key and Non-Key Facilities. In CY 2013, the bulk of the discharges came from Non-Key Facilities. Key Facilities accounted for approximately 34.3 million gallons of the total. LANSCE discharged approximately 20.1 million gallons in CY 2013, about 2.5 million gallons more than CY 2012, accounting for about 58.6 percent of the total discharge from all Key Facilities.

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

Key Facility	No. of Outfalls 2008 SWEIS	No. of Permitted Outfalls CY 2013	Discharge 2008 SWEIS	Discharge CY 2013
Plutonium Complex	1	1	4.1	2.20
Tritium Facility	2	None	17.4	0
CMR Building	1	None	1.9	0
Sigma Complex	2	1	5.8	0.01[a]
High Explosives Processing	3	1	0.06	0
High Explosives Testing	2	None	2.2	0
LANSCE	4	2	29.5[b]	20.07
Metropolis Center	1	1	13.6	11.97
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	34.26
Non-Key Facilities	4	4	200.9	88.85[c]
Totals	**21[d]**	**11**	**279.5**	**123.1**

a Estimated discharge from Emergency Cooling System at Sigma on August 18, 2013.

b 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.

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

d In previous Yearbooks, the number 15 was reported because 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 2013.

As previously stated, discharges from the Non-Key Facilities made up the majority of the total CY 2013 discharge from LANL. This total, 88.85 million gallons, was about 112.1 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 87 percent of the total discharge from Non-Key Facilities and about 63 percent of all water discharged by LANL in CY 2013.

Construction General Permit. The NPDES Construction General Permit (CGP) regulates storm water discharges from construction activities disturbing one or more acres, including those activities that are part of a larger common plan of development collectively disturbing one or more acres. The current CGP, which is regulated by EPA, became effective in 2012. Construction activities at LANL are subject to the 2012 CGP.

Parties subject to the CGP typically include both LANL and the subcontractor performing the construction work. At most construction sites, LANL and the subcontractor apply individually for NPDES CGP coverage but are co-permittees. NPDES CGP requirements include developing and implementing a Storm Water Pollution Prevention Plan (SWPPP) before soil disturbance can begin, implementing site-specific best management practices (BMPs), conducting site inspections, performing corrective actions throughout the duration of the project, and stabilizing disturbed areas upon completion of soil disturbance. A SWPPP describes the project activities, site conditions, potential pollutants, BMPs, stabilization and other permanent control measures to minimize the discharge of pollutants, and threatened and endangered species or historic property issues.

Compliance with the NPDES CGP is primarily assessed through permit required site inspections that document the condition of the site and also identify corrective actions required to maintain compliance with permit requirements. Data collected from these inspections is tabulated monthly for internal reporting.

During CY 2013, 32 LANL project sites were subject to the CGP. The Laboratory implemented and maintained CGP SWPPPs for each of these sites, and performed 664 site-specific storm water inspections. The NPDES CGP inspection compliance rate for CY 2013 was 85.2 percent (566 of the 664 inspections).

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 MSGP was issued by the EPA on September 29, 2008. LANS submitted its NOI to discharge under the 2008 MSGP in December 2008 and received coverage in January 2009. The LANS permit tracking number under the 2008 MSGP is NMR05GB21. Nation-wide authorization to discharge under this permit expired at midnight on September 29, 2013. However, EPA administratively continued the existing permit. They also published the 2013 Draft NPDES General Permit for Stormwater Discharges From Industrial Activities, also referred to as the Multi-Sector General Permit, by Federal Register notice on September 27, 2013 (78FR, 59672).The intent of the 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 2013 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 MSGP SWPPPs covering 13 facilities in CY 2013. Detailed results of CY 2013 MSGP monitoring are summarized in the 2013 Annual Site Environmental Report (LANL 2013a). LANL has completed all five years of required storm water analytical monitoring in accordance with the 2008 MSGP. Since LANL 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).

NPDES Individual Permit for Storm Water Discharges from SWMUs/AOCs. On February 13, 2009, EPA Region 6 issued NPDES Individual Permit (IP) No. NM0030759 to co-permittees LANS and DOE. Immediately following issuance of the IP by the EPA, the IP was appealed. Following permit modification negotiations in 2009, the EPA issued a new modified IP that was effective on November 1, 2010, and will expire on March 31, 2014. The IP authorizes discharges of storm water from certain SWMUs and AOCs (sites) at LANL. The EPA has approved a permit renewal application extension request and the existing permit conditions will be in effect until a new permit is issued.

The IP lists 405 permitted sites that must be managed to prevent the transport of contaminants to surface waters via storm water run-off. Potential contaminants of concern within these sites are metals, organic chemicals, high explosives, and radionuclides. These contaminants are present in soils near the top of the soil profile and are susceptible to storm-event-driven erosion and transport through storm water run-off.

The IP is a technology-based permit and relies, in part, on nonnumeric technology-based effluent limits (storm water control measures). Site-specific storm water control measures that reflect best industry practice, considering their technological availability, economic achievability, and practicability, are required for each of the 405 permitted sites to minimize or eliminate discharges of pollutants in storm water. These control measures include run-on, run-off, erosion, and sedimentation controls, which are routinely inspected and maintained as required.

For purposes of monitoring and management, sites are grouped into small sub-watersheds called site monitoring areas (SMAs). The SMAs have sampling locations identified to most effectively sample storm water run-off. Storm water is monitored from these SMAs to determine the effectiveness of the controls. When target action levels (TALs), which are based on New Mexico water quality standards, are exceeded, corrective actions are required. In summary, the process of complying with the IP can be broken down into five phases: (1) installation and maintenance of baseline controls, (2) storm water confirmation sampling in support of baseline controls, (3) corrective action (if TALs exceeded), (4) confirmation sampling in support of enhanced controls for corrective actions, and (5) certification of corrective action complete or application for alternative compliance.

In 2013, the following tasks were completed at LANL.

- Published the annual update to the Site Discharge Pollution Prevention Plan, Revision 1, (http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/individual-permit-stormwater/site-discharge-pollution-prevention-plan.php) that describes three main objectives: identification of pollutant sources, description of control measures, and monitoring that determines the effectiveness of controls at all regulated SWMUs/AOCs;
- Completed 1474 control measure inspections on all 250 SMAs;
- Completed 1935 sampling equipment inspections;
- Conducted BMP maintenance at 110 SMAs;
- Completed installation of additional controls at 37 SMAs;
- Collected baseline confirmation monitoring samples at 55 SMAs;
- Collected corrective action enhanced control confirmation samples at 26 SMAs;
- No further monitoring based on no TAL exceedances during baseline monitoring at 7 SMAs;
- Initiated corrective action based on TAL exceedances at 48 SMAs;
- Completed installation of enhanced control measures at 10 SMAs;
- Completed corrective action at 10 sites;
- Began recovery activities from the September 13, 2013, flood event. Recovery activities are ongoing;
- Submitted a request for extension to submit the permit renewal application deadline from September 30, 2013, to March 29, 2014;
- Submitted alternative compliance requests for 5 sites;
- Submitted force majeure requests for extension of completion of corrective action at 6 high-priority sites;
- Held one public and two technical meetings; and
- Completed website updates and public notifications.

3.3 Solid Radioactive and Chemical Wastes

Because of the complex array of facilities and operations, LANL generates a wide variety of waste types including solids, liquids, semi-solids, and contained gases. These waste streams are variously regulated as solid, hazardous, LLW, TRU, or wastewater by a host of state and federal regulations. The institutional requirements relating to waste management at LANL are located in a series of documents that are part of 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. Table 3-7 summarizes waste types and generation for LANL in CY 2013.

Table 3-7. LANL Waste Types and Generation

Waste Type	Units	2008 SWEIS[a]	CY 2013
Chemical	10^3 kg/yr	3,692.5	1,559.12
LLW	m^3/yr	106,411.3	2,918.49
MLLW	m^3/yr	11,964.8	864.14
TRU	m^3/yr	2,576.8	56.24
Mixed TRU	m^3/yr	[b]	37.58

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 2013 LANL operations were 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. 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 2013 are tracked in Section 3.11.2 of this Yearbook.

In CY 2013, chemical waste volumes were well below volumes projected in the 2008 SWEIS (Table 3-8). Chemical waste generation for LANL in CY 2013 was about 42 percent of the chemical waste volume projected in the 2008 SWEIS. Non-Key Facilities chemical waste generation accounted for about 72 percent of the total volume of chemical waste generated. Table 3-8 summarizes chemical waste generation during CY 2013.

Table 3-8. Chemical Waste Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2013
Key Facilities	10^3 kg/yr	596	313.29
Non-Key Facilities	10^3 kg/yr	650	1,130.44[a]
EP	10^3 kg/yr	2,446.5[b,c]	115.40
LANL	10^3 kg/yr	3,692.5	1,559.12

a Chemical waste generation at Non-Key Facilities exceeded 2008 SWEIS projections due to disposal of filter press cakes produced from treating effluent from SWWS that is blended with additional water sources and used at the SERF-E facility. The filter cakes composed approximately 785,800 kg of waste or approximately 63% of the total chemical waste generated.

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

c Projected annual waste generation for FY 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 2013, LLW volumes were well below volumes projected in the 2008 SWEIS (Table 3-9). LLW generation in CY 2013 for LANL was about 2 percent of volumes projected in the 2008 SWEIS. Key Facilities LLW accounted for about 21 percent of the total LLW volumes generated. Table 3-9 summarizes LLW generation during CY 2013.

Table 3-9. LLW Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2013
Key Facilities	m^3/yr	7,646	1,653.48
Non-Key Facilities	m^3/yr	1,529	1,250.90
EP	m^3/yr	97,236.3[a,b]	14.11
LANL	m^3/yr	106,411.3	2,918.49

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; current waste generation rates remain less than 2 percent of the projected quantity of LLW generation. MLLW generation in CY 2013 for LANL was approximately 7 percent of volumes projected in the 2008 SWEIS. Key Facilities MLLW accounted for about 98 percent of the total MLLW volumes generated. Table 3-10 summarizes MLLW generation during CY 2013.

Table 3-10. MLLW Generators and Quantities

Waste Generator	Units	2008 SWEIS	CY 2013
Key Facilities	m^3/yr	68	847.50[a]
Non-Key Facilities	m^3/yr	31	11.54
EP	m^3/yr	11,865.8[b,c]	5.10
LANL	m^3/yr	11,964.8	864.14

a MLLW exceeded 2008 SWEIS projections due to the reclassification and repackaging of legacy TRU waste at SRCW.

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

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, TRU and mixed TRU waste generation are analyzed together in this Yearbook (Table 3-11).

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

Waste Generator	Units	2008 SWEIS	CY 2013 TRU and Mixed TRU	CY 2013 TRU	CY 2013 Mixed TRU
Key Facilities	m^3/yr	413[a]	119.44	51.25	37.16
Non-Key Facilities	m^3/yr	23[a]	88.41	5.00	0.42
EP	m^3/yr	2140.8[,ab]	5.41	0	0
LANL	m^3/yr	2,576.8[a]	-	56.24	37.58

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).

Throughout CY 2013, LANL continued to ship waste to WIPP under the 3706 TRU Waste Campaign as a result of a framework agreement formed by the NMED and DOE/NNSA in CY 2011. As of December 2013, 1887 cubic meters of TRU waste had been shipped to WIPP. CY 2013 shipments reduced radioactivity of combustible and dispersible TRU waste stored aboveground at Area G by 9,071 drum equivalents and 8,850 picocuries.

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 2013, 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 2013. The recycle rate of total sanitary waste at LANL for CY 2013 was 84 percent.

Table 3-12. LANL Sanitary Waste Generation in CY 2013 (metric tons)

	Non-C&D	C&D	Total
Recycled	1,599	5,295	6,894
Landfill disposal	1,217	73	1,290
Total	**2,816**	**5,368**	**8,184**

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 utility 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.

3.4.1 Gas

Los Alamos County and LANL receive their natural gas from the New Mexico Gas Co. LANL has a CGTG that 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 on an as-required basis for peak-load shaving and back-up situations.

Table 3-13 presents LANL's CY 2013 gas usage. Approximately 90 percent of the gas used by LANL in 2013 was for heat production. The remainder was used for electricity production mainly by the CGTG. LANL onsite electricity generation is primarily used for peak-load shaving, back-up situations and for training of the operators in turbine operation.

Total gas consumption for CY 2013 was less than projected in the 2008 SWEIS.

Table 3-13. Gas Consumption (decatherms[a]) at LANL in CY 2013

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 2013	1,013,049	98,619	914,430	300,360[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 (1,262 klb in CY 2013) and that used for heat (273,680 klb in CY 2013).

3.4.2 Electrical

LANL is supplied with electricity through the Los Alamos Power Pool. DOE and Los Alamos County entered into a contract known as the Electric Coordination Agreement whereby each entity's electricity resources are consolidated or pooled. Changes in transmission agreements with the Public Service Company of New Mexico (PNM) resulted in the removal of contractual restraints on the import capability of Power Pool resources. Import capacity is limited only by the physical capability (thermal rating) of the transmission lines, which is 115 megavolt ampere (MVA) 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 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 proposed 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 photovoltaic (PV) to generate electric power. The system will be connected to a 7-MW-hour 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 for 1 MW of PV.

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 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. Also, the planning, design, and procurement of long-lead-time components for the multiyear project entitled "LANSCE Risk Mitigation" was approved by DOE/NNSA in 2010. The scope of this project encompasses the restoration of the LANSCE 800-MeV linear accelerator to historic performance levels (DOE 2010a).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 and 17,000 kilowatts operating requirements for the LANSCE Risk Mitigation project.

Table 3-14. Electricity Peak Coincidental Demand in CY 2013[a]

Category	LANL Base	LANSCE	Metropolis Center	LANL Total	County Total	Pool Total
2008 SWEIS	57,200	51,000[b]	18,000[c]	120,200[d]	19,800	111,000
CY 2013	38,395	18,031	9,846	66,272	19,640	85,912

a All figures in kilowatts.

b Expanded Operations Alternative limit for the LANCE Refurbishment Project. This project was approved under the DOE-approved Categorical Exclusion entitled LANSCE Risk Mitigation.

c Expanded Operations Alternative limit for the Metropolis Center.

d. This number represents 91,200 kilowatts for LANL as part of the No Action Alternative in the 2008 SWEIS plus 12,000 kilowatts (18,000 kilowatts Expanded Operations Alternative limit – 6,000 kilowatts No Action Alternative) to expand the capabilities and operational levels of the Metropolis Center as stated in the SWEIS RODs and 17,000 kilowatts (51,000 kilowatts Expanded Operations Alternative limit 34,000 kilowatts No Action Alternative) for the LANSCE Risk Mitigation Project.

Table 3-15 shows annual use of electricity for CY 2013. LANL's electricity use remains below projections in the 2008 SWEIS. Actual use has fallen below these values.

Table 3-15. Electricity Consumption in CY 2013[a]

Category	LANL Base	LANSCE	Metropolis Center	LANL Total	County Total	Pool Total
2008 SWEIS	356,000	208,000[b]	131,400[c]	651,400[d]	150,000	645,000
CY 2013	253,710	109,495	71,640	434,845	125,892	560,737

a All figures in MW-hours.

b Expanded Operations Alternative limit for the LANCE Refurbishment Project. This project was approved under the DOE-approved Categorical Exclusion entitled LANSCE Risk Mitigation.

c. Expanded Operations Alternative limit for the Metropolis Center.

d 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 and 69,000 MW-hours (208,000 MW-hours Expanded Operations Alternative limit - 139,000 MW-hours No Action Alternative) for the LANSCE Risk Mitigation Project.

Energy Efficiency. Preliminary results of an energy efficiency project at LANL were collected in CY 2012, which showed a significant reduction in energy use and associated costs.

In CY 2011, the Laboratory implemented an energy savings performance contract to upgrade and automate heating and air conditioning and upgrade to more energy-efficient 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 DOE/NNSA Sustainability Goals, LANL is working toward an energy-reduction goal of 15 percent by 2015 from a 2003 baseline. By the end of CY 2013, the Laboratory had reduced energy use by 12 percent. High Performance Sustainable Building implementation, HVAC re-commissioning, building automation system upgrades for night set-back capability, and footprint reduction efforts continue to contribute toward energy, water, and greenhouse gas reduction goals.

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. DOE/NNSA has a contract with Los Alamos County to supply water to the Laboratory. The distribution system used to supply water to LANL facilities consists of a series of 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 select facilities and has a Supervisory Control and Data Acquisition/Equipment Surveillance System on the water distribution system to keep track of water tank levels and usage. LANL continues to maintain the distribution system by replacing portions of the system as problems arise.

Elements of the Expanded Operations Alternative in the 2008 SWEIS 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 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 operations in CY 2012 led 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 2013. 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 2013, LANL consumed approximately 369 million gallons of water. Total use by LANL in 2013 was about 49 million gallons less than the 2008 SWEIS projection of 418 million gallons. The calculated NPDES discharge of 123.1 million gallons (see Table 3-6) in CY 2013 was about 31 percent of the total LANL usage of 369 million gallons.

Table 3-16. Water Consumption (million gallons) in CY 2013

Category	LANL Total	Metropolis Center	LANSCE	Los Alamos County	Total
2008 SWEIS ROD	459.8[a]	51[b]	119[c]	1,241	1,621
CY 2013	369.3	5.6	45.5	Not Available[d]	Not Available[d]

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. This number also represents 42 million gallons (119,000 million gallons for the Expanded Operations Alternative limit - 77 million gallons for the No Action Alternative) for the LANSCE Risk Mitigation Project.

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 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) was 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 and security. To achieve this goal, the WSST provides input and receives feedback on safety, health, and security issues. Employee involvement helps drive behaviors that support the Laboratory's 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 two subsequent DOE assessments in 2011 and 2013. In the most recent DOE-issued report from June 2013, it was noted that LANL is now meeting the expectations for "Star Status" in three of the five tenets (Management Leadership, Employee Involvement, and Safety Training), and needs additional improvements in the two tenets of Worksite Analysis and Hazard Prevention and Control. The key opportunities for improvement are being addressed through each Associate Directorate's Safety Improvement Plan process during which managers and workers partner together to produce the top safety actions they will be taking for the next year. The next DOE Voluntary Protection Program assessment is scheduled for April, 2014.

3.5.1 Injuries and Illnesses

Analysis of LANL's injury and illness performance shows an increase of 12 percent in CY 2013 compared with CY 2012 with respect to the Days Away, Restricted or Transferred (DART) rate and a reduction of 13 percent in the Total Recordable Case (TRC) rate.

For CY 2013, there were 121 recordable injury cases with 44 cases that resulted in DART duties. Table 3-17 summarizes CY 2013 occupational injury and illness rates. These rates correlate to reportable injuries and illnesses during the year for 200,000 hours worked or roughly 100 workers.

Table 3-17. TRC and DART Rates at LANL

Rate	Total 2013 Cases	CY 2012	CY 2013	Percent Change
TRC	121	1.44	1.25	13% Reduction
DART	44	0.38	0.46	12% Increase

3.5.2 Ionizing Radiation and Worker Exposures

Occupational radiation exposures for workers at LANL during CY 2013 are summarized in Table 3-18. The collective total effective dose (TED) for the LANL workforce during CY 2013 was 138.7 person-rem, a decrease of 1 percent from CY 2012 to CY 2013. Data in Table 3-18 show 268 more radiation workers received a measurable dose in CY 2013 compared with CY 2012. With more workers and essentially unchanged collective dose, the average non-zero dose per worker was lower by 17 millirem. Of the 138.7 person-rem collective TED reported for CY 2013, 1.8 person-rem was from internal exposures to radioactive materials, resulting from two intake events involving plutonium and low-level intakes of uranium and tritium from routine operations. 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	CY 2013
Collective TED (external + internal)	person-rem	280	140.1	138.7
Number of workers with measurable dose	number	2,018	1,435	1,703
Average non-zero dose: • external + internal radiation exposure	millirem	139	98	81

* Data in this table are current as of March 20, 2014.

The highest individual doses in CY 2013 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 per year dose limit, and no worker exceeded the 2-rem per year LANL administrative control level established for external exposures. Table 3-19 summarizes the highest individual dose data for CYs 2008–2013.

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

CY 2008	CY 2009	CY 2010	CY 2011	CY 2012	CY2013
2.106	1.142	1.198	1.039	1.401	1.093
1.198	0.933	0.940	1.004	1.234	0.988
1.132	0.932	0.859	0.993	1.195	0.987
1.096	0.885	0.856	0.983	1.181	0.929
0.952	0.877	0.833	0.910	1.123	0.886

Comparison with the 2008 SWEIS Baseline. The collective TED for CY 2013 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, TA-53 LANSCE, and the TA-50 and TA-54 waste facilities tend to drive increases or decreases in 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 Plutonium Facility operations accounted for the majority of occupational dose at LANL in CY 2013 which is historically consistent for LANL. Occupational dose was accrued from manufacturing and related weapons work, plutonium-238 work, repackaging materials, and providing radiological control technician and other infrastructure support for radiological work and facility maintenance at TA-55. Primary contributors to dose included work with plutonium-238, producing general purpose heat sources for use individually, and radioisotope thermoelectric generators. The top 25 doses at LANL in 2013 were accrued at TA-55. Doses at TA-55 would have been significantly higher due to planned programmatic work in all of these areas; however, most work was paused mid-year because of concerns with the criticality safety program.

In addition to TA-55 operations, a significant portion of LANL dose was accrued by workers performing retrieval, repackaging, and shipping of radioactive solid waste at LANL waste facilities at TA-50 and TA-54. This work continued throughout 2013 commensurate with commitments to reduce onsite waste inventories. There was also a significant portion of LANL dose accrued by workers performing programmatic and maintenance work at LANSCE commensurate with associated radiological work.

Internal doses increased seven-fold from 2012 to 2013, reflecting a combination of two intake events involving plutonium and low-level intakes of uranium and tritium. Two of the top three internal doses were associated with occurrence reporting and processing system (ORPS) event NA--LASO-LANL-TA55-2013-0010, which involved routine glovebox work using gloves with an undiscovered leak path around the mounting ring. The remaining top internal dose was associated with ORPS event NA--LASO-LANL-TA55-2013-0017, which involved craft work on a connection between an existing glovebox and a new installation. The next two lower doses were accumulated throughout the year performing uranium work, and the remaining doses were low level tritium intakes.

LANL extremity dose decreased by 21 percent, reflecting relatively less hands-on work in 2013 at TA-55 and waste handling operations at TA-50 and TA-54. Extremity doses remain commensurate with handling significant quantities of radioactive material.

ALARA Program: LANL occupational exposure continues to be deliberately managed under an aggressive ALARA Program within the LANL Radiation Protection Program, with emphasis on dose optimization during design and work control, 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 2014 collective doses are expected to increase, particularly as TA-55 operations are resumed. 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 2013 was approximately half of the LANL collective TED. As discussed previously, maintenance and programmatic 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.

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 2013 was 30 percent lower than 2008 SWEIS projections. The 9,530 total employees at the end of CY 2013 shows a minor reduction from the 9,553 employees reported in the 2012 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 2013	9,530	378	No longer included	0	371	10,279

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 2013 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 2013	4,335	1,715	2,124	1012	9,186	344	9,530

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 2013, the land resources (i.e., undeveloped and developed lands) available for use at LANL have been reduced. No tracts were conveyed or transferred in CY 2013.

Table 3-22 provides location and size information on the land tracts remaining to be conveyed or transferred. Since CY 2001, the following acres of land were transferred under Public Law 105-119[10] (42 USC 2391), which were analyzed in the Land Conveyance and Transfer EIS (DOE 1999c). Landlord activities for these tracts are managed by the LANS 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 de San Ildefonso.
- ~400 acres of land have been conveyed to Los Alamos County and the Los Alamos 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. On January 23, 2012, DOE/NNSA issued an amended ROD for the "Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts Administered by the Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico," (Conveyance and Transfer EIS; LANL 1999c) to address the remaining acreage of LANL's TA–21 Tract (about 245 acres) and the remaining acreage of the Airport Tract (about 55 acres). DOE/NNSA has determined that it is no longer necessary to retain these lands and will make them available for conveyance and transfer.

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10 On November 26, 1997, Congress passed Public Law 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.

Table 3-22. Potential Land Transfer/Conveyance Tracts Analyzed in the Land Conveyance and Transfer EIS

Land Tract	Approximate 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. To be subdivided into smaller sub-tracts.
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 the Airport Site.
Airport-3 South 2/A-5-2	44	The Airport Site, situated north of TA-21 and south of State Road 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 State Road 501
TA-21 West 2/A-15-2	1	DP Road
C-2, C-3 and C-4	150	Highway 501 (White Rock "Y" and Main Hill Road)

LANS' 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 within TA-21 was completed; this area will be made available for conveyance to Los Alamos County in the future. Through these efforts, LANL will support DOE in making several large tracts of land available for conveyance (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 to Los Alamos County.

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 in CY 2013 would not appreciably change the rate of transport of contaminants in the short term, but are part of a set of actions that collectively are expected to reduce long-term contaminant migration and impacts on the environment. Specific examples include source-removal studies that were conducted for the chromium contamination in the regional aquifer beneath Mortandad Canyon.

In May 2013, DOE/NNSA issued a categorical exclusion for Well Pump Tests in Sandia and Mortandad Canyons (DOE 2013a) for the evaluation of chromium mass removal.

LANL performed substantial groundwater compliance work in CY 2013 pursuant to the Consent Order. These activities included groundwater monitoring and groundwater investigations in support of various groundwater reports and corrective measures evaluations. However, no new monitoring wells were installed in CY 2013.

In CY 2013, LANL sampled 186 groundwater wells, well ports, and springs in 337 separate sampling events. Many springs and 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 90 percent of DOE-administered land in Los Alamos and Santa Fe Counties 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, slightly 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 archaeological sites at LANL date between the 13th 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[11] communities as traditional cultural properties.

Table 3-23. Acreage Surveyed, Prehistoric Cultural Resource Sites Recorded, and Cultural Resource Sites Eligible for the National Register of Historic Places (NRHP) at LANL FY 2008, 2009, 2010, 2011, 2012, and 2013[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
2013	62.9	23,137[d]	1747[c]	1647[c]	94.3	0

a Source: Information on LANL provided by DOE/NNSA and LANS 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 One site was within the tract of land transferred to the Bureau of Indian Affairs to be held in trust for the Pueblo de San Ildefonso. 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 Three tracts of land were conveyed or transferred to Los Alamos County or the Bureau of Indian Affairs during FY 2013. This change is reflected as is the addition of the newly surveyed acreage.

11 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.

To date, LANS cultural resource SMEs 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 SMEs 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 562 (Table 3-24). Most buildings constructed after 1963 are being evaluated on a case-by-case basis as projects arise that have the potential to impact the properties. Therefore, additional buildings may be added to the list of historic properties in the future.

Table 3-24. Historic Period Cultural Resource Properties at LANL[a]

FY	Potential Properties[b]	Properties Recorded[c]	Eligible and Potentially Eligible Properties[d]	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[f]	205	77.6	191
2013	562	461	360	202	78.1	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 Eligible for the NRHP.

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

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

LANS cultural resource SMEs 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).

There are 145 historic sites recorded at LANL. All have been assigned unique New Mexico Laboratory of Anthropology site numbers. Some of the 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 417 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

FY	Number of Buildings for which Documentation was Completed	Number of Buildings Actually Demolished in FY
2008	4	6
2009	4	6
2010	0	20
2011	0	13
2012	1	7
2013	0	0

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 2013[12], LANS evaluated 696 proposed actions and conducted one new field survey to identify archaeological sites. However, no new surveys to identify historic buildings were conducted. DOE/NNSA sent two survey reports to the SHPO for concurrence in findings of effects and determinations of eligibility for cultural resources located during survey projects. 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 2013 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.

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 when Los Alamos County was installing a new water tank on federal land. The project was stopped while archaeological excavation of the human remains took place. These remains

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

were repatriated during FY 2013. 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 2013.

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 1996). Nake'muu is the only Ancestral Pueblo site at LANL with standing walls. The site was occupied from circa AD 1200 to 1325 and contains 55 rooms with walls, some standing up to 6 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. LANS is in the process of evaluating possible mitigation efforts. Representatives from the Pueblo de San Ildefonso most recently visited Nake'muu on September 26, 2008 (FY 2008); October 23, 2009 (FY 2010); and November 10, 2010 (FY 2011). No Pueblo visits were conducted during FY 2013 due to scheduling issues.

Land Conveyance and Transfer. The Laboratory continued a multiyear program in support of the Land Conveyance and Transfer Project. During 2002 to 2005, 39 archaeological sites were excavated, with more than 200,000 artifacts and 2,000 samples being recovered (LANL 2008). During FY 2013, the ENV-ES group conducted 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 and collections from other earlier projects conducted on lands now administered by DOE are housed. Three tracts of land were transferred or conveyed by DOE/NNSA to Los Alamos Country, the Los Alamos School Board, and the Pueblo de San Ildefonso during FY 2013.

Cerro Grande Fire Recovery. During FY 2013, LANL continued to monitor five of the original 34 Ancestral Pueblo and Archaic period archaeological sites rehabilitated by the Pueblo de 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 2010c). 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 2013 field season, the remaining five sites were removed from the monitoring plan, as the erosion controls installed during FY 2012 were shown to be remediating the issues previously identified. Thus, only two traditional cultural property fences will continue to be monitored in FY 2014.

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. 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 2013, the negotiations between the New Mexico SHPO and DOE/NNSA on the updated CRMP draft continued.

During FY 2013, implementing activities included:

- Continued 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.
- At least 21 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. Cultural resources staff supported the Laboratory's 70th Anniversary events by leading five separate tours of LANL historic buildings for the 70th Anniversary Family Celebration of Saturday July 27, 2013.
- Tours for the DOE/NNSA Los Alamos Field Office, several LANL organizations, and the Public of Tsirege and Sandia Cave Complex were conducted. Additionally, a public lecture on the prehistory of the Pajarito Plateau at the Bradbury Science Museum was given in May 2013 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 2013 support this projection. These data are reported in the 2013 Annual Site Environmental Report (LANL 2013a).

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.

LANS 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 when new information is available. Neither of these documents was updated during CY 2013.

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. Wildfire, insect activity, and drought have greatly reduced tree densities in the area. Forest thinning activities have also reduced tree density and cover on much of the LANL forest and woodland.

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, fuels reduction in these areas and within defensible space has been a primary management activity to reduce fire hazards in forests and woodlands at LANL. In CY 2013, LANS continued to implement the Wildland Fire Management Program. The overall goals of the Wildland Fire Management Program 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.

Fuels management is completed in compliance with the Wildfire Hazard Reduction and Forest Health Environmental Assessment (DOE 2000).

During CY 2013, LANL also initiated a Forest Management Plan. Current climate modeling indicates that northern New Mexico is on a trajectory of continually increasing temperatures, with no concurrent increase in precipitation. LANL researchers predict that most native conifer trees will be dead by 2050. Projected climate changes and mortality of trees will lead to increased loss of forest cover, continued high risks of severe wildfire, and higher soil erosion rates in the LANL region. The purpose of the Forest Management Plan is to prioritize and provide treatment prescriptions for forest and woodland areas not currently treated under LANL’s Wildland Fire Program to meet the following objectives:

(1) minimize soil erosion;

(2) maintain piñon-juniper, ponderosa pine, and mixed conifer woodland and forest types in a healthy condition for as long as possible; and

(3) support wildfire fuel mitigation efforts

3.10.2 Threatened and Endangered Species Habitat Management Plan

Under the Threatened and Endangered Species Habitat Management Plan (LANL 2011g) in CY 2013, 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 (*Plethodon neomexicanus*). On October 10, 2013, the Jemez Mountains salamander was federally listed as an endangered species under the Endangered Species Act. In CY 2013, a site plan was prepared for the salamander and consultations began for its inclusion into the Habitat Management Plan. 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 (USFWS) 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 2013, three BAs were prepared for the DOE/NNSA Los Alamos Field Office and transmitted to the USFWS.

- "Biological Assessment of the Effects of Implementing the Jemez Mountains Salamander Site Plan on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory" (LANL 2013b);
- "Biological Assessment of the Effects of the Recreational Use of Los Alamos Canyon on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory" (LANL 2013c); and
- "Request to Amend the Biological Opinion on the Effects to the Mexican Spotted Owl from the Conveyance and Transfer of Seven Land Tracts at Los Alamos National Laboratory" (LANL 2013b).

One informational memo was prepared for the DOE/NNSA Los Alamos Field Office and transmitted to the USFWS.

- "Clean Fill Yard Scope Modification at the Los Alamos National Laboratory" (DOE 2013b).

3.11 Footprint Elimination and DD&D

3.11.1 Footprint Elimination

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 2013, DOE/NNSA removed 29 structures, eliminating 49,032 square feet of LANL'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 2013, DOE/NNSA demolished 29 structures. Table 3-26 summarizes the waste volumes for all buildings that went through the DD&D process in CY 2013.

Table 3-26. CY 2013 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] (Tons)	Recyclable Asphalt/ Concrete	Recyclable Wood	Equipment Salvaged[d]
03-0460	06/27/13	120	0.3	0.0	2	26		6
03-0461	07/08/13	266	0.7	0.1	4	58		12
03-0467	07/01/13	264	0.7	0.1	4	58		12
03-0469	07/30/13	266	0.7	0.1	4	58		12
03-0471	07/26/13	283	0.7	0.1	4	62		13
03-0472	07/23/13	283	0.7	0.1	4	62		13
03-0473	07/23/13	284	0.7	0.1	4	62		13
03-1572	06/26/13	168	0.4	0.1	3	37		8
03-1596	07/12/13	60	0.2	0.0	1	13		3
03-1702	09/17/13	60	0.2	0.0	1	13		3
43-0020	05/28/13	186	3	0.0	8	26		0.0
43-0024	05/20/13	0.0	0.0	0.0	0.0	0.0		3
46-0036	06/26/13	42	0.1	0.1	9	0.0		0.0
46-0181	07/15/13	0.0	0.0	0.0	0.0	0.0		10
46-0182	08/05/13	84	0.2	0.1	1	10		0.0
48-0213	08/16/13	227	0.5	0.2	10	42		0.0
54-0022	06/06/13	93	1	0.1	4	13		0.0
54-0034	12/20/13	86	0.0	0.4	5	23		0.0
54-0064	06/11/13	93	1	0.1	4	13		0.0
54-0244	06/12/13	79	1	0.1	3	11		0.0
54-0290	06/17/13	35	1	0.1	1	5		0.0
54-0296	07/10/13	20	0.0	0.0	1	3		0.0
54-0413	12/20/14	0.0	0.0	0.0	0.0	0.0		2

Table 3-26 continued

Building Number[b]	DD&D Completed	Waste Volumes (m^3) Construction/ Demolition Debris	Asbestos[c]	Universal Waste	Recyclable Metal[d] (Tons)	Recyclable Asphalt/ Concrete	Recyclable Wood	Equipment Salvaged[d]
54-0434	06/06/13	80	1	0.1	3	11		0.0
54-0461	12/20/14	0.0	0.0	0.0	0.0	0.0		2
54-0455	12/20/14	29	0.0	0.1	2	8		0.0
54-0473	06/25/13	102	2	0.1	4	14		0.0
54-1050	06/13/13	113	2	0.1	5	16		0.0
54-1051	05/30/13	20	0.0	0.0	1	3		0.0
54-1052	05/30/13	20	0.0	0.0	1	3		0.0
54-1057	07/03/13	20	0.0	0.0	1	3		0.0
Total		**3383**	**18.1**	**2.3**	**94**	**653**	**0**	**112**
2008 SWEIS		**246,409 m^3 [a]**						

a Construction/demolition debris includes uncontaminated wastes such as steel, brick, concrete, pipe, and vegetation 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 2013 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 15 facility construction and modification projects within the Key Facilities.

During CY 2013, five construction/modification projects were undertaken.

- Electrical and mechanical systems were expanded to meet new computer requirements at the Metropolis Center.
- The NMSSUP, Phase II continued at TA-55.
- The TA-55 Reinvestment Project construction continued.
- Construction of the LANSCE WNR Facility was completed; however, the design for the new substation continued.
- The MSL Infill Project was completed.

Within the Non-Key Facilities, two major construction projects were undertaken.

- Construction of the Indoor Firing Range was completed.
- Construction of the Interagency Wildfire Center was completed.

During CY 2013, 75 capabilities were active and 15 capabilities were inactive at LANL’s Key and Non-Key Facilities. At the CMR Building Key Facility, destructive and nondestructive analysis, nonproliferation training, actinide research and development, and large vessel handling capabilities were not active. No high-pressure gas fills and processing, gas boost system, development, diffusion and membrane purification, metallurgical and material research, 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. No fabrication of ceramic based reactor fuels took place at the Plutonium Facility Complex.

During CY 2013, operation levels for the Radiochemistry Facility exceeded the 2008 SWEIS capability projections.

The Radiochemistry Facility conducted radionuclide transport studies at levels twice the number projected in the 2008 SWEIS and increased isotope offsite shipments by 103 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 not associated with the increase in operations levels noted here.

In CY 2013, 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:

- HEP – due to disposal of chemical waste produced from steel tank refurbishment project at TA-16-0171
- HET – due to disposal of sediment and water from the cleanout of a cooling tower, disposal of cooling tower media and water overflow tank
- MSL – due to disposal of unused/unspent corrosive liquid
- Radiochemistry Facility – due to the disposal of water from the cleanout of a cooling tower and disposal of cooling tower media
- RLWTF – due to the disposal of unused/unspent chemicals
- Sigma Complex – due to (1) disposal of beryllium contaminated laboratory waste generated since 2011 and (2) water from the cleanout of a cooling tower and disposal of cooling tower media
- SRCW Facilities – due to (1) disposal of asphalt from a parking lot upgrade project, (2) disposal of asbestos from an asbestos abatement project, and (3) disposal of unused/unspent enamel paint
- Plutonium Facility – due to disposal of soil, PPE and plastics associated with the cleanup of spilled diesel fuel

LLW:

- SRCW Facilities - due to debris from the construction of Perma-Con® (modular containment structure) for processing low-level radioactive waste crate boxes stored in Area G
- RLWTF – due to a campaign to treat and dispose of evaporator bottoms

MLLW:

- Machine Shops – due to the decommissioning of a small part for final disposition
- SRCW Facilities – due to debris, that was of contact in nature, from the repackaging and over-packing of TRU waste containers and waste related to consolidating and packaging of MLLW

Radioactive airborne emissions from point sources (i.e., stacks) totaled approximately 220 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 53,687 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 2013, eight outfalls flowed.

Calculated NPDES discharges totaled 123.1 million gallons, approximately 30.7 million gallons less than the CY 2012 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 2013 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.

In CY 2013, DOE/NNSA removed 29 structures at LANL which eliminated 49,032 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 2013 was 369 million gallons, 75 million gallons less than in CY 2012. Electricity consumption in CY 2013 was 434 gigawatt-hours compared with the 2008 SWEIS projection of 651 gigawatt-hours. Gas consumption for CY 2013 was 1.0 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.

Radiological exposures to LANL workers were well within the levels projected in the 2008 SWEIS. The TED equivalent for the LANL workforce was 138.7 person-rem, which is much lower than the 280 person-rem workforce dose projected in the 2008 SWEIS. There were approximately 121 recordable cases of occupation injury and illness; this represents a 13 percent decrease from CY 2012. Also, approximately 44 cases resulted in DART duties, representing a 12 percent increase in cases from CY 2012. 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 10,279 employees at the end of CY 2013 represent a less than 1 percent reduction compared with the 10,336 total employees reported in the 2012 SWEIS Yearbook. The total number of employees is 24 percent below 2008 SWEIS projections.

Measured parameters for cultural resources and land resources were below 2008 SWEIS projections. No archaeological excavation occurred at TA-54 sites or anywhere else on LANL property. 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. No historic buildings were demolished in FY 2013. On October 10, 2013, the Jemez Mountains salamander was federally listed as an endangered species under the Endangered Species Act. A site plan was prepared for the salamander and consultations with the USFWS began for its inclusion into LANL's Habitat Management Plan. 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. As of 2013, this expansion had not become necessary. From 2001 to 2013, approximately 2,500 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. No tracts were conveyed or transferred in CY 2013.

In conclusion, LANL operations during CY 2013 mostly fell within 2008 SWEIS projections. Operation levels for the Radiochemistry Facility exceeded the 2008 SWEIS capability projections. This increase in operations did not cause an increase in waste generation or NPDES discharges; there was a slight exceedance in radioactive air emissions above the projections from the 2008 SWEIS. Although individual nuclide categories may slightly exceed projections, overall emissions and offsite dose remain bounded by the 2008 SWEIS projections for the Radiochemistry Facility. 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. Gas, electricity, and water consumption remained within the 2008 SWEIS limits for utilities.

DOE/NNSA is committed to reducing energy and water consumption and will continue to make improvements towards that goal. 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 led to increased use of recycled effluent in the cooling towers in CY 2013, thereby significantly reducing the amount of water consumed. Details can be found in LANL's FY 2014 Site Sustainability Plan (LANL 2012d). Overall, LANL operations data from CY 2013 indicate that LANL has been operating within the 2008 SWEIS projections and regulatory limits.

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Appendix A of the SWEIS Yearbook–2013 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	2013 Operations
Analytical Chemistry	Support actinide research and processing activities by processing approximately 7,000 samples per year.	Analytical Chemistry received approximately 800 samples and conducted more than 3,000 analytical processes involving microgram to grams 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 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.	No activity. This activity was suspended in 2011.
	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.

Table A-2 continued

Capability	2008 SWEIS Projections	2013 Operations
Fabrication and Processing (continued)	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).
	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.	Startup activities still in progress 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	2013 Operations
Radioactive Air Emissions			
Total Actinides[b]	Ci/yr	7.60E-4	9.20E-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	696.04
LLW	m^3/yr	1,835	53.56
MLLW	m^3/yr	19	8.95
TRU	m^3/yr	42[e]	8.34
Mixed TRU	m^3/yr	[e]	0.62

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.

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

Capability	2008 SWEIS Projections	2013 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.	Fabricated items from metals, ceramics, salts, beryllium, enriched and depleted uranium, and other uranium isotope mixtures.
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	2013 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	0.010
Wastes			
Chemical	kg/yr	9,979	23,224[b]
LLW	m^3/yr	994	0
MLLW	m^3/yr	4	0.36
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 cooling tower media from the cooling tower at SM-2238, which accounted for approximately 28 % (6,599.76 kg) of the chemical wasted generated at Sigma Complex, and the disposition of beryllium contaminated laboratory waste from the Beryllium Technology Facility (BTF), which is within the Sigma Complex. During CY 2013, 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 35% (8164.66 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	2013 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	2013 Operations
Radioactive Air Emissions			
Uranium isotopes[a]	Ci/yr	1.50E-04	Not measured[b]
NPDES Discharge			
No outfalls	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	474,002	26,990
LLW	m^3/yr	604	2
MLLW	m^3/yr	0	0.21[c]
TRU	m^3/yr	0[d]	0
Mixed TRU	m^3/yr	0[d]	0

a. No uranium-238 was measured at Machine Shops. However, uranium isotopes uranium-234 and uranium-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	2013 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	2013 Operations
Radioactive Air Emissions	Ci/yr	Negligible	Not measured[a]
NPDES Discharge			
No outfalls	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	590	704[c]
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.
c. Chemical waste generation at the MSL exceeded 2008 SWEIS projections due to disposition of unused/unspent corrosive products, which composed approximately 80% (560 kg) of the chemical waste generated.

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

Capability	2008 SWEIS Projections	2013 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	2013 Operations
Radioactive Air Emissions			
Not projected[a]	Ci/yr	Not projected[a]	Not measured[a]
NPDES Discharge			
03A027	MGY	13.6	11.97
Wastes			
Chemical	kg/yr	0	0
LLW	m^3/yr	0	0
MLLW	m^3/yr	0	0
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a. 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-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	2013 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 3,000 pounds (1,451 kg) of high explosives and less than 1,000 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.	Conducted safety and environmental testing related to stockpile assurance and new materials development as projected. Fewer than 15 safety and mechanical tests were performed.
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.	Continued to support stockpile stewardship and management activities as projected. Manufactured 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	2013 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	19,280[d]
LLW	m^3/yr	15	0
MLLW	m^3/yr	<1	0.11
TRU	m^3/yr	0[e]	0
Mixed TRU	m^3/yr	0[e]	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. Chemical waste generation exceeded 2008 SWEIS projections due to disposition of approximately 10,000 kg of chemical waste, which was generated during the refurbishment of TA-16-0171, a steel water tank.

e. 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	2013 Operations
Volume of Materials Required*	Conduct about 1,800 experiments per year.	HET operations conducted were primarily within TA-14, 15, 36, 39, and 40 at levels below SWEIS projections.
	Use up to 6,900 pounds (3,130 kg) of depleted uranium in experiments annually.	Less than 90 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.	5 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	2013 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			
03A185 (TA-15)[d]	MGY	2.2	No outfalls
Wastes			
Chemical	kg/yr	35,380	54,424[e]
LLW	m^3/yr	918	177
MLLW	m^3/yr	8	0.32
TRU[f]	m^3/yr	<1[f]	0
Mixed TRU	m^3/yr	[f]	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. Chemical waste generation exceeded 2008 SWEIS projections due to sediment and water mixture from clean-out of cooling towers and water overflow tanks, which composed approximately 51,000 kg of waste or 94% of the chemical waste generated.

f. 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	2013 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.	No activity
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	2013 Operations
Radioactive Air Emissions			
TA-16/WETF, Elemental tritium	Ci/yr	3.00E+2	4.27E+01
TA-16/WETF, Tritium in water vapor	Ci/yr	5.00E+2	9.45E+00
NPDES Discharge			
02A129 (TA-21)[a]	MGY	17.4	No outfalls
Wastes			
Chemical	kg/yr	1,724	688
LLW	m^3/yr	482	10
MLLW	m^3/yr	3	0.13
TRU	m^3/yr	0[b]	0
Mixed TRU	m^3/yr	0[b]	0

a. Outfall 02A129 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	2013 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 300 tests.
	Perform approximately 100 high-energy-density physics tests/year.	Provided components to WX and Physics Divisions for less than 50 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 300 laser and physics tests. Produced 100 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 50 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	2013 Operations
Radioactive Air Emissions	Ci/yr	Negligible	Not measured[a]
NPDES Discharge			
No outfalls	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	3,810	2,284
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	2013 Operations
Biologically Inspired Materials and Chemistry	Determine formation and structure of biomaterials for bioenergy.	Activities performed as projected. Growth in Biofuels research. (10 FTEs[a])
	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 at a reduced level of effort. (13 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, on a smaller scale. (11 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, work performed as expected at a reduced level of effort. (13 FTEs)
Genomic and Proteomic Science	Develop and implement high-throughput tools. Perform genomic and proteomic analysis.	Decrease in DOE support. (5 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. (13 FTEs)
	Perform genomic, proteomic, and metabolomic studies.	
Molecular Synthesis and Isotope Applications	Synthesize molecules and materials.	Activities performed as projected at a reduced level of effort. (8 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.	

Table A-19 continued

Capabilities	2008 SWEIS Projection	2013 Operations
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 at a reduced level of effort. (10 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. (18 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 705 lung and whole body client counts. Other counts associated with the quality control and blind audit programs were performed. (3.6 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	2013 Operations
Radioactive Air Emissions			
Not estimated	Ci/yr	Not estimated	Not measured[a]
NPDES Discharge			
No outfalls	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	13,154	11,908
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	2013 Operations
Radionuclide Transport Studies	Conduct 80 to 160 actinide transport, sorption, and bacterial interaction studies/year.	Activity performed as projected.
	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 305 offsite shipments; production reflecting an approximate 103% increase over levels identified in the SWEIS.*
Actinide and TRU Chemistry	Perform radiochemical operations involving alpha-emitting radionuclides.	Performed radiochemical operations for alpha-emitting radionuclides as projected. TA-48-1, 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.

Table A-21 continued

Capability	2008 SWEIS Projections	2013 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	2013 Operations
Radioactive Air Emissions			
Mixed Fission Products[a]	Ci/yr	1.5E-4	1.21E-07
Plutonium-239	Ci/yr	1.2E-5	None detected[b]
Uranium isotopes	Ci/yr	4.8E-7	6.26E-09
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	1.98E-05
Beryllium-7	Ci/yr	1.6E-5	None detected[b]
Bromine isotopes[c]	Ci/yr	9.3E-4	2.95E-03[d]
Germanium-68[e]	Ci/yr	8.9E-3	4.86E-03
Rubidium-86	Ci/yr	3.0E-7	None detected[b]
Selenium-75	Ci/yr	3.8E-4	1.42E-04
Other Activation Products[f]	Ci/yr	5.5E-6	None detected[b]
NPDES Discharge			
No outfalls	MGY	No outfalls	No outfalls
Wastes			
Chemical	kg/yr	3,311	13,918[g]
LLW	m^3/yr	268	32
MLLW	m^3/yr	4	1
TRU	m^3/yr	0[h]	0
Mixed TRU	m^3/yr	0[h]	0

a. The emission category of "mixed fission products" is no longer used for EPA compliance reporting; individual nuclides are called out instead. For this table however, the measured value includes emissions of Cs-137, I-131, and Sr-90/Y-90.

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. Though individual nuclide categories, such as Bromine isotopes, may slightly exceed projections, overall emissions and offsite dose remain bounded by the SWEIS projections.

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

f. The emissions category of "mixed activation products" or "other activation products" is no longer used for EPA compliance reporting; individual radionuclides are called out instead. The measured value in this table includes activation products not included in specific line-items.

g. Chemical waste generation at the Radiochemistry Facility exceeded 2008 SWEIS projections due to cleaning and descaling a facility cooling tower. Associated waste included sediment, organic material, scale, plastic media, and water from the cooling tower and consisted of approximately 13,000 kg or 93% of chemical waste generated at the facility.

h. 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*	2013 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.)	402,000 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: • 0 m^3 of LLW were shipped to Area G. • 91 m^3 were shipped to Nevada Test Site. • 0 m^3 of mixed LLW • 0.4 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 2.7 million liters of liquid LLW.
	Dewater, characterize, and package 60 m^3/year of LLW sludge.	2.1 m^3 LLW sludge (10 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 1,010,000 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	2013 Operations
Radioactive Air Emissions			
Americium-241	Ci/yr	Negligible	None detected[a]
Plutonium-238	Ci/yr	Negligible	1.62E-08
Plutonium-239	Ci/yr	Negligible	9.91E-09
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	4.89E-08
NPDES Discharge			
051	MGY	4.0	0
Wastes			
Chemical	kg/yr	499	1,656[b]
LLW	m^3/yr	298	644[c]
MLLW	m^3/yr	2.2	0
TRU	m^3/yr	13.7[d]	0
Mixed TRU	m^3/yr	[d]	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. Chemical waste generated at RLWTF exceeded 2008 SWEIS projections due to routine waste generation of unused/unspent product, which accounted for 100% (1655.56 kg) of chemical waste generated at RLWTF.

c. LLW generation at RLWTF exceeded 2008 SWEIS projections due to a campaign to treat and dispose of evaporator bottoms, which accounted for approximately 74% (476 m^3) of LLW generated at RLWTF.

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

Table A-25. LANSCE (TA-53) Comparison of Operations

Capability	2008 SWEIS Projections	2013 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 at 250 microamperes was delivered to IPF. No H+ beam to Area A. H- beam was delivered as follows: (a) to the Lujan Center at 100 microamperes. (b) to WNR at 2 microamperes (c) on demand was available to Areas B and C Beam was available 6 months of 2013 (up to 3,500 hours, depending on the experimental area).
	Reconfigure beam delivery and support equipment to support new facilities, upgrades, and experiments.	Activity performed as projected.
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 IPF. 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.	292 experiments were conducted at the Lujan Center and 67 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.

Table A-25 continued

Capability	2008 SWEIS Projections	2013 Operations
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 and 8 static 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, UCNB, Nab, and UCNTau experiments.
Medical Isotope Production	Irradiate up to 120 targets/year for medical isotope production at the Isotope Production Facility.	A total of 61 targets were irradiated in 2013 • 35 rubidium chloride targets and 2 rubidium targets for Sr-82; • 20 gallium targets for Ge-68 • 1 germanium target for As-73 • 1 tungsten oxide target for Re-186 • 2 thorium targets for Ac-225;and • 6 research samples for cross section measurements and yield determinations
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 partially performed, but subsequently stopped due to funding interruption.
Radioactive Liquid Waste Treatment (Solar Evaporation at TA-53)	Treat about 520,000 liters/year of radioactive liquid waste.	LANSCE received 214,160 liters of radioactive liquid waste into its holding tanks; 6,060 liters of this were from other sites. A total of 208,460 liters 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. LANSCE (TA-53) Operations Data

Parameter	Units	2008 SWEIS Projections	2013 Operations
Radioactive Air Emissions			
Argon-41	Ci/yr	8.87E+2	1.15E+01
Particulate & Vapor Activation Products	Ci/yr	Not projected[a]	3.02E-03
Carbon-10	Ci/yr	2.65E+0	1.48E-01
Carbon-11	Ci/yr	2.25E+4	9.04E+01
Nitrogen-13	Ci/yr	3.10E+3	1.91E+01
Oxygen-15	Ci/yr	3.88E+3	2.57E+01
Tritium as Water	Ci/yr	Not projected[a]	1.69E+01
NPDES Discharge			
Total Discharges	MGY	28.2	20.07
03A048	MGY	Not projected [b]	19.36
03A113	MGY	Not projected [b]	0.71
Wastes			
Chemical	kg/yr	16,783	1,842
LLW	m^3/yr	1,070	8
MLLW	m^3/yr	1	0.21
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]	2013 Operations
Waste Characterization, Packaging, and Labeling	Characterize 640 cubic meters of newly-generated TRU waste.	Characterized approximately 310 cubic meters.
	Characterize 8,400 cubic meters of legacy TRU waste.	Characterized approximately 1076 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	Data unavailable.
	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: 122 pipe overpack containers and 42 drums.
	Overpack and bulk small waste, as required.	Approximately 1048 drums were overpacked
	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 280 cubic meters of newly generated TRU and Mixed TRU to WIPP.
	Ship 8,400 cubic meters/year of legacy TRU waste to WIPP.	Shipped 882 cubic meters of TRU and Mixed TRU waste
	Ship LLW to offsite disposal facilities.	Shipped approximately 6,952 cubic meters of LLW for offsite disposal.
	Ship 55 cubic meters of MLLW for offsite treatment and disposal in accordance with EPA land disposal restrictions.	Approximately 1,067 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.	Shipped approximately 1,200 metric tons of chemical waste for offsite treatment and disposal.

Table A-27 continued

Capability	2008 SWEIS Projections[a]	2013 Operations
Waste Transport, Receipt, and Acceptance (continued)	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 821 cubic meters of LLW.
	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.	Shipped approximately 882 cubic meters of contact-handled legacy waste.
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 1.02 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 legacy TRU waste 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 81 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.

Table A-27 continued

Capability	2008 SWEIS Projections[a]	2013 Operations
Waste Treatment (continued)	Process newly generated TRU waste through new TRU Waste Facility.	No activity.
Waste Disposal	Dispose 84 cubic meters of LLW in shafts, 23,000 cubic meters of LLW in pits, and small quantities of radioactively contaminated polychlorinated biphenyls in shafts in Area G/year.	No activity
	Dispose additional LLW generated by DD&D and remediation activities.	No activity
	Migrate operations in Area G to Zones 4 and 6, as necessary, to allow continued onsite disposal of LLW.	No activity.
Decontamination Operations	Decontaminate approximately 700 personnel respirators and 300 air-proportional probes for reuse per month.	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

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

Parameter	Units	2008 SWEIS Projections	2013 Operations
Radioactive Air Emissions[a]			
Tritium	Ci/yr	6.09E+1	None detected[a]
Americium-241	Ci/yr	2.87E-6	None detected[a]
Plutonium-238	Ci/yr	2.24E-5	2.45E-10
Plutonium-239	Ci/yr	8.46E-6	1.80E-09
Uranium-234	Ci/yr	8.00E-6	2.09E-08
Uranium-235	Ci/yr	4.10E-7	None detected[a]
Uranium-238	Ci/yr	4.00E-6	5.29E-09
Other Radionuclides	Ci/yr	Negligible	2.98E-08
NPDES Discharge			
No outfalls	MGY	No outfalls	No outfalls
Wastes[b]			
Chemical	kg/yr	907	1,718[c]
LLW	m^3/yr	229	590[d]
MLLW	m^3/yr	8	833[e]
TRU	m^3/yr	27[f]	0
Mixed TRU	m^3/yr	[f]	0

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 asphalt and concrete from a parking lot upgrade at TA-50 WCCR, which accounted for approximately 37% (636 kg) of chemical waste generated at SRCW; (2) disposal of non-friable asbestos from abatement projects throughout LANL, which accounted for approximately 31% (544 kg) of chemical waste generated at SRCW; and (3) disposal of unused/unspent flammable enamel paint, which accounted for approximately 13% (225 kg) of chemical waste generated at SRCW.

d. LLW generation at SRCW exceeded 2008 SWEIS projections due to the disposal of fiberglass-reinforced plywood boxes and crates that were repackaged waste under the 3706 TRU Waste Campaign, which accounted for approximately 25% (147 m^3) of LLW generated at SRCW.

e. MLLW generation at SRCW exceeded 2008 SWEIS projections due to waste related to consolidating and packaging of MLLW, which accounted for 39% (326 m^3) of MLLW generated at SRCW.

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	2013 Operations
Plutonium Stabilization	Recover, process, and store existing plutonium inventory.	Activity performed as projected.
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.	No activity.
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.	Activities performed as projected through the end of June. Programmatic Pause on fissile material operations precluded further work during the second half of the CY.
	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).	No activity.
	Process neutron sources other than sealed sources.	No activity.
	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 or alloy 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.	No activity.

Table A-29 continued

Capability	2008 SWEIS Projection	2013 Operations
Actinide Materials Science and Processing Research and Development (continued)	Fabricate and study prototype fuel for lead test assemblies.	No activity.
	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.	No activity.
	Build test reactor fuel assemblies.	No activity.
	Continue research and development on other fuels.	No activity.
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	2013 Operations
Radioactive Air Emissions			
Plutonium-239[a]	Ci/yr	1.95E-5	7.31E-10
Tritium in Water Vapor	Ci/yr	7.50E+2	1.49E+00
Tritium as a Gas	Ci/yr	2.50E+2	2.01E+00
NPDES Discharge			
03A181	MGY	4.1	2.2
Wastes			
Chemical	kg/yr	8,618	153,956[b]
LLW	m^3/yr	757	138
MLLW	m^3/yr	15	3
TRU	m^3/yr	336[c]	43
Mixed TRU	m^3/yr	[c]	37

a. Projections for the SWEIS were reported as plutonium or plutonium-239, the primary material at TA-55.

b. Chemical waste generation at the Plutonium Facility Complex exceeded 2008 SWEIS projections due to an equipment failure and the associated cleanup of spilled diesel fuel. Associated wastes included soil, PPE, and plastics and consisted of approximately 97% (149,500 kg) of the total chemical waste generated.

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

Table A-31. Operations at the Non-Key Facilities

Capability	Examples
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	2013 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	88.85
001	MGY	[b]	77.7285[c]
13S	MGY	[b]	[c]
03A160	MGY	28.5	0.4986
03A199	MGY	[b]	10.62
Wastes			
Chemical	kg/yr	651,000	1,130,436[d]
LLW	m^3/yr	1,529	1,251
MLLW	m^3/yr	31	12
TRU	m^3/yr	23[e]	5
Mixed TRU	m^3/yr	[e]	0.42

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. Chemical waste generation at Non-Key Facilities exceeded 2008 SWEIS projections due to disposal of filter press cakes produced from treating effluent from SWWS that is blended with additional water sources and used at the SERF-E facility. The filter cakes composed approximately 63% (785,800 kg) of the total chemical waste generated.

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

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Appendix B
Chemical Usage and Estimated Emission Data

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Key Facility	Toxic Air Pollutants	CAS Number	Units	2013 Usage	2013 Estimated Air Emissions
Bioscience Facilities	1,4-Dioxane	123-91-1	kg/yr	1.03	0.36
	Acetic Acid	64-19-7	kg/yr	2.62	0.92
	Acetone	67-64-1	kg/yr	70.30	24.61
	Acetonitrile	75-05-8	kg/yr	48.71	17.05
	Acrylamide	79-06-1	kg/yr	1.12	0.39
	Ammonium Chloride (Fume)	12125-02-9	kg/yr	3.00	1.05
	Ethanol	64-17-5	kg/yr	111.47	39.02
	Ethyl Acetate	141-78-6	kg/yr	33.31	11.66
	Ethyl Ether	60-29-7	kg/yr	22.40	7.84
	Hexane (other isomers) or n-Hexane	110-54-3	kg/yr	31.69	11.09
	Hydrogen Peroxide	7722-84-1	kg/yr	108.32	37.91
	Isopropyl Alcohol	67-63-0	kg/yr	2.36	0.82
	Methyl Alcohol	67-56-1	kg/yr	43.69	15.29
	Methylamine	74-89-5	kg/yr	0.90	0.32
	Methylene Chloride	75-09-2	kg/yr	67.66	23.68
	Phenol	108-95-2	kg/yr	1.27	0.44
	Propyl Alcohol	71-23-8	kg/yr	0.81	0.28
	Tetrahydrofuran	109-99-9	kg/yr	0.89	0.31
	Trichloroacetic Acid	76-03-9	kg/yr	0.81	0.28
CMR Building	Acetic Acid	64-19-7	kg/yr	2.62	0.92
	Acetone	67-64-1	kg/yr	9.48	3.32
	Aluminum numerous forms	7429-90-5	kg/yr	0.25	0.00
	Bromine	7726-95-6	kg/yr	1.56	0.55
	Ethanol	64-17-5	kg/yr	6.39	2.24
	Hydrogen Bromide	10035-10-6	kg/yr	1.50	0.53
	Hydrogen Chloride	7647-01-0	kg/yr	53.42	18.70
	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.25	0.09
	Hydrogen Peroxide	7722-84-1	kg/yr	2.11	0.74
	Nickel, metal (dust) or Soluble & Inorganic Comp.	7440-02-0	kg/yr	0.35	0.12
	Nitric Acid	7697-37-2	kg/yr	88.32	30.91
	Sulfuric Acid	7664-93-9	kg/yr	0.92	0.32
	Uranium (natural) Sol.&Unsol.Comp. as U	7440-61-1	kg/yr	4.75	1.66
	Xylene (o-,m-,p-Isomers)	1330-20-7	kg/yr	0.43	0.15

Key Facility	Toxic Air Pollutants	CAS Number	Units	2013 Usage	2013 Estimated Air Emissions
High Explosives Processing Facilities	1,4-Dioxane	123-91-1	kg/yr	1.03	0.36
	Acetone	67-64-1	kg/yr	156.30	54.71
	Acetonitrile	75-05-8	kg/yr	7.07	2.47
	Acetylene	74-86-2	kg/yr	90.72	0.00
	Copper	7440-50-8	kg/yr	0.45	0.00
	Ethanol	64-17-5	kg/yr	132.26	46.29
	Ethyl Acetate	141-78-6	kg/yr	3.60	1.26
	Hexane (other isomers) or n-Hexane	110-54-3	kg/yr	27.07	9.48
	Hydrogen Chloride	7647-01-0	kg/yr	2.97	1.04
	Hydrogen Peroxide	7722-84-1	kg/yr	15.98	5.59
	Isophorone	78-59-1	kg/yr	0.23	0.08
	Isopropyl Alcohol	67-63-0	kg/yr	53.41	18.70
	Methyl Alcohol	67-56-1	kg/yr	1.98	0.69
	Methyl Ethyl Ketone	78-93-3	kg/yr	33.02	11.56
	Methylene Chloride	75-09-2	kg/yr	10.61	3.71
	n,n-Dimethylformamide	68-12-2	kg/yr	0.95	0.33
	Nitric Acid	7697-37-2	kg/yr	18.31	6.41
	Nitromethane	75-52-5	kg/yr	3.34	1.17
	p-Phenylenediamine	106-50-3	kg/yr	0.25	0.09
	Propargyl Alcohol	107-19-7	kg/yr	0.24	0.08
	Sulfur Hexafluoride	2551-62-4	kg/yr	40.60	14.21
	Sulfuric Acid	7664-93-9	kg/yr	7.26	2.54
	Tetrahydrofuran	109-99-9	kg/yr	11.56	4.05
	Thionyl Chloride	7719-09-7	kg/yr	0.82	0.29
	Toluene	108-88-3	kg/yr	0.87	0.30
	Triethylamine	121-44-8	kg/yr	0.87	0.31
	Zinc Oxide Fume	1314-13-2	kg/yr	2.00	0.02
High Explosives Testing Facilities	Acetylene	74-86-2	kg/yr	124.64	0.00
	Nitric Acid	7697-37-2	kg/yr	2.29	0.80
	Propane	74-98-6	kg/yr	22.84	0.00
	Sulfur Hexafluoride	2551-62-4	kg/yr	808.24	282.88
LANSCE	Acetonitrile	75-05-8	kg/yr	1.57	0.55
	Acetylene	74-86-2	kg/yr	185.98	0.00
	Ethanol	64-17-5	kg/yr	36.87	12.90
	Isobutane	75-28-5	kg/yr	64.62	22.62
	Isopropyl Alcohol	67-63-0	kg/yr	9.43	3.30
	Methyl Alcohol	67-56-1	kg/yr	10.29	3.60

Key Facility	Toxic Air Pollutants	CAS Number	Units	2013 Usage	2013 Estimated Air Emissions
LANSCE (continued)	Potassium Hydroxide	1310-58-3	kg/yr	2.50	0.88
	Propane	74-98-6	kg/yr	71.16	0.00
	Silver (metal dust & soluble comp., as Ag)	7440-22-4	kg/yr	6.21	2.17
	Sulfur Hexafluoride	2551-62-4	kg/yr	933.72	326.80
	Zinc Oxide Fume	1314-13-2	kg/yr	0.62	0.01
	Acetone	67-64-1	kg/yr	64.09	22.43
Machine Shops	Acetone	67-64-1	kg/yr	15.80	5.53
	Propane	74-98-6	kg/yr	23.28	0.00
MSL	Acetone	67-64-1	kg/yr	12.64	4.42
	Carbon Black	1333-86-4	kg/yr	0.25	0.09
	Glutaraldehyde	111-30-8	kg/yr	0.50	0.18
	Hydrogen Fluoride, as F	7664-39-3	kg/yr	0.49	0.17
	Hydrogen Peroxide	7722-84-1	kg/yr	0.70	0.25
	Isopropyl Alcohol	67-63-0	kg/yr	25.14	8.80
	Methyl Alcohol	67-56-1	kg/yr	3.17	1.11
	n,n-Dimethylformamide	68-12-2	kg/yr	0.95	0.33
	Sulfuric Acid	7664-93-9	kg/yr	0.92	0.32
	Tetrahydrofuran	109-99-9	kg/yr	3.56	1.24
	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	114.51	1.15
Plutonium Facility Complex	Acetic Acid	64-19-7	kg/yr	2.62	0.92
	Acetylene	74-86-2	kg/yr	187.13	0.00
	Chloroform	67-66-3	kg/yr	5.93	2.08
	Ethanol	64-17-5	kg/yr	38.79	13.58
	Hydrogen Peroxide	7722-84-1	kg/yr	2.11	0.74
	Methyl 2-Cyanoacrylate	137-05-3	kg/yr	1.95	0.68
	Methyl Alcohol	67-56-1	kg/yr	2.25	0.79
	Nitric Acid	7697-37-2	kg/yr	35.10	12.28
	Propane	74-98-6	kg/yr	24.31	0.00
	Sulfuric Acid	7664-93-9	kg/yr	0.92	0.32
	Trichloroethylene	79-01-6	kg/yr	23.43	8.20
RLWTF	Ethanol	64-17-5	kg/yr	0.39	0.14
Radiochemistry Facility	1,4-Dioxane	123-91-1	kg/yr	6.46	2.26
	2-Butoxyethanol	111-76-2	kg/yr	17.06	5.97
	Acetic Acid	64-19-7	kg/yr	2.62	0.92
	Acetone	67-64-1	kg/yr	126.10	44.14
	Acetonitrile	75-05-8	kg/yr	8.33	2.91

Key Facility	Toxic Air Pollutants	CAS Number	Units	2013 Usage	2013 Estimated Air Emissions
Radiochemistry Facility (continued)	Ammonia	7664-41-7	kg/yr	0.41	0.14
	Ammonium Chloride (Fume)	12125-02-9	kg/yr	0.75	0.26
	Antimony and Compounds, as Sb	7440-36-0	kg/yr	0.67	0.23
	Benzene	71-43-2	kg/yr	1.63	0.57
	Benzyl Chloride	100-44-7	kg/yr	0.50	0.18
	Beryllium	7440-41-7	kg/yr	0.23	0.08
	Cyclohexanol	108-93-0	kg/yr	2.40	0.84
	Ethanol	64-17-5	kg/yr	65.29	22.85
	Ethyl Acetate	141-78-6	kg/yr	3.60	1.26
	Ethyl Ether	60-29-7	kg/yr	32.76	11.47
	Hexane (other isomers) or n-Hexane	110-54-3	kg/yr	12.88	4.51
	Hydrogen Bromide	10035-10-6	kg/yr	3.00	1.05
	Hydrogen Chloride	7647-01-0	kg/yr	492.20	172.27
	Hydrogen Fluoride, as F	7664-39-3	kg/yr	7.40	2.59
	Hydrogen Peroxide	7722-84-1	kg/yr	19.34	6.77
	Hydrogen Sulfide	7783-06-4	kg/yr	0.91	0.32
	Isopropyl Alcohol	67-63-0	kg/yr	57.17	20.01
	Isopropyl Ether	108-20-3	kg/yr	0.72	0.25
	Mercury numerous forms	7439-97-6	kg/yr	0.45	0.00
	Methyl Alcohol	67-56-1	kg/yr	21.61	7.56
	Methylene Chloride	75-09-2	kg/yr	38.05	13.32
	Molybdenum	7439-98-7	kg/yr	3.83	1.34
	Nitric Acid	7697-37-2	kg/yr	1459.18	510.71
	Nitromethane	75-52-5	kg/yr	1.14	0.40
	Pentane (all isomers)	109-66-0	kg/yr	3.76	1.32
	Phosphoric Acid	7664-38-2	kg/yr	9.17	3.21
	Phosphorus	7723-14-0	kg/yr	0.59	0.20
	Propane	74-98-6	kg/yr	1569.08	0.00
	Sulfuric Acid	7664-93-9	kg/yr	3.86	1.35
	Tetrahydrofuran	109-99-9	kg/yr	10.02	3.51
	Toluene	108-88-3	kg/yr	14.74	5.16
	Triethylamine	121-44-8	kg/yr	0.44	0.15
	Yttrium	7440-65-5	kg/yr	1.12	0.39

Key Facility	Toxic Air Pollutants	CAS Number	Units	2013 Usage	2013 Estimated Air Emissions
Sigma Complex	2-Butoxyethanol	111-76-2	kg/yr	0.90	0.32
	Acetone	67-64-1	kg/yr	18.96	6.64
	Beryllium	7440-41-7	kg/yr	34.02	11.91
	Boron Oxide	1303-86-2	kg/yr	0.50	0.18
	Chlorine Trifluoride	7790-91-2	kg/yr	2.49	0.87
	Diethylene Triamine	111-40-0	kg/yr	0.96	0.34
	Ethanol	64-17-5	kg/yr	29.88	10.46
	Furfuryl Alcohol	98-00-0	kg/yr	10.74	3.76
	Hydrogen Chloride	7647-01-0	kg/yr	0.59	0.21
	Isopropyl Alcohol	67-63-0	kg/yr	6.28	2.20
	Magnesium Oxide Fume	1309-48-4	kg/yr	2.00	0.70
	Nitric Acid	7697-37-2	kg/yr	1.53	0.53
	Propane	74-98-6	kg/yr	92.99	0.00
Solid Radioactive and Chemical Waste Facilities	Ethanol	64-17-5	kg/yr	114.06	39.92
	Isopropyl Alcohol	67-63-0	kg/yr	0.37	0.13
	Methyl Ethyl Ketone	78-93-3	kg/yr	45.36	15.88
	Propane	74-98-6	kg/yr	194.98	0.00
Target Fabrication Facility	Acetone	67-64-1	kg/yr	18.17	6.36
	Chlorine	7782-50-5	kg/yr	4.08	1.43
	Dicyclopentadiene	77-73-6	kg/yr	0.50	0.18
	Ethanol	64-17-5	kg/yr	21.59	7.56
	Ethyl Acetate	141-78-6	kg/yr	14.41	5.04
	Ethyl Ether	60-29-7	kg/yr	8.40	2.94
	Hydrogen Peroxide	7722-84-1	kg/yr	0.70	0.25
	Indium & compounds, as In	7440-74-6	kg/yr	2.16	0.76
	Isopropyl Alcohol	67-63-0	kg/yr	18.85	6.60
	Methyl Alcohol	67-56-1	kg/yr	15.04	5.26
	Methyl Silicate	681-84-5	kg/yr	1.20	0.42
	Methylene Chloride	75-09-2	kg/yr	21.23	7.43
	o-Dichlorobenzene	95-50-1	kg/yr	2.61	0.91
	Propylene Dichloride	78-87-5	kg/yr	3.47	1.21
	Tetrahydrofuran	109-99-9	kg/yr	23.12	8.09
	Toluene	108-88-3	kg/yr	3.47	1.21
	Tungsten as W insoluble Compounds	7440-33-7	kg/yr	0.50	0.01

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Appendix C of the SWEIS Yearbook–2013
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–2013
Department of Energy
2013 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 these awards each year. In FY 2013, LANS received four awards for pollution prevention projects, including two NNSA Best-in-Class awards and two NNSA Environmental Stewardship awards. The first two projects listed below received the Best-in-Class awards.

- Tracer Forensic Incident Response Exercise is a workshop for training and meetings on cyber security problems. The team converted the workshop, which was annually held in New Mexico, into an online meeting. Having a virtual exercise allowed more than seven times as many people to participate and avoided travel costs and associated fuel use. An estimated 250 metric tons of carbon dioxide emissions were avoided by the reduced travel.
- Dr. Dennis L. Hjeresen won in the individual category of "Sustainability Champion" because he has demonstrated a deep understanding of sustainability and implemented innovative approaches to sustainability over his entire career at LANL. He is known nationally and internationally through the Green Chemistry Institute and his work on water issues and green technology development. Dr. Hjeresen currently serves as senior advisor for the Principle Associate Directorate for Business Services and Operations at LANL. He is responsible for integrating environmental responsibility and sustainability into all aspects of LANL operations. An important goal at the Laboratory is to not only increase the efficiency of building energy use but also to understand how to manage energy resources more intelligently.
- The National Security and Sciences Building (NSSB) provided a great opportunity for energy savings and Smart Grid Demand-Response experiments. Multiple energy conservation measures for the HVAC system resulted in almost a 13 percent reduction in energy use.
- Andrew Erickson won in the individual category of "Change Agent." As the Division leader for Utilities and Institutional Facilities at LANL, Mr. Erickson is responsible for meeting the DOE sustainability goals. Over the past three years, He has been responsible for the establishment and implementation of a sustainability program at LANL. He is responsible for over four million square feet of facilities along with the site's utility and road infrastructure.

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Los Alamos, New Mexico 87545